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EURONOTES: RISK AND PRICING

by

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AVAILABLE

Some text bound close to the spine.

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To

Tracy and Matthew

For their love and for their belief in me

GLOSSARY OF TERMS

Arbitrage	strategies which may be employed to enable a trader to profit from price differences for the same or similar goods in different markets. Historically arbitrage has implied profit at little or no risk.
Assignment	the sale of a swap or loan contract by one party to another, usually for a total up-front payment. Assignments can be cumbersome because they require the approval of the original party.
Basis point	one one-hundredth of a percentage point. The term is most often employed to describe the margin attached to a specific financial instrument or to compare differences in margins attached to various financial instruments.
Certificate of deposit (CD)	a negotiable bearer certificate issued by a bank as evidence of an interest-bearing time deposit.
Commercial paper	a short-term negotiable unsecured promissory note issued for a specific amount and maturity.
Continuous tender panel (CTP)	a tender panel of banks established to issue a borrower's paper at a price predetermined by the lead manager of the CTP. A feature of this type of tender panel is that members are allowed a specific amount of time within which to decide whether or not they wish to purchase paper at the specified price. This system therefore avoids the embarrassment often associated with the tender panel system of not being able to obtain paper or being left with paper that cannot be sold at a particular price.
Convertible euronote facility	this structure provides euronote underwriters with the opportunity, after a specified period of time, to buy FRNs (see floating rate notes) at par, so terminating their commitment to the euronote facility.
Country risk	the risk that economic agents (including the government) within a particular country will prove unwilling or unable to meet their international financial commitments.

Credit rating	a credit rating is an independent agency's opinion of the creditworthiness of a particular borrower. The credit rating itself is usually denoted by a letter and symbol indicating the agency's belief in the creditworthiness of the borrower.
Credit risk	the risk that a counterparty to a financial transaction will fail to meet its obligations according to the terms and conditions of the contract (default) for whatever reasons, thus causing the asset holder to incur a financial loss.
Disaster myopia	a systematic tendency to underestimate shock probabilities, usually associated with the field of international banking.
Disintermediation	the process by which borrowers and lenders deal directly with each other, by-passing the banking system.
Eurobond	bonds placed simultaneously on the markets of at least two countries and denominated in a currency that need not be the currency of either, usually by international financial syndicates with the participation of financial institutions of several countries.
Euro-commercial paper facility	a facility established to issue short-term bearer negotiable certificates outside the United States without an underwriting commitment to purchase unsold notes.
Euro-medium term notes	medium-term bearer negotiable certificates issued outside the United States for maturities ranging between one to five years.
Euro-note facility	a facility established to issue short-term bearer negotiable certificates outside the United States with an underwriting commitment to purchase unsold notes.
Facility fee	in respect of a euronote facility this fee is payable by the issuer on the full amount of its underwritten facility. The facility fee is due irrespective of the use made of the facility and irrespective of whether the underwriters are required to purchase short-term paper or make advances.

Financial crisis	a disturbance to financial markets, associated typically with falling asset prices and insolvency among debtors and intermediaries, which spreads through the financial system, disrupting the market's capacity to allocate capital.
Flip-flop	an FRN with a six-month interest rate structure, with the option to convert into a three-month structure, so giving the FRN added flexibility.
Floating rate note (FRN)	a medium-to-long-term bond, with most maturities being between five and fifteen years. An FRN is evidenced by negotiable bearer certificates, in denominations of at least US $1,000 and with a coupon consisting of a margin over an appropriate short-term reference rate, usually LIBOR (see later).
Gatekeeper	the person with the authority to permit access to a particular research site.
Global note facility	a facility which enables borrowers to raise funds by accessing various commercial paper markets simultaneously.
Interest rate swap	'a transaction in which two counterparties exchange interest payment streams of differing character based on an underlying notional principal amount' (BIS, 1986, p 261). There are three main types of interest rate swap: coupon swaps (fixed rate to floating rate in the same currency); basis swaps (one floating rate index to another floating rate index in the same currency), and cross-currency interest rate swaps (fixed rate in one currency to floating rate in another).
Invitation telex	in regard to euronote facilities this is the telex to potential underwriters which provides a comprehensive outline of the borrower.
Issuer set margin (ISM)	a pricing method associated with a tender panel, by which the issuer sets the price to be paid on its paper. Paper issued through this type of tender panel structure is price led rather than supply driven. A principal pricing agent will place paper on behalf of junior underwriters, with senior underwriters placing paper themselves at the issuer set margin.

Lead manager — the bank that arranges and, if necessary, syndicates the facility. The lead manager acts as a central organiser to co-ordinate the syndicate's dealings with the borrower.

Letter of credit — generally an obligation on the part of a bank to a third party to redeem a customer's maturing debt if that customer cannot meet its commitment.

London InterBank Bid Rate (LIBID) — the rate which banks will bid to purchase funds in the interbank market.

London InterBank Offer Rate (LIBOR) — the rate at which most banks can obtain funds in the interbank market.

Liquidity risk — the risk that a negotiable financial instrument cannot be sold quickly to realise an amount close to its full market value.

London InterBank Mean Rate (LIMEAN) — the mean of LIBID and LIBOR.

Loan sale — 'the sale, transfer or assignment of a loan or a loan participation to a third party with or without the knowledge of the borrower' (BIS, 1986, p 263).

Marking to market — the process by which the exposure in a trading position in securities or option/future contracts is recalculated.

Mean — the average of the total of all observations, i.e. the sum of all observations divided by the number of observations

Multi-option facility (MOF) — a facility which provides the borrower with several options regarding the means by which the borrower may raise funds.

Multiple placing agency (MPA) — a type of tender panel structure which enables underwriters to participate in the placement of euronotes.

Note issuance facility (NIF) — see euro-commercial paper facility.

Novation — a process which involves the discharge of one financial commitment and the creation of an entirely new one, rather than simply the transfer of an existing obligation.

OECD	Organisation for Economic Co-operation and Development.
Perpetual floating rate note	an irredeemable floating rate note.
Risk asset ratio system	this system reconstitutes the asset side of a bank's balance sheet, dividing assets into categories and applying weights to those assets according to their perceived riskiness. The ratio is arrived at by comparing the bank's capital to its recalculated assets.
Recourse	this legal term describes the claim that the purchaser of a financial asset has (under certain circumstances) on the original debtor (or its bank) should the debtor default.
Revolving acceptance facility by tender	an acceptance credit facility which incorporates the competitive features of a tender panel whilst retaining the high liquidity features of acceptance credits.
Revolving credit agreement	a commitment given by a bank to provide funds up to a specified amount against predetermined conditions.
Revolving underwriting facility (RUF)	see euronote facility
Secondary market	a market in which financial instruments are traded subsequent to their issuance in the primary market.
Securitisation	the term can be narrowly defined as the process by which debt is made marketable. On a wider interpretation securitisation can be divided into two forms. In its most extreme form it involves the unbundling and repackaging of already existing loan portfolios into securities. These securities are then sold, thereby removing the asset from the originator's balance sheet. The second form of securitisation involves the raising of debt through the issue of securities in the capital markets to replace bank loans.
Settlement risk	the risk that operational difficulties may affect the delivery of funds despite the possibility that the counterparty may be able to perform.

Sole placing agency (SPA)	a single dealership structure whereby responsibility for placing a borrower's paper is given to one bank or securities house.
Strike offer yield	the yield at which underwriters will be forced to purchase any notes not sold in the market.
Sub-participation	a method of transferring all or part of a financial obligation. Under this method the sub-participant makes a payment to the original lender in consideration of a right to receive a stream of payments in return, measured by the amounts of principal and interest received by the original lender from the borrower.
Swap	'a financial transaction in which two counter-parties agree to exchange streams of payments over time according to a predetermined rule' (BIS, 1986, p 268). See, for example, 'interest rate swap'.
Swingling	a facility which allows short-term funds to be drawn to bridge the gap between the offer of notes under a euronote facility and the receipt of funds.
Syndicated loan	usually a large loan provided by a group of international banks.
Systemic risk	the risk of a financial crisis (see 'Financial crisis')
Tender panel	a method of distributing notes issued under note issuance facilities or revolving underwriting facilities. A group of banks and/or securities houses have the right to bid for notes up to a predetermined level.
Transferable loan facility	a facility by which loans can be transferred by either assignment or novation. The former route involves a form of loan securitisation, transferable loan instruments (TLIs), a fully-fledged debt instrument reflecting the terms of the original agreement. The latter involves transferable loan certificates, differing in that they are not actually securities.
Transferable revolving underwriting facility	a method by which each underwriter to a euronote facility, with prior approval from the borrower, may assign its commitment to another nstitution.

AIMS AND PLAN OF STUDY

The central aim of this study is to determine whether the growth of euronote facilities has contributed to an increase in systemic risk. Systemic risk refers to the likelihood, or possible incidence, of a financial crisis. A financial crisis is defined by Eichengreen and Portes (1986, p 1) as:

> 'a disturbance to financial markets, associated typically with falling asset prices and insolvency among debtors and intermediaries, which spreads through the financial system, disrupting the market's capacity to allocate capital'.

The hypothesis that is explored in this study is that markets in new financial instruments may underprice risks during the development stage of the market because market participants hope to maximise profits in the long-term by gaining early market share.

The BIS (Bank for International Settlements, 1986b, p 201) warns that:

> 'Systemic risk may arise if considerable exposure is accumulated during the underpricing phase.'

If this could be shown to be the case, any contribution to systemic risk caused by the underpricing of euronotes in the short term should be reduced as margins widen in the longer-term.

The relationship between the euronote market and systemic risk is a crucial one, not just for market participants and bank regulators but also for students of the banking firm. There is much debate and confusion over the relationships between securitisation, the trend towards off-balance sheet (OBS) business, and the overall risks involved for the financial system. If the relationship between euronote facilities (one of the newest and least understood of all OBS innovations) and systemic risk can be identified, this would provide a valuable insight into the relationships between other OBS innovations and systemic risk. The relevance of applying (or not applying as the case may be) capital adequacy controls on these instruments, and indeed the ways in which capital may be applied for risk (prudential) purposes, might also be analysed in a more informed manner.

This study is divided into two main parts. The first part contains five chapters; it is concerned primarily with identifying areas of the euronote market which may affect systemic risk, either to increase it or to reduce it. The first part will also serve to document and clarify various operational aspects of the euronote market that are crucial for understanding and exploring the main thesis of this study.

Chapter 1 documents the relationship between the phenomenon of securitisation and financial innovation. The link between the underpricing of new financial innovations and systemic risk will be established and the risks inherent in new financial innovations examined. The latter part of Chapter 1 will examine some of the funding instruments that have developed in the euromarkets, starting with the development of the eurobond market in 1963. The euronote facility incorporates key aspects of all the instruments documented in this latter part of the chapter.

Chapter 2 examines the development of the euronote market as well as the different segments of the main market (ie sovereigns, supranationals, corporations and banks). The analysis moves on to explore the structure of a euronote facility, and its related implications for systemic risk. The latter part of this chapter documents the various pricing components and pricing processes that feature in a euronote facility. The theoretical and practical pricing processes of a euronote facility are compared to those of a revolving credit agreement. It is argued that - in theory at least - the process of pricing a euronote facility is no more likely to contribute to an increase in systemic risk than the corresponding process of pricing a revolving credit agreement.

Chapter 3 undertakes an analysis of the premiums charged by the euronote market for country risk compared with the premiums charged by the euroloan market for the same borrowers. The implications of the results of this analysis for systemic risk are examined. If it could be shown that the euronote market charges lower risk premiums than does the eurocredit market, a basis would exist for an analysis of systemic risk in the euronote market. Presumably, if the euronote market is willing to accept lower risk premiums, risk should be lower in this market. If it is not, systemic risk is increased.

Chapter 4 begins by analysing and distinguishing between the various placement methods available in the euronote market. An attempt is made to discover whether lower pricing in the market may be partially the result of the placement method used. If so this may suggest that one type of placement method is more likely to increase systemic risk than other placement methods.

The purpose of Chapter 5 is to examine those features of the eurocommercial paper market which may affect systemic risk. The eurocommercial paper market is simply the non-underwritten sector of the euronote market. Underpricing in this sector of the market may also contribute to an increase in systemic risk. It is, therefore, also important to examine factors that may affect pricing levels (and possibly systemic risk) in this sector of the market. The chapter begins by documenting the factors which have led to the dramatic growth of the eurocommercial paper market. A survey is undertaken of the various domestic commercial paper markets across the world. By providing this analysis, an insight is provided into the pace of development of the eurocommercial paper market and the relative importance of commercial paper markets in different domestic economies. The analysis will reveal that in certain cases commercial paper markets may not be a very significant component of the country's financial system. Financial crises in such markets may have less systemic implications than crises in other large commercial paper markets. It is argued that the growth of these markets presents a fundamental change in the funding patterns of large international borrowers.

In the second section of Chapter 5 the effect that regulation has had on the pricing levels of euronote facilities is explored. Theoretically, the application of regulation in the form of capital controls should increase pricing levels as banks pass on the 'tax' to their customers. Failure to put such theory into practice has been a criticism of Japanese banks in the securities markets. If practice relates to theory, then any increase in systemic risk which the growth of euronote facilities may have initially contributed to should be - at least partially - offset by the application of regulation. This hypothesis assumes that the capital regulations are risk-reducing. If they are risk-producing (ie, if the banks are forced to incur even greater risks in order to achieve competitive profit targets) systemic risk may actually be increased. This section of the chapter examines whether this has been the case.

Section 3 of this chapter analyses the role of trading in the euronote market; the implications of trading for systemic risk are examined. The fourth section of the chapter examines the different systems currently involved in the clearing of euronotes and eurocommercial paper. The section concludes with a brief discussion of the implications of a large settlement failure for systemic risk.

The final section of Chapter 5 analyses the effect that credit ratings have had on note pricing levels in the markets. The assessment of credit risk has traditionally been a prime commercial bank activity. In the euronote and eurocommercial paper markets, credit risk is assessed by investors - usually large corporations. To the extent that investors in eurocommercial paper are ill-equipped to analyse credit risk, systemic risk might be increased. One way of containing any increase in systemic risk - resulting from an inability on the part of investors to assess adequately credit risk - may be to rate euronotes and eurocommercial paper. If the market has assessed correctly the creditworthiness of the borrower in the first place, the borrower's average trading level should not change because of the application of a credit rating. If the market has incorrectly assessed the creditworthiness of the borrower, trading spreads should alter. It is the aim of this section of the chapter to determine which of these two explanations is the case. By doing so we seek to determine whether credit ratings in the euronote and eurocommercial paper market may be one way of, at least partially, containing any increase in systemic risk which the growth of this market may have stimulated.

The second main part of this study (Part 2) is concerned, not so much with clarifying those areas of the euronote market which may affect systemic risk - either to increase it or to reduce it - but rather to determine whether returns in the euronote market justify the risks incurred. If returns do not justify the risks incurred, systemic risk is increased. If they do justify the risks concerned, systemic risk may even be reduced.

The first five chapters serve in one sense as exploratory data analysis chapters, although they go beyond this by analysing and documenting a new market. In this context they serve to highlight the main area of concern as far as systemic risk is concerned, that of underwriting euronotes. Underwriters in the euronote market must base their pricing decisions on uncertain information about future events. There is no experience of default so far in the euronote market on which probabilities of future default could be based. From this point onwards the study concentrates on the underwriting of euronotes and its implications for systemic risk.

Chapter 6 discusses the use of semi-structured interviews to convey our concern about pricing of underwriting facilities to the market. The interviews are also used to gather qualitative and quantitative data on underwriting practices and pricing determinants. The methodological debate of using fieldwork methods to formulate and test hypotheses in the field of finance is addressed at the beginning of the chapter. This provides the empirical enquiry that follows with an informed and clear methodological position.

Chapters 7 and 8 use the quantitative data collected through the semi-structured interviews to determine, on a simulation basis, whether underwriters are receiving an adequate return for the risks incurred through underwriting euronotes. The facilities are viewed on a 'stand alone' basis, ie outside of any customer relationship and, hence, returns are also calculated on the same basis. The standards of adequacy of underwriter remuneration used in Chapters 7 and 8 are those suggested by market practitioners during the semi-structured interviews.

Similarly, the two methodologies used to calculate the return to an underwriter are those found to be employed in the market: return on assets (ROA) and return on exposure (ROX) are explained and analysed in Chapters 7 and 8, respectively.

The funding scenarios employed in Chapters 7 and 8 are chosen not only to represent a feasible range of funding possibilities, but also to highlight the systemic risk properties inherent in such funding scenarios and, indeed, in the application of the return methodologies themselves. It is concluded that the ROA methodology is so severely flawed that it may provide underwriters with grossly misleading information on which to base their underwriting decisions. Underwriters employing the ROA methodology may therefore underwrite at prices that are inadequate to compensate them for the risks they incur under the belief that potential returns will actually be higher than they will. In this sense systemic risk may be increased.

Under the ROX methodology returns to underwriters are found to be inadequate in every scenario as measured by the market's own standard of adequacy. On a stand alone basis, then, it is concluded that returns to underwriters are inadequate to compensate them for the risk they incur, and hence systemic risk may be increased. There is, however, a problem even with the ROX methodology. Both ROA and ROX are methodologies for calculating returns to underwriting banks in the euronote market; they provide no measure as to the probability of a scenario occurring. In a market where no probabilistic information exists on which to base decisions about future draw-down, default or market conditions, the market is said to be governed by uncertainty about future events (see Guttentag and Herring, 1986). For these reasons it would be hazardous to view ROA or ROX in the same light as internal rate of return (IRR).

IRR provides decision makers with information from which they can 'choose' certain projects or events in preference to others. The euronote underwriter has absolutely no choice over his funding strategy. This will be determined by uncertain future customer and market conditions. The only assumption made(under the ROX methodology) is that risk is likely to increase the more the underwriter is asked to fund, and so returns should also increase. This is consistent with financial economic theory (see, for example, Modigliani, 1959). On the basis of the ROX simulations, a 'systemic gap' is found to exist in the euronote market (the gap between which actual returns fall below required adequate returns).

Chapter 9 reviews the bank and financial pricing literature in order to formulate hypotheses to explain the existence of this 'systemic gap'. Evidence is drawn from the qualitative findings of the semi-structured interviews and the quantitative results of the simulation exercises to support the formulation of these hypotheses.

The hypotheses formulated in Chapter 9 are then tested through naturalistic research methods (participant observational fieldwork) in Chapter 10. The period of observation was conducted within the euronote team at County NatWest which is used as a case study for the large commercial bank owned investment bank environment. Sometime was also spent observing the euronote operations of Dean Witter Capital Markets which is used as a case study for the smaller securities house operating in the market. This case study approach (a widely accepted methodological approach in business research) complements the other research methodologies employed in this thesis.

A variety of research methodologies are, therefore, employed to collect data, formulate hypotheses and test hypotheses. The study is thus conducted on a triangular basis: where data are collected and analysed through exploratory data analysis and preliminary fieldwork; hypotheses formulated and then tested through semi-structured fieldwork and simulation exercises, and the results analysed and presented to the market using naturalistic and case study techniques. It is concluded that if the systemic gap identified in Chapter 8 is to be bridged, then profitability systems must be established to assess the value of customer relationships. Only then can an informed decision be made as to whether low pricing of underwriting commitments can be justified on a customer relationship basis.

Chapter 11 also employs the case study approach to examine the profitability systems in place throughout the National Westminster Bank plc Group and attempts to determine whether a relationship pricing strategy can be feasibly employed in the euronote market. The development of these systems and their impact on organisational structure are discussed. If these systems are capable of determining the value of customer relationships to the bank, then an informed decision can be made as to whether it is justifiable or not to underwrite euronotes at such low prices. The ability to cross-subsidise returns from the euronote market with returns from other areas of the customer relationship may make the inclusion of euronote underwriting facilities within the portfolio justifiable on a relationship basis. In this sense, systemic risk may not be increased.

Chapter 12 concludes and highlights the limitations of the study.

The structure of the thesis and its methodological links are displayed overleaf by the use of a flow chart.

Flow diagram of structure of thesis and methodological connections

	Aims	Central Question
		Does the growth of the euronote market contribute to an increase in systemic risk?
The problem and its setting		Synopsis of study
	1	Establish link between systemic risk and the introduction of new financial innovations - both product (eg euronote) and process (eg securitisation)
	2	Document structural components and pricing processes of a euronote facility in order to determine whether a euronote facility may be more likely to lead to an increase in systemic risk (as a result of these components and processes) than bank revolving loan commitments
Exploratory data analysis/ market analysis	3	Comparison of actual costs of borrowing in the euronote market with costs of borrowing in the euro-credit market. Does the euronote market charge lower risk premiums than the eurocredit market?
	4	Determine whether lower borrowing costs in the euronote market are partially the result of the placement method used
	5	Determine whether evidence exists to show that features associated with the eurocommercial paper market may affect pricing levels and systemic risk
		Conclusion to Part 1: Underwriting of euronotes identified as main area of concern in relation to systemic risk

	6	Methodological research debate and presentation of construction and results of semi-structured interviews to gather data on underwriting practices and pricing determinants
Collection and analysis of data	7+8	Analysis of quantitative data collected through semi-structured interviews. Returns are calculated to underwriters on a ROA and ROX basis (the two methods found to be employed in the market) in Chapters 7 and 8 respectively. Returns are found to be inadequate to compensate for the risks incurred on a stand-alone basis. A systemic gap is identified
Formulation of hypothesis	9	Disaster myopia and relationship pricing hypotheses are formulated to explain underpricing and the existence of a systemic gap in the euronote market
	10	Hypotheses tested through naturalistic research. The results are presented to the market.
Test of hypotheses and presentation of the results of the market	11	Case study to examine whether the profitability systems established within the National Westminster Bank plc are sufficiently sophisticated to allow a relationship pricing strategy to be employed within the euronote market
	12	Conclusions and limitations

PART ONE

CHAPTER 1

THE TREND TOWARDS SECURITISATION

1.1 Definition and Environmental Factors

A major trend in international financial markets during recent years has been the shift of credit flows from the banking system to the money and capital markets. This increased marketability of debt represents what is often referred to as securitisation: the process by which debt is made marketable. Guth (1986, p 36) defines the concept as,

> 'the replacement or substitution of loans (in other words book claims) by tradeable securities but frequently supported by credit lines in the event of the issue becoming unplaceable'.

Taylor (1986, p 27) defines securitisation more broadly (and subjectively) as:

> 'the process of creating financial instruments which act to increase the efficiency with which the capital markets function as a financial intermediary'.

Securitisation can be divided into two forms. In its most extreme form it involves the unbundling and repackaging of already existing loans into securities. These securities are then sold to market investors, thereby removing the asset from the originator's or holder's balance sheet, to be replaced in the first instance by cash. One of the best examples of this type of securitisation can be seen in the securitisation of mortgages in the US secondary mortgage market, although many other types of assets, including car loans, have also been securitised in this way.

The second form of securitisation involves the raising of debt through the issue of securities in the capital markets. By this method a borrower will raise funds directly from market investors as opposed to seeking finance from the banking system in the form of a bank loan or overdraft. This type of securitisation must ultimately breed disintermediation: the process by which borrowers and lenders deal directly with each other by by-passing the banking system. It is this latter type of securitisation which is now determining the present structure of financial instruments for borrowers and investors.

Although the means for borrowers to raise debt in the form of securities have been available for many years in the form of corporate bonds and eurobonds, the 1982 Third World Debt Crisis may be seen as the turning point for the massive increase in securitised debt. With it the spontaneous growth of sovereign syndicated lending to a number of less developed countries came to a virtual halt. At the same time those sovereign borrowers whose credit standing was good moved their portfolios away from bank loans and into securities. Furthermore, because of reschedulings, banks found themselves holding long term, highly illiquid assets for which they had to find longer term funding. Thus, they began to rely less on the interbank market for their funding requirements, issuing instead medium and long term floating rate notes (FRNs) in the capital markets.

The process of securitisation has also been stimulated by certain international macro-economic developments, such as the disappearance of the OPEC surplus and the emergence of large financial surpluses in Europe and Japan. Japan, with its massive savings rate, is now the largest capital exporter in the world. However, the financial flows created by Japanese savers are different from those created by the oil producers. Japanese savers generally do not place their money in bank deposits, they invest in life assurance companies and pension funds (as a result of the long-term savings preferences of the Japanese people), which in turn creates a massive demand for securities.

The trend towards the growth of securities markets and the decline in the traditional syndicated loan market is evident from Tables 1.1 and 1.2.

Table 1.1 The international credit and capital markets

US$ billion

Items	1981	1982	1983	1984	1985
International bonds and notes	44.0	71.7	72.1	108.1	162.8
of which: floating rate notes	7.8	12.6	15.3	34.1	55.4
convertible bonds	4.1	2.7	6.8	8.5	7.3
Syndicated eurobank loans(1)	96.5	100.5	51.8	36.6	21.6
of which: managed loans(2)	-	11.2	13.7	6.5	2.4
Note issuance facilities (3)	1.0	2.3	3.3	18.9	49.4
Total	141.5	174.5	127.2	163.6	233.8

Source: Bank for International Settlements (1986b, Table 5.1, p 130)

Notes:
1 Excludes US takeover-related standbys
2 New money element of rescue packages
3 Includes revolving underwriting facilities, multiple-component facilities (if they include a note issuance option) and other euronote facilities

Financial markets are therefore beginning to witness a change in investor and borrower preferences, away from bank assets and liabilities (ie loans and deposits), towards the issue and purchase of securities. Banks are beginning to experience disintermediation on both sides of the

Table 1.2 Securities issued by banks*

US$ billion

Items	1980	1981	1982	1983	1984	1985
FRNs	2.3	3.0	4.9	3.8	14.6	29.2
Other bonds	3.1	3.6	6.1	8.1	8.5	13.8
Total	5.4	6.6	11.0	11.9	23.1	43.0

Source: Bank for International Settlements (1986b, Table 5.5, p 139)

Note: * excluding CDs

balance sheet and have, thus, begun to lose some of their traditional advantages in managing risk. Indeed, it is now widely recognised that for many banks the policy of rapid balance sheet growth has ended, supplanted by a greater emphasis on balance sheet management. Despite this fact, banks are still looking for ways to increase, or at least maintain, their earnings without placing further pressure on their capital bases. They have looked increasingly towards off-balance sheet (OBS) business to accomplish this, moving from a primary insurance role (ie the provision of funds on demand) to a secondary insurance role (ie the provision of funds only after an initial attempt at raising funds by the borrower (possibly through securitisation) has failed).

1.2 Securitisation and Innovation

Securitisation has been both the cause and effect of financial innovation. A full appreciation of securitisation and its implications for the development and success of financial innovation - like the euronote facility - requires some knowledge of the place of securitisation within the general framework of financial innovation. As the Bank for International Settlements (BIS) (1986b, p 169) points out:

> 'An ideal theory of the process (of financial innovation) should explain how changes in general economic conditions created specific profit opportunities for new instruments to emerge'.

There is - as the BIS recognises - no generally accepted theory of innovations that meets all of these criteria.

An analysis of financial innovation, then, must examine several aspects of the concept in order to assemble an informative framework within which the development of new securitised innovations can be analysed. We will begin with a brief examination of the concept of innovation.

Technical progress is generally accepted as being one of the major causes of economic growth. As a tool of economic analysis it derives from the need to explain shifts in a production function (Hahn and Matthews, 1964). The term 'technical progress' is often used as a residual to explain all increases in output which cannot be traced to quantitative increases in the inputs of labour and capital (Johnston, 1966). The difficulty of breaking down further the various factors of aggregate technical progress, however, has directed attention to the microeconomic level which Johnston (1966) defines as innovation. More clearly, he defines innovation as:

> 'the introduction of new and improved processes and products into the economy' (1966, p 160).

Johnston applies the term 'innovation' to the introduction of such change in its first application and also when the innovation or an alteration spreads into other firms, industries or countries. His picture of innovation is a departure from the more traditional approach of Schumpeter (1936), who divided the process of technical change into three parts: invention, innovation and imitation. Invention for Schumpeter is simply the act of finding new ways to do useful or profitable things. Innovation is the economic application of inventions. Invention, thus, requires innovation on the part of both producers and consumers before technical progress can occur. Imitation is simply the replication of already existing innovations.

Johnston (1981) argues, however, that by segregating invention, innovation and imitation, Schumpeter fails to emphasise the interdependent nature of all the steps of a time sequence. Innovation, he contends, should be regarded not only as an initial happening but also as a subsequent diffusion through the economy. Innovation, emphasised by students like Blaug (1965), Mansfield (1968) and Scherer (1973), can be both a product and a process, although in practice the two are so interwoven that any distinction between them is often arbitrary.

When dealing with innovation in the real sector it is possible to limit to a certain extent the scope of the analysis through the application of an objective criterion, ie a new product or process that qualifies for patent protection. There is no such counterpart in the financial sector. When analysing financial innovation we have little option but to develop our own criteria based on the characteristics of newly developed financial instruments. This point will be taken up later.

A major empirical problem associated with financial innovation is its cause-effect relationship with real economic growth. Gurley and Shaw (1955) criticise the traditional theories of economic development which are discussed in terms of wealth, the labour force, output and income. They argue that these real or 'goods' aspects of development have been the centre of attention in the economic literature to the comparative neglect of financial aspects, yet:

> 'financial development is incomprehensible apart from its context of real development' (1960, p 122).

Nevertheless, there is no clear empirical evidence to prove or disprove the hypothesis that financial development effects economic growth (see Goldsmith, 1969, p 391). As Gardener (1986, p 11) points out, in practice we must rely on a collection of empirical facts, observations, history and theory.

It is a basic tenet of financial development theory that each new stage of development of the financial system is characterised by financial innovation (see Revell, 1973, pp 24-28). Rybczynski (1985) argues that the evolution of the financial system which occurs as the economy expands involves three stages. The character of the financial system in this model is initially a bank-orientated one; banks are the main channel for collecting and investing savings. The financial system develops towards a market-orientated state, where capital markets channel a large proportion of savings directly, and later to a strongly market-orientated phase. In this latter phase, financial institutions increasingly dispose of and trade in their assets. It is suggested by Rybczynski, (1985) that the United Kingdom and the United States are currently in the third (most advanced) phase of development, while countries like Japan and West Germany are approaching it. This third stage of development - the strongly market-orientated phase - is also characterised by the appearance of risk hedging instruments, like financial futures, options and swaps and increasing securitisation. This development process is depicted in Figure 1.1 below.

Figure 1.1 The evolution of the financial system - Rybczynski's model

Bank-orientated phase	Banks channel funds between savers and investors
Market-orientated phase	Capital markets develop to channel funds directly from savers to investors. Disintermediation occurs.
Strongly market-orientated phase	Financial institutions increasingly dispose of and trade in their assets. Disintermediation is taken to a more advanced stage: that of securitisation of assets.

Innovation - argues Rybczynski (1985, p 39) in the context of the evolution of the financial system - enhances the ability and willingness of an economy to assume and carry risk. This ability is dependent on the stage to which the economy has evolved. The implication of these conclusions is that the process of securitisation provides an impetus to the development of financial innovations which enables the economy to assume and bear risk more safely.

This brings us to the question of what determines financial innovation. Or to put it another way, why does financial innovation occur? Two strands of thought can be identified in the literature on financial innovation: those who view financial innovation as demand-driven, and those who view it as being supply-driven.

The BIS (1986b, p 171) argues that to develop an economics of the innovation process, it is necessary first to create a taxonomy, or classification system. The taxonomy would then establish the important characteristics or functions of innovations: the demand for new instruments could then be analysed as a demand (a kind of derived demand) for these characteristics or functions. The BIS (1986b, p 171) proposes a classification scheme for financial innovations based on the type of financial intermediation function performed. This leads to the following classification system:

- risk-transferring innovations
- liquidity-enhancing innovations
- credit-generating (or debt-generating) innovations
- equity-generating innovations

The first classification - risk-transferring innovations - encompasses the new instruments or techniques that allow economic agents to transfer among themselves the price or credit risks inherent in financial positions. Liquidity-enhancing innovations are those financial innovations which either increase the negotiability (or transferability) of existing financial instruments or represent new financial instruments with greater liquidity characteristics. Credit-generating innovations provide economic agents with greater access to credit supplies, while equity-generating innovations provide economic agents with greater access to equity supplies.

Table 1.3 A classification of innovations by financial intermediation function

Innovation	Price-risk transferring	Credit-risk-transferring	Liquidity-enhancing	Credit-generating	Equity generating
A On-balance-sheet					
Adjustable rate mortgages	X				
Floating rate loans	X				
Back-to-back loans	X				
Asset sales without recourse		X			
Loan swaps		X			
Securitised assets		X	X		
Transferable loan contracts		X	X		
Sweep accounts and other cash management techniques			X		
Negotiable money-market instruments			X		
Money-market mutual funds			X		
Zero coupon bonds				X	
'Junk' bonds				X	
Equity participation financing				X	
Mandatory convertible debentures					X
B Off-balance-sheet					
Futures	X				
Options and loan caps	X				
Swaps	X			X	
Forward rate agreements	X				
Letters of credit		X			
Note issuance facilities	X	X	X		
Credit-enhancing guarantees on securities		X	X		

Source: Bank for International Settlements (1986b, Table 8.1, p 172)

Table 1.3 provides a list of selected innovations classified by this suggested scheme. It is interesting to note from Table 1.3 that the only financial innovation which is characterised by three intermediation functions (price-risk transferrring, credit-risk transferring and liquidity-enhancing) is note issuance facilities (NIFs), one of the main instruments analysed in this study. This classification implies multi-faceted and complex characteristics for such instruments.

On the supply side the BIS (1986b, chapter 9) concentrates on four broad factors or forces that have increased the willingness to supply the financial innovations that have emerged in recent years. These are technology, regulatory factors, greater competition in the financial sector and the historical dynamics of the financial innovation process itself. The latter point refers to the fact that new innovations are modelled on old ones. However, the BIS (1986b, p 186) goes on to argue that future financial innovation may be generated by a dynamic that works independently of the developments that previously generated innovation. New instruments may be developed to exploit a large number of minor profit opportunities, rather than just a few major ones. Gardener (1986, p 13) refers to the BIS approach to financial innovation as the eclectic or 'European view' of the economics of financial innovation.

A more specific supply-driven theory of financial innovation in the United States has been forwarded by Kane (1981) and Eisenbeis (1986). The theory has come to be known as the regulatory dialectic. This treats the political process of regulation and the economic process of regulatee avoidance as opposing forces that adapt continually to each other. It emphasises the tensions and ambiguities inherent in efforts for regulators either to impose restraints on persons and institutions that function in what is otherwise a free society or to let markets impose economic hardships on groups that are politically strong (Kane, 1981, p 355).

Kane (1981, p 358) likens the struggle between innovating firms and regulatory activity to a struggle between a visible and invisible hand to form the shape of a clay structure. Instead of acting in concert, the two hands work almost completely at cross purposes. The visible hand is the market place in which firms innovate; the invisible hand is that of regulatory activity. For Kane, then, innovation is often a response to regulation, and innovation in turn provides an impetus to re-regulation. Kane (1981, pp 359-360) argues further that the incentive to innovate around regulations is increased in times of accelerating inflation. Accelerating inflation raises the opportunity cost burdens associated with pre-existing regulations, such as the holding of reserves. At the same time exogeneous technological change lowers the marginal cost of avoiding regulatory burdens.

One tentative conclusion that can be drawn from the work of the BIS and the Kane/Eisenbeis regulatory dialectic is that regulation may have been one of the major economic forces behind the securitisation phenomenon. It should be noted here that taxation has also played its part in stimulating innovation, and indeed securitisation. As Miller (1986, p 36) states:

> '... securities can be used to transmute one form ... of income into another - in particular from higher taxed forms to lower taxed ones'.

Governments will attempt to change legislation to close such loopholes. Again, this sequence of action and reaction is part of the regulatory dialectic.

Although there is little doubt that regulation has played an important part in the development of financial innovations - and recently securitised innovations - it is too narrow a perspective to explain the entire process. A more general model has been developed by Silber (1982) emphasising the microeconomic framework of financial innovation. The main hypothesis is that new financial instruments are innovated to lessen the financial constraints imposed on firms (Silber, 1982, p 5). According to Silber, firms maximise utility subject to a number of internal and external constraints. Internal constraints may include self-imposed liquidity or growth rates, while external constraints may encompass market pressures and regulations. Silber argues that innovation results when the costs of adhering to existing constraints become too high. Silber's theory of financial innovation is similar to Kane's but it is wider in its scope. It allows for the fact that firms may innovate to by-pass internal as well as external constraints.

Most views on financial innovation, then, whether they stress demand or supply side factors, tend to regard innovation as resulting in large part from changes in the environment in which financial firms operate.

According to Dufey and Giddy (1981, p 2) the incentives to innovate will decline _a priori_ when patent protection is less effective, when the industry is potentially more competitive, and when product imitation is easy. Because of the technical ease of imitation, and because of the difficulty in proving any financial contract to be unique rather than a variant of some existing combinations, there can be no patent system in financial instruments or techniques. One might thus suppose that the rate of innovation in financial markets would be relatively low. Yet the experience of the past twenty five years in world financial markets indicates that new instruments and techniques have appeared with a high frequency. This apparent paradox is understood by examining the temporary monopolistic situation which results from financial innovation.

Dufey and Giddy (1981, p 4) point out that customers will tend to purchase new financial instruments and services only from firms that have a reputation for providing such products with 'sound legality and predictable riskiness'. In practice, then, an economic rationale exists for particular financial institutions to specialise in the repeated development, marketing and support of new financial contracts. In other words, reputable banks and other financial institutions will have a temporary monopoly advantage that enables them to appropriate returns from investment in the development of financial innovations, even when imitation is immediately possible (Dufey and Giddy, 1981, p 4).

Accepting that an institutional mechanism exists for the continued generation of financial innovations, it remains for theory to predict what kinds of innovations will occur and under what circumstances. Dufey and Giddy (1981, p 5) classify innovations under two headings: 'aggressive' innovations, which are the result of investment in research by firms specialising in the development of new financial products; and 'defensive' innovations, which result from changes in customer needs or in relative costs. They classify the latter further into two categories: those aimed at circumventing government regulation, and those resulting from relative price or risk changes in the economic environment.

The first point has already been made by students like Kane (1981), Eisenbeis (1986) and Silber (1982). The second point is more specific.

It emphasises how many financial innovations arise, not from constraints, but from newly emerged gaps in the range and combination of financial services offered.

All the models and theories of financial innovation discussed so far provide us with a greater understanding of the processes, causes and effects of financial innovation. This knowledge is vital for a fuller understanding of the phenomenon of securitisation. Securitisation must be viewed within a broader framework of financial innovation. It appears to be the result not just of constraining factors such as regulation, but also of emerging profit opportunities in financial markets.

1.3 How Securitisation Transforms Various Risks

1.3.1 Credit risk

The BIS (1986b, p 194) argues that new financial instruments (securitised or otherwise) may be divided into two groups with respect to credit risk: those which extend credit, and those which do not. Eurobonds, floating rate notes (FRNs), asset sales, euronotes, and in fact all other securitised instruments involve credit extension. The BIS (1986b, p 194) states that credit extension involves:

> '... bearing credit risk, equal to the full principal amount, and extending to the maturity of the credit obligation'.

Euronote facilities are interesting in this respect in so far as their primary function is to provide liquidity to the borrower rather than a straightforward extension of credit. Yet the eventual result of a borrower drawing on the facility would necessarily require a form of credit extension of the part of the underwriting bank.

1.3.2 Market liquidity risk

The new financial instruments must trade or sell in new markets where liquidity has not yet been tested. Up until mid-1987 most international securities markets experienced a bull market environment (rising prices and falling interest rates). Bull markets naturally encourage the trading of securities, and indeed, most of the new securitised instruments have developed in this type of environment. The liquidity which has been provided by rising securities prices may disappear if interest rates (real and nominal) begin a long-term climb again. It should also be emphasised that because an asset is marketable or negotiable, this does not necessarily mean that it is liquid (as recent experiences in the FRN market confirm: see Cohen, 1987 and the stock market crash of 1987/88). Liquidity implies the ability to sell an asset at or close to its face value under most market conditions. One of the basic functions of securitisation is that liquidity is provided not by relationship banking or straight loan commitments but by standby commitments and the ability to sell assets in the capital and money markets.

1.3.3 Settlement risk

The integration and deregulation of financial markets has dramatically increased the transactions volume in financial markets (see BIS, 1986b, p 195). Large securities clearing systems have developed such as Cedel and Euroclear (see Feeney, 1986, pp 51-52) to clear these transactions. A computer failure at one of these major clearing centres could cause major financial losses.

1.3.4 Funding risk

The BIS (1986a, p 3) defines funding risk as:

> 'the risk that a bank will be unable to purchase or otherwise obtain the necessary funds to meet its obligations as they fall due'.

A bank may experience funding difficulties if, in order to meet an unexpected large withdrawal of funds, it has to rely on less stable purchased deposits or the issuance of securities. The BIS (1986a, p 4) has concluded that:

> 'The rapid growth of commitments represents a significant additional risk to banks' funding strategies. Many commitments are callable entirely at the borrower's option and many are most likely to be called when the markets ... are reluctant to meet the borrower's needs. It is therefore possible that a bank might be faced with large and perhaps unexpected calls under commitments at a time when markets are unreceptive to its needs for additional funds'.

For these reasons the BIS warns that the banks will have to be particularly cautious in their funding management, arguing (1986a, p 4) that:

> 'Banks may wish to assess (and set limits on) their total volume of commitments in terms of their perceived funding capacity, perhaps assessing this on a worst case basis'.

The advent of securitisation and the trend for banks to move business off the balance sheet has radically transformed the various risks usually associated with financial markets.

1.4 Pricing Securitised Instruments

The vulnerability of financial markets to financial crises is generally considered to be lessened if economic agents, in particular financial institutions, have greater capital in reserve as compared to their risk exposures. This issue, argues the BIS (1986b, p 199):

> '... gives rise to concern about the 'pricing' of credit transactions, that is, ensuring that the gross amounts earned on financial transactions permit accumulation of reserves sufficient to protect all parties to transactions ... Thus the question of whether new financial instruments contribute to an increase in systemic risk depends in part on whether they produce sufficient profit margins on average to cover potential losses from market, credit or other risks, both in the short and the long-run'.

In periods of rapid innovation, markets for new instruments grow quickly. It is possible that market makers and their customers may not have time to accumulate experience in a variety of economic circumstances before managing large exposures. The BIS (1986b, p 200) argues that there are learning costs with new instruments and markets that may manifest themselves in the form of underpricing of transactions, which may generate either short-term or long-term losses:

> 'Some market participants believe that there is a general tendency for new instrument markets systematically to underprice specific risks during a phase of development of a new market ... This pattern may in part be explained by the tendency of major financial institutions to seek to maximise profits in the long-term, and thus to compete aggressively in the short-run to maintain market share. It is frequently argued that the extremely thin margin characteristics of some of the most competitive new instrument markets are insufficient to justify the range of risks involved, and that margins will widen as markets mature'.

However, the BIS (1986b, p 201) goes on to warn that:

> 'Systemic risk may arise if considerable exposure is accumulated during the 'underpricing phase''.

The BIS (1986b, p 201) also puts forward the hypothesis, in contrast to that of the learning phase theory, that:

> 'the pricing of risks ... may go through extended phases of underpricing because of an inability to foresee long-run events, combined with pressures to compete in the short-run'.

This latter hypothesis is similar to Guttentag and Herring's (1986) Disaster Myopia hypothesis. They define Disaster Myopia (1986, p 2) as: 'a systematic tendency to underestimate shock probabilities'. This important hypothesis will be examined in greater detail in Chapter 9 of the study.

It has been necessary to quote at length from the BIS work because it has an essential bearing on the objective of this study: to discover whether the development of euronote facilities has increased systemic risk. The BIS study is also an important theoretical and empirical work in itself. It has been emphasised that one of the features of new financial markets is often an 'initial' underpricing of risk to gain market share. The BIS have argued that the initial underpricing of risk does lead, at least in part, to an increase in systemic risk. A number of hypotheses has been briefly stated for the possible underpricing of risk in new financial markets. The BIS proposes two main hypotheses for present purposes that may be defined a little more formally as 'the Learning Phase' hypothesis and the 'Disaster Myopia' hypothesis. Both of these will be examined in relation to euronote facilities in Chapters 8 and 9 of the study.

It may be possible to prove the underpricing of new instruments in isolated cases. It is far more difficult to determine 'market underpricing', and it is this latter type of underpricing which the BIS argues increases systemic risk.

1.5 Underpricing and Systemic Risk

We have defined systemic risk as the risk of a financial crisis - a sudden and unexpected disequilibrium in a financial market. The link between the underpricing of new financial innovations and systemic risk has also been established. Systemic risk may, however, arise in two different forms according to Van Horne (1985, p 627) - as a 'bubble' or a 'balloon'. As Van Horne (1985, p 627) states:

> 'A bubble, of course, implies an eventual bursting. If the time and magnitude of the burst were known in advance, all participants would be guided. With completely rational expectations, bubbles simply would not occur. A bubble depends on irrational behaviour at least part of the time'.

If market underpricing could be proven, and if it could also be shown that such underpricing was in fact economically unjustifiable then there would be room to argue that the growth of the euronote market could contribute to an increase in systemic risk of the 'bubble' kind. A financial crisis may be imminent.

If, however, market underpricing could be shown to be economically justifiable (possibly because stability is being provided for through profit from other parts of the customer relationship) then we might argue that a balloon may be a better metaphor for any increase in systemic risk contributed through the growth of the euronote market. It expands, but not to the extent that it bursts. The eventual deflation is less abrupt.

1.6 Selected Trends

It was mentioned previously that new financial innovations are usually variants on other financial innovations. Securitised innovations are no different. In order to gain a fuller understanding of the practical process of innovation which has taken place in international financial markets during recent years - culminating so far in the development of the euronote - an historical perspective is required. This section of the chapter will trace some of the major developments which have occurred in the euromarkets up to the emergence of the euronote.

1.6.1 The growth of the eurobond market

Innovation has often been described as merely the ability to continue to do what you have always done, when you have been told not to do it. And so, just as the eurocurrency market was born in 1957 because of the British government's restrictions on the use of sterling to finance trade credits, so the main impetus to the development of the eurobond market came in 1963 with the imposition of the Interest Equalisation Tax (IET) in the United States. This tax was aimed at discouraging foreign borrowers from making bond issues in the US market. However, as the demand for funds by international borrowers was greater than the capacity of any other national capital market to accommodate it, the eurobond market was created whereby international borrowers could float long-term bond issues on a worldwide scale.

'Eurobonds' are those bonds placed simultaneously on the markets of at least two countries, and denominated in a currency that need not be the currency of either, usually by international financial syndicates with the participation of financial institutions of several countries. They are thus distinguished from 'foreign bonds', which can be defined as those issued on behalf of non-residents on a capital market of a single country by a syndicate that is generally national. Foreign bonds are denominated in that country's currency.

Because of the tendency of national authorities to regulate strictly the access of foreign borrowers to their domestic capital markets, the eurobond market has developed as the most accessible market for raising long-term capital in the world. It grew from the first eurobond issue of $15 million for the Italian motorway operator, Autostrade, in 1963 to a market size of nearly $50 billion in 1982.

With the lifting of the IET in 1974, some investors feared for the future of the eurobond market, predicting that it would be replaced as a source of long-term funds for international borrowers by the more efficient US capital market. Time has proved this prediction wrong. As Table 1.4 shows, the market has gone from strength to strength. With the development of its institutional framework, underwriting commissions have fallen through competition, and the secondary market has improved. However, during 1968 and 1969 the market's growth nearly proved its downfall; it threatened to choke the market with the resultant paperwork generated. Bond deliveries at that time were usually made through banks in the United States. The back offices of the clearing banks were already overloaded with domestic trades, and eurobond deliveries were delayed and mishandled. With the increasing volume of new issues, these problems worsened. They were eventually solved by self-help. A European clearing system, Euroclear, was set up in December 1968 (initially by Morgan Guaranty) and a competing European system, Cedel, in January 1971. Co-operation and competition between the two systems have enabled clearings between them to be carried out efficiently.

A second crisis for the market came in 1974. New issue volume slumped to under $2 billion in the wake of the first oil shock, with many analysts once more predicting the end of the eurobond market.

Table 1.4 Eurobond issues, 1974-76 and 1982-83

Borrowing countries or areas	Years	Eurobond issues (US$ million)		
		Total	US dollars	Deutschemark
Western Europe	1974	1,430	430	370
	1975	4,570	1,350	1,770
	1976	5,440	3,750	1,200
	1982	16,550	12,690	1,930
	1983	22,770	16,630	2,410
Canada	1974	440	380	-
	1975	1,150	610	-
	1976	3,010	1,570	40
	1982	6,920	5,600	100
	1983	3,840	2,660	360
United States	1974	110	100	-
	1975	310	220	-
	1976	410	400	-
	1982	13,020	14,340	530
	1983	6,070	5,680	220
Other developed countries [1]	1974	330	220	110
	1975	2,220	1,340	700
	1976	2,070	1,510	510
	1982	3,860	3,050	480
	1983	6,060	4,760	830
Rest of the world [2]	1974	140	120	-
	1975	740	230	80
	1976	1,040	450	300
	1982	2,820	2,510	210
	1983	1,680	1,510	160
International institutions	1974	2,070	1,830	160
	1975	1,480	1,060	340
	1976	2,960	2,050	730
	1982	3,280	2,490	-
	1983	6,070	4,500	60
Total issues	1974	4,520	3,080	640
	1975	10,200	4,810	2,890
	1976	14,930	9,730	2,780
	1982	46,450	38,680	3,250
	1983	46,490	35,740	4,040

Source: BIS, Annual Reports, 1977-1984 (based on OECD sources)
Notes: 1 Australia, Japan, New Zealand and South Africa
2 Including Eastern European countries

Indeed, there was good reason for this pessimism: the markets wanted anything but fixed-rate dollars, the eurobond market's main product, and this situation led to the emergence of a syndicated floating rate loan market. However, as the market attracted its share of recycled oil dollars in 1975, volume began to recover rapidly, with total volume and the average size of each issue increasing. This added further liquidity to the market, whilst attracting more institutional investors. These developments spurred growth to the point that, after the US government and UK gilts markets, it is now the third largest fixed rate market in the world.

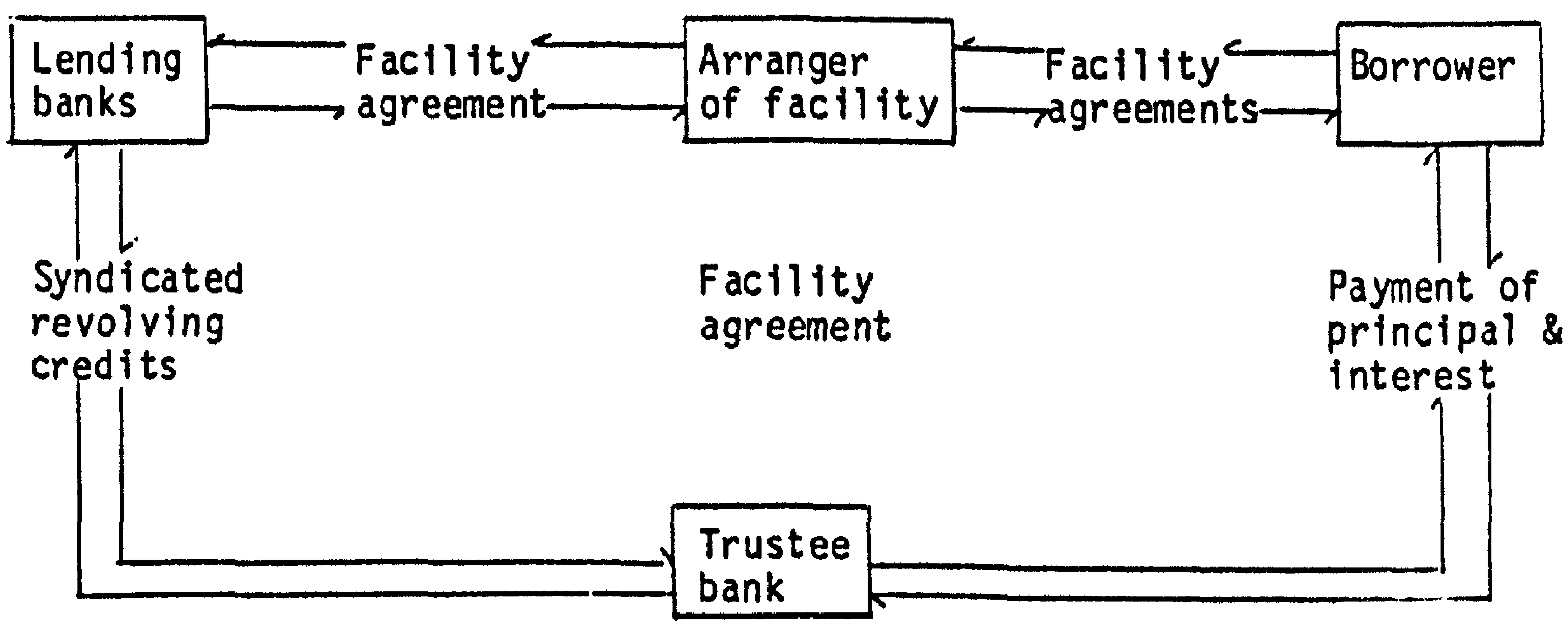
1.6.2 The development of the syndicated loan market

Faced with worsening inflation in the late 1960s, coupled with the world oil price shocks of the early 1970s, banks became increasingly unwilling to lend fixed-rate funds over a medium-to-long period at the very time when international borrowers were looking to the euromarkets for medium-to-long-term funds to finance their capital investment projects. Indeed, many investors sought funds on a scale so large that it was impossible for one bank to handle alone these transactions. Clearly a way had to be found to minimise a bank's exposure to credit risk over the medium-to-long period whilst, at the same time, allowing international borrowers access to these funds on the scale they required. The result was the floating-rate syndicated loan, the euroloan or the revolving syndicated credit.

The floating rate concept virtually eliminated for banks the risk of future fluctuations in the funding cost of medium-term loans. Interest is usually computed by adding a spread to the London Interbank Offer Rate (LIBOR), the rate at which banks may obtain funds from other banks operating in the euromarkets. Often, however, a loan may be priced at a spread over any one of twenty or so different reference rates. The spread, be it over LIBOR or some other rate, is negotiated with the borrower at the outset, and either remains constant over the life of the loan or changes after a number of years. For example, a 15-year loan may be syndicated at a spread of 3/8 percent over LIBOR for the first five years, 1/2 percent for the next five years, and 5/8 percent for the last five years.

Although LIBOR is changing constantly, the rate on any particular loan is readjusted only every three or six months. This is known as pricing on a rollover basis, with the readjustment period usually being determined by either three- or six-month LIBOR. Under this agreement lenders promise to advance non-negotiable funds to the borrower on his satisfying certain requirements. The commitment of the lending banks to provide this facility cannot be transferred easily, and only with the prior approval of the borrower by means of assignment. Funds are advanced direct by lenders (see Figure 1.2).

Figure 1.2 Parties to a revolving credit agreement



The spread over the index is determined by the quality of the borrower. However, as spreads rarely reach 2½ per cent for any borrower, it is not necessarily a good indicator of the borrower's credit standing. In addition to the interest spread on a euroloan there are also commitment fees, front-end fees, and occasionally an annual agent's fee. Commitment fees are charged to the borrower on a percentage of the undrawn portion of the credit. They have been typically 1/2 per cent annually, imposed on both term loans and revolving credits. Front-end fees, on the other hand, are one-time charges negotiated in advance and imposed when the loan agreement is signed, with the agent's fee (if applicable) usually being a small yearly charge.

The other feature of such a loan is its syndicated nature, whereby a large loan can be made available to a borrower by syndicating it by distributing portions of the loan commitment between several different banks and thereby reducing the credit exposure of any one bank. The syndicated euroloan has thus helped to bridge the gap between short-term bank loans and long-term eurobonds, whilst providing adequate funding through the process of syndication. These developments opened up the market for lesser quality borrowers, which had previously been unable to tap the more elitist eurobond market. Hence, as Table 1.5 shows, the market grew from a total of \$4.7 billion in 1970 to \$82.8 billion in 1979.

There are weaknesses in the syndication process. In times of crisis each syndicate member will obviously try to look after its own interests, with some wishing to call in their debt. This situation may be hard to rectify when there are many lenders, few of which have a direct relationship with the borrower.

Table 1.5 New syndicated eurocurrency bank credits

US$ billion

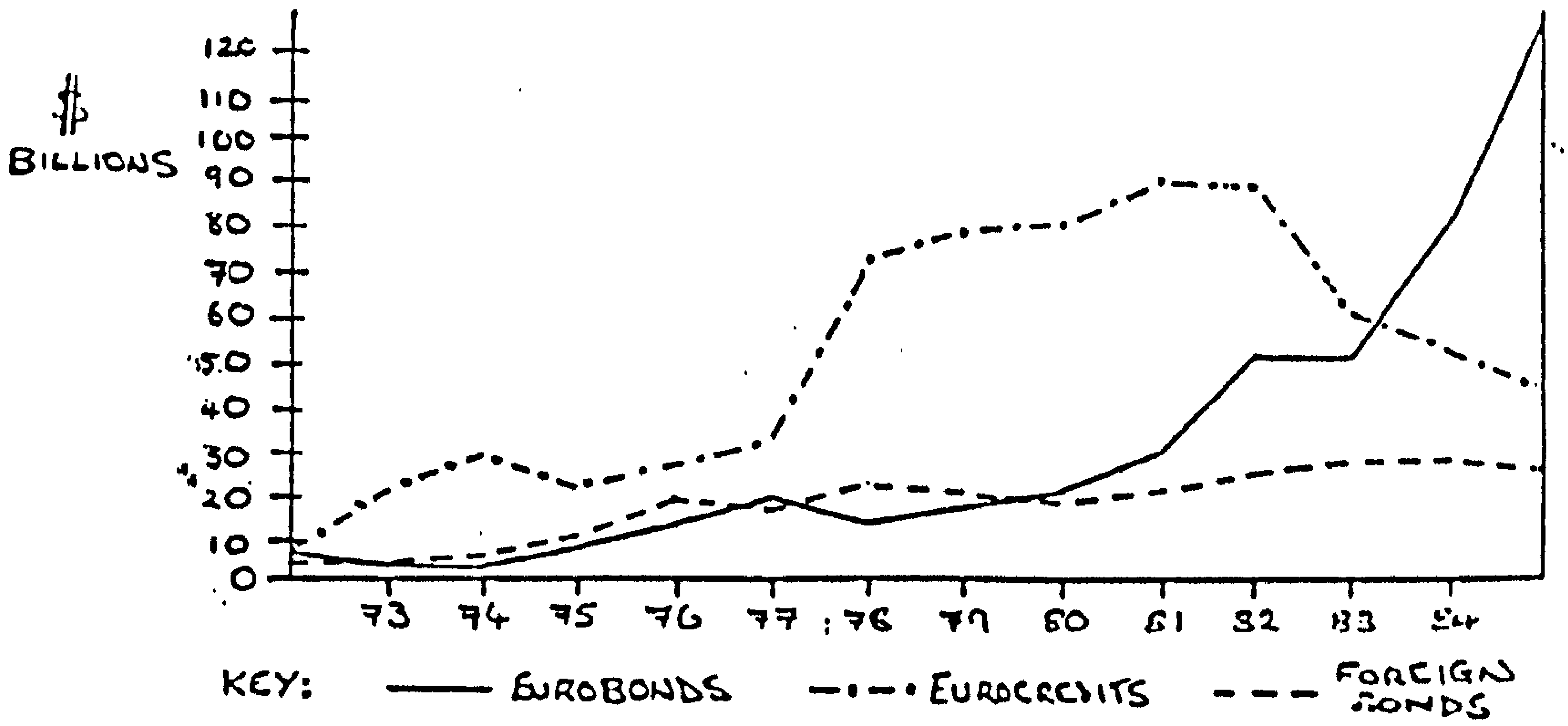
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	Jan-April 1980
Industrialised countries	4.2	2.6	4.1	13.8	20.7	7.3	11.3	17.4	29.1	27.5	9.2
Non-OPEC LDCs	0.3	0.9	1.5	4.5	6.3	8.2	11.0	13.5	26.9	35.4	4.9
OPEC countries	0.1	0.4	0.9	2.8	1.1	2.9	4.0	7.5	10.4	12.6	3.1
Communist countries	-	0.1	0.3	0.8	1.2	2.6	2.5	3.4	3.8	7.3	0.8
Total	4.7	4.0	6.8	21.9	29.3	21.0	28.8	41.8	70.2	82.8	18.4

Source: Morgan Guaranty Trust Company, World Financial Markets
Notes: Because of rounding, figures may not add to totals.

The syndication process can also give a false sense of security to participating banks, which may thus rely on the judgement of the lead bank rather than conduct their own credit assessment of the borrower. The hazards of this type of lending became all too clear in the early 1980s, when many less developed countries (LDCs) had to reschedule and refinance their existing commitments. The portfolios of many banks suffered, and new syndicated loans fell from $82.8 billion in 1979 to only $18.4 billion in 1980.

The great weakness of the traditional syndicated loan was thus apparent - it was unmarketable. Tradability was seen as essential if borrowers were to continue to gain access to funds in the euromarkets. As a result, there was again a massive surge in the growth of the eurobond market after 1980 (see Figure 1.3). Although the classic eurobond did provide essential liquidity and hence an acceptable means of asset tradability in banks' portfolios, the problem of fixed interest rates still remained.

Figure 1.3 New issue volume on eurobond and credit markets



Source: OECD, Financial Statistics Monthly

Note: 1985 figures are for January-May at annual rate.

1.6.3 Floating rate notes

1.6.3.1 The emergence of floating rate notes

The international debt crisis of the early 1980s significantly affected future patterns of international lending. Banks were forced to re-assess the risks involved in syndicated lending, and this assessment led to a drastic curtailment in the volume of new lending in a market which took twelve years to build up and virtually twelve months to destroy. As a result, banks were left with surplus funds for which they began to seek other lending opportunities in industrialised countries and in those LDCs that enjoy a high credit standing. Furthermore, banks sought assets which were more liquid and hence more transferable than the traditional syndicated loan. At the same time, it appears that (especially since the failures of Herstatt and Franklin National) investors have begun to regard bank liabilities as riskier investments than had previously been the case. They favoured more direct relationships with certain high quality borrowers.

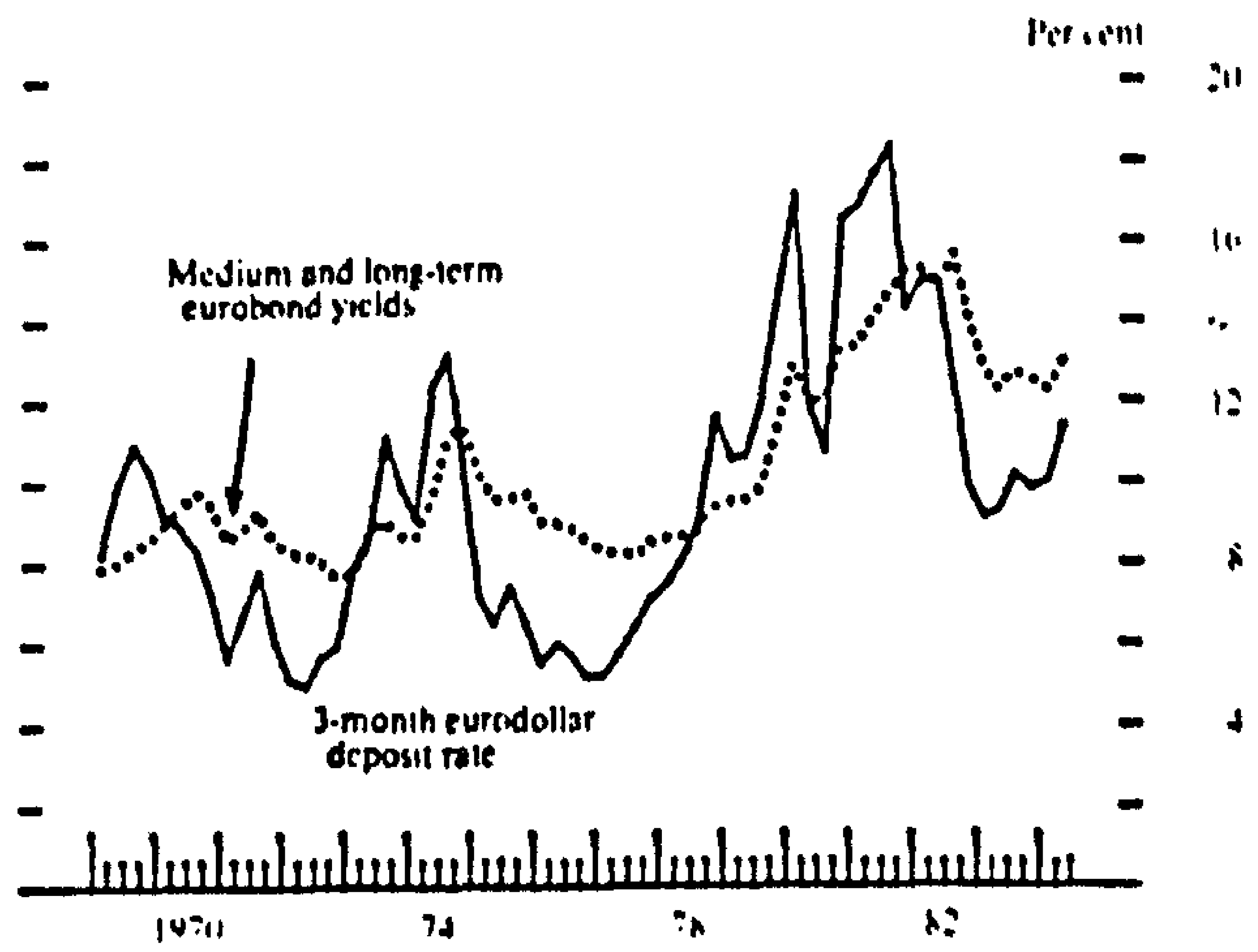
Balance of payments developments after 1982 - the erosion of the OPEC surplus and increasing surpluses in Europe - increased the supply of funds from investors with a greater preference for securities. This was a development which reduced bond issuing costs for the most-favoured borrowers, precisely the type of borrower which banks were now looking towards. With the problem of fixed rates remaining, the floating rate bond or, more commonly, the floating rate note (FRN) was a natural development.

An FRN is a medium-to-long-term bond, with most maturities being between five and fifteen years, and it is evidenced by negotiable bearer notes, in denominations of at least $1,000, and with a coupon consisting of a margin over an appropriate short-term reference rate, usually three- or six-month LIBOR. The coupon is paid at the end of each interest period, and it is then adjusted in line with current rates for the next interest period. As with fixed-rate eurobonds, most FRNs are nominally listed on a stock exchange, although they are traded (almost entirely) by telephone or telex.

The FRN is a hybrid between fixed-rate but marketable eurobonds, and floating rate but non-negotiable eurocredits. It is a classic example of the adaptability of free financial markets to changing circumstances. The aim of the FRN was to bridge the gap between the demand for and supply of medium- and long-term funds by paying investors an interest rate which changed in line with short-term money market interest rates. It was the logical capital market counterpart to the development of 'roll-over' bank credits, and was thus an alternative to fixed-rate bonds at times when rising or volatile interest rates discouraged lenders from committing their funds long term at fixed rates. At the time the first FRN was issued in 1970, rising interest rates had made it virtually impossible for borrowers to raise more than $25 million in one issue with, at times, an inverse yield curve (with short-term rates higher than long-term rates) emerging, thereby encouraging investors to switch to short-term assets (see Figure 1.4).

Although banks initially aimed to invest in prime name FRNs, they soon learned that the interest structure on these notes made it possible for them to match what is essentially a medium-term asset against short-term liabilities. To the extent that banks became buyers of FRNs, it thus became possible for less than prime quality borrowers to issue FRNs and so tap the bond market. This was partially the result of most eurobanks' established credit appraisal systems, which allowed them to assess the creditworthiness of lesser known names, something which private individuals and non-bank institutions (the main buyers of bonds) are largely unable to do. Nevertheless, the international debt crisis has ensured that the vast majority of issuers on these markets are high quality borrowers.

Figure 1.4 Yields on eurocurrency instruments, 1969-83



Source: Bank of England Quarterly Bulletin, September 1984, p. 338

1.6.3.2 Swaps

One of the main incentives to the growth of the FRN (and fixed-rate eurobond) market in recent years has been the parallel growth of the swap market. There are four basic swap structures:

1 the interest rate swap
2 the fixed-rate currency swap
3 the currency coupon swap
4 the basis rate swap

Although all these structures have been used, it is the first type of swap structure, the interest rate swap, which has provided the greatest impetus to the growth of the FRN market. The analysis of the contribution of swaps to the growth of the FRN market will therefore be confined to an examination of this type of swap.

The interest rate swap is the commonest type of swap, with a total market size at end-year 1985 of over $50 billion. In its simplest form it involves the exchange of floating-rate interest for fixed-rate interest in the same currency, calculated in relation to an agreed principal amount. Counterparties to such an agreement are therefore able to convert a floating-rate asset or liability into a fixed-rate asset or liability (or vice versa).

Interest rate swaps result from the differentials between the counterparties' credit standing in the fixed and floating rate markets. As fixed-rate investors appear to be more sensitive to credit quality than floating-rate bank lenders, a greater premium is demanded of lesser quality issuers in the fixed-rate debt market than in the floating-rate market. Swaps work to allow counterparties to use the market in which they have the greatest relative cost advantage and then to swap the funds obtained into fixed/floating rate debt. This process allows for a credit arbitrage between the two markets. A simplified example of the borrower attributes necessary for such arbitrage is given in Table 1.6. The example shows how a swap can arbitrage between the fixed rate bond market and the floating rate section of the market. Although this is only one example of how borrowers can access different markets or segments of the same market it does serve to illustrate how the swap market has provided an impetus to the growth of the eurobond and FRN market.

Table 1.6 Minimum borrowing costs for borrowers X and Y in the fixed and floating rate markets

	Borrower X	Borrower Y	Relative cost advantage
Credit quality of borrower	AAA	BBB	
Cost of raising fixed-rate debt on capital markets	10.65%	11.50%	0.85%
Cost of raising floating-rate debt on capital markets	3-month LIBOR plus ¼%	3-month LIBOR plus ½%	0.25%

From Table 1.6 it is clear that borrower X can raise funds more cheaply than borrower Y in both the fixed and floating rate markets. However, the relative cost advantage of borrower X over borrower Y is less in the floating-rate market than it is in the fixed-rate market. By tapping the markets in which they have the greatest relative cost advantage (the fixed-rate market for borrower X and the floating-rate market for borrower Y) and entering into an interest rate swap, both borrowers can reduce their minimum cost of funds. This process is shown in Table 1.7.

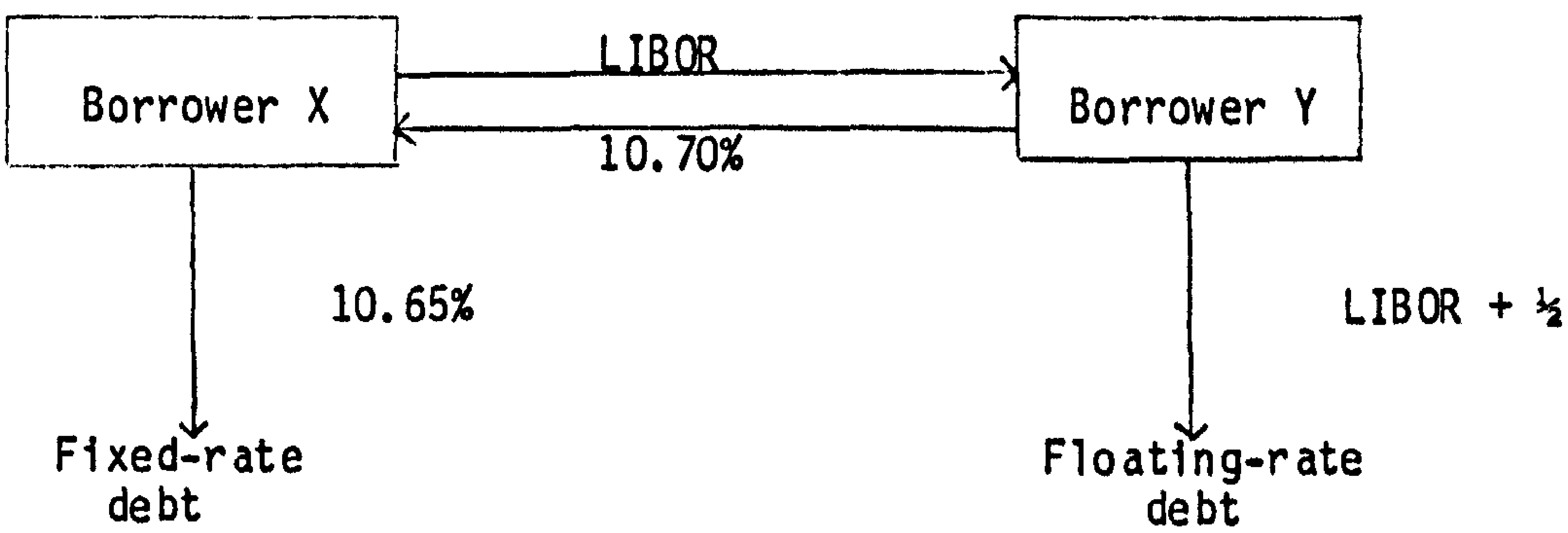
Table 1.7 depicts a very simple interest rate swap transaction, by which both parties are able to reduce their cost of funds by 30 basis points. The process is shown diagramatically in Figure 1.5.

In Figure 1.5, borrower X raises funds from the market at a fixed rate of 10.65 per cent. Borrower Y raises funds at a floating rate of LIBOR + 1/2 per cent. Borrower X then pays LIBOR to borrower Y who in turn pays 10.70 per cent to borrower X. Through this process both borrowers save 30 basis points (see Tables 1.6 and 1.7).

Table 1.7 Lowering the cost of funds through an interest rate swap

	Borrower X	Borrower Y
Raises funds at	10.65%	LIBOR + ½
Pays	LIBOR	10.70%
Total cost of funds	(10.65%+LIBOR-10.70%) LIBOR - 1/20	(LIBOR+½+10.70%-LIBOR) 11.20%
Cost saving (basis points)	30	30

Figure 1.5 An interest rate swap transaction



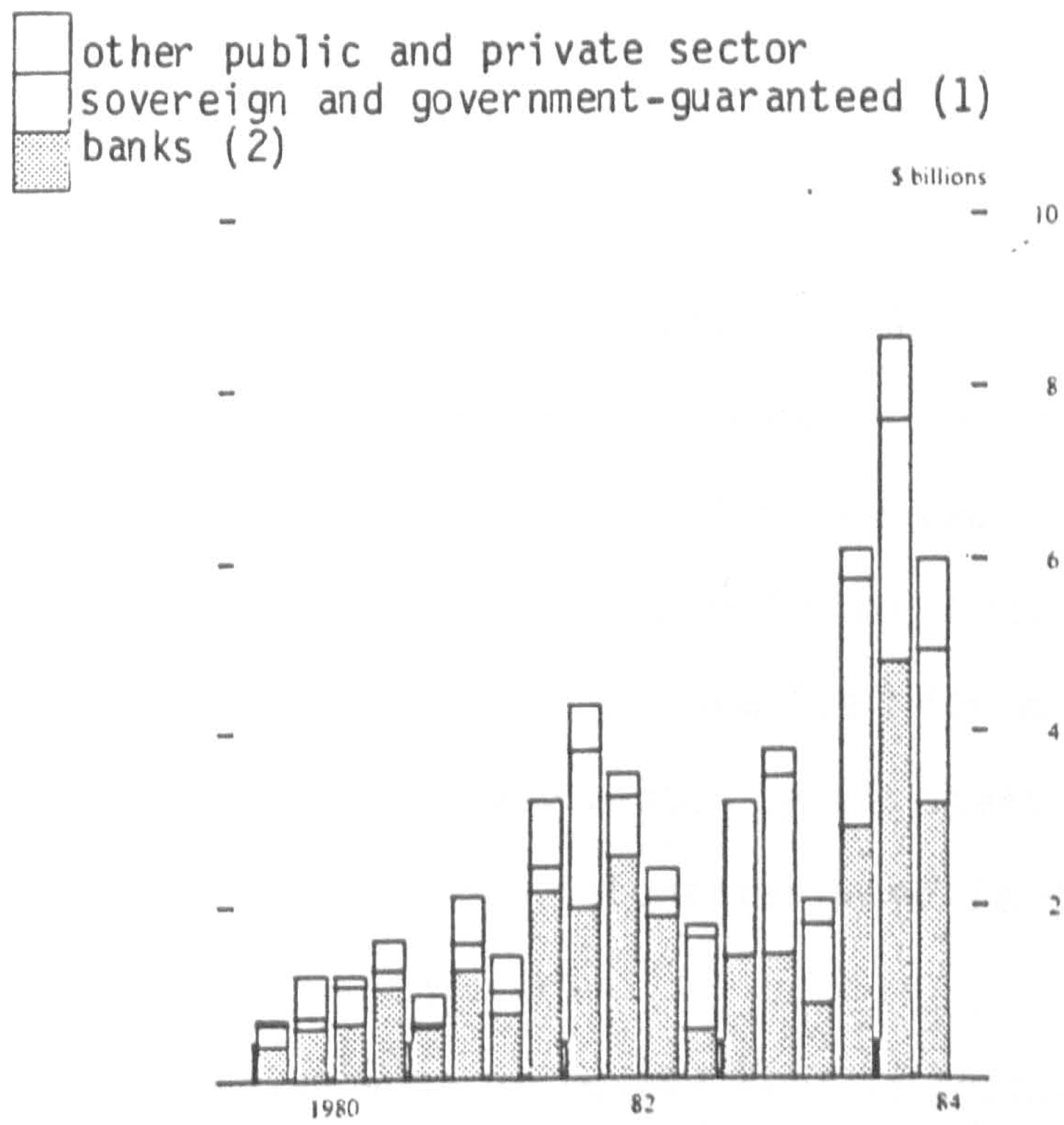
This process emphasises the benefits of interest rate swaps for borrowers in the fixed and floating rate markets. There are also many benefits to be gained by investors, as well as borrowers, in the swap markets. The potential for investors to secure benefits from a swap transaction was provided by Italy's $500 million FRN issued in November 1985. This note is non-callable for seven years. Call options prevent investors from swapping their investment because there is the chance that the borrower will redeem the issue, thereby ruining the swap. With the Italian FRN, a company which has issued a fixed rate bond and swapped it for a floating rate of interest below LIBOR can gain yield by reinvesting in the Italian deal.

Swaps can, therefore, be advantageous to both borrowers and investors. It is beyond the scope of this study to examine and assess the different types of swap structures and their risk implications. Suffice it to say that the growth of the swap market has provided a major impetus to the growth of both the fixed-rate eurobond and FRN markets. The swap market has not only enabled borrowers to swap funds between these two markets, but also to swap different currencies in the same market.

1.6.3.3 Bank FRNs

Possibly an even more significant factor contributing to the growth of the FRN market has been the use made of it by banks as borrowers: since 1975 banks have accounted for over half the funds raised in the FRN market. This development was brought about by the failure of Herstatt and Franklin National, which emphasised the need for long-term funding, particularly for banks which lacked a natural dollar deposit base. Although the FRN is rather expensive as an alternative source of funding for banks (the cost of obtaining long-term funds through FRNs before 1983 being typically 0.25 per cent over LIBOR, plus front-end fees of up to 2.5 per cent), there has been no shortage of bank regulations in some countries, particularly France and Japan, which require banks to match a proportion of their lending with long-term liabilities. Indeed, as credit controls in France do not apply to lending funded by bond issues, it is not surprising that French banks have become the most prominent single group of borrowers.

Figure 1.6 Floating rate notes: types of borrower



Source: Bank of England Quarterly Bulletin, September 1984, p. 338

Notes: (1) includes EEC borrowing on behalf of France
(2) includes World Bank

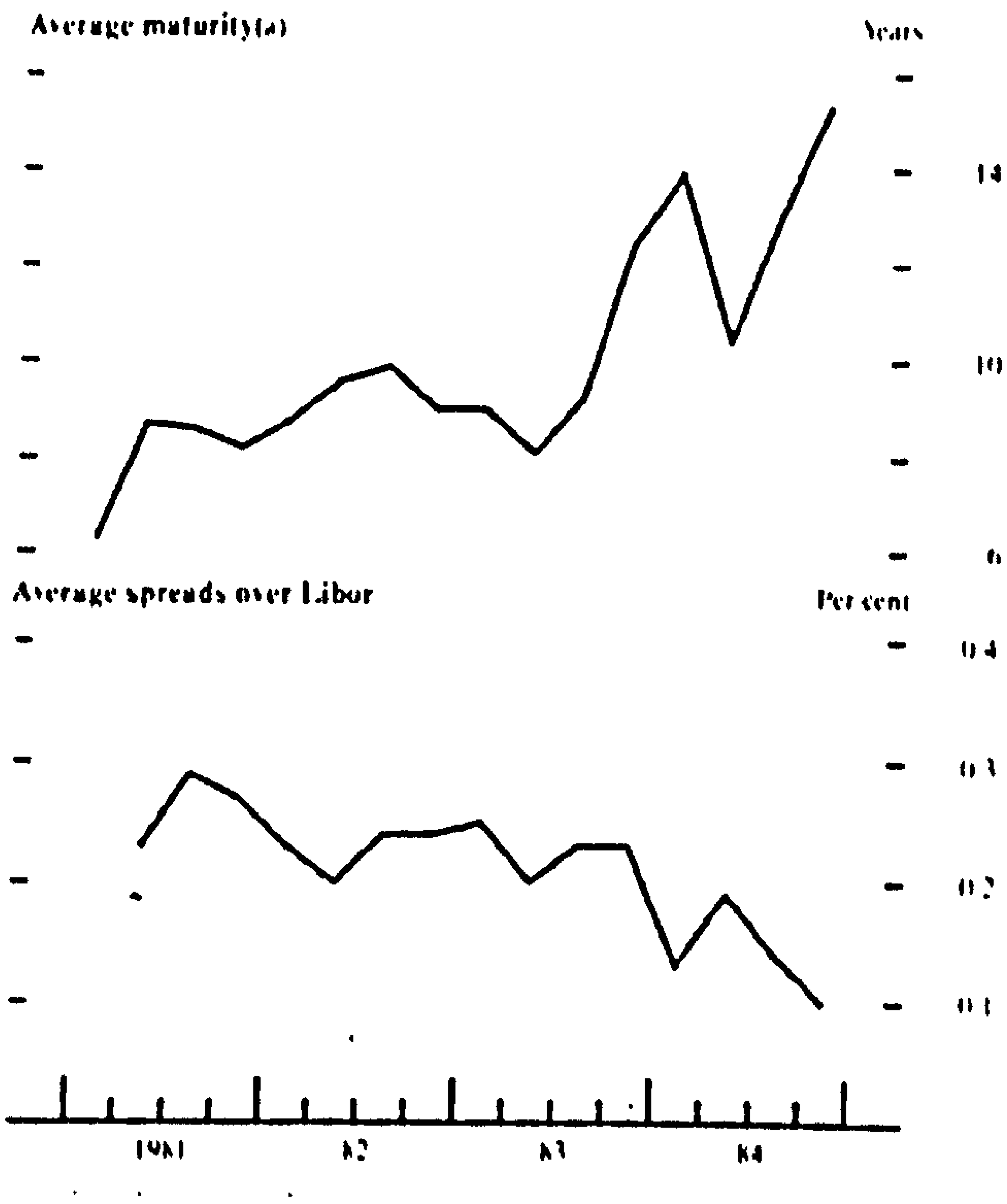
In several countries FRNs issued by banks in subordinated form are counted as capital, thereby allowing banks to gear up rather than merely fund capital. This has caused double leveraging dangers, with banks funding other banks' debt capital. Supervisory authorities, including the Bank of England, have reacted to the potential risks involved in this activity.

Following from this, one of the most interesting features of the market at the moment is the extent to which banks buy and sell FRNs between each other. Estimates of banks as representing 80 per cent of the total market are often quoted, although a move away from LIBOR pricing for non-bank borrowers has seen a growth in this sector of the market (see Figure 1.6). The FRN market has thus supplemented the interbank market.

Investor demand for high quality assets, the improved current account position of certain sovereign OECD borrowers (such as Sweden) and greater competition among intermediaries have produced better terms for those borrowers with access to the market. They have achieved lower costs and longer maturities (see Figure 1.7). The overall cost over LIBOR of a FRN (including front-end fees) for an OECD sovereign borrower in 1982 was around 0.6 per cent; by the start of 1984 this had halved to around 0.3 per cent. Maturities have lengthened, first to forty years and then to perpetuals.

The problem with perpetual FRNs is that, as unredeemable notes, they are not eligible for inclusion in primary capital under Bank of England regulations. The banks, therefore, had to devise a formula whereby an FRN would be both attractive to the market and at the same time satisfy the Bank of England's criteria for inclusion in primary capital. Lloyds Bank provided the solution. It argued that, in the (perhaps unlikely) situation of its experiencing credit problems, the notes could be converted into equity in the form of preference shares; this was an acceptable compromise solution to the Bank of England's original supervisory proposals. By converting to equity in times of crisis for the bank, the loan would become subordinate to other debts, ranking with equity. As such, it could be counted as equity. The formula proved a success and was followed by perpetual issues for Midland, National Westminster and Standard Chartered, thereby improving the free capital ratios of all these banks quite considerably (see Table 1.8).

Figure 1.7 Average terms on dollar FRNs for all borrowers



Source: Bank of England Quarterly Bulletin, March 1985, p. 60
Note: Perpetual issues are excluded.

The irony in this market is that it is conducted in risk capital at prices more or less equal to those of riskless interbank capital. The argument for these risk-free prices is that the Bank of England would prevent a UK clearing bank failure, thus making clearing bank perpetuals equivalent to gilt-edged stocks. Whether or not FRN investors should be protected as well as depositors in the banking system is a matter of opinion. The provision of LLR (Lender of Last Resort) support in this respect could lead to the collection of abnormal profits on the part of the banks, where returns to investors do not justify the risk of the particular investment. In such situations systemic risk could be increased.

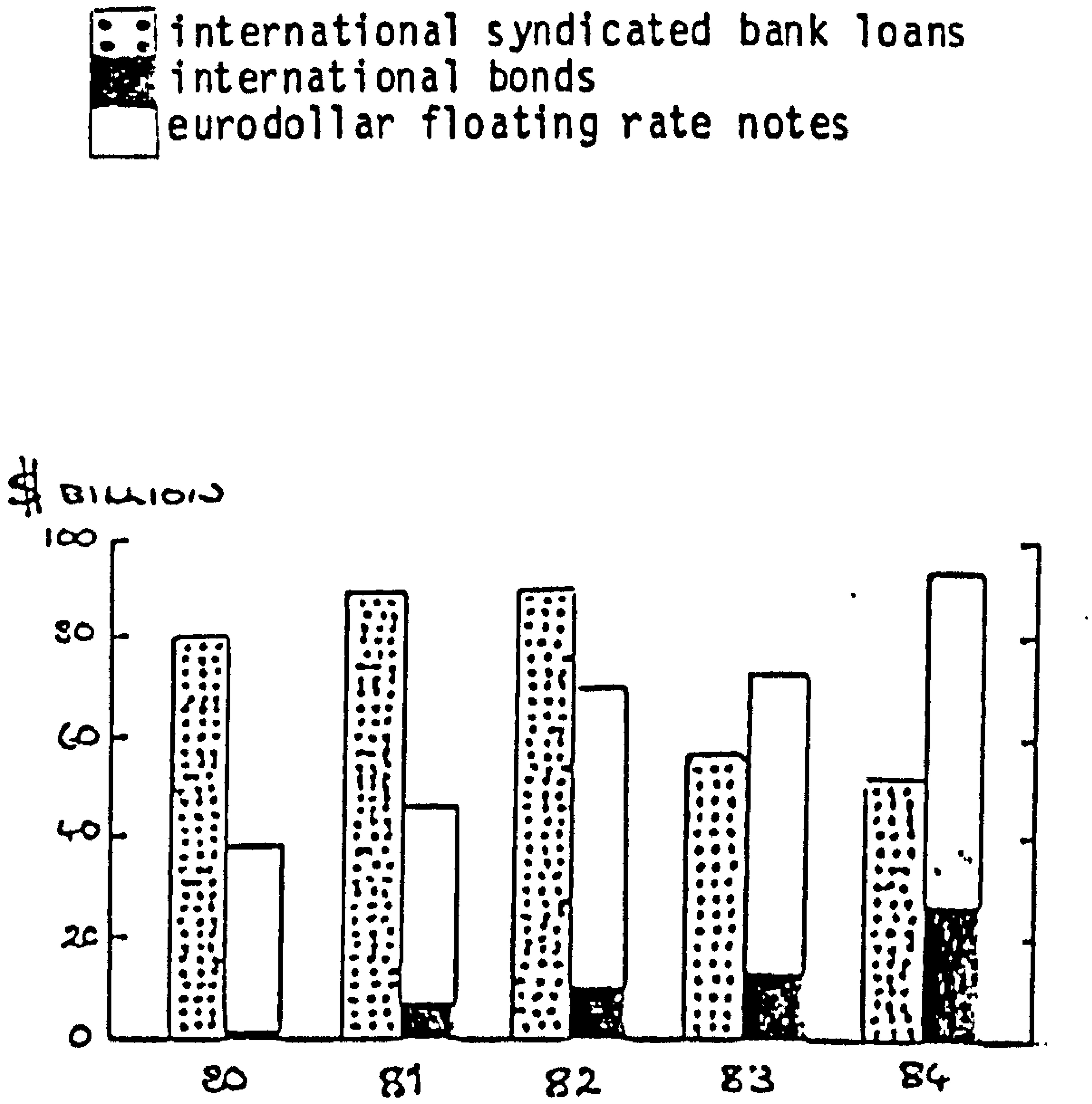
Table 1.8 Perpetual floaters

Bank	Amount ($ million)	Interest rate (%)	Free capital ratio (%)	
			End-1984	After issue
Lloyds	750	6-month LIBOR + ¼%	5.0	6.6
Midland	750	6-month LIBOR + ¼%	4.4	5.4
National Westminster	1,000	6-month mean + ¼%	4.5	6.0
Standard Chartered	400	6-month LIBOR + 1/8%	4.9	5.9

Source: The Banker, June 1985
Note: The effects of the deconsolidation of South African interests by Standard Chartered are reflected in the after-issue free capital ratio.

Until 1982 the rationale for issuing an FRN rather than arranging a syndicated loan was not so much the cost or maturity structure of the notes as the diversification of funding sources which could be achieved by selling paper to non-banks or to other banks that might otherwise not have participated in international lending. Paradoxically, it is the availability of funding sources which gives the FRN its high liquidity, and it is this liquidity that is the main reason for the growth of the market (see Figure 1.8). Any reduction in the liquidity of these notes will scare off the new FRN investors, such as corporate treasurers and money managers, who believe that the FRN is a money market instrument, a position that it has not yet reached. The FRN still represents medium-term unsecured risk, but because it is a security, bankers appear to believe that they have more security than if the money was lent as a credit. Only time can tell.

Figure 1.8 Gross volume of new international bonds and bank lending



Source: Salomon Brothers

For the corporate issuer FRNs have one great weakness: they do not enable the borrower to plan cash flow since interest payment periods are fixed. When a project is built around fixed price contracts, this is a major defect. It is this lack of flexibility that is the great weakness of FRNs, a weakness that has led to the development of one of the most innovative forms of lending in the euromarkets since the development of the eurobond in the 1960's - euronote facilities.

1.7 Summary

In this chapter we have explored the relationship between the phenomenon of securitisation and financial innovation. A link between the alleged underpricing of new financial innovations and systemic risk has been established. The latter part of the chapter examined some of the funding instruments that have developed in the euromarkets since the beginning of the eurobond market in 1963. From the following chapters it should be clear that the euronote facility incorporates aspects of all the instruments documented in this latter part of Chapter 1. In this sense, the forgoing survey has provided the necessary background for a more complete understanding of the emergence and nature of euronote facilities.

CHAPTER 2

EURONOTES: STRUCTURE AND PRICING

2.1 Introduction to Euronote Facilities

The euronote facility is a financial innovation in the traditional sense. It was developed for two reasons: firstly, to by-pass the government regulations imposed on banks' balance-sheet totals (footings) in the form of capital adequacy requirements; and secondly, to fill the gap left by the development of previous instruments, in particular revolving syndicated credits and floating rate notes. The euronote facility offers the borrower the flexibility of a revolving syndicated credit at the low cost of a bond.

Under a euronote facility a medium-term loan is funded by selling short-term paper, typically with a maturity of three or six months. A group of underwriting banks guarantee the availability of funds to the borrower by purchasing any unsold notes at each interest rate rollover date or by providing a stand-by credit. When the borrower is a bank, the paper is in the form of short-term certificates of deposit; when the borrower is not a bank, the paper form is promissory notes. This technique allows conventional instruments to be unbundled and reassembled in a novel form.

For the borrower the facility offers essentially the same features as a revolving credit, but the component functions can be carried out by several institutions rather than one: the first to arrange the loan, a second to provide the funds, and a third to be responsible for the maturity transformation whereby the borrower is assured of medium-term funds from a sequence of short-term borrowings. As the technique has developed, it has been possible to offer borrowers increased flexibility, and this is precisely what the FRN lacks.

2.2 The Difference between NIFs and RUFs

The facility just described is known as a euronote facility. When the facility is underwritten, as in this case, it is known as a revolving underwriting facility (RUF), and when it is not underwritten it is known as a note issuance facility (NIF). Hence a RUF is merely an underwritten NIF. Whereas the obligations of the facility arranger/placing agent in a NIF may simply be to use his best endeavours to place the notes or to activate a tender panel procedure (see 'Placement methods'), a RUF contains a legal obligation on the part of the underwriters to take up any notes not otherwise subscribed. This is a fundamental difference, as we shall see when we consider the regulation of euronotes. In this sense a NIF is not strictly a contingent liability because it is conducted on a 'best efforts' basis only.

Under the process of loan securitisation, debt is made negotiable in order that it may be sold direct to investors. As a result of this new phenomenon, the banks' traditional role as intermediary between the borrower and the lender is being eroded, a process known as disintermediation. Consequently, commercial banks are turning their attention to the investment banking field and acting less as principals (taking risks directly on to their own balance sheet) but more as underwriters/agents in the case of RUFs and agents in the case of NIFs. By this means they earn commitment fees and placing fees as an alternative to lending. Thus, there has been a blurring of the distinctions not only between traditional commercial banking and the functions undertaken by securities houses and merchant or investment banks, but also between the money and capital markets themselves.

2.3 Overview of the Market

It must be stated from the start that the future of the euronote market does not hinge on the continued existence of financing techniques such as NIFs and RUFs; these are merely hybrid techniques, which may only be a passing phase in the development of a market that will continue long after these acronyms have been forgotten. Its future lies in its ability to compete with, rather than merely provide an alternative to, other funding instruments available in the euromarkets: notably FRNs. For prime-name non-bank borrowers, this may mean developing along the lines of the US commercial paper market. It was often thought that the development of a eurocommercial paper market was unlikely. This is no longer the case.

With a RUF and, to a certain extent a NIF, the borrower is sure of the money if he needs it, knowing his maximum cost of funds but borrowing more cheaply according to the success of the notes in the market. This has been the underlying principle guiding the euronote market since the first issue arranged by Citicorp for the Shipping Corporation of New Zealand in 1978. The Shipping Corporation of New Zealand was a prime name in the international markets, and it was looking for floating-rate, revolving syndicated finance. At that time all the major international banks submitted proposals within the same price band. Admittedly they were the best rates for a prime name at the time, but what eventually won the day was not the finest terms bid but an entirely new structure, a committed note purchase facility (later known as a revolving underwriting facility). The facility developed by Citicorp was cheaper than a syndicated loan and with more flexibility than an FRN.

The development of this instrument was thus based on two observations of current market features. The first was that there already existed an active short-term debt market in certificates of deposit (CDs) covering a period of typically one, three and six month maturities. Why then should investors not also be interested in purchasing paper from other high quality investors such as governments and prime name corporations, many of which enjoyed an even higher credit standing than those banks already issuing CDs? The second observation was that, if banks were prepared to lend to these borrowers over a period of, say, five years, then why should they not also be prepared to underwrite a commitment for the issuing of their paper for the same period? The answer to these two questions was yes, and so the first RUF was born.

Two other important factors should be recognised in the Citicorp transaction. In the first place Citicorp acted as sole placing agent (SPA) in the transaction. The tensions which such a role can cause with underwriting banks will become apparent in our discussion of placement methods. Second, by selling the notes purchased from the issuer, Citicorp succeeded in removing the notes from its own balance sheet. As margins on lending continued to decline, return on assets (ROA) became probably the most important profitability measure for banks. Attention began to focus more on fee income than interest income. Both these points will be expanded in later chapters, but we should recognise in them themes which had an important influence on the development of a eurocommercial paper market a few years later.

2.4 The Market Players

2.4.1 Investors

With the onset of the international debt crisis and pressures on banks' capital ratios, euronotes were a particularly tempting investment for banks seeking short-term liquidity. As a result, the euronote market owes its existence to an initially large interest by commercial banks in the purchase of these notes. Notes were thus purchased at spreads over LIBOR. The bank investors were mainly those that had previously participated in the syndicated loan market. However, as the advantages of euronotes became clear, many smaller commercial banks and merchant banks not previously involved in syndicated lending began to participate in the market, with a move towards greater mismatching of funds. This increase in market participation heralded an inevitable increase in competition to the extent that spreads, although still over LIBOR, fell significantly. Banks no longer looked for a high yield on notes but were satisfied with a lower spread for a good name.

Coinciding with this development was the emergence of prime name corporate buyers. For those investors LIBOR was irrelevant, because their cost of funds was tied more accurately to the rate that they could obtain in a bank deposit of similar term to the respective investment. The euronote market has developed to the point where there are now two distinct types of investor:

1 banks and near-banks
2 prime name corporate and high quality sovereign states

Banks are bound to be the main buyers of LIBOR-plus paper for the simple reason that no investor will be over-enthusiastic about investing in an instrument which yields less than his cost of funds unless the possibility of a mismatch position is overwhelmingly attractive. Banks, therefore, tend to invest in higher yielding, riskier paper. Prime name corporations, on the other hand, are far more risk-averse than commercial banks, and they seek an investment for which they are virtually guaranteed repayment. This type of investor has readily available short-term funds to invest, but will not place them in LIBOR-plus paper because of the higher risk of non-payment. They will seek sovereign or prime corporate paper, based on the criteria of other short-term investments open to them at the time, such as certificates of deposit, treasury bills and US commercial paper.

2.4.2 Borrowers

The yield at which euronotes are issued is dependent upon the credit quality of the issuer and on the investor base at which the notes are aimed. The highest quality issuers will be able to issue paper at rates below LIBID (London interbank bid rate), whereas for poorer quality names the LIBOR-plus category will be relevant. It is in between these two categories, LIBOR-plus to LIBID-minus, that the fiercest battles will be fought. It is precisely this middle pricing category that is most likely to disappear, because successful placing agents will fight to place lesser price paper in the LIBOR-minus category, with their failures ultimately descending to the LIBOR-plus category.

From an issuer base with three yield bands there may thus develop a two-tier market, in which the world's highest quality borrowers will be able to issue paper below LIBID. This paper is aimed at the higher quality investor market of prime bank names and non-bank investors. Lesser quality sovereign or corporate names will have to issue at rates identical to, or in excess of, LIBOR, and these notes will therefore be aimed at investors tied to such an index, namely banks. As a result of this 'adverse selection' against them, banks will face a deterioration in the overall quality of their credit portfolios.

2.4.3 Summary

From the preceeding, it seems likely that in coming years the share of notes held by banks will fall as higher quality names enter the market. Banks, unable to purchase such paper because of its low yield, will either be forced completely out of the market or will have to serve as agents bringing together sources of funds (investors) and users of funds (borrowers). The trend towards loan securitisation is therefore one that must inevitably go hand in hand with the trend towards disintermediation and the deterioration in on-balance sheet lending. As a result, the attraction for banks in the near future may be not so much the issue or purchase of euronotes as the arrangement of the facility. Indeed a definite decline in the issue of bank euronotes is already perceivable (see Table 2.1).

Table 2.1 Volume and number of euronote transactions by type of borrower (1976-86)

$ million

	1978-83		1984		1985		1986	
Sovereign	1750	(6)	7225	(6)	3035	(7)	8868	(25)
Supranational	250	(3)	500	(2)	850	(2)	200	(1)
Corporate	2119	(22)	6676	(43)	28769	(157)	9132	(60)
Bank	4743	(53)	2719	(32)	7269	(69)	4909	(51)
	8862	(84)	17120	(83)	39950	(235)	23109	(137)

Source: Euromoney Capital Markets Guide, 1986

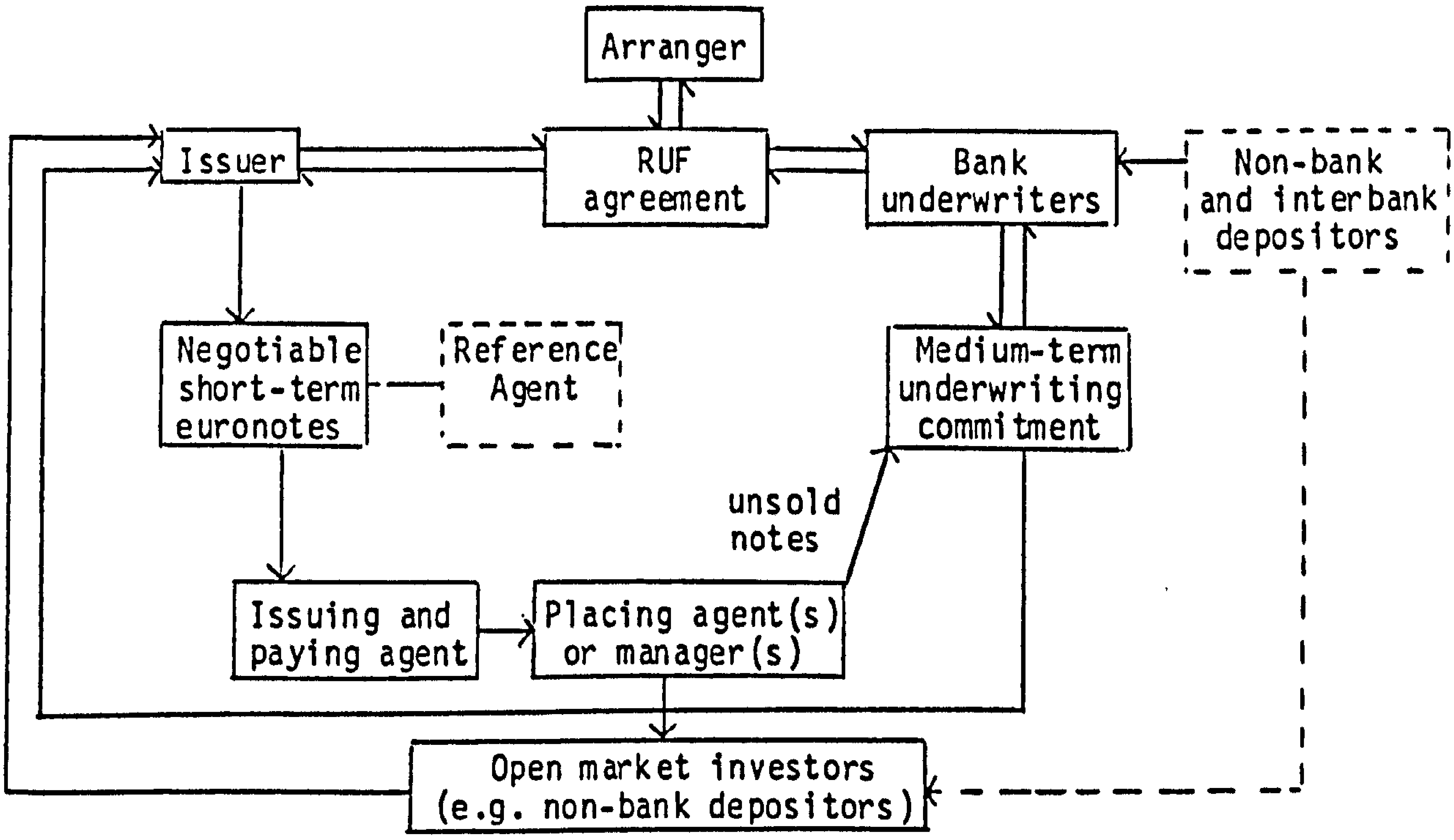
As more prime name borrowers and investors enter the market, LIBOR will start to become more irrelevant as a feasible reference rate. The fact that most prime name borrowers can now issue euronotes at LIBID minus or even at some other absolute rate bears this out. LIBOR could well go the same route as the US prime rate, which is now widely recognised as irrelevant to the funding schemes of the world's highest quality borrowers. This swing indirectly signals the comparatively diminished creditworthiness of the banks as measured by their own interbank system.

2.5 The Structure of a Revolving Underwriting Facility

Although a RUF is only one type of euronote facility, it is certainly the most fundamental. For this reason it is practical to highlight the structure and pricing of this instrument (noting that the main difference between a RUF and a NIF is merely the absence of an underwriting commitment in the latter) in order to be able to evaluate the structure of other instruments available in the euronote markets, all of which are essentially developments, or variants, of this particular instrument.

In a RUF the arrangers bring together a group of medium-term commercial bank underwriters and the issuer or potential issuer: these parties enter into a RUF agreement. The process is outlined schematically in Figure 2.1 Under this arrangement, the commercial bank underwriters agree to underwrite for a medium-term period the issue of negotiable short-term euronotes by the issuer. If the issuer decides to use the facility, notice of issuance is given to the commercial bank underwriters and, prior to the interest rate setting date, a selling period occurs, during which the negotiable short-term euronotes are

Figure 2.1 Parties to a RUF



Source: Dean Witter Capital Markets International Ltd

offered direct to open market investors. A variety of methods can be used for the placement of these euronotes during the selling period before unsold euronotes, if any, are allocated to the bank underwriters. Allocation takes place before the interest rate setting date in order to give the investors and underwriters the option of match-funding their investments. Under the RUF agreement it is usually the intention to sell the negotiable short-term euronotes to non-bank investors, who would otherwise be investing their liquid funds in bank deposits. Meanwhile, the commercial bank underwriters expect to receive an annual underwriting fee as compensation for their medium-term underwriting commitment. In the event of their being allocated unsold euronotes, they would continue to receive the underwriting fee and, in addition, would receive the full contracted yield on the negotiable short-term euronotes involuntarily purchased.

A RUF may be of two types. Firstly, it may be used as a source of funding, in which case notes will be issued and hence the facility will be drawn. Secondly, it may be held in reserve, when the facility is not drawn but used to back up other types of financing such as a US commercial paper programme; or it may simply be left undrawn as a type of insurance policy, to be used only if required. The different ways in which these two types of the same facility are priced will be discussed in the next main section, 'The Pricing of a RUF'.

Theoretically, the structure of a RUF dictates that its cost must be lower than that of a traditional syndicated loan because it separates sources of funding from sources of medium-term credit. As the notes usually mature within three or six months, with no obligation on the investor to purchase any further notes, the investor requires only a short-term return on his money. Furthermore, as the underwriters provide medium-term credit at low cost, the issuer pays a short-term rate for what is essentially a medium-term commitment. So how is it that underwriters are prepared to provide a medium-term back-up for a fee which more accurately reflects a short-term liability? The answer lies, once again, in the unique structure of a RUF, which provides the underwriter with remoteness from funding risk, increased return on assets, and a marketable short-term liability.

2.5.1 Remoteness from funding risk

An underwriter to a RUF is less likely to be called upon to honour his commitment than in a conventional revolving credit. The reason is that in a revolving credit the underwriter must provide funds on demand by the borrower, whereas in a RUF the execution of an underwriter's commitment depends not only on the borrower's decision to issue paper but also on the agent's inability to place that paper with investors. As the structure of a RUF is such that placing agents generally earn no fee if they fail to place the paper, underwriters may take comfort in the fact that placing agents will undoubtedly try their utmost to place the paper. As a result, the underwriter is two steps removed from funding, rather than one. Indeed, if a RUF is specifically designed as a stand-by, there may be a disincentive clause which penalises the borrower for using the facility, and so further reduces the likelihood that the underwriter will be asked to fund the borrower.

The very structure of a RUF may, therefore, contribute to a reduction in systemic risk. As the BIS (1986, p 204) point out:

> 'Many observers believe that unbundling (new instruments) permits better allocation of risks systematically. That is, price risk can be separated to a substantial degree from credit risk, and the market risk transferred to another economic agent who has an offsetting exposure on his balance sheet. To the degree that markets function in this fashion, total systemic risk is reduced, since the creation of new instruments by definition cannot create net new price risk, but instead is used to 'match' offsetting real exposures of economic agents. Some gain in reducing systemic risk may also derive from the lowering of credit risk for those economic agents able to lay off unwanted exposure to market risk'.

To the extent that RUFs can unbundle risks and lay off unwanted exposures to market risk in this way, systemic risk may be reduced. The BIS goes on to emphasise again, however, that it is important that the risks inherent in these new instruments are priced to provide an adequate return. At this stage it would be more correct to say that the structure of a RUF provides the 'potential' for a reduction in systemic risk. Whether this potential is realised will depend also on the pricing of the facility.

A second feature of a RUF which reduces the underwriter's risk of having to fund the issue is the fact that, as soon as paper is placed with the investors, the underwriters are assured of repayment of principal and interest and are in essence freed from that funding risk for the length of the maturity of the notes. As a result of this they may have capacity on their books to take on short-term advances until the date at which the notes mature. The danger has been noted, however, that underwriters may be called upon to fund an issue, possibly even in its entirety, if the conditions of the borrower deteriorate to the state that the placing agent(s) are unable to sell the paper in the market. However, as most RUFs contain an adverse changes clause (whereby the underwriters are released from their obligation to fund if the borrower's financial condition deteriorates), the underwriter's risk of being left with unsold paper is once more reduced. This clause thus prevents the issuer from drawing under the facility when a deterioration in his financial condition makes it likely that his agent(s) will be unable to place the paper. It is important to emphasise, however, that these clauses have never been tested in law.

2.5.2 Multi-option facilities

Multi-option facilities (see Glossary of Terms) have been developed whereby the borrower has several options on how he may raise funds, only one of which may be through the issue of short-term euronotes. Another option may be through direct borrowing from the underwriter. If the issuer decides on this route, the underwriters have been put back in the position of being only one step removed from funding. This obviously increases the underwriters' risk and tends to undermine their return on assets.

2.5.3 Return on assets

This is one way in which one may determine the financial return to an underwriter. The increase in the underwriter's return on assets (ROA) results from the continuous stream of underwriting fees, irrespective of whether the facility has been drawn or whether the underwriter has had to purchase unsold notes. According to Dungan (1985, p 12), for notes that have already been placed with end investors the underwriting fee is not applicable as the risk has been removed. As a result, the fee may apply only to those notes actually funded by underwriters and, hence, actually at risk. Similarly, the underwriter's front-end fees (received for participation in the facility) may be amortised over the life of the facility and applied only to the average amount actually funded, so providing an increased return on assets. In addition, although it is possible that underwriters may be forced to purchase notes because there is no market for them, it is much more likely that they will be forced to purchase because the margin on these notes has risen. If this is the case, it may still be possible to sell the notes in the market within the combination of the margin and the underwriting fee, therefore minimising the loss on the notes (if any) carried by the underwriter. When an underwriter is required to provide funds in the form of a bank loan, such transferability was not possible until recently.

Although ROA provides us with a method for assessing the financial return to an underwriter, the actual return is by no means certain. The return to the underwriter will be determined by a number of factors such as:

- how many notes the underwriters are forced to purchase
- the time at which they purchase notes
- whether or not the notes can be resold
- any tax or capital requirement attached to the facility

By calculating a ROA under different funding scenarios, it may be possible to consider more accurately whether the return to the underwriters provides adequate compensation for the exposure incurred. If this could be done on a market basis, one could obtain an indication of whether euronotes contribute to an increase in systemic risk, at least in the short-run. This analysis will be attempted in Chapter 7. There are, however, flaws in the ROA methodology as a means of calculating the return to underwriting banks. These flaws will be identified in Chapter 7 and an alternative method for calculating the return to underwriting banks will be proposed.

2.6 Pricing of a Revolving Underwriting Facility

The purpose of this section of the chapter is not to review pricing theory *per se* as it relates to RUFs (this is covered in Chapter 6). Rather this section will examine the main pricing components of a RUF. The theoretical and practical pricing processes of a RUF will be compared to that of a simple revolving credit agreement. It will be argued that, theoretically, the pricing process of a RUF is no more likely to lead to an increase in systemic risk than that of a revolving credit agreement. The practice, however, may be different. From a practical stance there has been no experience of default in the euronote market to guide pricing. Pricing may be based more on heuristics than formulae. To the extent that heuristics used may be poor surrogates for measures of risk (default probabilities, etc) systemic risk may be increased. The section concludes with a brief exposition of how the discounted issue price and maximum yield to maturity are actually calculated on euronotes.

2.6.1 Pricing components

The pricing components of a RUF can vary significantly, depending upon the specific funding requirements of the borrower. However, the following represent the three most common components of such a facility:

2.6.1.1 Annual underwriting fee (or facility fee)

This is payable by the issuer and is usually settled semi-annually or quarterly in arrears on the full amount of its underwriting commitments. This fee is due irrespective of the use made of the facility and irrespective of whether the underwriters are required to purchase short-term paper or make advances. It is thus similar to the commitment fee of a traditional revolving credit except that it is paid irrespective of use.

2.6.1.2 Arrangement fee (or front-end fee)

This is payable by the issuer to the arranger(s) of the facility at closing, and a portion of it will be shared with the underwriters in the form of front-end management or participation fees.

2.6.1.3 Yield

The yield on the notes when sold to the placing agent, tender panel or underwriters will vary with market conditions, the maximum yield being nearly always equal to the yield at which the notes have to be taken up by the underwriters. The spread on the notes, relative to a particular interest rate benchmark, will vary according to the quality of the borrower and the type of investor at which the notes are aimed; LIBOR, LIBID and US prime have all been used. Since investors prefer to purchase securities at par or at a discount (rather than at a premium involving a capital loss at maturity), notes are normally priced carrying a low nominal interest rate, and they are issued at a discount. If the borrower's credit standing improves or the market for his notes expands, this method enables the yield to be lowered simply by an increase in the price or a lowering of the re-allowed discount. A placement commission may also be payable.

In pricing RUFs lead managers set the fixed margin or the 'cap rate' at a level which they believe can be sustained for the entire medium-term life of the facility. If there is any future protection required, the facility will include provisions for higher returns to the underwriters in the event of increased levels of funding.

2.6.2 Revolving loan commitments

Over the last fifteen to twenty years loan commitment contracts have increasingly replaced alternative credit instruments in the commercial loan markets. By 1986 these contracts accounted for about three-quarters of bank business loans in the United States (Melnik and Plant, 1986, p 267). A similar proportion is found in other industrial countries. Previous papers on loan commitment contracts have emphasised the problem of credit availability on the supply side. Examples of this approach may be found in Blackwell and Santomero (1982), Deshmukh, Greenbaum and Kanatas (1983). Other work in the area of loan commitment contracts has concentrated on the specific issue of pricing of these contracts. Papers here include Thakor, Hong and Greenbaum (1981), Hawkins (1982), Berlin (1986) and Melnik and Plant (1986).

The following section will examine how loan commitment contracts became the dominant commercial credit instrument. This will be followed by a brief analysis of the pricing of loan commitment contracts (or revolving credit agreements) compared to the pricing of revolving underwriting facilities (RUFs), in theory and practice.

2.6.3 An overview of institutional changes in the loan market

One of the most important changes in the nature of banking in modern economic history was the transformation of banks from institutions which granted mainly short-term self-liquidating loans to intermediaries operating mainly through long-term customer relationships. This transformation from transaction-based loans to enduring customer relationships began in the early twentieth century. Since this transformation is so important, it is useful to recount its historical development.

Classic banking procedure strove to base all bank earnings on short-term, self-liquidating commercial loans. This approach, referred to as the 'real bills doctrine', may be traced back to Adam Smith (1776). Smith contended that a bank could ensure adequate liquidity and profitability by adhering to four principles: the bank should hold an adequate level of reserves; the bank should also maintain correspondent relationships and secondary reserves in order to be able to compensate for lost reserves; the loan portfolio should comprise only self-liquidating loans; and loans should be advanced only to industrial and commercial customers. The last two guidelines have become known as the 'real bills doctrine'.

In terms of banking practice, commercial banks on both sides of the Atlantic adopted the real bills component of Smith's theory. From the start of the nineteenth century banks generally lent short-term funds backed by promissory notes. In some cases the doctrine became legally binding through legislation (see Klebaner, 1974, for a detailed review of banking legislation).

Although banks still followed the doctrine at the turn of the century, customer-specific risk premiums were becoming increasingly common. This was followed by a gradual shift towards term loans. The shift to longer-term business was accompanied by a diversification of bank portfolios (Laughlin, 1910). It was also accompanied by a gradual shift in basic loan screening techniques. As far as longer-term loans were concerned bankers began to use borrower financial characteristics as primary criteria for the granting of loans rather than specific transaction parameters.

Although official policy in the 1920s and 1930s continued to endorse the real bills doctrine, in practice banks were, by this time, moving further away from strict adherence to the doctrine. By the 1960s, term loans were the largest category in bank loan portfolios. These were followed by long-term revolving credit agreements in the 1970s. Over 80 per cent of long-term commercial and industrial loans in the United States are now made under revolving loan commitments (Brady, 1985).

The pricing of transaction-specific loans is well known. Essentially it is based on discounting promissory notes. In contrast, the pricing of enduring customer-specific credit facilities has attracted relatively little analysis. The contracts involve two pricing variables, the interest for take-downs and the commitment fees. As Melnik and Plant (1986, p 270) point out:

> 'One of the major differences between transaction-based lending and enduring customer relationships is the method of pricing risk. Under transaction-specific lending the borrower is charged an increasing risk premium that varies directly with the amount of funds borrowed. Therefore the risk premium by which lenders are compensated is built into the marginal pricing formula of credit. Under the loan commitment contract the borrower generally compensates the lender (for risk) through a lump sum front-end payment'.

Melnik and Plant go on to argue that this key difference helps to explain the historical trend towards enduring customer relations. They argue (1986, p 279) that commitment contracts now dominate because their pricing formula leads to a more efficient utilisation of credit. They show that, whenever default risk is independent of utilisation, the pricing of 'insurance' against default risk as a fixed front-end fee is preferable. However, when default risks increase with draw-down, a rising marginal risk premium could be more appropriate.

2.6.4 Pricing revolving loan commitments and RUFs in theory

Although all commitments involve a contractual promise to lend up to some maximum amount over a given period, revolving credit agreements (or loan commitments) also contain a loan formula. The loan formula contains a benchmark or reference rate (eg prime, LIBOR, LIBID, etc) and a contractually fixed markup. The size of the markup is determined by the customer's creditworthiness. Revolving credit agreements therefore protect the customer against both funding/availability risk (the risk that funds may be unavailable at a future date) and markup risk (the risk that funds may only be available at a substantially increased cost).

As Berlin (1986, p 7) emphasises:

> 'The provision of insurance, however, is not costless for the bank. While the fixed markup provided by a revolving loan commitment is a definite advantage to the customer, it increases bank risk'.

In order to compensate the bank for this risk, customers with revolving credit agreements are usually required to pay a commitment fee. The fact that commitment fees are seldom required on confirmed credit lines indicates that it is the combination of the promise to lend and the fixed markup that poses special risks for which the bank requires added compensation.

In the following paragraphs we will examine the theoretical pricing process of a revolving credit agreement compared to that of a RUF. In theory, the pricing of a RUF is very similar to the pricing of a revolving credit agreement or 'line commitment'.

A line commitment is a promise from a bank to lend up to \$L until the maturity date T. Between now and date T the firm, at its discretion, can borrow all or part of the line at r(t)+ per cent per period (the interest rate benchmark plus a given risk premium), where the risk premium may be a function of the interest rate benchmark (Hawkins, 1981, p 60). The gross dollar amount of the line being used at any time is denoted by B. This represents the face value of current borrowings. All outstanding borrowings must be repaid at time T.

In addition to paying interest on the amount of borrowing on the line commitment, the company may often agree to keep a certain level of deposits with the bank, although this may not always be the case. These deposits are known as compensating balances. The amount of compensating balances required is a proportion of both the size of the line commitment, L, and the current borrowings or 'draw-down', B. The analysis can be simplified by using one proportion, x. Required compensatory balances are x(L+B). If compensatory balances fall below this level, a penalty must be paid. This penalty is of the form of p per cent for every dollar the actual compensating balances, CB, are below the required balances (ie, p(x(L+B) - CB) dollars). A line fee of μ per cent is paid on the amount of unused line borrowing.

The nature and form of compensating balances can differ greatly among loans. Our example presents a simple, traditional form of compensatory balances, and is sufficient for our purposes. For a more comprehensive discussion of compensatory balances, see for example, Bartter and Pendleman, 1979.

In our example, when the firm borrows $B of the line, after taking account of compensating balances, net borrowing is only B-CB = N dollars. From the above description Hawkins (1981, p 61) explains that the per-period payment of the firm due to the line C is

$$C = \mu(L-B) + p(x(L+B) - CB) + (r+\sigma)B$$
$$= (\mu+px) + ((r+\sigma) - \mu + px)B - pCB$$

If we were to devise a formula to determine the yield to bank underwriters in a RUF, it would be very similar. It could be written as follows:

$$C = a + \mu(L) + (r+\sigma)B$$

where:

C = committed amount

a = front-end fee (a fixed constant)

μ = the facility fee

L = line commitment

$(r+\delta)B$ = an interest rate benchmark plus a risk premium on the borrowed amount. In the case of a RUF this is referred to as the maximum margin

There are certain differences between a RUF and a revolving credit agreement. A RUF requires no compensatory balances. With a RUF, however, the facility fee (line fee in the case of a revolving credit agreement) is paid on the total committed amount, not just the line outstanding. Apart from these differences the theoretical pricing structures of a RUF and a revolving credit agreement are very similar. They differ most in structure as section 1 has emphasised. Theoretically, both formulae should be calculated to provide what may be viewed as an 'adequate' return. If the risk premium charged in either case is insufficient for this purpose, systemic risk could be increased. There is, however, little 'theoretical' pricing evidence to suggest that this is more likely to be the case with a RUF than with a revolving credit agreement.

2.6.5 Pricing in practice

In practice there is no set procedure or formula for setting the pricing levels of the separate components of a RUF. Unlike revolving credit agreements, RUFs are new, complex and largely untested as far as bad debt experience is concerned. Much of the assessment is based on what the arranger(s) of the facility perceives to be the correct market price for the issuer's paper. In order to assess this 'correct market price', however, the arranger(s) will try to compile a profile of the issuer by looking not only at his present financial position but also his past transactions (if any) in this market, as well as past issues of FRNs, fixed-rate bonds, bank credits, and so on. The arranger(s) will also examine any US commercial paper programme that this issuer may have, or have had, and the rating which this paper was given. Having examined all these factors and assessed the 'current feel' of the market, the arranger(s) must fix a price aggressive enough to gain the issuer's mandate but with a yield high enough to attract short-term investors and underwriters. If this yield is insufficient, systemic risk could be increased. To the extent that it may be based on 'heuristics' this may well be the case. This area will be examined in Chapter 9.

The actual pricing of the facility will depend on whether it is meant to be used or whether it is designed merely as a stand-by facility, in which case the underwriting fee would be lower than on a used facility because of the underwriter's lower perception of ever being called upon to purchase notes. However, there would also be a higher usage cost for this facility in order to compensate the underwriters for their lower commitment fee if the facility was used, and indeed to dissuade the borrower from using the facility at all.

In the case in which the facility is meant to be used, the underwriting fee would be higher, with a lower usage cost. A maximum yield would be set on the notes in relation to the average market level at which the borrower could obtain short-term funds. This is the contracted yield (or strike yield) at which euronotes will be allocated to the underwriters in the event that the placing agent(s) have been unable to place the entire tranche with market investors. In order to create this maximum yield, given the low interest rates attached to euronotes, it is necessary for the notes to be issued at a discount. The maximum yield is thus the value of the interest, payable at maturity, plus the discount on the notes, expressed as a percentage of the price originally paid or the discounted issue price. Under this method the issuer never receives the full nominal principal amount of the RUF as the notes are issued at a discount to their face value.

2.6.6 Determining the discounted issue price and maximum yield

The discounted issue price set on euronotes is simply determined by the following formula: the principal sum (i.e. face value of notes to be issued) plus the principal sum multiplied by (the spread relative to LIBOR, multiplied by the maturity of the notes) all over 1 plus (the full contracted yield rate multiplied by the maturity of the notes). This can be written:

$$\text{Issue price} = \frac{\text{principal} + (\text{principal} \times \text{spread relative to LIBOR} \times \text{maturity of notes})}{1 + \text{full contracted yield rate} \times \text{maturity of notes}}$$

<u>Example 1</u>

Assume:

Principal	=	\$10,000,000
Spread relative to LIBOR	=	LIBOR less 0.125% p.a.
Maturity of notes	=	6 months (182 days)
Full contracted yield rate	=	LIBOR plus 0.25% p.a.
6-month LIBOR	=	10% p.a.

Thus:

$$\text{Discounted issue price} = \frac{10{,}000{,}000 + (10{,}000{,}000 \times 9.875/100 \times 182/360)}{1 + 10.25/100 \times 182/360}$$

$$= \frac{10{,}499{,}236}{1.0518194}$$

$$= \text{US\$ } 9{,}981{,}975.9$$

To find the maximum amount payable at maturity and hence the maximum yield we simply take the sum of the top half of the equation:

Maximum amount payable at maturity = principal + (principal x spread relative to LIBOR x maturity of notes)

$$= 10{,}000{,}000 + (10{,}000{,}000\ (9.875/100 \times 182/360))$$

$$= \text{US\$ } 10{,}499{,}236$$

Another way of calculating the maximum amount payable on the notes is by using the discounted issue price and full contracted yield in place of principal and spread over LIBOR respectively:

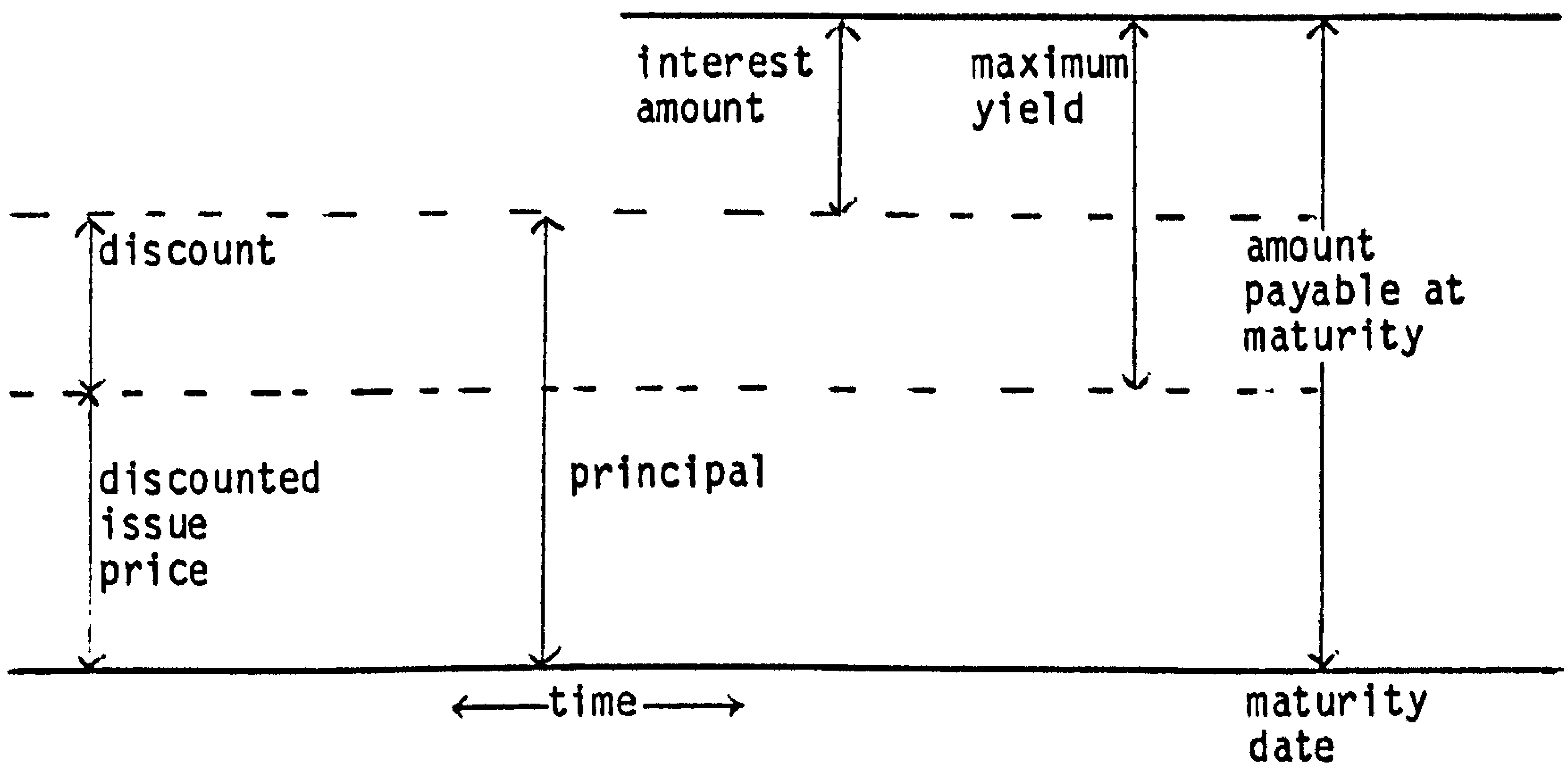
Maximum amount payable at maturity = issue price + (issue price x full contracted yield x maturity of notes)

$$= 9{,}981{,}975.9 + (9{,}981{,}975.9\ (10.25/100 \times 182/360))$$

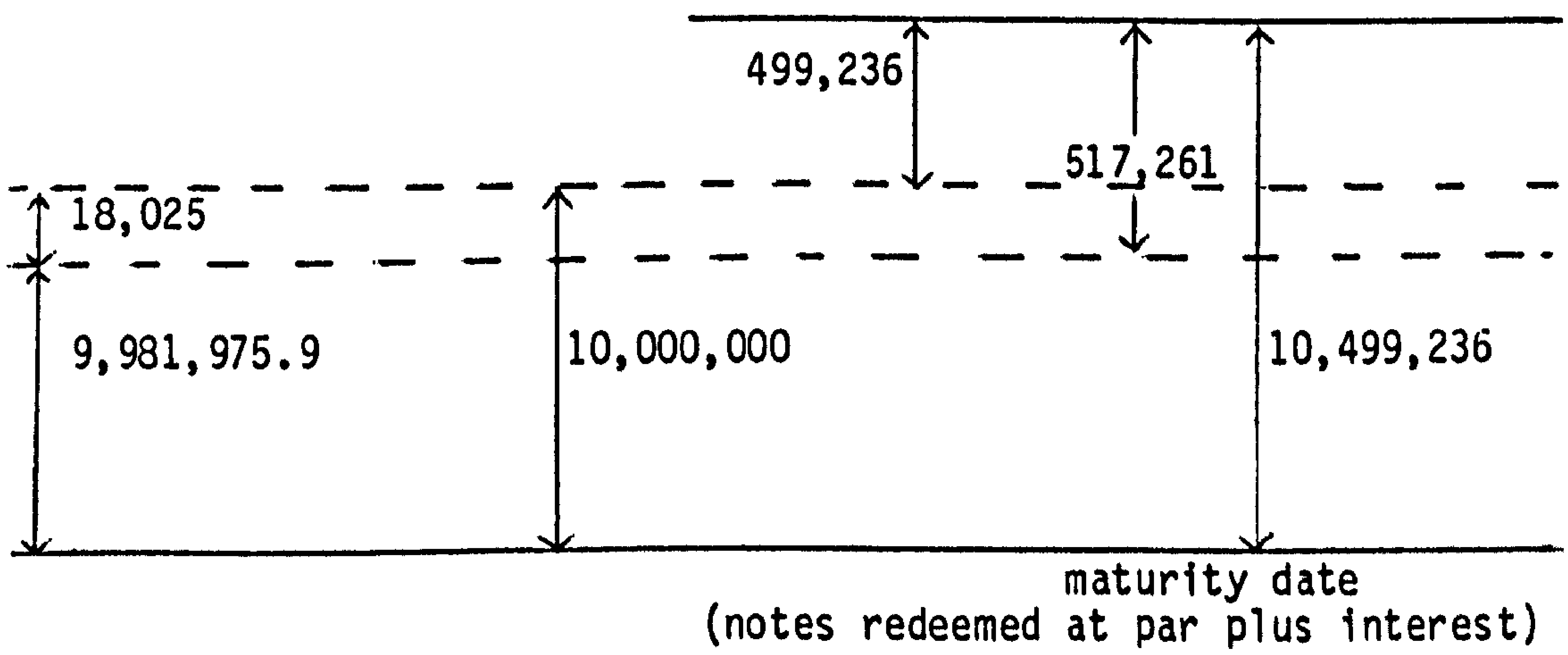
$$= \text{US\$ } 10{,}499{,}236$$

The maximum yield is thus the difference between the issue price and the price payable at maturity, in this case $517,261.

The method of setting this maximum yield on the discounted issue price is explained in the diagram below (adapted from Dean Witter Capital Markets International Ltd):



If we were to insert the figures used in our arithmetical Example 1 into this diagram, the following would be the case:



This shows how notes are issued at a discount, which in this case is \$18,025 (\$10,000,000 - \$9,981,975). The maximum yield on the notes is thus equal to the discount plus the interest sum payable on maturity, which is \$517,261; this plus the discounted issue price gives the total amount payable to the underwriters on the maturity of the notes.

However, the maximum full contracted yield is only the yield given to the underwriters in the event that they have to purchase unsold paper. The paper is offered to market investors at a lower yield. This is achieved by selling the paper closer to its face value (principal amount), thereby reducing the discount and so raising the issue price. This results in a higher amount being paid initially (because of the lower discount) with the same nominal amount being received at the maturity of the notes issued (with interest remaining unaffected). This process of lowering the yield on euronotes from the maximum yield is shown arithmetically in Example 2.

Example 2

Using the same figures as in Example 1 but with a lower contracted yield of only LIBOR flat (10% p.a.), we can write:

$$\text{Higher discounted issue price} = \frac{10{,}000{,}000 + (10{,}000{,}000\ (9.875/100 \times 182/360))}{(1 + 10/100 \times 182/360)}$$

$$= \frac{10{,}499{,}236}{1.0505555}$$

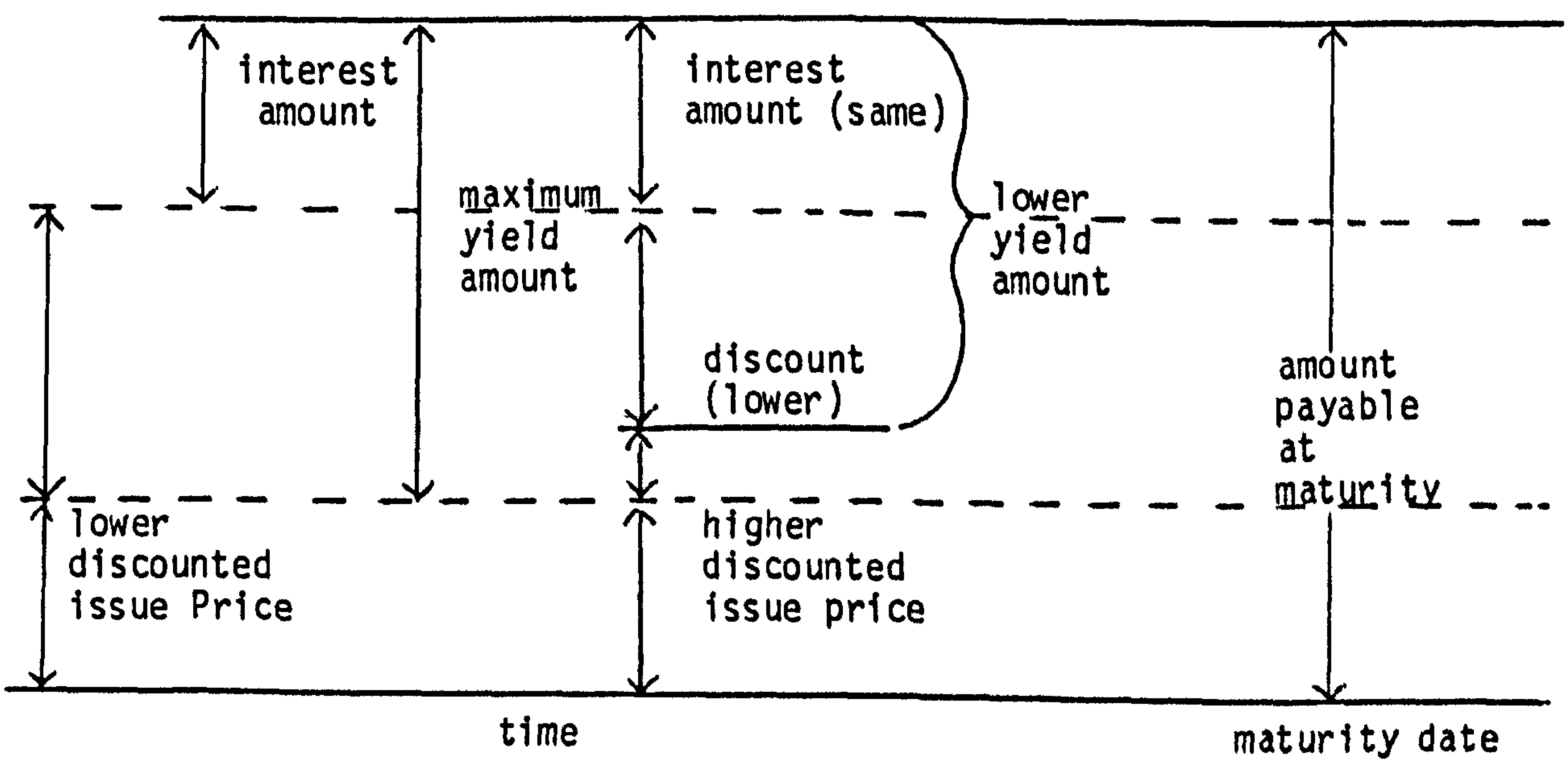
$$= 9{,}993{,}985$$

Higher discounted issue price = US$ 9,993,985

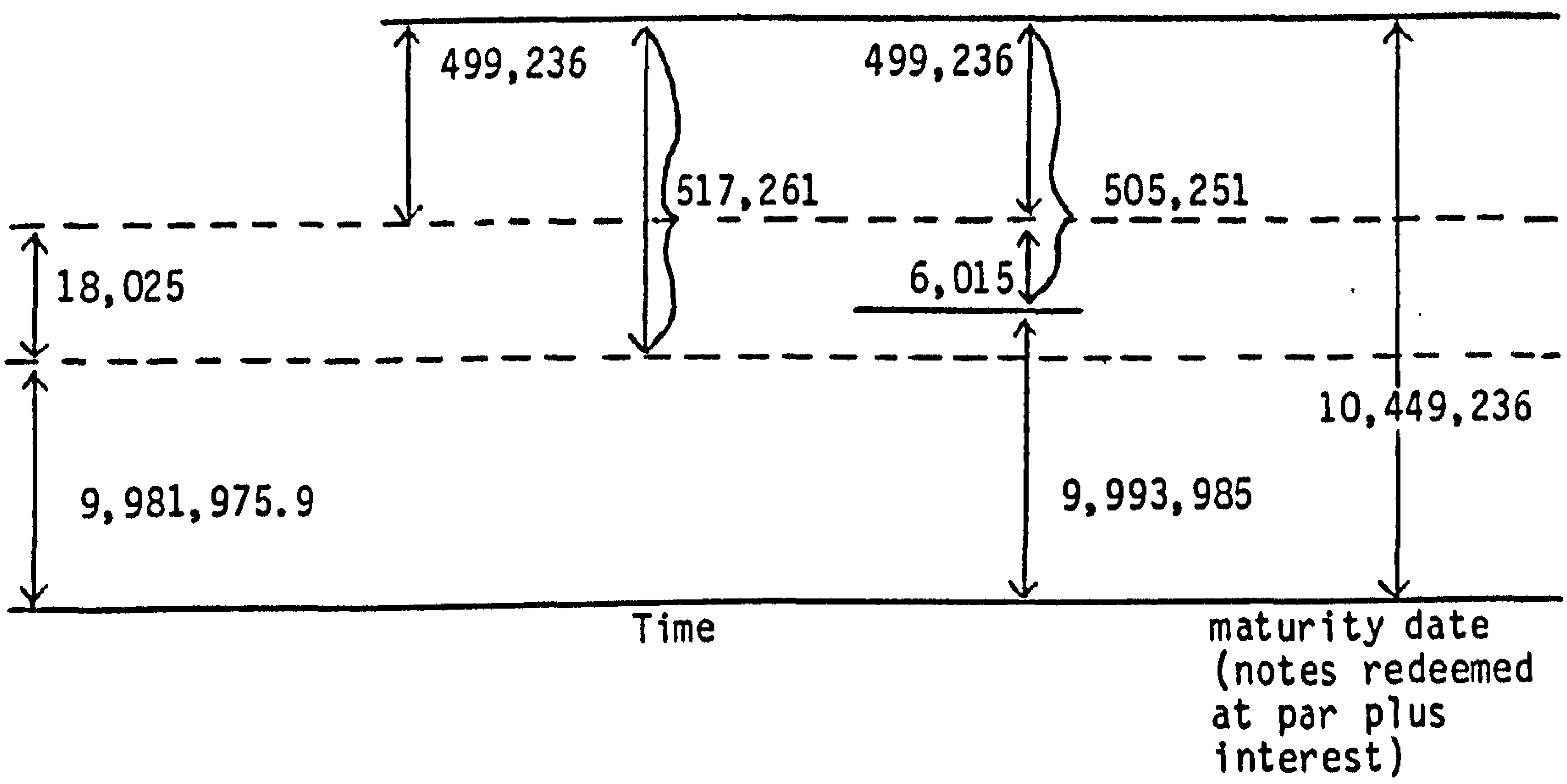
The discounted issue price has been increased by lowering the yield percentage. However, as the interest rate sum is fixed, the notes will be redeemed for the same amount as before:

Maximum amount payable at maturity	=	100,000,000 + (100,000,000 (9.875/100 x 182/360))
	=	US$ 10,499,236

The reduced yield on these notes is only \$505,251 compared with a previous total of \$517,261. Even though the investor will receive the same principal amount back at maturity as before, he will have had to pay more for the notes in the first place, and therefore his return is reduced. The process of lowering the yield on euronotes from the maximum yield can also be shown diagrammatically:



If we were to insert the figures used in Example 2, the following would be the case:



It is clear from the above example that increasing the discounted issue price (and hence reducing the discount) does not affect the amount payable at maturity, but that making the notes more expensive initially lowers the yield (discount plus interest amount) at maturity.

2.7 Summary

In this chapter we have examined, firstly, the structure of RUF and assessed its implications for systemic risk, and secondly the processes (both theoretical and practical) of pricing a RUF, and compared them to the process of pricing a revolving credit agreement. We would conclude that to the degree that the structure of a RUF allows different risks to be unbundled and transferred to economic agents with offsetting exposure, systemic risk may be reduced. Further, the pricing process of a RUF, at least theoretically, would appear to be no more likely to contribute to an increase in systemic risk than that of a revolving credit agreement. In practice, however, this may not be so. The euronote market is still in its infancy. There has been little, if any, bad debt experience to date. In practice, pricing is based on perception. The lack of a tried and tested pricing process for RUFs may, therefore, contribute to an increase in systemic risk where RUFs replace revolving credit agreements.

CHAPTER 3

COMPARISON OF EURONOTES AND ALTERNATIVE INSTRUMENTS

3.1 Introduction

The main purpose of this chapter is to compare the costs of euronote facilities with the costs of syndicated loans (eurocredits), and to examine the implications for systemic risk. Euronote facilities have largely replaced eurocredits (euro-bank loans). They have done so for a variety of reasons, the main one being cost. It will be shown in this chapter, building on previous evidence, that a borrower's cost of funds in the euronote market (so long as the market is open to him) is considerably below his cost of funds in the eurocredit market. Significantly, it will be shown that the euronote market charges lower premiums for differences in country risk than does the eurocredit market. If these contentions are supportable we will have a rationale on which to build our study of systemic risk in the euronote market. That is: if it is cheaper to borrow in the euronote market than the eurocredit market this implies that investors are prepared to accept a lower return in the euronote market. Risk should, theoretically, be less in the euronote market than in the eurocredit market to compensate for these lower returns.

Before embarking on our analysis of euronote costs versus eurocredit costs, it will be necessary to examine briefly the advantages and disadvantages of euronotes compared to other funding possibilities. By doing so it will be shown that euronote facilities compete with more than just bank credit facilities. The chapter will conclude with a comparison of the advantages and disadvantages of euronotes compared to alternative investments.

3.2 The Borrower's Perspective

3.2.1 Comparative costs of euronotes and FRNs

In a euronote facility the cost to the borrower is stated on a 'probable cost' basis, the probability being that notes will be placed with market investors at either a pre-fixed yield or a competitive yield, rather than being left with the underwriters at the full contracted yield. The borrower can never be absolutely certain of the price he will eventually have to pay for the facility, although he will know the maximum price that may be payable. This is a criticism that is also valid when comparing euronotes with syndicated credits.

With an FRN the cost to the borrower is certain: the price is predetermined, and the note is sold at that price. On this basis the FRN would appear to be more favourable to the prime name borrower than a euronote facility. Indeed, it is no longer certain that a prime name borrower will even be able to achieve a lower probable cost on a euronote facility than the certain cost of an FRN, because prime name FRNs can now be issued at sub-LIBOR pricing; the Kingdom of Sweden US dollar FRN priced at LIBID less 1/16 per cent p.a. (1986) is an example. Although Sweden is receiving bids of under LIBID on its outstanding $4 billion euronote facility, when the 1/8 per cent p.a. commitment fee for this facility is taken into account the margin on the notes increases to nearly LIBOR-flat.

For a euronote facility to be competitive with a high quality sovereign FRN such as Sweden, the market must first develop well below its present yield barriers to be able to absorb high credit notes at discounts below available FRN spreads. Only then will the probable cost of a euronote (for high quality borrowers) be competitive with the certain cost of an FRN. For lesser quality borrowers without access to the FRN market or with access at unfavourable rates, the euronote market will be the more attractive of the two alternatives.

3.2.2 Fluctuations in the costs of funds

Under an FRN, a fixed-rate bond or a syndicated loan, the borrower's cost of funds is unaffected by shifts in his creditworthiness or a deterioration in the market's perception of his creditworthiness once the paper has been placed or loan advanced. Although such a situation may affect the price at which an FRN or fixed-rate bond is traded in the secondary market, it will have no effect on the issuer's immediate cost of funds. With a NIF or RUF, however, as notes are issued in proportionate amounts over the life of the facility to make up the full credit, a shift in the market's perception of a borrower's financial position can adversely affect the price at which it can place (if at all) the next tranche of notes under the facility.

3.2.3 Maturities

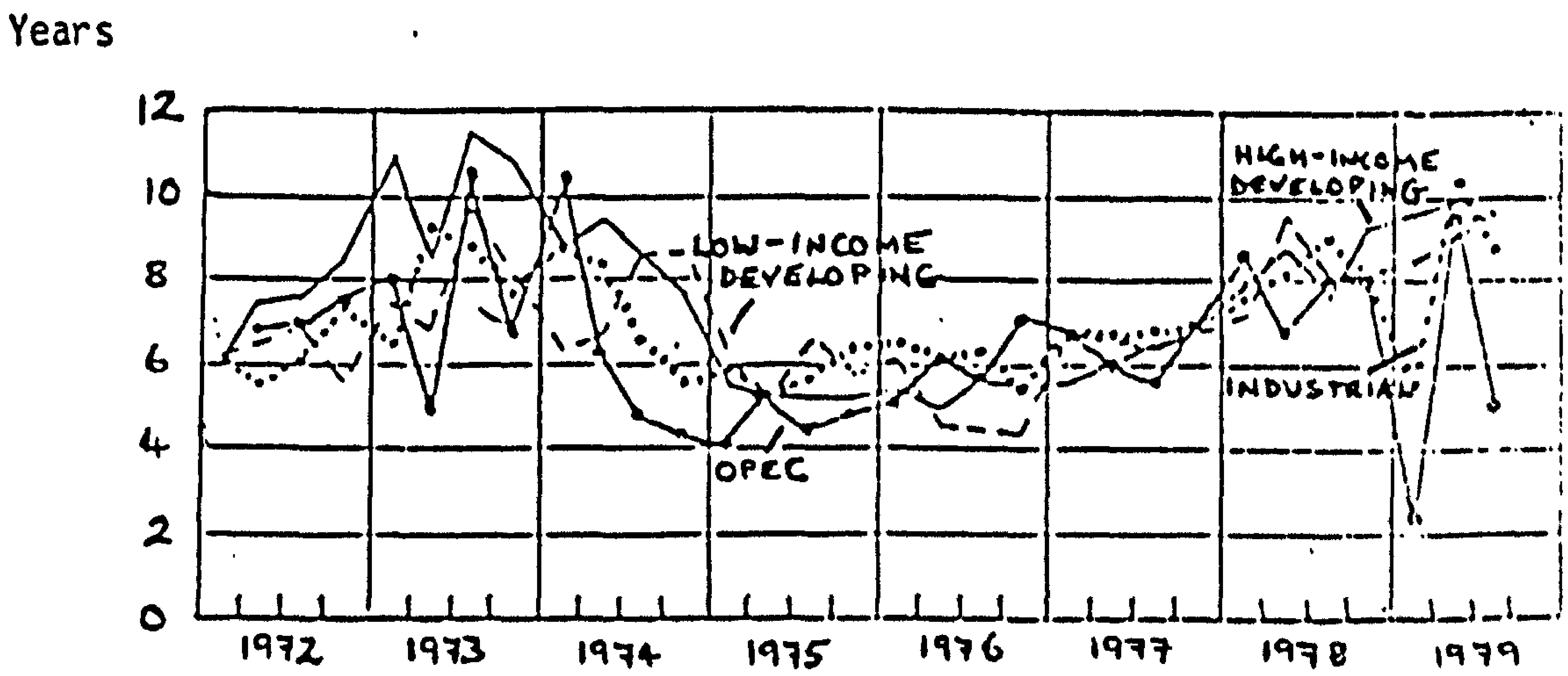
Table 3.1 shows the maturities achieved on euronote facilities since 1982 by some of the most creditworthy borrowers (noticeably sovereign or quasi-sovereign), with the longest being ten years, although the Export Finance and Insurance Corporation has achieved a maturity of 15 years. These maturities are considerably shorter than those available in the FRN market, where 40-year maturities and perpetual notes are quite common. On the other hand, euronote maturities appear to be longer than those achieved on most syndicated loans, even at a time of credit market expansion (see Figure 3.1).

Table 3.1 **Maturities gained on selected euronote facilities, April 1982 - April 1985**

Country	Date	Amount (US$ million)	Maturity (years)
Australian Industry Development Corporation	July 1984	100	10
Australian Wheat Board	Jan. 1984	300	2
Denmark	July 1984	1,000	10
Credit National	June 1984	160 (ECU)	7
Ireland	Mar. 1982	100	7
Ireland	Apr. 1982	150	7
State Bank of India	June 1984	100	7
Korea Exchange Bank	Sept. 1984	75	5
New Zealand	Nov. 1984	1,500	7
New Zealand Meat Producers Board	Jan. 1985	200	5
Petroleos Mexicanos	Oct. 1981	200	6
Portugal	Mar. 1985	500	5
Red Nacional de los Ferrocarriles Espanoles	Apr. 1982	100	8
Spain	July 1984	500	10
Sweden	Sept. 1983	4,000	10

Source: Euromoney Capital Markets Guide

Figure 3.1 Maturities on syndicated loans, 1972-79



Source: World Bank, Borrowing in International Capital Markets

Nevertheless, the maturities on euronotes, whilst being competitive with those on syndicated loans, are uncompetitive with those achievable on FRNs. A trend towards longer maturities in the euronote market is perceivable and this development may provide for a wider investor base, thereby giving the euronote a more competitive position when compared with the FRN. This trend was discernible with the introduction of euro-medium term notes (EMTNs) during 1986 with maturities between one to five years although the growth of this segment of the euronote market has not been maintained during 1987.

3.2.4 Diversification of funds

The possibility of tapping a growing and diverse group of investors is one of the main attractions of the euronote facility to the borrower, especially for high quality borrowers who can price their issues below LIBID, thereby attracting mainly non-bank investors. For these borrowers there will be a readily available non-bank investor market. Even for lesser rated borrowers, whose paper will be most likely to end up with banks, these banks may contribute a source of funds different from the one to which the investor is usually limited. These banks are most likely to be looking for a low-risk, advantageously priced, short-term asset rather than a medium-term commitment.

3.2.5 Flexibility

A euronote facility, like a syndicated loan, is not locked into any one interest rate fixing period; note maturities, although short, are very flexible, and the borrower has the ability to expand or contract lending as required, unlike the position with a syndicated loan. This flexibility is probably the main incentive, especially for sovereign borrowers, to tap the euronote market. The borrower has the opportunity to play the yield curve by choosing, for instance, three-month LIBID rather than six-month LIBID.

FRNs do not have this flexibility, with the borrower constantly committed to the three-month or six-month rate chosen at the beginning of the facility. Although from 1970 to 1985 short-term rates have occasionally been higher than long-term rates, hence encouraging borrowers to switch to FRNs (which have a short-term interest rate structure), FRN issuers do not have the option to switch from, say, three-month to six-month LIBID at each rollover date.

Where the euronote is inflexible, however, is in the currencies in which it may be denominated. The absence of a multi-currency option (although there may be the option, in a euronote facility, for the issuer to switch to a straight syndicated loan with a multi-currency facility) is obviously a severe defect of the facility when compared with syndicated loans and even with FRNs. Although FRNs do not carry a multi-option facility, they can be denominated in a single non-dollar currency such as sterling or ECUs.

As concerns sterling, the Bank of England's philosophy until 1986 appeared to be that only notes with maturities of five years or more are acceptable, with the short-term market being amply served by the banker's acceptance credit market, in which the Bank itself is a major dealer. Not surprisingly, most European central banks appear reluctant to allow a flood of short-term paper to loosen their hold on their respective money supplies. However, in March 1985 the Bank of England announced that it will allow non-bank borrowers, under certain circumstances, to make regular issues of sterling bonds with a maturity of between one and five years. This was followed in April 1986 by the announcement that issues of sterling commercial paper were to be allowed.

3.2.6 Comparative costs of euronotes and syndicated eurocredits for different country borrowers: implications for systemic risk

Although it is commonly stated that euronotes have significant cost advantages over syndicated credits because of their unique structure, it is very difficult to put these advantages into quantitative terms. One level of analysis would entail a comparison between spreads which borrowers have achieved on syndicated eurocredits and the spreads which the 'same' borrowers have achieved on euronotes, as well as a comparison of other associated fees. The difficulty is that many euronote issuers have never borrowed in the eurocredit markets; those that have may not have paid spreads relative to LIBOR or have done so such a long time ago that the terms they achieved may not be indicative of those they might achieve today. However, a study carried out for Euromoney by Mills (1985) - who is senior economist, division of international finance, Board of Governors of the Federal Reserve System, Washington - has shown that in mid-1985 borrowers using the euronote market achieved spreads of between 15 and 55 basis points lower than those achieved on previous syndicated loans for the same borrowers.

Spreads over LIBOR, or in some cases under LIBOR, on the bid side of the secondary market, as supplied by Merrill Lynch, are shown in Table 3.2 for selected euronote facilities. Where the published spread was quoted relative to LIBID, Mills converted it to a LIBOR equivalent by assuming the usual 1/8 per cent spread between LIBOR and LIBID. Mills uses the secondary market bid rates for euronotes as proxies for

Table 3.2 Spreads relative to LIBOR for borrowers in the euronote and eurocredit markets between February 1984 and June 1985

Borrower	Euronotes bid rate 28.6.85	Eurocredits Actual (on date arranged)(1)	Eurocredits Estimated if made today(2)	Difference between Euronote spread and estimated Eurocredits spread(3)
		Basis Points		
Australia				
State Electricity Commission of Victoria	3	-	-	47
Victoria Transport Borrowing Agency(4)	-	62.6 (5/84)	50	
Elders Capital Corp(5)	6	-	-	44
Elders IXL Ltd	-	62.5 (2/84)	50	
France				
Credit National	3	37.5(6) (10/84)	25	22
Elf Aquitaine	8	-	-	
Central Government	-	24(7) (7/85)	24(8)	16
Ireland				
Central Government	2	47(7) (5/84)	40	38
Italy				
IRI	9	-	-	
IMI	-	22 (6/85)	22(8)	13
Korea				
Korea Exchange Bank	14	70 (2/85)	69(9)	55
Norway				
Statoil	-12.5(10)	37.5 (4/84)	30	42.5
Portugal				
Central Government	15	62.5 (2/85)	55	40
Spain				
National Railways	5	50 (5/84)	35	30
Official Credit Institute	10	37.5(7) (4/85)	35	25
United Kingdom				
Britoil	-7.5(10)	-	-	
National Electricity Council	-	25(8) (8/84)	20	27.5

Source: Rodney Mills, 'The nifty way to beat euroloans', Euromoney, October 1985, p 241

Notes:

1 Some spreads are averages of different spread levels over the life of the loan. The date is the date when the mandate was given, except that the date of signing is used for the Australian loans and the renegotiations
2 Author's estimate of spread of eurocredit that borrower would have to pay in mid-1985
3 Difference between euronote spread and adjusted spread on eurocredit
4 Guaranteed by State of Victoria
5 Guaranteed by Elders IXL Limited
6 Assumes full utilisation. The spread is at several different levels that rise with the degree of utilisation. The annual facility fee is not included in the cost shown.
7 Renegotiation of remaining maturities of earlier loan
8 Same spread as in second column
9 Actual average spread on Korean Development Bank loan mandated in May 1985
10 Actual quotations are relative to LIBID, and have been converted to a LIBOR basis by assuming LIBOR at 1/8 per cent above LIBID

rates paid by borrowers. His rationale for using such proxies is enshrined in the following statement (Mills, 1985, p 241):

> 'Market sources assert that secondary market bid rates at a given moment have generally been somewhat above, if not equal to, the rates provided by borrowers. Discrepancies sometimes emerge because rates bid at tenders may be depressed by over-zealous bidding of panel members with an eye to future business. But the discrepancies between tender ranges and secondary market rates are said to be generally not more than a few basis points.'

Mills selects the twelve euronote rates shown in Table 3.2 because they appear to be comparable with spreads over LIBOR on syndicated credits raised by the same borrower. The list is short because at the date of publication the other euronote issuers (39 in total) had not arranged eurocredits on disclosed terms.

Comparisons of the spreads on euronotes and eurocredits show substantial cost savings with euronote facilities compared to eurocredits. As Mills (1985, p 214) acknowledges, however, any quantification of savings is made difficult by the fact that the eurocredits shown in Table 3.2 were arranged, often, before mid-1985, and some as long ago as 1984. Mills has, therefore, estimated the eurocredit spread if signed in mid-1985. He takes into account the fact that since early 1984 eurocredit spreads have been declining.

There are gaps in the data because of the paucity of loans. Two developed countries, Italy and Spain, have, however, continued to borrow actively in the eurocredit market. For several years the Federal Reserve staff has, for internal purposes, maintained a series of weighted average spreads over LIBOR on eurocredits arranged for public sector borrowers in a number of countries. Mills averaged together the movements in the spreads for Italy and Spain in the Federal Reserve series during 1984 and the first half of 1985. He then used these data to obtain the adjusted eurocredit spreads in Table 3.2 where necessary. The adjusted spreads are shown to the nearest five basis points. Although they are not completely accurate they are a better indicator of mid-1985 hypothetical borrowing costs than the unadjusted spreads which take no account of falling (real and nominal) interest rates in the market.

Even when compared with the adjusted eurocredit spreads, the euronote spreads indicate lower interest cost for euronote facilities than for eurocredits. The cost savings differ significantly from thirteen basis points for the Italian borrower to 55 basis points for the Korean borrower. Mills (1986, p 242) explains this by saying:

> 'This wide range does not reflect imperfect adjustments; the eurocredit spreads shown for France, Italy and Korea are actual spreads on very recent credits. The wide country-to-country variation in the savings from NIFs reflects the fact that the euronote market makes smaller differences for country risk than does the eurocredit market.'

Once the facility fee (underwriting fee) on euronotes is taken into account, however, the cost saving on euronotes is significantly reduced (see Table 3.3): for example, a facility fee of 25 basis points for Portugal wipes out approximately two-thirds of Portugal's cost saving from its euronote facility arranged in February 1985. On the other hand the lower level of front-end fees on euronotes, estimated at about 3 basis points below those on eurocredits, partially offsets the reduction in cost savings brought about by the higher facility fees on the former. All in all Mills estimates that euronotes save the borrower between 10 and 50 basis points over a syndicated eurocredit.

Table 3.3 Fee data for NIFs arranged January 1984 to June 1985

	Annual facility fee	Annualised front-end fee Basis Points
Sample average	12 (108 NIFs)	3 (37 NIFs)
NIFs of euronote issuers shown in Table 1:		
State Electricity Commission of Victoria	15	na
Elders Capital Corporation	10	3
Credit National	10	2.5
Elf Aquitain	None(1)	na
Government of Ireland(3)	12.5-25(2)	3-9(2)
Italy: IRI(3)	na	na
Korea Exchange Bank	25	na
Statoil	na	na
Government of Portugal	25	6.25
Spanish National Railways(3)	na	na
Spain: Official Credit Institute	na	na
Britoil	12.5	na

Source: Rodney Mills, 'The nifty way to beat euroloans', Euromoney, October 1985, p 241

Notes:
1 The issue is 'eurocommercial paper' and is not underwritten by banks
2 The data refer to three separate issues
3 These NIFs were arranged in 1982

There are, however, a number of flaws in Mills' methodology. To begin with Mills uses secondary market bid rates on 28.6.85 as proxies for the issuer's funding cost in the euronote market. Mills is incorrect to record simply the bids all on the same date. As we will see in later chapters, the bid rate on a euronote may move for various reasons. The 'initial' bid rate of the tranche is, therefore, a better proxy for the issuer's actual cost of funds. As spreads in the market range between four and five basis points, the initial bid will be, almost certainly, within this range.

Secondly, when attempting to standardise his eurocredit data for June 1985, he uses the change in the weighted average spreads for Italy and Spain. These two weighted average spreads represent only the decline in spreads for top quality Italian and Spanish borrowers. It is doubtful how representative they are for borrowers such as the Korean Exchange Bank or even Credit National or Britoil.

It is our contention that a more accurate way of comparing euronote spreads with eurocredit spreads is to compare borrowers that have entered both markets at very close intervals. Using this methodology, credit risk in both markets is identical. In fairness, this was not possible in 1985 because of the paucity of traded euronotes. The specific contribution towards improving Mills' results in the context of our research objectives is to update Mills' study for the second half of 1986 and the first half of 1987, with the aforementioned amendments.

Since the study by Mills more borrowers have entered both the euronote and eurocredit markets, and some of those that were present in the markets in 1985 have since exited. Many of the borrowers in our study are, therefore, different from those in Mills' study. Following Mills' guidelines, only top quality borrowers in each country are compared. Taken purely on credit quality, therefore, each country should be able to borrow at very similar terms in the eurocredit market. The same should be true of the euronote market. Any discrepancies can, therefore, be attributed to country risk.

In our study the initial euronote tranche bid rate is compared with the eurocredit spread for the same borrower. Because the facilites are so close to each other in time period (the longest period being 4 months) no adjustment proxy - as in Mills' study - is necessary.

Table 3.4 displays the initial euronote bid rates and eurocredit spreads for all borrowers who entered both markets for LIBOR-based funds between June 1986 and May 1987. From Table 3.4 it is clear that spreads in both markets have declined substantially since 1985. One significant feature of the euronote market in 1986/87 (which was absent in 1985) is the remarkably low rates at which sovereign or sovereign-backed borrowers can raise funds; sometimes as low as 37 basis points below LIBOR. This development is partly a result of the move towards pricing sovereign, and sovereign-backed paper off the US treasury bill rate rather than LIBOR or LIBID. Sovereign euronotes, thus, compete with government paper rather than other money market products.

It would appear from the results of Table 3.4 that the euronote market still seems to charge smaller premiums for country risk than does the eurocredit market. The difference between the lowest euronote spreads of -37 basis points (for Credit National, CNT, RENFE and the Kingdom of Sweden) and the highest of 10 basis points (for the Korea Exchange Bank) is only 47 basis points.

Table 3.4 Spreads relative to LIBOR for borrowers in the euronote and eurocredit markets between June 1986 and May 1987

Borrower	Euronotes initial tranche bid rate	Date	Eurocredits spread	Date	Difference between euronote spread and eurocredit spread
		Basis points			
Australia					
Australian Wheat Board	-10.5	12.86	25	12.86	35.5
BHP	-5.5	11.86	15	11.86	20.5
Elders 1XL	3		37.5	1.87	34.5
France					
Credit National	-37[1]	6.87	LIBOR	6.87	37
CNT	-32	7.86	LIBOR	8.86	32
EdF	-37	3.87	LIBOR	4.87	37
Iceland					
Landsbankki Islands	5	5.87	18.5	5.87	13.75
Ireland					
Central Government	-34	1.87	10	1.87	44
Italy					
CIR	5	11.86	10	7.86	5
Banco di Napoli	7	4.87	10	4.87	3
Korea					
Daewoo Corp	-		50	5.87	50
Korea Exchange Bank	10	1.87	62.5	3.87	42.5
New Zealand					
Fletcher Challenge	7	1.87	18.75	1.87	11.75
Norway					
Det Norske Veritas	8	8.86	18.75	8.86	10.75
Statoil	-12.5[2]	6.86	20	6.86	32.5
Oman					
Sultanate of Oman	9	7.86	37.5	7.86	28.5
Portugal					
Central Government	-32	12.86	37.5	12.86	69.5

Table 3.4 (contd) **Spreads relative to LIBOR for borrowers in the euronote and eurocredit markets between June 1986 and May 1987 continued**

Borrower	Euronotes initial tranche bid rate	Date	Eurocredits spread	Date	Difference between euro-note spread and euro-credit spread
		Basis points			
Spain					
Hydroelectrica Iberduero	5	3.87	7.5	1.87	2.5
Sweden					
Electrolux	-2.5	7.86	10	7.86	12.5
Kingdom of Sweden	-37	3.87	12.5	3.87	49.5
Volvo	-12.5	3.87	6.25	3.87	18.75
United Kingdom					
Allied Lyons	-0.5	5.87	15	5.87	20
Britoil	-10.5	3.87	22.5	3.87	31
Jaguar	-9.5	12.86	10	7.86	19.5
National Mutual	-2.5	4.87	20	4.87	22.5
Whitbread	-1.5	3.87	12.5	3.87	14

Notes: 1 Where bid rates are given against US Treasury bills the usual percentage point is added to give a rate relative to LIBOR

2 Where bid rates are given against LIBID the usual 1/8 per cent is added to give a rate relative to LIBOR

The difference between the lowest eurocredit spreads of LIBOR-flat (for Credit National, CNT and EdF) and the highest eurocredit spread of 62.5 basis points (again for the Korea Exchange Bank) is 62.5 basis points.

A perhaps more surprising result is that of the Government of Portugal. As a sovereign borrower Portugal can raise funds very cheaply in the euronote market, yet pays a high premium in the eurocredit market. This again is a result not so much of a widening of spreads in the eurocredit market, but of the euronote market's desire for sovereign credits. The market appears to be willing to accept such low returns for even poorer sovereign credits such as Portugal because of the short-term nature of the notes (generally of a three-month maturity). If we examine the fee levels charged for Portugal's underwriting commitment (see Table 3.5) we can see that - as in Mills' study - Portugal's cost of funds over the longer-term is considerably increased.

The results of our study would seem to support Mills' finding that borrowers (especially sovereign borrowers) can make significant interest cost savings by using the euronote market as opposed to the eurocredit market. The 26 differences shown in Table 3.4 average 27 basis points (compared to 30 basis points in Mills' study). Again, however, cost savings are reduced once fees are taken into account (see Table 3.5). Of the 387 euronote facilities arranged between 1985 and 1987 the average facility fee was eleven basis points (compared to twelve basis points in Mills' study). At this average level of eleven basis points, the facility fee would wipe out approximately 42 per cent of the cost advantage of euronote facilities - the 26 basis points of spread obtained from the comparisons in Table 3.4 How much is therefore offset may vary considerably from one euronote facility to another.

As Mills (p 242) pointed out, however,

> '... the impact of the annual facility fee on the relative costs of NIFs and eurocredits is tempered by the apparently lower level of front-end fees on NIFs as compared with eurocredits.'

Table 3.5 Fee data for euronote facilities arranged from June 1986 to May 1987

	Annual facility fee	Annualised front-end fee
	Basis points	
Sample average	11 (387 NIFs)	2 (387 NIFs)
NIFs of euronote issuers shown in Table 3.5		
Australian Wheat Board	10	0
BHP	5	0
Elders 1XL	7.5	1
Credit National	4.5	2
CNT	6.25	1
EdF	6.25	2
Landsbankki Islands	10	2
Government of Ireland	4.5	0.5
CIR	7.5	1
Banco di Napoli[1]	na	na
Daewoo Corp	22.5	0
Korea Exchange Bank	15	3
Fletcher Challenge	10	1
Det norske Veritas[1]	na	na
Statoil	5	0
Sultanate of Oman	12.5	4
Government of Portugal	25	0.5
Hydroelectrica Iberduero	5	0
Electrolux[1]	na	na
Kingdom of Sweden	6.25	0
Volvo	6.25	1
Allied Lyons	6.25	1
Britoil[1]	na	na
Jaguar	6.25	0
National Mutual[1]	na	na
Whitbread[1]	na	na

Notes: 1 ECP programmes

Mills was unable to obtain front-end fee data for the euronote facilites in his study but referred to a study of front-end fees between 1981 and 1983. This study found that on 74 credits to developed countries the front-end fee (on an annualised basis) averaged 8 basis points.

We have been able to obtain front-end fee information for only a few of the borrowers examined in our study. This information is shown in Table 3.6 below. The average front-end fee of the facilities shown in Table 3.6 is 10.8 basis points. This difference, if applied to the rest of the facilities examined, offsets over half the burden of the average annual facility fee plus front-end fee payable on euronotes.

Table 3.6 Front-end fee data for eurocredits in Table 3.5

Basis points

Borrower	Annualised front-end fee
Government of Ireland	10
Government of Portugal	15
Kingdom of Sweden	12.5
Volvo	5
Statoil	12.5
Korea Exchange Bank	10

Source: Merryll Lynch

But what does this mean for systemic risk? To say that the euronote market charges insufficient premiums to account for differences in country risk would be to say that euronote facilities may well contribute to an increase in systemic risk. What we have done is to update Mills' data, and this has led us to conclude that euronote facilities appear to charge lower premiums to account for country risk differences than do the eurocredit facilities. To the extent that these lower premiums may be insufficient, euronote facilities may well contribute to an increase in systemic risk if banks provide them in place of traditional eurocredits. The sufficiency of the returns in euronote facilities will be examined more rigorously in Chapters 5, 7 and 8.

Again, in order to understand fully the reasons for the rapid growth of the euronote market, we now turn our attention briefly to the investor. Some of the comparative features of syndicated loans, NIFs, RUFs and FRNs are set out in Table 3.7. These should set the scene for the next stage of the present investigation.

3.3 Comparison of Euronotes and Alternative Instruments: the Investor's Perspective

Having compared the features of euronotes with those of other funding instruments from the borrower's perspective, we must now turn to the types of instrument that compete with euronotes as an investment. Three instruments will be examined: bank deposits, which give yields at approximately LIBID; euro-CDs which typically trade at 1/16 or 1/8 under LIBID; and treasury bills which might trade at a full percentage point (100 basis points) below LIBID.

3.3.1 Bank deposits

The most actively traded euronotes in the market are usually those at or just above LIBID; investors in this market are looking for a higher yield than they are used to getting on other instruments. LIBID-plus notes therefore appear to be competing with bank deposits for investors' funds.

Table 3.7 **Comparative features of syndicated credits, FRNs, RUFs and NIFs**

	Syndicated credits	FRNs	Euronotes	
			RUFs	NIFs
Cost: used	High	Low	Low	V.low
unused	High	...	Low	V.low
Flexibility (e.g. interest period/ usage	Yes	No	Yes	Yes
Diversification	No	Yes	Yes	Yes
Amounts	Large	Large	Large	Large
Maturity and average life	Shorter	V.long	Long	Long
Issuer quality	Broad	More restrictive	Broad	More restrictive (but broader with letter of credit)
Multi-currency	Yes	No, but single non-$ currency, e.g. £ and ECU	No, but ECU (and future possibility of sterling)	No, but ECU (and future possibility of sterling)
Syndication risk	Low	Low	Low	Low where applicable
Standard documents	No	Yes	No	No
Ease of legal transferability	No, but possible	Yes	Yes on short-term notes	Yes where applicable
Secondary market liquidity	V.low	V.high	Low to date but high potential if supply forthcoming	Low to date but high potential if supply forthcoming
Importance to issuer of tenderer/underwriter quality	Important	Not so important	Important	...
Value as bridge to capital markets	Zero	High	High particularly if used	High particularly if used

Source: adapted from Dean Witter Capital Markets - International Ltd.

These investors realise that some high quality (or even medium quality) notes are just as secure as bank deposits, yet they achieve a premium on these notes over what they could obtain from a bank deposit. This situation cannot continue: there is no reason why euronotes issued by prime name borrowers should carry such a premium.

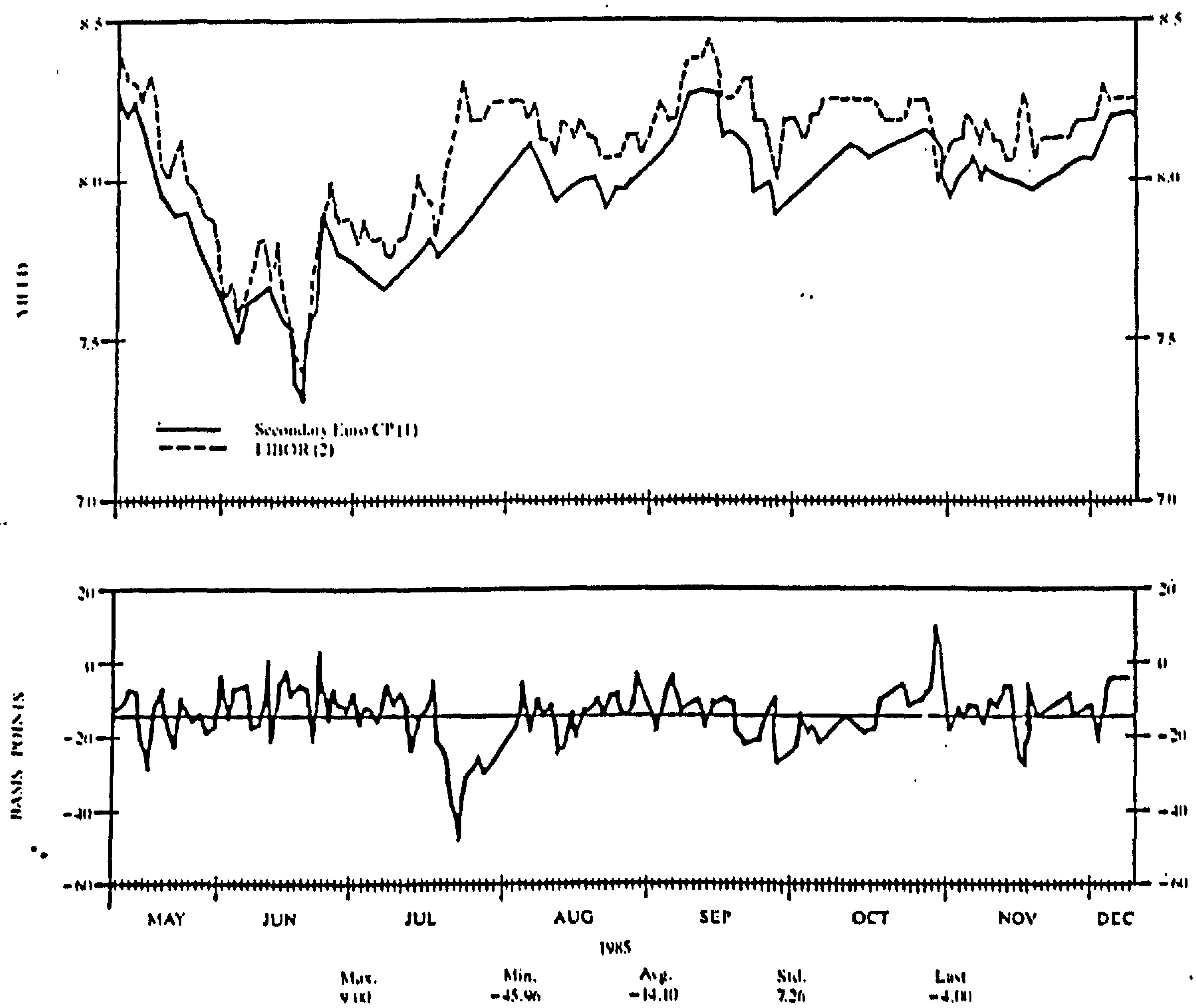
When funds are placed in a bank deposit a credit risk is assumed on that bank, for which one usually obtains LIBID. Yet higher quality borrowers, such as Spain and the New Zealand Meat Board, are having to pay out LIBID-plus on their notes. The bank-deposit investor essentially requires a premium over his deposit before he will move out of that investment into euronotes. In market parlance, he is looking for yield. As Figure 3.2 shows any premium over deposit rates (as represented by three month LIBOR) had all but disappeared by the end of 1985. This would seem to indicate a growing efficiency of the market.

3.3.2 Euro-CDs

The euro-CD investor is different from the bank deposit investor by being more concerned with liquidity than yield. Euro-CDs are highly liquid money market investments. Investors in this instrument will only move into an alternative instrument if it can provide the same liquidity at either better rates or less risk. The fact that euronotes appear to have had a greater impact on the bank deposit base than the euro-CD market would seem to imply that euro-CD investors are not yet convinced of the liquidity of euronotes.

Since the liquidity of euronotes increases as more borrowers and investors enter the market, the ability to diversify away from bank risk will entice the euro-CD investor to the market. Consequently, the euronote market will move away from a bank depositor investor base to a

Figure 3.2 Three-month euro-CP versus three-month LIBOR

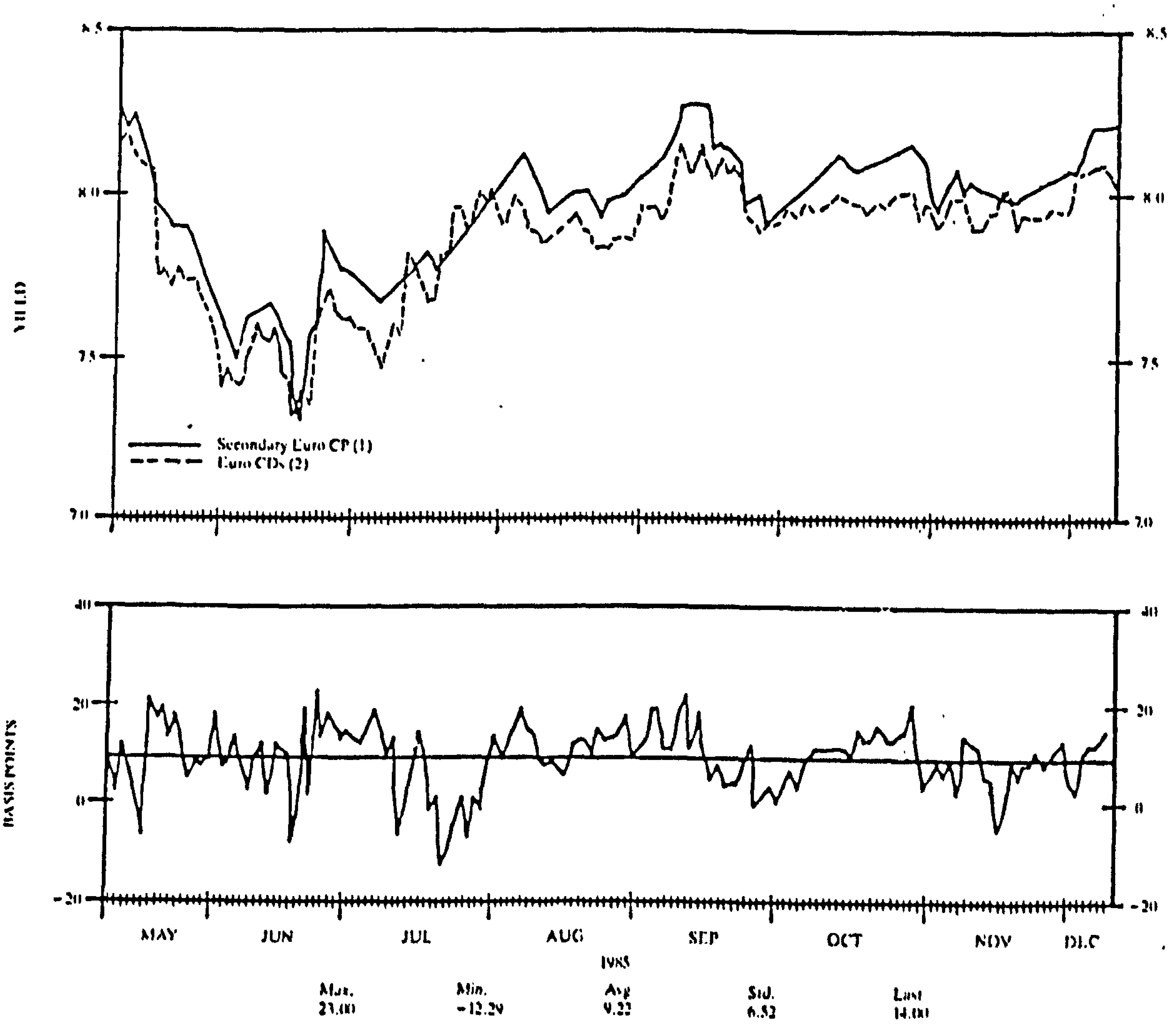


Sources: 1 Morgan Stanley International's actual sales of 75-104 day eurocommercial paper of high quality issuers

2 Three-month London Interbank Offered Rate - source: Data Resources Inc

euro-CD investor base for top-quality names. Figure 3.3 reveals the premium paid on euronotes over euro-CD rates up to 1986.

Figure 3.3 Three-month euro-CP versus three-month euro-CDs



Sources: 1 Morgan Stanley International's actual sales of 75-104 day eurocommercial paper of high quality issuers

2 Three-month London Interbank Offered Rate - source: Data Resources Inc

3.3.3 Treasury bills

Treasury bills are the ultimate cash alternative. Investors in these instruments have a substantially lower yield benchmark than those in bank deposits and euro-CDs. Treasury bills are uniquely safe liquid investments in that they can be sold for little, if any, loss of value under most market conditions. Trading at often 100 basis points below LIBID it seems unlikely that euronotes (at least in the foreseeable future) will become a viable alternative to such an instrument.

3.3.4 Summary

The main competitor of the euronote in the money markets (from an investor's perspective) at the present time is the euro-CD. However, as liquidity increases in the euronote market, there is no reason why yields on euronotes should not go through euro-CD yields. As a result, good quality euronotes will cease to be a viable alternative investment to bank deposit investors because the premium over bank deposits will disappear. Consequently, before 1990 banks may very well start to regain some of their traditional short-term depositors, whilst losing a greater proportion of their euro-CD investors.

3.4 Conclusions

The flexibility and diversification aspects of the euronote facility are strong inducements for the borrowers to enter the market. This applies particularly to high quality sovereign and corporate borrowers. In terms of flexibility it outscores the FRN, and in terms of diversification possibilities it outscores the syndicated loan (and possibly also the FRN). However, although beating the syndicated loan on most counts, in terms of probable cost it is likely to be uneconomic for most highly rated sovereign borrowers when compared with the certain cost of an FRN. Where the euronote fails drastically against the FRN is in its maturity structure: for those borrowers requiring long-term funds the euronote market is still not a viable alternative to the FRN.

In this chapter we have compared the advantages and disadvantages of euronote facilities with other funding options available to the borrower and the investor. This analysis is essential if we are to understand fully the reasons for the dynamic growth of the euronote market. It is this growth configuration that has been one possibly important factor in systematic risk build-up in the market. Despite cost advantages with euronotes, borrowers may decide to enter other markets as well. The reasons for doing so may be ones of funding and currency diversification and/or relationship banking. In keeping with the central problem of this study, however, we have also added at least partial support to the hypothesis that euronote facilities may contribute to an increase in systemic risk. Our method for doing this has been to compare the differences which the euronote market makes for country risk with the differences made by the eurocredit market for the same sample of borrowers. We have shown, building on previous evidence and within the limitations of our sample, that the country-to-country variations in the savings from euronote facilities reflect the fact that these euronote facilites appear to make smaller differences for country risk than does the eurocredit market. In other words, the size of the risk premia charged between different country borrowers is lower in the euronote market than in the eurocredit market. This naturally means lower returns to investors. If lower returns equate to insufficient returns, we may conclude that the euronote market does, at least partially, contribute to an increase in systemic risk. This latter question will be addressed more formally in Part II of our study.

CHAPTER 4

PLACEMENT METHODS AND SYSTEMIC RISK

4.1 Introduction

The purpose of this chapter is, firstly, to describe and distinguish between the different placement methods available in the euronote market. Numerical examples will be provided to show how the costs to the issuer and returns to placing banks can be calculated under different funding scenarios. A comparison will be made between the calculation of ROA applied to a RUF and the calculation of ROA applied to a simple revolving credit.

Secondly, an attempt will be made to discover whether any empirical evidence exists to suggest that one type of placement method is more likely to lead to the purchase of notes at their 'perceived' correct price. If empirical evidence could be found to determine this it might, tentatively, be argued that the systemic risk properties of euronotes depends partly on the placement method used for distributing the notes.

Placement capability is the main requirement of any note issuance facility, and the one which attracts most reverential respect from fellow market participants. Many different placement methods have been used for distributing euronotes since the first deal for New Zealand Shipping Corporation in 1978; each has its own particular features, although it is noticeable that a few standard structures have prevailed.

PART A

4.2 Sole Placing Agency (SPA)

By this method of placement the issuer appoints a sole placing agent, whose job it is to place the issuer's paper with market investors each time a new tranche is issued. It is in the SPA's interest to place the paper at as low a yield as possible because it receives the difference between the contracted yield on the notes and the yield at which it is able to place the notes with market investors. Furthermore, the underwriters may take solace in the knowledge that the SPA will do its utmost to place these notes, because failure to do so usually means no fees.

This method of placement ensures that paper will be placed at a uniform price and in an orderly and controlled manner. Underwriters, however, forced to guarantee the SPA's ability to place paper in the market, have become increasingly frustrated by the fact that their involvement in the facility is limited to their underwriting commitment, with no possibility of purchasing paper in their own right (other than being allocated unsold paper). Many underwriters wish to use short-term paper to develop their own securities placement capacity, a necessity made more urgent by this very process of loan securitisation in the international credit markets.

The main difference, as far as the underwriting banks are concerned, between the SPA method and a straightforward revolving credit facility is that unlike the commitment fee in a revolving credit facility - which is paid on the undrawn amount of the commitment - the facility fee is paid irrespective of the utilisation of the facility. For example, if a revolving credit facility is priced at:

Drawn down rate	LIBOR + 0.125 per cent per annum
Commitment fee	0.0625 per cent per annum

The undewriter's ROA if the facility is fully drawn is LIBOR + 0.125 per cent per annum. If the facility remains undrawn the return is 0.0625 per cent per annum.

Similarly if a RUF is priced at:

Maximum margin	LIBOR + 0.0625 per cent per annum
Facility fee	0.0625 per cent per annum

The underwriter's ROA if the facility is fully drawn is LIBOR + 0.125 per cent per annum (maximum margin + facility fee). If the facility remains undrawn the return is 0.0625 per cent per annum.

In our expositional example, the two facilities produce the same returns whether drawn or undrawn. Each facility, however, prices its relative asset (loan or euronote) differently.

Let us now examine how euronotes are actually issued under the SPA method.

Example 1

Issuer	AAA Corporation
Amount	US $200 million
Maturity of facility	10 years
Facility fee	0.125 per cent per annum
Maximum margin	LIBOR + 0.125 per cent per annum
Funding request	US $50 million of three month euronotes
Underwriting banks	10 each with US $20 million commitment

Under normal conditions AAA Corporation will give its SPA four to five business days notice to issue, in our example, US $50 million of three month euronotes. In other words, AAA Corporation requires value in its account four to five days from now. This gives the SPA two to three days to find investors for the tranche at or below the maximum margin of LIBOR + 0.125 per cent per annum. Underwriters are also informed of the possibility that they may have to purchase notes at this level. If the SPA only manages to place all the notes at the maximum margin, it will have made no return on the deal. If, however, the SPA manages to place all the notes at LIBOR + 0.10 per cent per annum, it will have earned a profit (sales turn) of 0.25 per cent per annum. It can be shown thus:

US \$50,000,000 x 0.025% X 90/360

= US \$12,5000 x 0.25

= US \$3,125

When interest rates fall the prices of negotiable investments rise. The above example captures this simple relationship. If, however, the SPA is able to place only US \$20 million of euronotes at LIBOR + 0.10 per cent per annum, it will notify the underwriting banks that they will have to purchase the other US \$30 million. Under the SPA method the US \$30 million of euronotes will be allocated equally among the underwriting banks. In our example there are ten underwriting banks so each would receive a US \$3 million tranche of euronotes at the maximum margin of LIBOR + 0.125 per cent per annum. The SPA has still earned a sales turn of 0.025 per cent on the US \$20 million of euronotes it managed to place at LIBOR + 0.10 per cent per annum. This provides the SPA with a profit of US \$1,250.

Although the underwriting banks can attempt to sell any notes they have been allocated by the SPA, it is unlikely they will find many opportunities to do so if a skilled SPA has been unable to do so previously. The SPA method, therefore, effectively prevents underwriting banks from sharing in any placement profits.

4.3 Multiple Placing Agency (MPA)

This method overcomes the problem associated with SPA: that underwriters are unable to participate in the placement of the issuer's paper. Under MPA each underwriter has the right to call his quota of the tranche at any time within the selling period, thereby providing certainty of allotment, and a fee for placing the notes. However, one of the great weaknesses of this system is that the bank with a broad range of investor clients, and therefore strong placement capacity, may not be a very strong medium-term underwriter. The situation may thus arise in which prime name issuers are being underwritten by lesser quality institutions.

A second problem with MPA is that under this system paper may be placed with market investors at differing yields, with agents competing amongst each other and thereby driving up the yield to market investors. Although this would seem to hurt only the MPAs - as the investors get a higher yield on the paper and the issuer has to pay the contracted yield anyway - it may also have an adverse affect on the issuer in so far as the placing of his paper at high yields may affect the pricing of his next issue, forcing prices above what might otherwise be expected for that type of borrower.

4.4 Tender Panel (TP)

The tender panel system was devised as a means of overcoming the criticisms of SPA and MPA. Under this system a group of banks (or securities houses) bids direct to the issuer (or through a facility arranger) for the right to place his paper. The underwriting banks may or may not be members of the TP. This system ensures that the banks with the strongest placement capacity get the paper as they will be the banks most able to bid lower yields. As the issuer also takes some benefit from the lower yields (unlike the position with SPA or MPA), the competitive bidding structure of a TP is an added advantage to him.

Although the TP structure allows for competitive bidding, no one TP manager is accountable to the issuer for the placement of, or yield gained on, the paper. This apart, the main disadvantage of the TP system derives from the fact that no one panel member is at any time assured of gaining funds because of the bidding mechanism. As a result, a TP member will be unable to make a firm offer to an investor client on his ability to obtain paper, let alone the price at which the paper may be offered.

We can show how the TP system operates through constructing a typical example.

Example 2

Issuer	BBB Corporation
Amount	US $400 million
Maximum margin	LIBOR + 0.125 per cent per annum
Funding request	US $100 million of three month euronotes
Underwriting banks	10 with US $40 miillion commitment each
TP banks	15 (Bank A to Bank O)

Let us assume that in Example 2 the tender agent has received by the last day of the selling period (day three if value is required on day five) the following tenders (bids) from the TP banks:

TP banks	Amount tendered for	Bid yield
Bank E	5	LIBOR - 0.10 per cent per annum
Bank F	1	LIBOR - 0.0625 per cent per annum
Bank A	8	LIBOR - 0.0625 per cent per annum
Bank C	8	LIBOR - flat
Bank D	4	LIBOR - flat
Bank A	10	LIBOR - flat
Bank F	10	LIBOR + 0.01 per cent per annum

TP banks	Amount tendered for	Bid yield
Bank G	15	LIBOR + 0.02 per cent per annum
Bank H	8	LIBOR + 0.02 per cent per annum
Bank N	20	LIBOR + 0.04 per cent per annum
Bank A	14	LIBOR + 0.05 per cent per annum
Bank K	12	LIBOR + 0.06 per cent per annum
Bank F	10	LIBOR + 0.625 per cent per annum
Bank L	8	LIBOR + 0.08 per cent per annum
Bank N	7	LIBOR + 0.10 per cent per annum
Bank J	7	LIBOR + 0.125 per cent per annum
Bank D	10	LIBOR + 0.125 per cent per annum

No bids received from banks B, I and O.

The bids received total US $157,000,000 whereas the issuer has only requested US $100,000,000. Tenders are awarded, of course, on a yield basis beginning with the lowest offered yield. In our example the cut-off point at which the issuer can raise his US $100 million is LIBOR + 0.05 per cent (bid by Bank A). Up to and including Bank N's bid of US $20 million at LIBOR + 0.04 per cent per annum the issuer could only obtain US $91 million. However, if the issuer accepts Bank A's bid of US $14 million at LIBOR + 0.05 per cent per annum in total then he would receive US $105 million. What would happen is that the issuer would accept only US $9 million of Bank A's bid at LIBOR + 0.05 per cent per annum. Three banks did not bid, which is a common occurrence in TP arrangements.

A number of points should be made about our example. Firstly, a bank may make more than one bid. This is referred to as 'scatter bidding'. This method may be more effective in determining the level at which the notes will be sold, as TP banks are only told of their successful bids and not the average accepted bid yield. Bank E's single bid at LIBOR - 0.10 per cent per annum will not be effective in establishing the issuer's average accepted bid yield. Bank A's approach is far more effective. By scattering its bids from LIBOR - 0.0625 per cent per annum to LIBOR-flat to LIBOR + 0.05 per cent per annum it gains important yield information. Since its highest bid is only partially accepted it must be at the highest accepted yield. By scattering its bids Bank A has managed to purchase US $27 million of euronotes at an average cost of LIBOR - 0.004 per cent per annum. Bank E has purchased US $5 million at LIBOR - 0.10 per cent per annum. Bank A has, therefore, also been more profitable by scattering its bids in this way.

One weakness of the TP system, however, is that it tends to lead to opportunistic behaviour. An investor may approach a TP member only if he has liquidity of the right maturity and if the investment which the TP member is offering bears a yield above other, more easily administered instruments in the market. A TP member, therefore, has to compete not only for the right to place the paper, but also again after the paper has been gained in order to secure investor interest. Indeed, as this system is (almost by definition) tied to some method of index bidding - be it LIBOR, LIBID or some other interest rate index - its applicability for prime name corporations, whose cost of funds is not linked to any such index, is questionable.

The TP method is thus an unwieldy method of distributing paper, and although it is one which virtually guarantees low yields, it does not guarantee a uniform yield. As a result, it has been argued that if the paper were to be priced before issue and then issued at a volume which the market took at that price, a low and yet more uniform yield might be obtained. Such an argument has led to the development of what might be described as a hybrid TP system, the continuous tender panel (CTP).

4.5 Continuous Tender Panel (CTP)

Under this system the issuer will appoint a continuous tender panel manager, who will set up a CTP of managing underwriters. Each tranche of notes will be issued at a strike offering yield, predetermined by the CTP manager. The CTP manager will then offer the notes to the CTP members at this yield, after which any notes unsold by this allocation will be sold to the CTP manager's investor clients also at the strike offering yield. Any notes still unsold will be allocated to CTP members at the full contracted yield.

This strike offering yield thus provides for a standard offering basis and a uniform yield on the notes offered to market investors. CTP members may be given 15 minutes or so to make a firm offer to investors without obligation on the part of the CTP members to purchase the notes and without risk to its investors. This system therefore avoids the embarrassment often associated with the tender panel system of a panel member's not being able to fulfil an offer to supply notes. It is unlikely that the CTP manager will keep the strike offering yield artificially low (in order to try and sell notes to its own investor clients) as the underwriters will be angered by the allocation of any unsold paper which they themselves had previously bid upon.

We can now examine how euronotes are issued through the CTP method by constructing our own expository example:

<u>Example 3</u>

Issuer	CCC Corporation
Amount	US $400 million
Maximum margin	LIBOR + 0.125 per cent per annum
Funding requirement	US $200 million of three month euronotes
Underwriting banks	Ten banks each with US $40 million commitment (Bank A to Bank J)

In our example the CTP manager would offer the US $200 million tranche to the ten underwriting banks as members of the CTP at an initial strike offering yield of LIBOR + 0.0625 per cent per annum. Each bank now has the right to purchase US $20 million of euronotes.

Let us assume that Banks D, E, G and H immediately subscribe for their full US $20 million each at the strike offering yield of LIBOR + 0.0625 per cent per annum.

The CTP manager protects banks A, B and C on day two for fifteen minutes at the same strike offering yield for US $20 million each. Within this time Bank A informs the CTP manager that it can take US $15 million at this yield. Bank B confirms a subscription of US $5 million, and Bank C of nothing.

The CTP manger sells US $38 million total, US $20 million of which is at the original strike offering yield of LIBOR + 0.0625 per cent per annum, and US $20 million of which is at a later established strike offering yield of LIBOR + 0.10 per cent per annum. The total amount of euronotes sold is, therefore, as follows:

Bank	Amount subscribed	Strike offering yield
Bank D	US $20 million	LIBOR + 0.0625 per cent per annum
Bank E	US $20 million	LIBOR + 0.0625 per cent per annum
Bank G	US $20 million	LIBOR + 0.0625 per cent per annum
Bank H	US $20 million	LIBOR + 0.0625 per cent per annum
Bank A	US $15 million	LIBOR + 0.0625 per cent per annum
Bank B	US $5 million	LIBOR + 0.0625 per cent per annum
Banks C, F, I J	Zero	
CTP Manager	US $20 million	LIBOR + 0.0625 per cent per annum
CTP Manager	US $20 million	LIBOR + 0.10 per cent per annum
Total	US $140 million	

With US $140 million subscribed the issuer is still US $60 million short of his request for US $200 million. This shortfall is made up by allocating the other US $60 million to the underwriters at the maximum margin of LIBOR + 0.125 per cent per annum, after deducting euronotes purchased at the strike offering yield. In our example the US $60 million is allocated equally to those banks which did not previously subscribe: that is, Banks C, F, I and J each receive US $15 million of euronotes.

Since the CTP offering period extends to the interest rate fixing date, non-bank investors may be more inclined to purchase notes because (unlike banks) they are not likely to be match funding their investments and therefore may wish to see in which direction interest rates are moving before they commit themselves. If euronote facilities are to survive, it is essential that this type of investor base be captured.

The CTP method depends so much on the manager's judgement in the setting of the strike offering yield that it is unlikely to develop as the standard placement method. Hence the development of a placement method very similar to CTP but taking the onus off the CTP manager in the setting of the offer yield, issuer set margin (ISM), is of considerable interest.

4.6 Issuer Set Margin (ISM)

Under this method the issuer sets the price on his paper (notes) prior to offering it to the issuing/underwriting banks. This is basically a two-tier modification of SPA, in which the principal placing agent (who is not an underwriter) places paper on behalf of junior underwriters, with senior underwriters placing paper themselves at a rate predetermined by the issuer. ISM therefore allows underwriters with strong placing capacity to place paper (if they so wish), while those with weak placing capacity have their allocation placed for them by the principal placing agent. These junior underwriters are therefore not at the mercy of the tender panel members to bid for paper since, for them as for the issuer, the principal placing agent is also placing agent of last resort. The underwriters who choose to place paper themselves are referred to as special placing agents. Whereas under the CTP method underwriters may only be guaranteed a price for a short period of time, the ISM method gives a firmer commitment to the underwriters, although the price is correspondingly less flexible.

Any euronotes purchased by an underwriter at the ISM will be deducted from his commitment so that if he is later allocated unsold notes, he will not be forced to purchase notes above his initial commitment. This can be illustrated with an example:

Example 4

Issuer	DDD Corporation
Amount	US $400 million
Maximum margin	LIBOR + 0.125 per cent per annum
Issuer set margin	LIBOR + 0.0625 per cent per annum
Funding request	US $200 million of three month euronotes
Underwriting banks	Ten banks each with US $40 million commitment (Bank A to Bank J)
Placing banks	Each underwriter can purchase up to 50 per cent of its commitment

Since the issuer requires US $200 million and the underwriters can subscribe for 50 per cent of their commitment, this means that each underwriting bank has the right to subscribe for US $10 million of euronotes at the ISM of LIBOR + 0.0625 per cent per annum. Let us assume that the underwriters subscribe in the following manner:

Bank A	US $2 million
Bank B	US $2 million
Bank C	US $3 million
Bank D	Zero
Bank E	Zero
Bank F	US $5 million
Bank G	US $6 million
Bank H	Zero
Bank I	US $6 million
Bank J	US $6 million
Total	US $30 million

The principal placing agent will now be required to place the remaining US $170 million by itself. Assuming that the principal placing agent is unable to place any notes at the ISM of LIBOR + 0.0625 per cent per annum, the remaining US $170 million will be placed with the underwriting banks at the maximum margin of LIBOR + 0.125 per cent per annum, subtracting any notes already purchased at the ISM. The allocation will, therefore, be as follows:

Bank A	US $18 million
Bank B	US $18 million
Bank C	US $17 million
Bank D	US $20 million
Bank E	US $20 million
Bank F	US $15 million
Bank G	US $14 million
Bank H	US $20 million
Bank I	US $14 million
Bank J	US $14 million
Total	US $170 million

The issuer has obtained his US $200 million at an average cost of US $30 million x LIBOR + 0.0625 per cent per annum and US $170 million x LIBOR + 0.125 per cent per annum.

In our example the underwriting banks can purchase 50 per cent of their commitment at the ISM. This proportion is, of course, flexible in practice.

4.7 Assessment of Placing Methods

While it is easy to assume that one structure has displaced its predecessor, most bankers would agree that this is far from the case. The suitability of any individual structure depends to a considerable extent on the particular needs of the borrower.

Sole placing still makes sense when credit analysis is required, and when the credit has to be explained in order to build up a strong investor clientele base. It may also make sense for the smaller deals, in which more than one distributor could cause ridiculous pricing.

No one house could possibly hope to corner the entire market, and the tender panel system will continue to be more relevant when very wide distribution is necessary. An obvious example is the $4 billion RUF established for the Kingdom of Sweden in 1984: bids for the paper ranged from the now infamous LIBID less 0.35 per cent to LIBOR-flat. The tender panel will continue to be useful for established investors for whom it is necessary to market neither the instrument nor the name: that is, for a market where price is the only relevant factor for investors. However, unlike the US government securities market, the eurocommercial paper and, indeed, US commercial paper markets do not fit this criterion.

Alternatively, the tender panel may be useful if the paper is being targeted at investors with daily excess liquidity who want to put that liquidity to use. These will be investors who are largely indifferent to maturity, seeking only a margin; the only investors that continuously fit this description are banks. Indeed, the decline in the bank investor share of the market recently (1987) is indicative of an increase in the use of different distribution mechanisms which have attracted greater non-bank investor interest. The tender panel system perpetuates a system where paper is priced relative to an index and sold to the banking system as a short-term asset. For this purpose it is an effective distribution mechanism, but not for those corporations and sovereign borrowers for which LIBOR or LIBID is irrelevant as a measure of their cost of funds. The tender panel, although it has played a vital role in the development of the euronote market, must ultimately be superseded by distribution methods tailor-made for these target investors if the market is to proceed to its natural conclusion, that of a fully fledged eurocommercial paper market. In this context the stage seems to be ready for issuer set margin (ISM) methods, priced relative to the borrower's true cost of funds (which may be irrespective of LIBOR), to take over from sole placing and tender panels as the standard placement method for top quality borrowers.

Having examined the different placement methods, we are now able to move on to the second main part of this chapter.

PART B

4.8 The Impact of Placement Methods on the Price of Notes

Our aim in the second part of this chapter is to determine whether any evidence exists to suggest that one placement method consistently places notes in the market at 'perceived' inadequate rates of return. The key word here is 'perceived'. It is not our aim to determine the actual creditworthiness of any notes placed in the market; the aim is to determine whether the market itself 'perceives' the rates of return on certain notes to be insufficient or inadequate. In Chapter 5 we will examine more explicitly how credit quality - measured by credit ratings - affects the price of notes traded. The market's 'perception' of the notes can be measured by monitoring the spread relationship attained between a benchmark, usually LIBOR or LIBID, when notes were successfully auctioned or initially bid for, and where subsequently they traded over the life of the note in relation to that same benchmark. If note yields rise in the secondary market, it can be assumed (certainly in a bull market environment as experienced by the euronote market since its inception) that the market perceived the initial return on the note to be inadequate. If note yields consistently fall or stay the same in the secondary market, we can assume that the market perceives the notes to have either a more than adequate return or the correct return, respectively.

For expositional purposes, placement methods have been broken down into 'dealerships' and 'tender panels'.

Tender panel auction statistics are generally unavailable. Regan (1985, p 20) notes that the number of borrowers issuing through the tender panel system in 1985 (ranging from triple-A to triple-B issues and beyond) was 56. The number of issues that performed consistently better (yields fell) in the secondary market was zero. This suggests that on every occasion that notes placed through the tender panel method were traded, the market perceived the yield on the notes to be insufficient, and so yields rose.

Much tender panel data is unavailable to us, but Regan's conclusion does seem to suggest that the tender panel method of distributing notes may place notes in the market at yields which initially do not reflect the perceived risk of that issuer.

We have been fortunate enough to gain tender panel winning bid rates for a number of major borrowers in the euronote market at the end of 1985 and beginning of 1986. The data were obtained mainly from Merrill Lynch and NatWest Investment Bank through a series of data collection visits to relevant banks in London, documented in Chapter 6. These bid rates were compared with the average bid levels at which the notes traded over their lifetime. The bid rates represent the prices which the market are prepared to pay (demand) for that supply of notes. Table 4.1 compares tender panel data with the average bid level at which the notes traded over their lifetime. If the notes traded at a premium over the average winning tender panel bid rate then a + sign preceeds the bid rate. A + sign implies that the market perceived the average winning tender panel bid rate to be insufficient for the risk of the notes. A - sign implies that the market perceived the average winning tender panel bid rate to be more than sufficient for the risk of the notes.

The final column of Table 4.1 shows that the bid levels at which notes traded were almost always above the average winning tender panel bid rates (and mainly above the highest winning tender panel bid rates). Only two borrowers (Credit Nationale and National Nederlanden) saw their notes trade at levels below the average winning tender panel bid rates for those notes. These results would seem to add support to Regan's (1985) conclusion that tender panel paper performs badly in the secondary market. The reason appears to be (as suggested in section 4.4 of this chapter) that tender panels may lead to over-aggressive pricing of notes. There may be no market for the notes at or below these prices and so the notes are 'dumped' in the market at above tender

Table 4.1 Comparison of tender panel bid rates with average trading levels of euronotes: October 1985 to May 1986

	Amount offered $m	Bids received $m	Value date	Maturity months	Accepted average bid bp	Accepted lowest bid bp	Accepted highest bid bp	Average bid rate over life of notes bp	Difference between accepted average TP bid rate and average bid rate over life of notes bp
AIDC	25	65	26 Nov	2	L-10.13	L-10.13	L-10.13	LBD	+2.37
CSR Finance	20	56	25 Nov	6	L-6	L-1	L	L+2.37	+8.37
EdF	100	455	21 Nov	3	LBD-6.69	LBD-8	LBD-6	LBD	+6.69
Alcoa	50	94	19 Nov	3	L+0.0527	L+0.02	L+0.06	L+11.36	+11.30
Blue Circle	50	107	18 Nov	3	L+1.786	L+1	L+2	L+9.18	+7.39
Kingdom of Sweden	200	930	18 Nov	3	LBD-6.471	LBD-8.01	LBD-5.5	LBD+0.4	+6.87
SR Finance Ltd	10	58.5	13 Nov	6	L-6	L-1	Lflat	...	...
Unilever	100	276	12 Nov	3	LBD-7.16	LBD-8	LBD-6.8	LBD+2	+9.16
Commonwealth Bank of Australia	30	155	31 Oct	3	LBD-8.25	LBD-10	LBD-7.5	LBD+0.54	+8.79
Great Western Savings	15	-	25 Oct	3	L+10.27	L+11	L+6	L+12.9	+2.63
CRS Finance	15	-	25 Oct	1	L-6	Lflat	L-2	...	...
Credit National	90	428	25 Oct	3	L-15.4	L-16.5	L-14.5	LBD	-2.9
Nationale Nedlnden	37	69	24 Oct	6	L-9.76	L-10	L-9.7	L-2.68	-7.08
Sealand	25	61	31 Jan	3	L+9.08	L+8	L+10	L+11	+1.92
United Biscuits	90	154	10 Feb	3	L+0.6627	L-3	L+3	L+7	+6.34

Notes: 1 LIBOR is taken as 1/8 per cent below LIBID
2 Issued in 1986

Key: L = LIBOR
LBD = LIBID

bid rates. In this scenario it may not be investors who lose out, but the tender panel banks themselves.

The tender panel banks must, on our results, be taking a loss on the sale of the notes. It is not the purpose of this chapter to explain why they may do this. This will be discussed in Part Two of this thesis. We may tentatively conclude at this point that, on our data, the price which the borrower will pay on the maturity of his notes appears to be 'perceived' by the market (in most cases) as inadequate to compensate for the risk of the notes. It is unlikely that these discrepancies are caused by supply and demand factors as there is no economic reason why notes supplied through the tender panel system should always meet with lower demand. A more feasible conclusion is that the notes have been incorrectly priced. To the extent that this is true, systemic risk may be increased by the issue of notes through tender panels that price notes below their perceived risk levels.

We have not yet, however, discovered whether the dealership method of placing notes does so closer to their perceived correct value. It is impossible to obtain prices agreed between dealers and their clients. Such information is zealously guarded by the dealing banks. We have, therefore, no option but to use a proxy for the initial agreed price. The closest proxy for this price is the initial tranche bid rate. Table 4.2 compares the initial tranche bid rate with the average bid rate over the life of the notes for all the borrowers who issued through dealership from November 1985 to July 1986. These issuers plus the issuers examined in Table 4.1 account for nearly 50 per cent of the issuers in the euronote market over this time period, and more than 70 per cent in terms of notes outstanding over the same time period.

Table 4.2 Comparison of dealer placed paper rates with average trading levels of euronotes: November 1985 to July 1986

Borrower	Initial tranche bid rate basis points	Value date	Maturity months	Average bid rate over life of notes basis points	Difference between initial tranche bid rate and average bid rate over life of notes basis points
Grand Metropolitan	L	2 Nov	3	L-0.088	-0.088
Renault	LBD+8	23 Nov	6	LBD+6.9	-1.1
Trizec Corporation	L+15	30 Nov	1	L+15	0
BHP	LBD+7	7 Dec	3	LBD+9	+2
OKB	LBD	14 Dec	3	LBD	0
Svenska Handelsbanken	LBD+4	4 Jan	3	LBD+2.72	-1.28
Electrolux	LBD+11	11 Jan	6	LBD+9.91	-1.09
Skopbank	LBD+8	18 Jan	3	LBD+7.33	-0.67
Union Bank of Finland	LBD+5	18 Jan	3	LBD+2.08	-2.92
Citicorp	LBD	1 Feb	3	LBD+1.54	+1.54
BP	LBD	8 Mar	3	LBD-0.25	-0.25
Den Danske Provinsbank	LBD+12	8 Mar	2	LBD+10.14	-1.6
Volvo	LBD	29 Mar	3	LBD	0
ENEL	US T bills+73	17 May	3	US T bills + 62	-11

Notes: L = LIBOR
LBD = LIBID
US T Bills = US Treasury bills

The final column of Table 4.2 shows that the bid levels at which dealer-placed notes traded were almost always at or below the initial tranche bid rate. Only two borrowers (BHP and Citicorp) saw their notes trade at levels above the initial tranche bid rate. The variability of the average bid level around the initial bid level is also very low. Disregarding for the moment the state-backed ENEL, the average variability of the average bid rate around the initial bid rate was only 0.89 basis points compared to 6.29 basis points for tender panel issuers. Even including the ENEL notes, the average variability of the average bid rate around the initial bid rate for dealer-placed notes was only 1.68 basis points.

Our results for dealer-placed notes would seem to suggest that the market (generally) perceived the initial yields on the notes to be at least, if not more than, sufficient to compensate for the risk of the notes.

What conclusions can we draw from these findings? We stated at the beginning of this section that if evidence could be found to show that one type of placement method consistently placed notes at perceived insufficient yields then we might tentatively conclude that this type of placement method is more likely to lead euronote facilities to contribute to an increase in systemic risk than a placement method which places notes at perceived sufficient yields. This conclusion is based on the BIS (1986, p 201) contention that systemic risk may be increased if new instruments are not priced in relation to their risk characteristics - that is to say, if the return on new instruments is insufficient in relation to the risks incurred.

It is important to remember that the price of a euronote is not the same as the price of equity. Euronotes are debt instruments and so their actual prices vary inversely with yield. The yields on euronotes placed through the TP system, however, appear to be inadequate.

Since yields are inadequate, investors are effectively being asked to pay a premium on these securities - this is the opposite, in terminology if not economically, to what Davis and Pointon (1985, p 249) call 'market pricing' in reference to new equity issues. With many new equity issues the issue may be underpriced in order to induce potential investors to take it up in its entirety. In the context of TP issues in the euronote market, these issues appear to be overpriced in the sense that yields are insufficient (from the market's point of view) to compensate for the risks incurred. Yields must rise and prices fall before investors are induced to purchase the notes. Investment banks are, therefore, taking a loss in the market. If this loss is not justified by returns from other parts of the relationship then systemic risk may arise.

However, all this analysis has shown is that, for the end of 1985 to the early part of 1986, the euronote market appeared to 'perceive' that notes placed through the tender panel system carried an insufficient return, whereas the market generally appeared to 'perceive' notes which were placed thorugh dealership methods to carry an acceptable rate of return.

Although supply and demand factors will have played their part it seems unlikely that on almost every occasion supply exceeded demand for TP paper, whereas demand exceeded supply for dealer paper. The notes themselves are the same, irrespective of placement method. Although not all issues were rated in the euronote market, they all carried first prime ratings in the United States.

4.9 Summary and Conclusions

It appears, then, that for notes placed through the tender panel system, end investors 'may' be getting a lower return than the market perceives to be sufficient. Since the secondary market has, of course, no influence over the final yield on the notes (as this is simply the yield the issuer pays) this again suggests that whoever holds the notes on their maturity date may gain a perceived inadequate return. If market perception is a good indicator of actual risk, we would conclude that whether euronotes contribute to an increase in systemic risk does depend, at least partly, on the placement method used to distribute the notes. Since no analysis has been undertaken of the actual credit quality of the notes this must remain a tentative conclusion. In Chapter 5 an analysis will be undertaken of the affect of credit ratings (which measure credit quality) on the price of notes traded.

CHAPTER 5

THE DEVELOPMENT OF EUROCOMMERCIAL PAPER

5.1 Introduction

The purpose of this chapter is to examine features of the eurocommercial paper market which may affect systemic risk. All the features examined in this chapter are also relevant for the eurocommercial paper market's underwritten counterpart, the euronote market. They are, however, either associated more directly with the eurocommercial paper market (such as trading and credit ratings) or have fuelled the development of the eurocommercial paper market (such as regulation and clearing houses). For these reasons they are combined within the one chapter. Four features are discussed in relation to systemic risk: these are, regulation, trading versus placement, clearing procedures and credit ratings. To begin with, however, the first section of the chapter will examine the reasons for the emergence and growth of the eurocommercial paper market. A survey is undertaken of the extent to which commercial paper is now a feature of domestic financial markets.

5.2 Emergence and Growth

The early 1970s certainly seemed to provide little impetus to the development of a eurocommercial paper market. The syndicated loan market was booming with spreads on short-term credits well above 1/2 per cent, and above 1 per cent on medium-term loans. The US commercial paper market provided a competitive outlet for US corporate funds. Risk diversification was achieved by either adding more banks to the syndicate list or by selling paper to a broader investment base in the

United States. With the financial climate as it was, some external stimulus was required for a eurocommercial paper market to develop. Such stimulus came in 1968 with the establishment in the United States of the Office of Foreign Direct Investments (OFDI). The OFDI promulgated regulations which affected how US companies could finance their overseas subsidiaries and affiliates. US companies which had a 10 per cent or more investment in a foreign company were designated as direct investors and subject to capital restrictions. The amount of direct investment that a company could make was set at a percentage of the average positive direct investment made by the company during the base years 1965 and 1966. The percentage was then related to the geographic area receiving the investment, but for Europe it was either 65 per cent or 35 per cent depending on the country.

The OFDI did permit US companies to raise long-term finance which could be used to offset direct investment. For example, a US company might use the proceeds of a long-term foreign borrowing to invest funds in a foreign subsidiary. The capital transferred could be deducted, the effect being a zero net transfer of capital. To count as long-term borrowing, the debt could not be repaid with twelve months of its origination.

The capital restrictions imposed on US companies by the OFDI were penal. Borrowing rates in the euromarkets, which were generally higher than borrowing rates in the US commercial paper markets, were made even more onerous by the OFDI restrictions.

It was in response to these difficulties that in 1971 a number of US companies established what were known as eurocommercial paper programmes, based on the US model. The real advantage of setting up a eurocommercial paper programme was the fact that it could be classified as long-term borrowing under the OFDI regulations so long as paper was 'rolled-over' on maturity for at least twelve months.

In February 1974 the OFDI regulations were repealed. US companies were now able to fund their overseas operations as before, by freely using their own domestic markets. The market was founded on 100 per cent US company involvement, which soon disappeared once the regulatory climate changed.

It was to be over six years until the next eurocommercial paper programme was to appear. This was a eurocommercial paper programme established by Merrill Lynch in 1980 for Associates Corporation of North America ('Associates'). At the time Associates was expanding its operations in Japan and wished to diversify its funding base. Associates really required sterling funds. It used the US dollar funds generated by the programme to swap into sterling through the foreign exchange markets. Although the Associates' programme was successful, there were only two more eurocommercial paper programmes established prior to 1984: the Republic of South Africa (October 1981) and the Australian Resources Development Bank Ltd (ARDB) (October 1983). It was from 1984 onwards that the eurocommercial paper market really took off fuelled by the trend towards securitisation. Some indication of the size and growth rate of the eurocommercial paper market compared with its underwritten counterpart, the RUF market, is shown in Figure 5.1.

The move towards eurocommercial paper has been accompanied by an increase in the amount of fully discounted notes as opposed to interest-bearing notes, which have generally been the norm with underwritten facilites. This switch to full discount notes is primarily the result of the following factors:

Figure 5.1 **The Growth Of The Euronote Market**

1 The investor base in euronotes/eurocommercial paper, as well as in other euromarket instruments, is gradually becoming more aware of the attributes of full discount notes. Such notes should be particularly attractive to those investors that already have a US commercial paper programme. US commercial paper is issued at a full discount, and so the issue of eurocommercial paper on the same basis would allow for a better comparison of the yields on the two facilities. This method therefore increases the opportunities for arbitrage between the US and euromarkets.

2 Some investors are, quite simply, unable to buy interest-bearing securities.

3 In a bull market some investors are averse to buying notes in the secondary market at a premium to the coupon. This situation could never arise with full discount securities.

The formula for calculating the purchase price of a full discount euronote is as follows:

$$\text{Purchase price} = \frac{\text{face value of note}}{1 + \dfrac{(\text{maturity of note} \times \text{purchase yield})}{36{,}000}} \qquad \ldots (5.1)$$

There is still much confusion over the differences between RUFs, NIFs, and eurocommercial paper. It is important to note that, apart from the fact that the notes may be either interest-bearing or full discount under each programme, the note itself is in most cases identical. Irrespective of the name of the facility, the actual instrument which is offered to investors is much the same in each case. The difference between euronotes and eurocommercial paper lies not so much in the structure of the notes as in the way the facilities are arranged. It is sometimes suggested that the term eurocommercial paper implies a pure dealership mechanism, with direct bidding as opposed to a tender panel acting through an agent. This is by no means true. Eurocommercial paper tends to be issued through a dealer mechanism, but it need not be. The main concern of any eurocommercial paper issuer must be the ability to issue as much paper as required at a certain time, at the most competitive rates. The type of placement method for eurocommercial paper, as for euronotes, must be determined on economic grounds by reference to the particular attributes and requirements of the issuer.

Although the notes issued under a euronote or eurocommercial paper facility are fundamentally the same, there has been a very different impetus to the growth of these markets. Under a euronote facility, an issuer will make a request for paper: the facility is issuer-driven. It is the issuer that will approach the bank and ask for a quote on its paper. The impetus to the growth of the eurocommercial paper market has been quite the reverse: eurocommercial paper is investor-driven. In this situation a potential investor will contact a bank seeking paper of a certain price and maturity. The bank (probably an investment bank) will check its stocks to see if it has such paper on its books. More often than not this exercise proves to be fruitless. The bank will then telephone around other banks to see if they have paper of the type required by the potential investor. This exercise, too, will often be to no avail. The bank will then approach one (or more) of its issuer clients and will ask it to issue paper of the type and maturity required. In return for the issue of this paper the bank will guarantee a certain price for a given quantity. The eurocommercial paper market, as opposed to the euronote market, is market-driven. It is driven basically by investment banks, which make offers to note-issuers as a result of investor demand.

5.3 Domestic Commercial Paper Issues

According to the Bank of England statistics (1987, pp 47-48), the \$359 billion of commercial paper outstandings in national markets, with the perhaps \$35 billion of euronotes and eurocommercial paper in issue, brings the total of worldwide commercial paper issues to \$394 billion (see Table 5.1). A large proportion of this total, however, represents domestic rather than cross-border lending. Only the United States and the euromarket have had large issues made by foreign borrowers.

Although the US commercial paper market stands as a model for the development of other domestic commercial paper markets, local conditions have helped to shape many of these markets along slightly different lines.

In this section of our study we will examine, briefly, the growth of various domestic commercial paper markets around the world. What should, hopefully, be clear at the end of this examination is that commercial paper represents not just another innovation in the financial system which may disappear as conditions change. It represents a fundamental change in the structure of worldwide financial markets, brought about by the structural process of disintermediation and securitisation.

Table 5.1 **Worldwide commercial paper issues**

late 1986 outstandings: $ billion

Market	
United States	322.7
of which foreign borrowers	37.8
Canada	11.4
Sweden	7.4
Spain	5.4
Australia	4.3
France	4.0
Hong Kong	1.2
United Kingdom	1.0
Norway(a)	0.9
Singapore(a)	0.3
Netherlands	0.3
Sub-total	358.9
Euronotes and eurocommercial paper	35.0
Total	393.9

Source: Bank of England Quarterly Bulletin, vol 27, no 1, February 1987, p 48

Note: (a) estimate based on the value of facilities arranged

5.3.1 United States

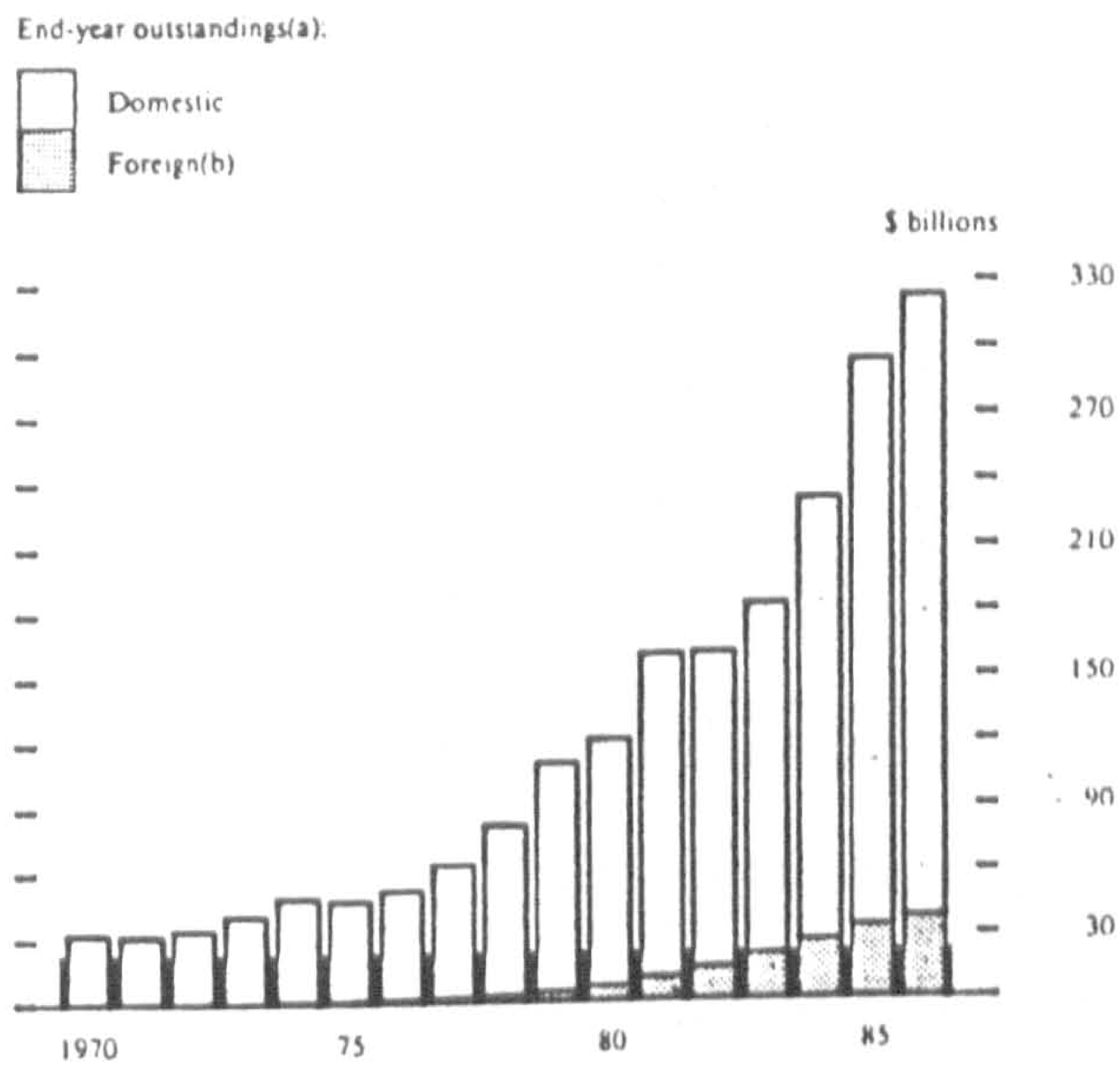
There is a considerable volume of literature on developments in the US commercial paper market: see, for example, Steiner, 1921; Greef, 1938; Myers, 1932; Beckhart, 1932; Foulke, 1931; Jacobs, 1957; Bloch, 1961; Seldon, 1963; Baxter, 1964; Johnston, 1968.

As with other aspects of society, credit markets change with the passage of time. The US commercial paper market is no different. Up to the end of the nineteenth century, commercial paper consisted mainly of trade notes received by manufacturers, wholesalers or jobbers in payment for the shipment of goods to other firms. The recipients of the notes endorsed them over to banks to their own creditors, or to brokers who in turn sold them to banks. Commercial paper was, thus, almost exclusively two-name paper. The buyer of goods was known as the 'maker', and the seller was known as the 'payee'. Denominations were in odd amounts, which reflected the value of particular shipments of goods. Today US commercial paper consists of single-name notes issued in round denominations (from $100,000 upwards) and unrelated to the shipment of goods.

The main issuers are finance companies. Issuers do not have to register their issues with the Securities Exchange Commission (SEC); nor do they have to publish a prospectus as long as the proceeds are used to finance current transactions and the paper has a maturity of no more than 270 days. Most issuers sell their paper through commercial paper dealers, who buy the paper and then resell it to institutional investors. Many of the larger finance companies and US bank holding companies dispense with dealing services and place their paper direct. Settlement is same day, and almost all issues are rated by one of the US rating agencies. The major investors in US commercial paper are corporations, money market funds, and banks. Secondary market trading is uncommon, as paper is nearly always held to maturity.

The volume of paper outstanding in the US commercial paper market has increased rapidly in the last few years. As Figure 5.2 shows outstandings grew from $111 billion in 1979 to $162 billion in 1982, and $323 billion in August 1986 (Bank of England, 19877, p 49). The greatest rate of increase has been in issues for foreign borrowers located outside the United States.

Figure 5.2 Issues in the US commercial paper market



Source: Bank of England Quarterly Bulletin, vol 27, no 1, February 1987, chart 3, p 49

There have been suggestions that the US and eurocommercial paper markets may eventually merge into one global market as rates in these markets converge as a result of arbitrage between the two. Many facilities are offering the borrower the opportunity to tap both markets, either by switching from one to the other as rates change or by raising funds from both markets at the same time. This latter method is increasing in popularity as borrowers begin to realise the arbitrage possibilities between the two markets. These have become known as global note facilities, although Bank of America prefers the term 'BONUS' (borrower's option for notes and underwritten stand-by).

Fundamental differences remain, however, between the US and euro-commercial paper markets. The average maturity of euronotes and euro-commercial paper is longer than that of US commercial paper: maturities in the euronote and eurocommercial paper market are generally of three months, six months and one year, whereas maturities in the US market are generally much shorter (22 days on average), with a wider range of maturities available. Euronotes and eurocommercial paper are far more liquid than US commercial paper: there is a growing secondary market, whereas no such market exists in the United States. In the United States investors are able to purchase paper of the type and maturity they require because of the massive depth of the market (over $300 billion outstanding). It is, therefore, a placement market, with paper staying with investors until its maturity. It is not yet possible to purchase such a variety of paper in the euronote and eurocommercial paper market.

The question often arises, therefore, whether the euronote and eurocommercial paper market is a placement market or a trading market. The answer is that it is both. Because of the relatively shallow depth of the market (euronotes and eurocommercial paper are actually only separate segments of the same market), it is not always possible to place notes with investors at issue. It is becoming increasingly necessary to trade these notes, not only to go out actively and seek issuers that are prepared to issue notes to meet investor demand, but also to create synthetically odd maturities in the secondary market.

The comparative features of euronotes, eurocommercial paper and US commercial paper are set out in Table 5.2.

Table 5.2 **Comparative features of euronotes, eurocommercial paper and US commercial paper**

	Euronotes	Eurocommercial paper	US commercial paper
Cost	Low	Very low	Lower still (usually)
Flexibility	Yes	Yes	Yes
Average maturity on notes	Short	Short	Very short
Range of note maturities available	Narrow	Narrow	Wide
Issuer quality	Broad	More restricted	More restricted
Secondary market liquidity	Low to date but increasing with supply	Low to date but increasing with supply	Non-existent
Standardised fee structure	No	No	Yes
Market awareness of investor needs	Less aware	Very aware	Very aware
Importance of trading	Very important	Very important	Not important

5.3.2 Canada

Canada's commercial paper market began in 1952. Its development, therefore, closely paralleled the post World War II resurgence of the US commercial paper market. (In March 1951, total US commercial paper outstandings passed US $1 billion, almost the peak level attained in 1920 after reaching a low of US $94 million in 1932.) In Canada, unlike the US commercial paper market, issues by industrial and financial borrowers were preceded by issues by the finance subsidiaries of US automobile companies (the largest being General Motors Acceptance Corporation) and the large retail department stores (for further details on this point see Sarpkaya, 1980). In November 1986 outstandings of sales finance and consumer loan company paper totalled Can $ 5.7 billion (US $4.1 billion). Outstandings of other commercial paper issued by industrial and financial companies reached Can $10.0 billion (US $7.2 billion), including Can $3.9 billion (US $2.8 billion) of issues by non-financial corporations (Bank of England, 1987, p 50).

Commercial paper in Canada may be issued for maturities between 30 and 365 days. Its average maturity (44 days) is twice that of the US market (Smith, 1986, p 25). Finance companies generally place their paper directly. This paper is then usually held to maturity. Most other paper is placed through dealers. Unlike in the US commercial paper market, many issues of commercial paper by Canadian companies are secured against company assets (usually accounts receivable).

It is not required that borrowers publish a prospectus when issuing commercial paper in Canada. Nevertheless, most issues are rated and there are considerable disclosure requirements. Although Canadian commercial paper does not have to be related to a specific transaction, Canadian companies tend to make more use of the bankers' acceptance market to raise short-term funds. Outstandings in the banker's acceptance market in November 1986 totalled Can $25.7 billion (US $18.6 billion) compared with outstandings in the commercial paper market of Can $15.7 billion (US $11.4 billion) (Bank of England, 1987, p 51).

5.3.3 Australia

The Australian promissory note market began in 1972 when GMAC issued a small amount of bearer notes guaranteed by its parent. Until 1979 no other issuer entered the market. The Australian commercial paper market (known locally as the promissory note market) has grown rapidly in the last few years. There are now some 125 issuers of promissory notes including 70 corporations, 30 financial institutions and 25 quasi-sovereign authorities (Arthur, 1986, p 47).

The promissory note market received a boost in 1979 when the Australian Federal Government required the Australian Wheat Board to finance its crops on a commercial basis. This move on the part of the Federal Government was an attempt to tighten control over the money supply in the wake of the 1978 bumper wheat crop, which they had to fund through mutual credit facilities. The Australian Wheat Board chose to use the promissory note market as a large part of its commercial funding strategy. Today, nearly 90 per cent of the Australian Wheat Board's short-term domestic funding requirements are met through the issue of promissory notes.

Development past this stage was, however, rather slow due to stamp duty costs which added approximately 0.50 per cent to 90 day issues and 0.25 per cent to 180 day issues (Respinger and Turner, 1986, p 42). This effectively removed the cost advantage over cash advances. The market received a fillip in 1983 when stamp duty was abolished on all negotiable money market instruments. This led to a resurgence of interest in domestic short-term securities.

Austraclear was established in September 1984 as a central clearing house, similar to Cedel and Euroclear in Europe. This - coupled with the rating of issues by a ratings agency, Australian Ratings - further encouraged the development of the market.

By mid-1986, approximately Aus $14 billion (US $9.3 billion) of facilities had been signed, with notes outstanding estimated at Aus $6.5 billion (US $4.3 billion) (Bank of England, 1987, p 52).

5.3.4 Netherlands

The Dutch capital market was liberalised with effect from 1st January 1986. Among the new developments was the establishment of a guilder-denominated commercial paper market. The guilder commercial paper market has made a relatively slow start. This is due mainly to the high level of liquidity of Dutch corporations and the small number of foreign borrrowers who have issued in the market. Nevertheless, in a country where there is no acceptance market, commercial paper could make a valuable contribution to the short-term funding requirements of Dutch corporations. Guilder commercial paper can be issued for maturities between 14 days and two years (Rose, 1986, p 27). During 1986 nine programmes were signed and in October 1986 DF 750 milion (US $0.3 billion) was outstanding (Bank of England, 1987, p 52). Since October 1986, the Dutch central bank has provided a clearing service, which may encourage the growth of the market.

5.3.5 Spain

The Spanish commercial paper market first began in October 1982 with an issue for a state-owned borrower. The market has flourished despite the imposition of reserve requirements to bank supported paper in early 1984. Outstandings in late 1986 were in excess of US $5 billion (Bank of England, 1987, p 52). These outstandings were comprised of issues by companies, banks, and subsidiaries of foreign companies. Spanish commercial paper, or 'pagares de empresa' as it is known, is traded on the Spanish stock exchange. Many of the issues are supported by standby facilities, which gives them the guarantee of medium-term funds if short-term notes cannot be sold. The programmes then assume the essential characteristics of a RUF.

5.3.6 Norway

In December 1984 the Norwegian Ministry of Finance authorised the issue of short-term negotiable paper, termed certificates. These certificates are classified into four categories: treasury certificates, bank certificates, finance certificates (issued by private finance companies) and loan certificates (issued by state banks and other enterprises). The certificates all carry a maximum maturity of twelve months. There is a minimum issue size of NKr 25 million and a minimum denomination of NKr 1 million. Only Norwegian institutions and enterprises are allowed to issue and purchase certificates.

Throughout 1985 twenty-five issues of loan certificates with a gross value of NKr 3.5 billion (US $0.5 billion) were made. In the period January to October 1986 seventy-five issues with a gross value of NKr 6.6 billion (US $0.9 billion) were made (Bank of England, 1987, p 52).

5.3.7 Sweden

The Swedish commercial paper market began in the early 1980s. By late 1986, with SKr 50 billion (US $7.4 billion) outstanding, the Swedish commercial paper market was the third largest domestic commercial paper market in the world after the United States and Canada. There is no secondary market and there is no regulatory requirement for a back-up line of credit. Average paper maturities in this market are generally shorter than in the United States. At the end of 1986, there were over a hundred issuers in the market, including Swedish companies, municipalities, and the local subsidiaries of several multinational corporations.

5.3.8 Hong Kong

The Hong Kong dollar commercial paper market opened in 1982. It was not until 1984, however, that the market really began to grow, when issues totalling HK $2.6 billion (US $0.3 billion) were arranged. Nineteen programmes were announced in 1985 totalling HK $8.4 billion (US $1.0 billion) followed by six programmes in the first ten months of 1986 to the value of HK $3.8 billion (US $0.5 billion). By mid-1986 estimated outstandings had reached US $1.2 billion (Bank of England, 1987, p 53).

5.3.9 Singapore

The Singapore commercial paper market (or promissory note market as it is known) opened in 1984 as an adjunct to the euronote and eurocommercial paper markets. Five facilities were signed in 1985 with a total value of S $0.3 bilion (US $0.1 billion). This was followed by the announcement of six further facilities in the first ten months of

1986, totalling S $0.4 billion (US $0.2 billion) (Bank of England, 1987, p 53).

5.3.10 France

Launched in December 1985, the market for commercial paper in France, or 'billets de tresorerie', has grown rapidly. The market was authorised as part of the government's policy of liberalising French capital markets and giving borrowers a wider choice of financial instruments. Although the French commercial paper market was built on the US model, it has a number of unique features. Commercial paper may be issued only by non-bank French comapnies and subsidiaries of foreign companies. A US-style liquidity line must be established for at least 75 per cent of commercial paper outstanding (prior to March 1987 this figure was 95 per cent). Issuing companies are obliged to report current liabilities and assets quarterly and submit profit and loss accounts semi-annually. Settlement in this market is usually next day.

As in other commercial paper markets, notes are in bearer form and can be either placed directly or through dealers. The minimum denomination for billets de tresorerie is Ffr 5 million. Maturities can range from 10 days to seven years (prior to March 1987 the maximum maturity was two years). To date, however, most issues have been in the 20 to 40 day range. By the end of November 1986, outstandings were valued at Ffr 25.8 billion (US $4.0 billion), with over 100 issuers in the market (Bank of England, 1987, p 53). The main investors have been sicavs (investment companies), pension funds, insurance companies and commercial companies.

5.3.11 United Kingdom

5.3.11.1 Development of the market

The UK government gave the go-ahead on 29th April 1986 to the creation of a sterling commercial paper market in the United Kingdom. Prime quality borrowers and investors now trade short-term money direct with each other in the form of unsecured paper. It has been an anomaly of the UK financial system that no means existed that allowed companies to borrow direct from market investors on a short-term basis. This anomaly has now been removed.

To assess the demand for a sterling commercial paper market one has only to look at the list of UK industrial companies that have issued commercial paper in the United States. The following list is taken from Standard & Poor's Commercial Paper Ratings Guide (1986):

Allied-Lyons	Heron International
Babcock International	ICI
BAT Industries	Marks and Spencer
Beecham Group	Metal Box
BICC	Plessey
Boots	Reckitt & Colman
Bowater	Redland
British Gas	Rolls Royce
Britoil	South of Scotland Electricity Board
Cadbury Schweppes	Thorn EMI
Consolidated Gold Fields	Unigate
English China Clays	United Biscuits
GKN	

With the growth of the eurocommercial paper market, firms are beginning to tap both US and eurocommercial paper markets, often swapping the proceeds into sterling. Such an operation is referred to as multi-currency commercial paper. The example below shows how a company could raise 60-day sterling by using the US commercial paper market (the example is an adaptation of one provided by Merrill Lynch in October 1985 referring to the use of the US commercial market to raise Deutschemarks):

Stage 1 — Borrower asks US broker for a bid on 60-day sterling

Stage 2 — Dealer will determine:

1. relevant commercial paper rate for dollar equivalent of amount of sterling required
2. a sterling spot rate
3. a sterling interbank swap rate for 60 days forward
4. a eurodollar time deposit rate for the number of days between the day on which dollars are available in the US commercial paper market and the settlement of a sterling spot purchase transaction

Stage 3 — An all-inclusive sterling borrowing rate is conveyed to the borrower along with the prevailing eurosterling rate for comparison

Stage 4 — If rate is acceptable, the borrower issues US commercial paper to the equivalent amount of sterling funds required

Stage 5 — Broker pre-calculates the interest to be earned on the commercial paper proceeds for the period prior to settlement in the spot forex market

Stage 6 — The interest to be earned is added in advance to the net commercial paper proceeds and applied towards a spot market purchase of sterling required

Stage 7 — At the same time as the spot market transaction, the broker repurchases the same amount of sterling forward from the issuer to give value on the maturity date of the commercial paper

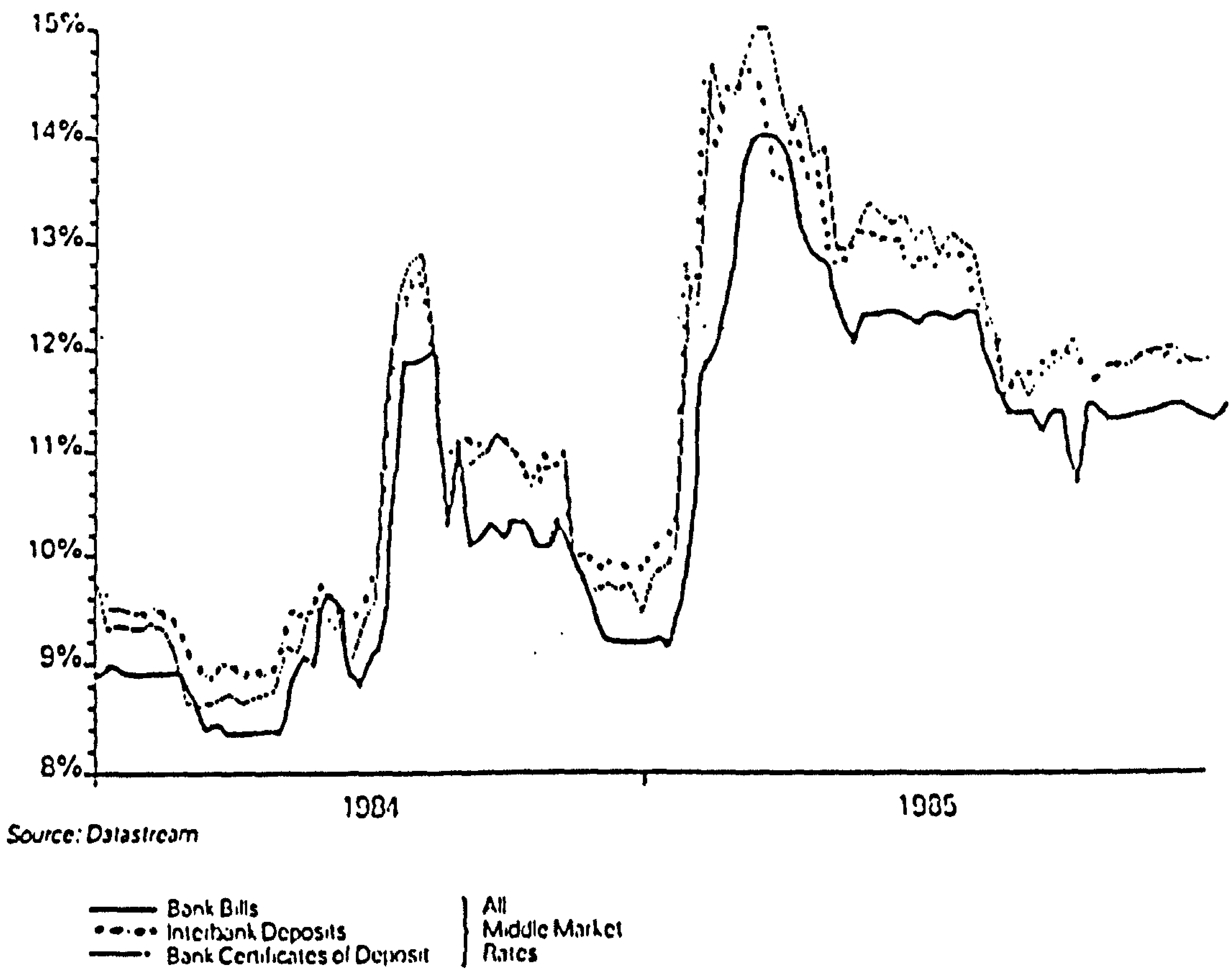
Stage 8 — The sterling funds are delivered to the borrower in accordance with his instructions

This process is obviously time-consuming and expensive for the borrower. It is far easier for a company to raise funds through a sterling commercial paper market and dispense with this process. It is also easier for the government to monitor notes denominated in sterling from the start than those swapped from dollars into sterling.

There was also a monetary rationale for establishing a sterling commercial paper market, the objective being to reduce the growing dependence of the UK corporate sector on bank borrowing. From 1981 until October 1985 the government issued more gilt-edged stock than was necessary to meet its public sector borrowing requirement (PSBR). A massive rise in borrowing by corporates from the banks inflated money supply figures. Contractionary open market operations (in gilts) were therefore necessary to achieve (or attempt to achieve) the monetary targets. Shortages in the money markets were the result. The government also kept treasury bill issues low and offset money market shortages by purchasing bank acceptances. As a result of this overfunding the bill mountain grew from £2 billion in 1981 to nearly £15 billion in 1985. The Bank of England's massive appetite for acceptances drove yields on these instruments down to sometimes 100 basis points below bank CDs and interbank deposits (see Figure 5.3). Acceptances thus became an extremely cheap source of funds for corporate borrowers.

As a result of this discrepancy in yields a situation arose in which bills were issued by the private sector merely to relend the funds obtained through such issues at a higher yield in the market. This was been a contributing factor to the increase in large term deposits towards the end of 1985 and beginning of 1986. This form of bill arbitrage, or 'round tripping' as it was known, had the effect of offsetting the initial reduction in the money supply brought about by overfunding. Although the government's policy is now merely to fund to meet the PSBR, this does not, in itself, imply an immediate reduction in the bill mountain. Indeed, figures compiled by County Bank, National Westminster's merchant banking subsidiary, show that the yield spread between bank acceptances and bank CD and interbank deposit rates had still not declined by early 1986 (see Figure 5.4).

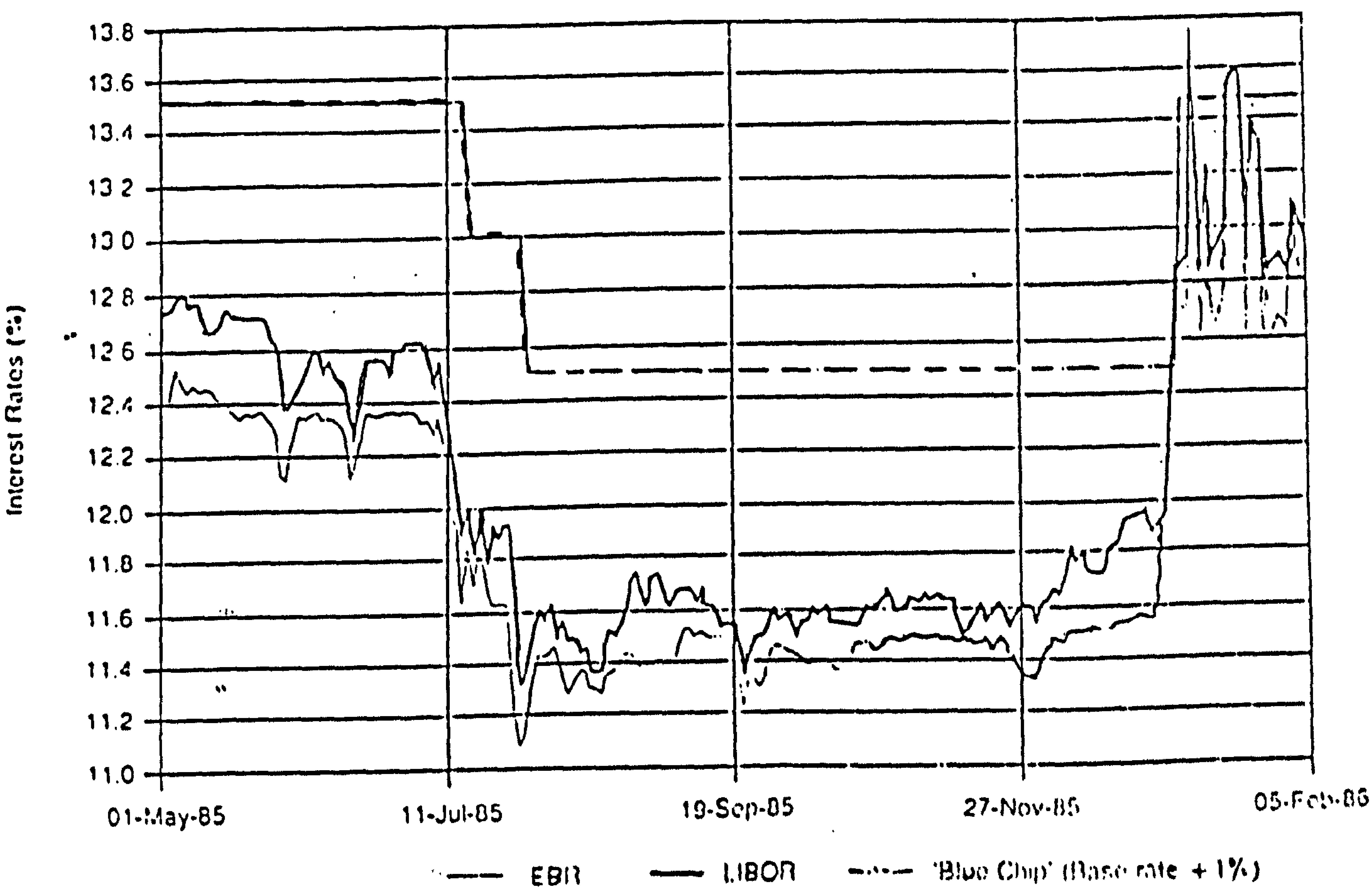
Figure 5.3 Yields on 3-month sterling bank bills, interbank deposits, and bank certificates of deposit



One way to narrow the yields between these instruments (and hence to increase the yield on bank acceptances) would be to introduce a viable alternative to bank acceptances; this instrument was sterling commercial paper. Sterling commercial paper consists of short-term (seven days to one year) unsecured promissory notes issued by corporations wanting large amounts of cash. The purchasers are financial institutions or other corporations with temporary cash surpluses. The notes do not carry an interest coupon but are sold at discounts below face value to provide a return to investors. Unlike acceptances, commercial paper does not require an underlying trade transaction. It is priced off LIBID (London Interbank Bid Rate). As long as LIBID does not rise too far above the eligible bill rate (the acceptance rate) - 8 to 10 basis points above the eligible bill rate would probably be enough to hinder the growth of the sterling commercial paper market - sterling commercial paper will prove to be a viable short-term funding alternative to acceptances.

Figure 5.4 Short-term sterling interest rates

Daily data for three-month rates (yield basis)



Source: County Bank Limited

5.3.11.2 Obstacles removed

The principal constraint on the development of sterling commercial paper was that the issuer could have been seen as carrying out a 'deposit taking' role in contravention of the 1979 Banking Act. The Chancellor (Mr Nigel Lawson) has amended the Act to exempt from the prohibition on deposit taking in Section 1 issues by companies of sterling debt securities with a maturity of less than one year, which meet with the specific requirements governing the issue of such debt.

One of the main problems for the Bank of England in allowing issuers of sterling commercial paper to be exempt from the Banking Act was the problem of investor protection. This has been overcome by restricting access to the market to large high quality companies. Paper issuers' ordinary or preferred stock has to be listed on the London Stock Exchanges, and these issuers will be required to have net assets of at least £50 million. These restrictions will ensure that issuers will already have been analysed by the investment community and complied by United Kingdom disclosure requirements. On this criterion approximately 300 UK companies could be potential sterling commercial paper issuers, and as many as 50 foreign ones. As the paper will almost certainly end up with professional investors it will be exempt from stamp duty and withholding tax.

5.3.12 Implications of commercial paper markets

Commercial banks will obviously hope to gain a large section of these markets through buying commercial paper for their own books. This is to be expected from the outset as these markets will be very shallow and so even top quality names should not be able to issue paper much (if at all) below the bank CD rates. This should allow banks to purchase paper at reasonable yields. Indeed, it seems likely that the banks will be the major players in the commercial paper markets in the short run as they are amongst the few players in the money markets skilled in credit analysis. Eventually banks will be looking to trade this paper rather than keep it on their own books. Because of the lack of initial liquidity in most of these markets this may not be immediately possible. The banks may thus have to warehouse paper and tap it into the markets as the demand arises. This trading function will become particularly important for the banks, especially if rating agencies enter the markets, thereby providing for a more efficient market mechanism. As the markets mature, rates will fall, with some prime name issuers actually being able to raise funds below the banks' cost of funds.

The investors in this type of paper will not be the banks so much as those investors not tied to any interest rate index, like pension funds, life insurance companies and large corporations. The attraction for these investors would be the opportunity to diversify their asset portfolios away from bank paper and bank deposits.

In the long term it is the commercial banks yet again that stand to lose out from the development of commercial paper markets. The purpose of these markets is to raise cheap funds by by-passing the traditional intermediary role of the banking system. Banks will be disintermediated on both sides of the balance sheet. They will lose both deposit taking and lending business, as investors move out of bank assets into commercial paper, and as those companies that can issue paper below the rate at which they could obtain bank funds do so. This 'double disintermediation' will result from the fact that corporate borrowers, unlike banks, do not have to hold reserves against short-term debt. As they can, therefore, take full use of the borrowed funds, they are, in effect, paying less for their money even when the nominal return to investors corresponds with that offered by the banks. In practice, this means that commercial paper issuers may be able to offer slightly higher rates than the banks, and still benefit from issuing paper rather than seeking finance from the banking system, thereby benefiting both borrowers and investors.

In the United States the bank prime lending rate has tended to be used as a benchmark in the substitution of paper for bank loans. As this spread is often quite large, most paper-issuing corporations prefer not to use the banks at all for short-term financing other than when the commercial paper market is tight or closed to them. Indeed, it is debatable whether most prime name corporations should pay a large bank lending rate for an intangible intermediary service from which they may receive relatively little value. What should be clear from our examination of worldwide commercial paper markets is that they represent a fundamental change in the funding patterns of large corporations.

A further impetus was given to the growth of commercial paper markets in 1986 when a number of regulatory authorities applied specific risk asset ratios to underwriting commitments attached to euronote facilities. The various regulatory authorities applied capital weightings in the hope that their banks would pass-on the 'tax' in higher fees. This would provide underwriting banks with a higher rate of return on assets. If this could be shown to have occurred then it might be argued, on the one hand, that any increase in systemic risk which may have occurred through an initial underpricing of euronote facilities may have been, at least partially, rectified in the long-run through the transfer of capital 'taxes'. On the other hand, it might be that capital ratios are themselves exacerbating the problem of systemic risk by forcing banks to accept higher risks to earn the implied profit target. It is to this question that we now turn our attention.

5.4 Regulation and Pricing

April 1985 saw the circulation of a discussion paper by the Bank of England indicating the introduction of a risk-assets ratio weighting of 50 per cent on all underwriting commitments attached to euronote facilities. This was followed, in May 1985, by the introduction of a similar 30 per cent weighting by the Japanese Ministry of Finance, and the introduction of the same 30 per cent weighting by the US Federal Reserve in January 1986. British banks have argued that regulatory asymmetries in the application of capital ratios may hinder their own competitive position. Since this time, other countries' bank regulatory agencies have followed suit in applying capital against euronote facilities (see Appendix 5.1).

More significant, however, may be the paper released jointly by the Bank of England and the US Federal Banking Regulatory Authorities in January 1987. The paper outlines proposals for a common measure of capital adequacy. It is worthwhile quoting the position of both regulatory bodies on the application of a risk assets ratio to underwriting commitments attached to RUFs. The paper states (1987, p 86):

> 'Undrawn commitments will have conversion factors which vary with the original maturity of the facility. The supervisory authorities believe that the longer-term obligations, like Revolving Underwriting Facilities, involve a particularly significant credit risk. Therefore, facilities with an original maturity of over 5 years will have a conversion factor of 50 per cent; facilities of an original maturity of between 1 and 5 years will be converted at 25 per cent; and those formally reviewable annually, including overdrafts, will have a conversion factor of 10 per cent.'

Following on from the proposals laid down by the Bank of England and the US Federal Reserve, the BIS issued proposals in December 1987 for common minimum capital requirements for banks across the industrialised world.

In accordance with the earlier proposals of the Bank of England and the US Federal Reserve, capital requirements are to be calculated by assigning risk weightings both to assets and to off-balance sheet exposures. From the end of 1990 banks will be expected to maintain a standard ratio of capital to weighted risk assets of 7.25 per cent. This will be increased to 8 per cent in 1992.

The risk asset ratio system reconstitutes the asset side of a bank's balance sheet, dividing assets into categories and applying weights to those assets according to their perceived riskiness. The ratio is arrived at by comparing the bank's capital to its recalculated assets. Osborn (1987) has stated that the application of these ratios implies not so much that banks are unable to assess the risks of these instruments, but that they may not be able to provide adequately for these risks on an individual basis, unless all other market participants are forced to do the same.

The application of such capital ratios should, in theory, lead to higher fee prices for RUFs either as the banks pass on part of the cost to their customers or take on higher risks. Lomax (1987, p. 19) supports this contention saying:

> 'These ratios thus get built into pricing policy, since a bank would need to obtain a sufficient margin on a particular form of business to be able to cover the costs of the capital held against that business. If the ratio is 10 per cent, then sufficient profit will need to be made on a commercial loan to support twice as much capital as when the ratio is only 5 per cent ... In due course these ratios will have powerful effects upon the development of business, because of the interaction of capital requirements, the cost of capital, and prices in the market place.'

We would also expect to see a reduction in the rate of growth of committed facilities and an increase in the rate of growth of eurocommercial paper facilities. From Figure 5.1 a slight reduction in the rate of growth of euronote facilities is noticeable since mid-1985. It is also noticeable that in 1985 the eurocommercial paper market began its rapid growth. It seems, then, that regulation may have played some part in the growth of the eurocommercial paper market. What is certainly not clear, however, is that the application of risk assets ratios to underwriting commitments attached to RUFs has increased the levels of fees for these facilities. It may, of course, be that there is an element of cross-subsidisation from other parts of the bank. This is beyond the scope of this exploratory analysis, but does not detract from the fact that if fee levels are falling despite the application of capital ratios then the banks must be taking the shortfall themselves.

One way of attempting to discover whether the application of regulation (in the form of capital controls) has increased fee levels for euronote facilities is to chart the levels of fees for the market before and after the application of regulations. The data used in this section of the chapter are not publicly available, and they have been kindly provided by NatWest Investment Bank Ltd and Bank of America Capital Markets Ltd. By exploring the data (in this case trends in fee levels) we should be able to provide some evidence to support the main research hypotheses - to be formulated in the following chapters.

As emphasised in Chapter 2, there are two relevant fee levels for euronote facilities: undrawn costs and drawn costs. Undrawn costs represent the return gained by the underwriting banks if they are never asked to fund the facility. Drawn costs represent the return to the underwriting banks if they are asked to fund the facility.

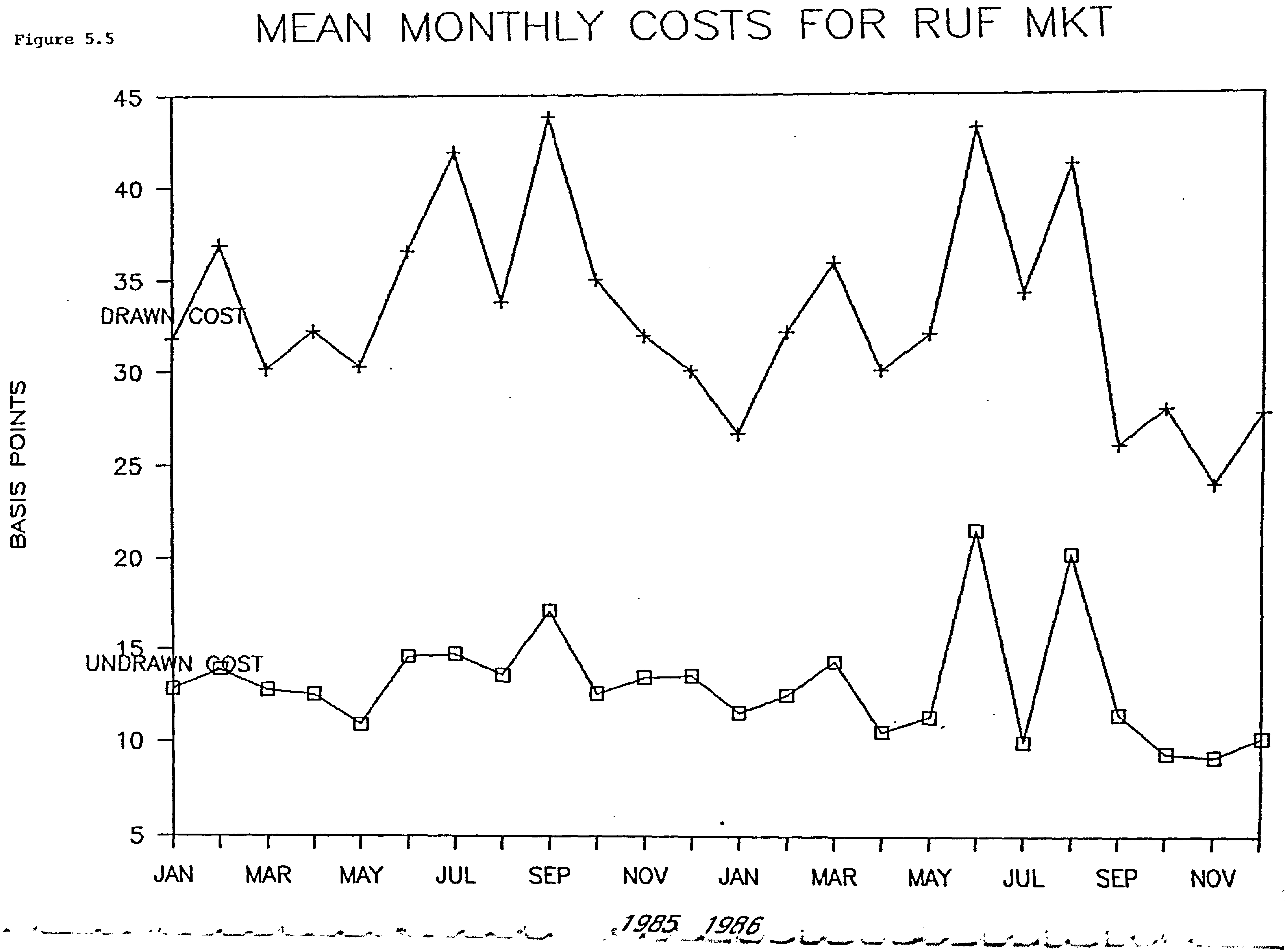
Naturally, drawn costs are higher than undrawn costs (which simply include a front-end fee and a facility fee) because the underwriter receives the maximum margin on any notes purchased.

Due to the fact that euronote facilities have developed in a bear market environment (rising prices/falling interest rates) an average interest rate for the period under observation has been used to smooth any trend which may have been attributable to falling interest rates.

Figure 5.5 presents all mean monthly drawn and undrawn costs for the whole euronote market between January 1985 and January 1987 (see Appendix 5.2 for the presentation of the data). If a tendency across this period of time is observable it would appear to be one of variability around a mean cost of approximately 32 basis points, and a undrawn cost of approximately 13 basis points. The market appears to have remained around these levels over the time period. There is little evidence to suggest that the application of regulation during 1985 and 1986 has increased fee levels in the market. It may even be that a slight decline is noticeable in both drawn and undrawn costs. Although the graph may appear to be somewhat variable, it must be remembered that the *y* axis represents basis points - in other words, each point on the scale represents 1/100 of 1 per cent. Even so, the upward peaks in months 7, 9, 18 and 20 (July 1985, September 1985, June 1986 and August 1986) seem difficult to explain. Closer examination is, therefore, necessary.

Figures 5.6, 5.7 and 5.8 divide the market into sovereign, corporate and bank borrowers respectively. From Figure 5.6 a decline in the mean monthly drawn and undrawn costs for sovereign borrowers over the time period is noticeable (see Appendix 5.3 for the presentation of the data used). The application of regulations appears to have made

Figure 5.5



MEAN MONTHLY COSTS FOR RUF MKT
BASIS POINTS
45
40
35
30
25
20
15
10
5
DRAWN COST
UNDRAWN COST
JAN
MAR
MAY
JUL
SEP
NOV
JAN
MAR
MAY
JUL
SEP
NOV
1985 1986

Figure 5.6

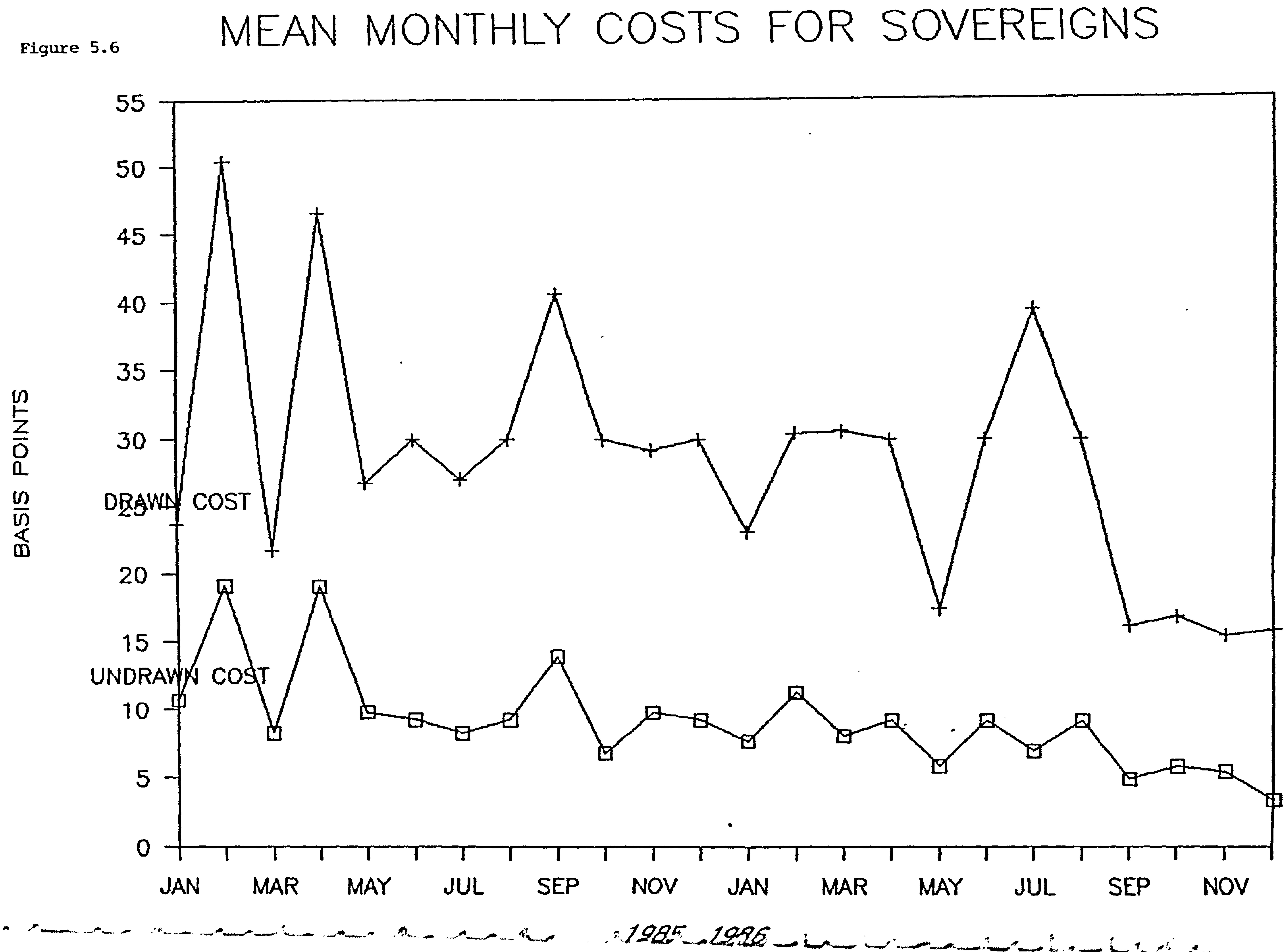

MEAN MONTHLY COSTS FOR SOVEREIGNS
BASIS POINTS
55
50
45
40
35
30
25
20
15
10
5
0
DRAWN COST
UNDRAWN COST
JAN
MAR
MAY
JUL
SEP
NOV
JAN
MAR
MAY
JUL
SEP
NOV
1985 1986

Figure 5.7

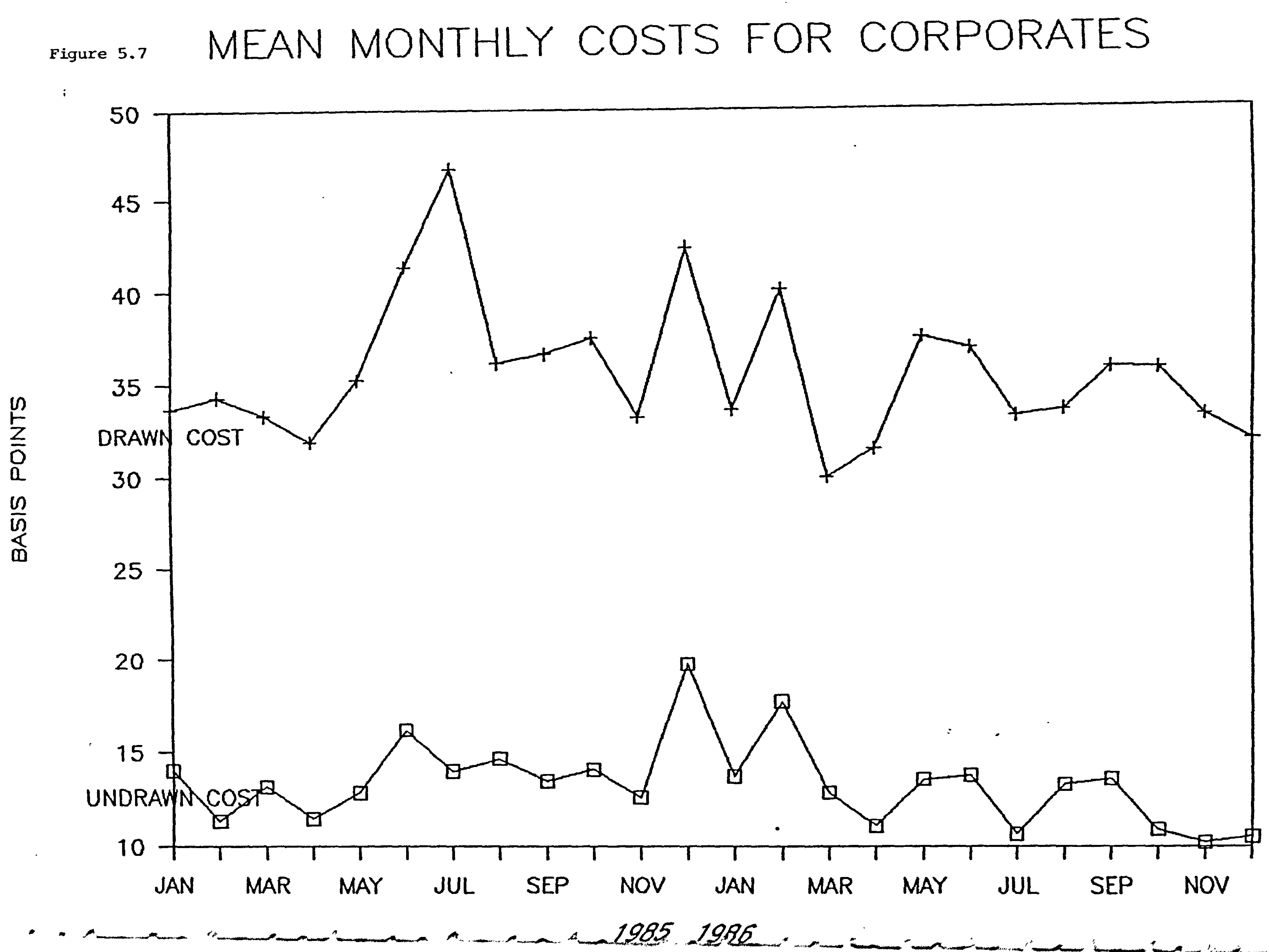

MEAN MONTHLY COSTS FOR CORPORATES
BASIS POINTS
50
45
40
35
30
25
20
15
10
DRAWN COST
UNDRAWN COST
JAN
MAR
MAY
JUL
SEP
NOV
JAN
MAR
MAY
JUL
SEP
NOV
1985 1986

Figure 5.8


MEAN MONTHLY COSTS FOR BANKS
BASIS POINTS
0
10
20
30
40
50
60
70
DRAWN COST
UNDRAWN COST
JAN
MAR
MAY
JUL
SEP
NOV
JAN
MAR
MAY
JUL
SEP
NOV
1985 - 1986

little if any impact on the fee levels in this segment of the euronote market. Again there are variations in the market fee levels at certain points in time, noticeably months 2 and 4 (February 1985 and April 1985). This is explained by large borrowings in the market by Portugal in those months. Portugal is recognised as a less than prime credit in the euronote market and the high fee levels charged for Portugal (undrawn cost of 20 basis points and a drawn cost of 51 basis points) are captured in these months' fee data.

Figure 5.7 presents the mean monthly drawn and undrawn costs for corporates (see Appendix 5.4 for the respective data). Again there is little or no evidence to suggest from these data that regulation has affected fee levels in this segment of the market. Although only an optimist would suggest that there is any clearly observable decline in drawn or undrawn costs in this segment of the market, neither is there any observable rise in fee levels over the time period. Drawn costs fluctuate within a low 15 basis points band and undrawn cost within an even lower 10 basis points band.

Figure 5.8 shows a different picture. It presents the mean monthly drawn and undrawn costs for banks (see Appendix 5.5 for the respective data). Both fee levels in this segment of the market are very volatile, particularly in months 7, 9, 18 and 20 (July 1985, September 1985, June 1986 and August 1986), precisely the months at which the whole of the euronote market reaches its highest peaks in terms of fee levels. Apparently, it is the volatility of the bank segment of the euronote market in these months which is showing up in Figure 5.5. The volatility of the levels of the bank segment of the euronote market is a result of the heterogeneity of this segment of the market compared with other sectors. A far wider range of credits borrow in this segment of the euronote market, ranging from the high quality conglomerates such as Citicorp and Bank of Tokyo to poor, less well-known names such as Korea Export Import Bank, which borrowed extensively in June and August of 1986.

It is virtually impossible to assess the affect of regulation on the fee levels achieved in this sector of the market. Although this segment of the market is highly volatile, there is certainly no observable upward trend in fee levels, which 'might' be attributable to the application of regulations.

To add support to this claim the mean drawn and undrawn costs in the euronote market and its respective sectors were calculated for 1985 (before the actual application of risk-assets ratios) and for 1986 (after the application of the risk-assets ratios). The results of this analysis are presented in Table 5.3. In the euronote market, the sovereign sector and corporate sector, the mean drawn and undrawn costs were actually lower in 1986 than 1985. In the bank sector there was a slight increase. This is due to the substantial borrowings in the market in June and August of that year by the Korea Export Import Bank. If this borrower is ignored when calculating drawn and undrawn costs for the bank sector in 1986 then both undrawn costs and drawn costs for 1986 fall below the respective levels for 1985: the mean undrawn cost becomes 11.6066 instead of 18.235, and the drawn cost falls from 36.253 to 33.056.

Table 5.3 Means of drawn and undrawn costs in euronote market and respective sectors for 1985 and 1986

	Euronote market	Sovereign sector	Corporate sector	Bank sector
Mean undrawn cost for January 1985 to December 1985	13.5694	11.1125	13.9758	15.610
Mean undrawn cost for January 1986 to December 1986	12.7333	7.2825	12.6825	18.235
Mean drawn cost for January 1985 to December 1985	34.5692	32.1383	36.8942	34.675
Mean drawn cost for January 1986 to December 1986	31.7991	24.6141	34.5300	36.253

Source: Data provided by Merrill Lynch Capital Markets International Ltd

5.4.1 Summary

There is little, if any, evidence to suggest that, from our data, regulation has affected the trend in fee levels for the euronote market, or the different segments of the market. Fee levels (on a drawn and undrawn basis) have continued on a steady, if somewhat downward trend. The decline in fee levels is particularly noticeable in the high quality segments of the euronote market, in particular in the sovereign sector. In this sector (and perhaps the corporate sector also) the market appears to have moved through the regulations, which suggests that the regulated banks are absorbing the capital ratios in their own books. This will, naturally, damage further the returns to underwriting banks. We would conclude that regulation, in the form of specific risk assets ratios, does not appear to have increased the fee levels attached to euronote facilities. Any possible reduction in systemic risk which may have resulted from the transferal of capital requirements to higher fee levels does not appear to have materialised.

This is not to say that the application of a risk asset ratio to bank underwriting commitments has increased systemic risk. We are trying to show that the application of the ratio does not appear to have checked the downward trend in fee levels in this market. If the risk asset ratio is simply linked to the perceived riskiness of individual assets then in this particular case there may be room to argue that it has had a negative effect on returns in the market. The capital cost appears to have been absorbed rather than passed on. However, as Lomax (1987, p. 17) argues, if the new system is seen as a step towards a portfolio assessment of the banks, then the concept may prove to be rigorous.

A well-managed bank will aim to build a well-diversified portfolio with little covariance between assets. In other words, banks will seek to develop a balanced portfolio that is not unduly exposed to any particular industry or market. The function of capital is not to guard against expected losses: that is the function of profits. Capital adequacy guards against peak losses and an unusually high covariance of loss. As such it could be argued that capital should be linked to the portfolio structure of assets rather than the perceived riskiness of individual assets as the present risk asset ratio system is. For example, two banks may carry similar underwriting commitments but have different asset portfolio mixes. In Bank A's portfolio underwriting commitments may account for 20 per cent of the asset base. In bank B's portfolio underwriting commitments may account for only 2 per cent of the asset base and may have a greater negative correlation with the rest of the portfolio. To apply the same risk asset weighting to both banks simply in accordance with the type of asset held does not reflect the true risk of the portfolio.

As shown in this section, applying a risk asset ratio to an individual asset, without consideration of how that asset fits in to the structure of the portfolio, can reduce returns in that market (assuming the capital cost is allocated directly). A risk asset ratio system linked to the structure of a bank's assets allows for greater flexibility in the allocation of capital in accordance with the unique composition of that bank's asset portfolio. This point becomes particularly important if banks are pricing assets on a relationship or 'customer portfolio' basis as risk and return are both calculated in accordance with their relationship with other assets in the customer portfolio.

If risk asset ratios are to be applied to a bank's portfolio of assets, rather than individual asssets, then it is important that systems exist within the bank to be able to analyse the profitability of different sections of the asset portfolio. A bank can then allocate capital itself to each asset section in accordance with the exposure of the portfolio to that particular section and, of course, in accordance with the minimum level of capital required to be held against the portfolio for Bank of England purposes.

A recent survey in London by Coopers & Lybrand - reported by Hislop (1987) - reveals that most of the British banks are basing their capital allocation systems on the minimum regulatory requirements of the Bank of England with apparent little regard to their own internal portfolio management. This may be largely due to the fact that sophisticated profitability systems do not exist in many banks. As such it is difficult to make strategic planning decisions about the structure of the asset portfolio. In the absence of these systems the Bank of England guidelines provide a ready-made capital allocation system, but without any regard to the (correlation) composition of a bank's assets.

In the case of RUFs, however, the application of specific risk asset ratios does not appear to have combatted systemic risk by increasing fee levels.

5.5 Trading Versus Placement

The role of placement in the euronote market holds relatively little risk. The placement of notes is carried out on a 'best efforts' basis only (unless, of course, the placing bank is also an underwriter). Any notes which cannot be placed below the maximum margin are returned to the underwriters. Notes need not be taken on to the placement bank's books. With trading the situation is different. Let us take an example.

Example 1

Assume Bank X obtains US $10 million of 3 month euronotes at LIBOR less 0.10 per cent per annum. At the time of rate-fixing LIBOR was set at 7 per cent per annum. Bank X thus owns the paper at 6.9 per cent per annum. The notes run from 3rd March to 1st June. We can determine the amount Bank X paid to the issuer on 3rd March by using the discount note formula. Using this formula we find Bank X paid:

$$\text{US } \$10{,}000{,}000 \div 1 + \frac{6.9 \times 90}{36{,}000}$$

$$= \text{US } \$9{,}830{,}425.1$$

This figure represents an asset on Bank X's books and must be funded. Bank X does not intend to hold the notes but to sell them as soon as possible. It therefore funds in the overnight market at a rate of 7 per cent per annum. This amounts to a cost of:

$$\frac{\text{US } \$9{,}830{,}425.1 \times 7}{36{,}000}$$

$$= \text{US } \$1{,}911.47$$

Bank X has now incurred a negative carry as it has paid more in the overnight market than it is receiving on its euronotes for one night. Its overnight yield on its euronote holding is:

$$\frac{\text{US } \$9{,}830{,}425.1 \times 6.9}{36{,}000}$$

$$= \quad \text{US } \$1{,}884.16$$

The negative carry is not just US $1,911.47 - US $1,884.14 = US $27.31 because if interest rates increase, it will increase when Bank X renews its borrowing. If Bank X cannot sell its euronotes the next day it will have to renew its borrowings. The number of times it is forced to do this will determine the eventual compounded interest it will have to pay. It is not the purpose of this thesis to examine in detail the trading and funding mechanics of money market instruments. Suffice to say that the length, level and rate of funding will affect the eventual return to any trader. In what is still an immature market an incorrect funding decision can eliminate any profit on a trade. Such a loss making situation can be depicted by taking our example one step further:

Assume interest rates rise on the day Bank X wishes to realise its euronote holding. LIBOR now stands at 7.0625 per cent per annum. To sell its euronotes Bank X must at least meet LIBOR:

$$\text{return on sale} = \quad \text{US } \$10{,}000{,}000 \div \frac{7.0625 \times 89}{36{,}000}$$

= US $9,828,396.2

less purchase price = US $9,830,425.1

less funding cost = US $1,911.47

loss on trade = (US $3,940.37)

If banks bid aggressively in tender panels to the point of maximum value for particular euronotes, the only way such banks can make a turn (a profit) is if interest rates fall or the yield curve remains positive. If interest rates stay the same or rise, as in our example, the trading bank will lose money. A particularly worrying point for the euronote market is that liquidity has invariably been provided by a secondary market with a falling rate (bull) environment.

The Bank of England (1985, p 402) has expressed concern over the supposed liquidity of euronotes, pointing to the fact that, if a borrower was to get into financial difficulty, any notes held by banks on the borrower would certainly move to a discount, with the margin possibly becoming so wide that the notes might become unsaleable. We would emphasise once more that marketability is not the same as liquidity. The fact that an asset may still be sold at a discount does not imply that the asset is liquid. Liquidity implies the ability to sell an asset at, or very close to, face value under most market conditions. It is doubtful whether euronotes and eurocommercial paper will ever achieve this liquidity.

As the Bank has also pointed out, the fact that an asset is tradeable does not mean that capital to provide against potential losses can be reduced. Indeed, prime quality assets may by-pass the banking system entirely, ending up with other prime name corporations and so leaving the banking system with reduced asset quality. Furthermore, with a security like a euronote, a downgrading of a borrower's credit rating would mean a discount on its securitised debt, thereby requiring the bank to write down the asset earlier than would otherwise have been the case. As far as this may be true the entire process of securitisation, whereby bank loans and deposits are replaced by securities, may contribute to an increase in systemic risk.

5.5.1 Summary

It is not sufficient that capital is just placed against underwriting commitments attached to RUFs. In this section we have tried to show that trading activities can result in substantial losses. As stated, the euronote market has grown in a bull market environment. What is more it is still an immature market that has depended largely on secondary market trading for liquidity. If insufficient capital is placed against trading positions then a bear market could result in substantial trading losses which are under-provisioned. The effect of a bear market with trading spreads widening could, however, be more disastrous for underwriting banks. The hypothesis is that as rates begin to rise, placing banks will find it increasingly difficult to place paper with investors below the maximum margin on the notes. The notes will therefore be returned to the underwriters who will be asked to fund precisely at the time when they will be shortest of funds. In this scenario systemic risk might be increased significantly.

5.6 The Clearance of Euronotes and Eurocommercial Paper

In this section we will examine briefly the different systems currently involved in the clearing of euronotes and eurocommercial paper. We will then examine briefly the possibility of same day settlement. This section will be concluded with an examination of the implications of a clearing system failure for systemic risk.

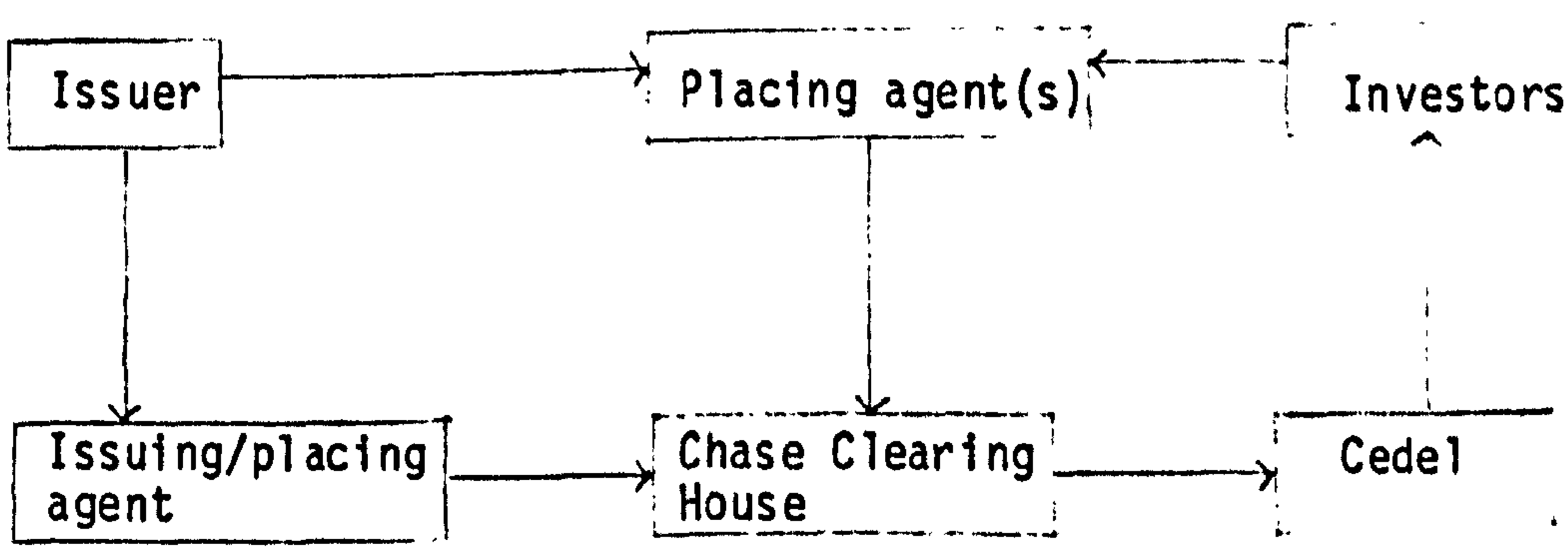
Euronotes and eurocommercial paper can currently be cleared through one of four major clearing systems. The first of these, Euroclear, is based in Brussels; the second, Cedel, is based in Luxembourg, with the other two, First Chicago Clearing Centre and Chase Manhattan Bank NA, in London.

Euroclear and Cedel are mainly clearing centres for long-term bonds. They have both adapated their systems to handle the shorter maturity paper predominant in the money markets. First Chicago and Chase Manhattan, on the other hand, are both specialists in the clearance of eurocommercial paper. They were both established initially to compete for the clearance of bank CDs. It was a natural evolution for both systems to incorporate euronotes and eurocommercial paper into their business activities.

The fragmentation between the various clearing systems has been a source of concern among market practitioners. In response to this concern, certain links have been established between the various systems. For instance, Chase Manhattan and Cedel operate a system which provides for same day settlement of notes.

Under this system the borrower issues notes of a specific amount and maturity with an absolute (as opposed to LIBOR-related) rate. The placing agents then place the notes with investors or traders. All this takes place usually before 11.00 a.m. (New York time), but is possible up to 5 p.m. for same-day settlement. Instructions to issue and pay out on the notes will then be given to the issuing/paying agent by the issuer, in this case through Chase's securities settlement system. The placing agents also send their settlement instructions to the clearing centre through this system. Investors then communicate settlement instructions to Cedel through Cedcom. Prime paper is then sent from the issuing/paying agent to the placing agent's account in the Chase clearing system. After receiving the paper from the placing agents on behalf of investors, the Chase clearing system verifies these against placing agents' instructions, and the paper is transferred to Cedel's account with Chase. The process can be accommodated under a book entry or grid note facility. In this all parties to the transaction must be members of the Chase clearing centre. Chase's same-day settlement process is shown in Figure 5.9.

Figure 5.9 Chase Manhattan's same-day settlement process



This system allows for physical delivery in London to investors that are not members of the Chase clearing centre. Where a grid system is used, all participants must be members. This is true of another same-day settlement system now in operation, the First Chicago Clearing System. Although grid note systems remove the need to move paper physically, they create a monopoly, as well as raising the question whether the notes are subject to stamp duty. Indeed, one of the main features of these clearing systems (whether they be physical delivery or book entry systems) is that they are issuer-driven despite the fact that the eurocommercial paper market is developing as investor-driven. It remains to be seen whether investors will follow where the issuers and clearing centres are leading.

As far as the clearance of euronotes and eurocommercial paper is concerned, the main risk facing participants is that of settlement risk. The BIS (1986, p 195) argue that:

> 'The key question is whether ... overall transactions volumes have become so huge that, even with low error rates, the inevitable breakdown at a major concentration point in the funds transfer system can involve very large amounts.'

They go on to argue (1986, p 196) that:

> ' Much attention has been devoted to developing mechanisms to control risks, including means to resolve disputes as a result of processing errors. Nevertheless, major disruptions of the transaction process have occurred, as yet without systemic damage, and central bankers remain concerned that competitive pressures to cut transactions costs may make it difficult for financial institutions to retain even the present degree of control and protection.'

The BIS are, of course, not just referring here to the euronote and eurocommercial paper markets. But their concern is also relevant to those markets. A major clearing failure in a market of US $30 billion of notes outstanding could indeed cause systemic damage. However, to the extent that euronotes are replacing other bearer securities (such as euro-CDs and FRNs) which are also subject to the same settlement risk, it is doubtful whether the growth of the euronote market has contributed significantly to systemic risk from this aspect.

5.7 Credit Risk and Ratings in the Euronote Market

5.7.1 Introduction

Financial innovation theory tells us that if new financial instruments are underpriced systemic risk may arise (see, for example, BIS, 1986b, p. 199). If investors are purchasing investments below an adequate return for the risk of those investments (because of a lack of knowledge of that risk) then the risk of a financial crisis increases. Credit ratings may be one way of reducing this possibility through increasing the communication of information to the market.

This section examines the effect of credit ratings on trading levels of borrowers' notes in the euronote market. Results show that although differently rated issues trade at different levels, the application of a credit rating makes virtually no difference to the trading level of a borrower's notes if that borrower has already been issuing in the market. The implication is that credit ratings appear to be merely confirming the market's own 'perceived' rating of the borrower. Some evidence is found, however, to indicate that credit ratings may be more significant in the lower quality categories of the market.

The effect of the 1987/88 stock market crash on ratings in the euronote market is also examined.

5.7.2 Credit risk and ratings

Credit risk has traditionally been assessed by commercial banks. In the euronote and eurocommercial paper market credit risk is assessed by investors, usually large corporations. Indeed, perhaps the most important feature of the euronote and eurocommercial paper market is that it removes banks from the role of analysing and assuming the credit risk of the issuer. In this market investors have to accept credit risk at an interest rate acceptable to the borrower. Because of the very short-term nature of the notes issued in this market, both interest and principal are paid on the maturity date of the notes. With such short-term notes the investor, in effect, takes a double repayment risk in that he cannot even rely on repayment of interest to offset partially any default on the principal sum, because both fall due simultaneously.

To the extent that investors in euronotes (generally large corporations) are ill-equipped to analyse credit risk, systemic risk might be increased. One way of containing any increase in systemic risk, due to an inability on the part of investors to assess adequately credit risk, may be to rate euronotes and eurocommercial paper. Lower rated issues would carry higher yields than highly rated issues. The question to ask is whether ratings have altered trading spreads between creditworthy and less creditworthy borrowers. It is important to note that the implicit creditworthiness of a borrower should not change because of a rating. A rating simply communicates the creditworthiness of a particular borrower to a market. If the market has correctly assessed the creditworthiness of the borrower in the first place, the issuer's average trading level should not change because of the application of a credit rating. If the market has incorrectly assessed the creditworthiness of the borrower, trading spreads should alter.

By examining the bid yield (trading level) we are effectively examining the demand for the notes. A credit rating does not affect the supply of notes already in the market: the supply of these notes is fixed until their maturity date. A credit rating may, however, affect demand if the market has incorrectly assessed the credit risk of the borrower.

Before embarking upon this analysis it will be useful to point out some discrepancies which can arise in the rating process. A brief breakdown of the way the rating agencies apply credit ratings will also be given to provide the reader with a knowledge of the symbols used in this section of the chapter.

To begin with, a distinction must be made between a paper programme with an irrevocable bank letter of credit, which is a guarantee to the investor of repayment of his investment, and a note programme that carries a bank underwriting guarantee. The latter is a guarantee not to the investor but to the issuer that notes left unplaced at each interest rate rollover date will be purchased by the underwriters.

There is no problem for the rating agencies in rating underwritten euronotes, because the committed bank stand-bys provide a visible liquidity source. For eurocommercial paper, however, there is no immediately visible liquidity source. With such programmes issuers have to prove that sufficient liquidity (possibly in the form of bank stand-by lines) exists in the event of the issuer's experiencing difficulties.

A distinction must also be made between the rating of paper with an irrevocable letter of credit and the rating of paper based on an assessment of the issuer's own credit standing. Because of the lack of ratings in the euronote and eurocommercial paper market, issuers have started to refer (where applicable) to their US commercial paper rating. For companies issuing in the United States without a bank letter of credit, this is a fairly good surrogate. But of the 50 euronote and eurocommercial paper issuers that have US commercial paper programmes, ten are backed by a bank letter of credit. This is a guarantee to the investor as opposed to merely a liquidity source. It is wholly incorrect to apply such ratings to euronote and eurocommercial paper programmes to which the letter of credit does not apply.

There are presently three main rating agencies for euronotes and eurocommercial paper. These are Standard and Poor's, Moody's investors service and the recently formed EuroRatings Limited. The last is based in London, and is hoping to use European rather than US accounting standards.

Table 5.4 gives a breakdown of the various rating symbols used by each agency in the rating of euronotes and eurocommercial paper, with an explanation of each rating. To provide some indication of the quantitative information required to perform a rating, a Standard & Poor's rating worksheet for industrial companies is provided in Appendix 5.6.

One interesting observation about ratings in the euronote market is that the distributions are highly skewed towards high quality. Examination of Appendix 5.7 reveals that of the 170 rated borrowers in the market at April 1987, only 50 had actually issued any notes. Further examination reveals that of these 170 rated borrowers 133 (78 per cent) had at least one 'First prime' rating. A 'First prime' rating is defined as a rating of A-1(+), P-1 or E-1(+). If ratings are shown by number of issuers who have actually issued notes, we find that over 80 per cent of all ratings are 'First prime'. This is not a surprising observation. It is up to the issuer whether he chooses to use the rating assigned by one or more of the rating agencies. Since many issuers may not wish to appear less than 'First prime', a less than 'First prime' rating may not be used when raising funds. The issuer may prefer to use name recognition only.

Table 5.4 Euronote and eurocommercial paper ratings by each rating agency(1)

Standard & Poor's	Moody's	EuroRatings	Explanation of rating
A-1	P-1	E-1	Highest grade. Paper assigned this rating is regarded as having the strongest degree of assurance for timely payment
A-2	P-2	E-2	Very good grade. Issues assigned this rating reflect an assurance of timely payment slightly less in degree than the strongest issues
A-3	P-3	E-3	Good grade. Commercial paper assigned this rating has a satisfactory degree of assurance for timely payment but the margin of safety is not as great as in the case of the two higher categories
B	Not prime	-	Issues rated 'B' on Standard & Poor's system are regarded as having only an adequate capacity for timely payment. Such capacity, however, may be damaged by changing conditions or short-term advertisites. Issues rated 'not prime' on Moody's system are simply those which do not fall within the prime rating categories
C		E-4	This rating is assigned to short-term debt obligations with a doubtful capacity for payment
D			This rating indicates that the issuer is either in default or is expected to be in default upon maturity.

Source: Compiled from Standard & Poor's Credit Overview International; Moody's Short-term Market Record, and EuroRating's Eurorating's Report

Note: 1 + sign denotes the top range of the specific rating category

Before attempting to determine whether credit ratings affect the trading levels of an issue (which implies that the market's perceived rating of the issue was in fact different to the actual rating) it is necessary to determine the respective levels at which different rated issues trade.

In order to conduct this analysis the following tables have been compiled from data provided by Merrill Lynch, Standard & Poor's, Moody's Investors Service, EuroRatings, and International Financing Review. Tables 5.5 to 5.8 show the average trading levels (defined as the average monthly bid levels) relative to the market for first time issuers with different quality and combinations of ratings. The 'market' in each table is not the entire euronote issuance market, which includes sovereigns, banks and corporates. Rather, the 'market' is defined as the issuer's own sector of the entire market, ie the 'market' for a bank issuer is the bank sector of the euronote market, and the market for a corporate issuer is the corporate sector of the euronote market. Yields in the euronote market have been declining. To take account of this trend all issuer's trading levels are given relative to the 'market' average for the same time period.

From Table 5.5 we can see that on average issuers entering the market with a 'First prime' rating saw their notes trade at 12.57 basis points below their respective market averages. From Table 5.6 we can see that gaining a second 'First prime' rating appears to have made little difference to this trading level; the average trading levels here being 12.51 basis points below their respective market averages. No issuers came to the market with three 'First prime' ratings.

Table 5.7 shows, more significantly, that on average those issuers entering the market with one or more 'second prime' ratings (A2, P2, E2)

Table 5.5 **AV trading level relative to the market for first time issuers with one 'first prime' rating (ie A1, P1 or E1)**

Issuer	Rating	AV issue bid of month after issue	AV market bid of month after issue	Difference
Bergen Bank	P-1	LIBID + .02	LIBOR + 0.0471	-0.1521
Citicorp	P-1	LIBID	LIBOR - 0.0127	-0.1123
Compagnie Bancaire	P-1	LIBID + 0.08	LIBOR + 0.0570	-0.1020
Exportfinans	P-1	LIBID - 0.04	LIBOR - 0.0698	-0.0952
Fleet fin Group	P-1	LIBID + 0.08	LIBOR + 0.0564	-0.1014
Household Fin Corp	P-1	LIBID + 0.03	LIBOR + 0.0570	-0.1520
ICI	P-1	LIBID	LIBOR + 0.0766	-0.2016
Landesbank Schleswig-holstein	P-1	LIBID + 0.02	LIBOR - 0.0310	-0.0740
Nat-Nederlanden	P-1	LIBOR - 0.04	LIBOR + 0.0609	-0.1010
Security Pacific Corp	P-1	LIBOR + 0.05	LIBOR + 0.14	-0.09
Unilever	P-1	LIBID - 0.01	LIBOR + 0.0721	-0.2070
United Technologies Corporation	P-1	LIBID + 0.05	LIBOR + 0.0225	-0.0975
Volvo AB	P-1	LIBID	LIBOR + 0.0560	-0.1810
MEAN	P-1	LIBID + 0.186	LIBOR + 0.0409	-0.1257

Note: LIBID is 1/8 per cent below LIBOR

Table 5.6 AV trading level relative to the market for first time issuers with two 'first prime' ratings (A1/P1, A1/E1 or P1/E1)

Issuer	Rating	AV issue bid of month after issue	AV market bid of month after issue	Difference
BP	A-1+/P-1	LIBID	LIBOR + 0.0535	-0.1785
Christiania Bank	A-1+/P-1	LIBID + 0.02	LIBOR - 0.0198	-0.0802
Commonwealth Bank of Australia	A-1+/P-1	LIBID	LIBOR + 0.0193	-0.1443
Den Norske Creditbank	A-1+/P-1	LIBID + 0.03	LIBOR + 0.0307	-0.1257
EBS Finance Corp	A-1+/P-1	LIBID + 0.05	LIBOR + 0.0511	-0.1261
GMAC	A-1+/P-1	LIBID + 0.01	LIBOR + 0.0217	-0.1367
Merrill Lynch	A-1+/P-1	LIBID + 0.05	LIBOR + 0.0557	-0.1307
National Mutual Group Finance Ltd	A-1+/P-1	LIBID + 0.11	LIBOR + 0.0340	-0.05
Svenska Handelsbanken	A-1+/P-1	LIBID + 0.04	LIBOR + 0.069	-0.154
MEAN	A-1+/P-1	LIBID + 0.0344	LIBOR + 0.0350	-0.1251

Note: No issuers came to the market with three 'first prime' ratings

Table 5.7 AV trading level relative to the market for first-time issuers with one or more 'second prime' ratings (A2, P2, or E2)

Issuer	Rating	AV issue bid month after issue	AV market bid month after issue	Difference
Bowater	P-2	LIBOR + 0.06	LIBOR + 0.0489	+0.0111
Deere & Co	P-2	LIBOR + 0.07	LIBOR + 0.0536	+0.0164
Kansas City Power & Light	P-2	LIBOR + 0.15	LIBOR + 0.0885	+0.0615
Piedmont Aviation Inc	P-2	LIBOR + 0.15	LIBOR + 0.05532	+0.0947
Tenneco Inc	P-2	LIBOR + 0.08	LIBOR + 0.0557	+0.0243
Calfed	A-2/P-2	LIBOR + 0.15	LIBOR + 0.28	+0.122
Mean		LIBOR + 0.11	LIBOR + 0.0550	+0.055

saw their notes trade at 5.5 basis points above their respective market averages.

The premium above the market is even more significant for those issuers entering the market with one or more 'third prime' rating (see Table 5.8) (A3, P3, E3): on average 13.45 basis points above the average market level. This figure must be tempered by the fact that only two issuers initially entered the market with 'third prime' ratings.

With the results from Tables 5.5 to 5.8 we can compile a table of the levels at which these rated issuers' notes have traded. These figures are presented in Table 5.9. They also give an indication of where (using our data) different rated issues might be expected to trade. Again yields are presented against average market yields as

Table 5.8 **AV trading level relative to the market for first-time issuers with one or more 'third prime' ratings (A3, P3, E3)**

Issuer	Rating	AV issue bid of month after issue	AV market bid of month after issue	Difference
General Instrument Corp	P-3	LIBOR + 0.22	LIBOR + 0.0379	+0.1820
Northern Indiana Public Service Co	P-3	LIBOR + 0.15	LIBOR + 0.063	+0.087
Mean	P-3	LIBOR + 0.185	LIBOR + 0.0505	+0.1345

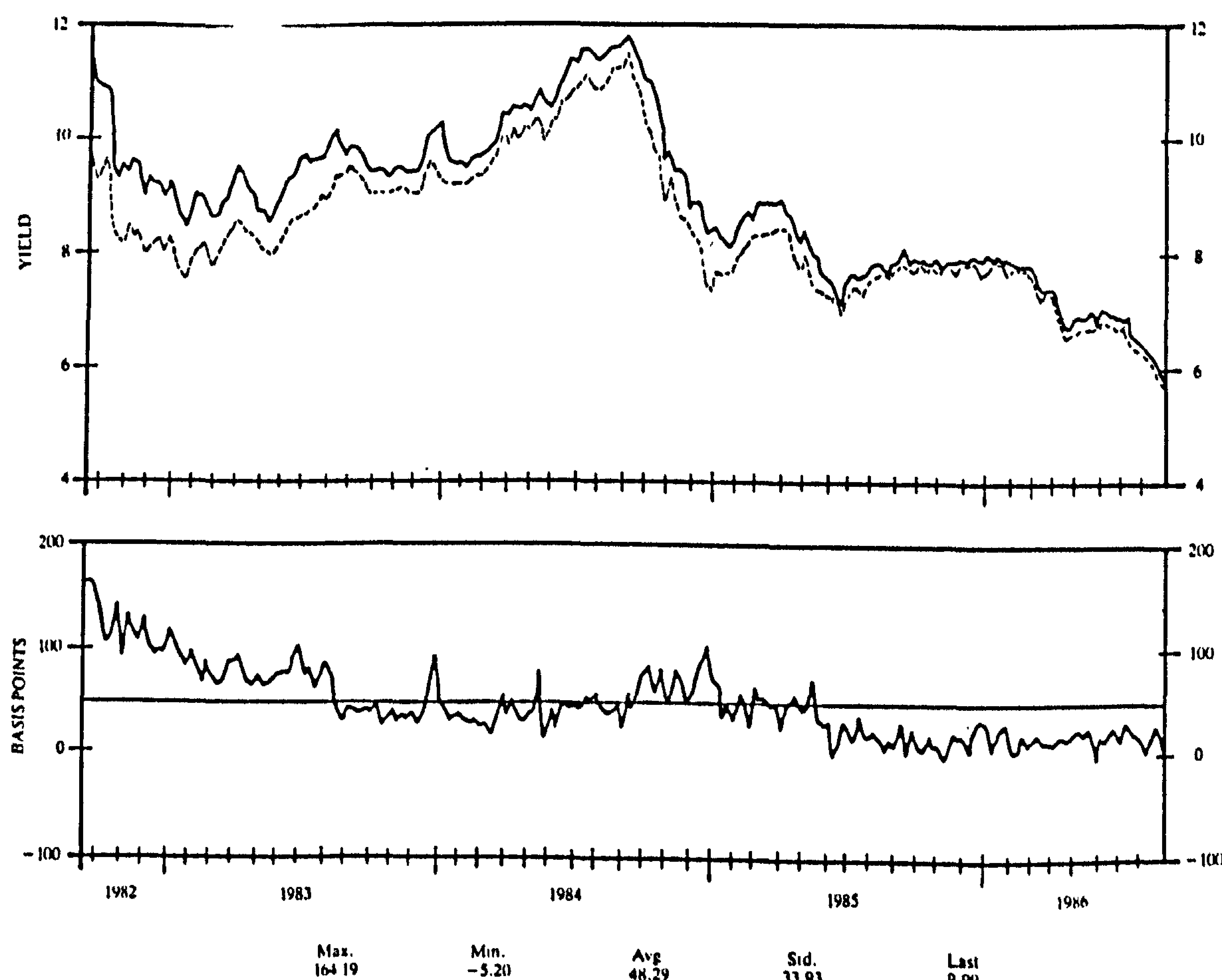
Table 5.9 **Average issue yields relative to average market yields for different rated issuers**

Rating	Average yield relative to average market yield Basis points
A1(+) or P1 or E1(+)	-12.57
A-1(+)/P-1, A-1(+)/E-1(+) or P-1/E-1(+)	-12.51
A-2 and/or P2 and/or E2	+5.5
A3 and/or P3 and/or E3	+13.45

opposed to a pricing benchmark in order to take account of the trend of declining yields in the euronote market.

It is important to note at this juncture, however, that overall levels of interest rates also play an important role in determining the risk premium an issuer will have to pay. To take the US commercial paper market as an example, in periods of relative stability and low interest rates, the spread in the commercial paper market for issuers with the highest credit ratings (ie A-1(+) and P1) and lesser credits (ie A2/P2 or lower) are relatively narrow (eg 0.10 to 0.20 per cent or 10 to 20 basis points). In periods of high rates and volatility (eg the early 1980s) these spreads were in excess of 100 basis points (Oricoli and Farrow, 1987, p 10). Figure 5.10 provides an historical summary of A1/P1 versus A2/P2 spreads in the US commercial paper market.

Figure 5.10 Interest rate spreads on A1/P1 rated finance companies versus A2/P2 rated finance companies on a discount basis



Source: Data Resources Inc.

One interesting point which arises from Figure 5.10 is that in periods of falling interest rates (particularly 1984 and 1987, precisely when the euronote market was growing rapidly) the spreads between A1/P1 and A2/P2 rated paper in the United States varied between ten to twenty basis points. Our own analysis of the euronote market provides us with a mean spread of eighteen basis points between A1/P1 issuers and A2/P2 issuers, not dissimilar to the situation in the United States between 1984 and 1987. The euronote market, however, has never experienced a rising interest rate environment (bear market). It is quite possible that the premiums charged between A1/P1 paper and A2/P2 paper in such an environment may widen substantially.

To return to our own analysis, Table 5.9 shows quite clearly that different rated issuers sell their notes at different yields. The premium is most obvious between 'first prime' and 'second prime' rated issues - a difference of over eighteen basis points on average. The premium between 'second prime' and 'third prime' rated issuers is less obvious, but still significant, eight basis points on average.

Interestingly, an application of a second 'first prime' rating appears to make little difference to the average trading level of issuers' notes.

These results are interesting, but they tell us little about whether ratings affect the trading levels of different issues. We still do not know whether these ratings have altered trading levels by communicating to the market that the previously 'perceived' credit quality of certain issues was incorrectly assessed. Nor do we have any indication that ratings may have merely evidenced or confirmed the previously 'perceived' credit quality of certain issues, in which case trading levels will have remained unaltered. If the first could be shown to have happened, there would be room for argument that credit ratings may make it easier for investors to assess correctly the credit quality of certain issues. In this scenario credit ratings may help to contain any increase in systemic risk which the growth of the euronote market may have contributed towards. If the second scenario could be shown to have happened, there would be little grounds for arriving at such a conclusion (at least not on this basis).

It is to this question that we now turn. Table 5.10 shows the effect that a 'first prime' rating has on the bid yield of a previously unrated issuer (already issuing in the market) relative to the market bid yield. Before the application of the rating the bid yield at which the issues traded would have been determined mainly by the 'perceived' credit quality of that issuer: in other words, by the issuer's 'perceived rating'. What is clear from Table 5.10 is that the application of a 'first prime' rating made virtually no difference to the bid yields at which the issues traded. This suggests that credit ratings here merely confirmed what the market already believed and so no adjustment was necessary. This conclusion is supported by the results of Tables 5.11 and 5.12. These tables show respectively that the application of a second and then third 'first prime' rating make virtually no difference to the average bid yields at which the issues traded.

Only two isuers who came to the market initially without a rating then received one or more 'second prime' ratings or less. These issuers are MCORP, who received a rating of P-2, and Northern Indiana Public Service Company, who received a rating of P-3. Prior to the ratings both issuers were trading at levels different to those at which, on our data, those ratings would suggest.

Table 5.10 **The effect of receiving one 'first prime' rating on the movement of a previously unrated issuer's bid yield relative to the market bid yield**

Issuer	Rating	Average issue bid of month prior to rating	Average issue bid of month after rating	Diff-erence	Average market bid of month prior to rating	Average market bid of month after rating	Diff-erence	(1) Difference
CSR Finance Ltd	P-1	LIBOR+0.12	LIBOR+0.12	0	LIBOR+0.095	LIBOR+0.095	0	0
Konsalis Osake Pankki	P-1	LIBID+0.01	LIBID+0.01	0	LIBOR-0.0626	LIBOR-0.064	+0.0014	-0.0014
PK Banken	A-1+	LIBID+0.02	LIBID+0.01	-0.01	LIBOR-0.0145	LIBOR-0.0145	0	-0.01
Postipankki	A-1+	LIBID	LIBID	0	LIBOR+0.0334	LIBOR+0.032	-0.0014	+0.0014
Royal Insurance plc	P-1	LIBOR+0.05	LIBOR+0.05	0	LIBOR+0.05	LIBOR+0.05	0	0
Skopbank	P-1	LIBID+0.07	LIBID+0.07	0	LIBOR-0.0312	LIBOR-0.032	0	0
State Bank of New South Wales	A-1+	LIBID+0.08	LIBID+0.08	0	LIBOR-0.019	LIBOR-0.017	-0.02	+0.02
Union Bank of Finland	P-1	LIBID+0.01	LIBID+0.01	0	LIBOR-0.05	LIBOR-0.06	-0.01	+0.01
Westpac Banking Corp	P-1	LIBID+0.03	LIBID+0.03	0	LIBOR-0.09	LIBOR-0.1	-0.01	+0.01
Kloeckner & Co Financial Services	A-1	LIBOR+0.03	LIBOR+0.03	-0.02	LIBOR+0.038	LIBOR+0.033	-0.005	-0.015
Mass Transit Railway Co	A-1	LIBOR+0.03	LIBOR+0.01	-0.02	LIBOR+0.08	LIBOR+0.07	-0.01	-0.01
Fisons Finance	E-1	LIBOR+0.02	LIBOR+0.02	0	LIBOR+0.02	LIBOR+0.02	0	0
MEAN				-0.0042			-0.0046	0

Note: (1) Difference between movement in issuer's average bid yield and movement in market average bid yield

Table 5.11 The effect of receiving a second 'first prime' rating on the movement of an already 'first prime' rated issuer's bid yield relative to the market bid yield

Issuer	2nd rating	Average issue bid of month prior to 2nd rating	Average issue bid of month after 2nd rating	Diff-erence	Average market bid of month prior to 2nd rating	Average market bid of month after 2nd rating	Diff-erence	(1) Difference
Bergen Bank	A-1+	LIBID+0.02	LIBID+0.02	0	LIBOR-0.0198	LIBOR-0.0247	-0.0049	+0.0049
CSR Finance Ltd	A-1	LIBOR+0.12	LIBOR+0.05	-0.07	LIBOR+0.095	LIBOR+0.099	+0.004	-0.074
Compagnie Bancaire	A-1+	LIBID+0.06	LIBID+0.06	0	LIBOR+0.04	LIBOR+0.03	-0.01	+0.01
Export-Finans	E-1+	LIBID-0.04	LIBID-0.05	-0.01	LIBOR-0.08	LIBOR-0.08	0	-0.01
Household Finance Corp	E-1+	LIBID	LIBID	0	LIBOR+0.023	LIBOR+0.021	-0.002	+0.002
KOP	E-1+	LIBID+0.01	LIBID+0.02	+0.01	LIBOR-0.06	LIBOR-0.07	-0.01	0
PK Banken	P-1	LIBID+0.01	LIBID+0.01	0	LIBOR-0.015	LIBOR-0.015	0	0
Postipankki	P-1	LIBID	LIBID	0	LIBOR-0.032	LIBOR-0.057	-0.025	+0.025
Royal Insurance plc	A-1	LIBOR+0.05	LIBOR+0.05	0	LIBOR+0.05	LIBOR+0.044	-0.006	+0.006
State Bank of New South Wales	P-1	LIBOR+0.05	LIBOR+0.04	-0.01	LIBOR-0.04	LIBOR-0.04	0	-0.01
Unilever	E-1+	LIBID-0.05	LIBID-0.05	0	LIBOR+0.023	LIBOR+0.021	-0.002	+0.002
Union Bank of Finland	E-1+	LIBID+0.01	LIBID+0.01	0	LIBOR-0.06	LIBOR-0.07	-0.01	+0.01
Volvo	A-1+	LIBID	LIBID	0	LIBOR+0.085	LIBOR+0.052	-0.033	+0.033
MEAN				0			0	0

Note: (1) Difference between movement in issuer's average bid yield and movement in market average bid yield

Table 5.12 The effect of receiving a third 'first prime' rating on the movement of an already double 'first prime' rated issuer's bid yield relative to the market bid yield

Issuer	Rating	Average issue bid of month prior to 3rd rating	Average issue bid of month after 3rd rating	Diff-erence	Average market bid of month prior to 3rd rating	Average market bid of month after 3rd rating	Diff-erence	(1) Difference
BP	E-1+	LIBID	LIBID	0	LIBOR+0.023	LIBOR+0.021	-0.002	+0.002
Volvo AB	E-1+	LIBID	LIBID	0	LIBOR+0.023	LIBOR+0.021	-0.002	+0.002
MEAN				0			-0.002	+0.002

Note: (1) Difference between movement in issuer's average bid yield and movement in market average bid yield

On application of the ratings both issuers average bid yields moved closer to the average bid yields for those ratings: from 14 basis points above the average market yield to 9 basis points above the average market yield for MCORP (the average trading level for P-2 issuers being 5.5 basis points above the market on our data), and from 15 basis points above the average market yield to 13 basis points above the average market yield for Northern Indiana Public Services Corporation (the average trading level for P-3 issuers being 13.45 basis points above the market on our data).

Only two issuers trading with two 'first prime' ratings have then received a third 'first prime' rating. The effect of receiving a third 'first prime' rating on the movement in their average bid yields relative to the market average bid yield is shown in Table 5.12.

Our data for previously unrated issuers who then received 'second' or 'third prime' ratings is obviously sparce - only two issuers. We may tentatively argue that credit ratings in the euronote makret, as a means of communicating credit risk effectively and so containing any possible increase in systemic risk, may be more significant at the lower quality end of the market. If we look back at Tables 5.4 and 5.6 we must conclude that, on our data, credit ratings appear to have had little effect on the first two categories of ratings. In these higher quality categories credit ratings appear to be merely confirming the market's 'perceived rating'. It may be in the latter two categories that credit ratings may help to contain any possible increase in systemic risk brought about by the growth of the euronote market. We do not claim to have proven this point, merely to have used all the existing data, part of which tends to support it.

5.7.3 The effect of the 1987 stock market crash on the eurocommercial paper market

Since our analysis of the effect of credit ratings in the eurocommercial paper market the world's equity markets have experienced a severe bear market climate. It will be necessary for us to analyse briefly the effect of the bear market in equities on the eurocommercial paper market to determine whether our results to date need now to be amended.

On 11th October 1987 the world's major stock markets experienced a severe decline: the beginning of the 1987/88 bear market in equities. This decline in the equity markets led to a 'flight into quality'. Investors pulled out of the falling equity markets and placed their money into high quality, short-term paper. The best sovereign issuers such as Sweden and the French state names, obtained rates as low as 35 basis points below LIBID immediately after the crash compared to rates of between fifteen and eighteen basis points before the crash. Table 5.13 presents the average price levels at which sovereign paper traded in the three months prior to 22nd October 1987, the average price in the week following 22nd October 1987 and the average price in the three month period since 22nd October 1987.

As can be seen from Table 5.13, bid yields in the sovereign sector of the eurocommercial paper market fell sharply following the October crash, indicating a sharp rise in demand for sovereign paper. One reason for this increase in demand was that, at the time, central banks (which are prominent buyers of sovereign paper) had large reserves of dollar funds to invest as a result of heavy intervention to support the dollar on the foreign exchange markets.

Table 5.13 The effect of the stock market crash of 1987 on the price of sovereign eurocommercial paper

Issuer	Rating	Av issue bid of 3 months period prior to the crash	Av issue bid of week following the crash	Av issue bid of thee month period following the crash	Av fall in sovereign market sector since the crash
Belgium	E-1+	LIBID-10	LIBID-20	LIBID-18	-8
Commonwealth Bank of Australia	A-1+/P-1	LIBID-8	LIBID-15	LIBID-12	-4
CNT	P1	LIBID-15	LIBID-30	LIBID-26	-11
Credit Foncier	E-1+	LIBID-15	LIBID-28	LIBID-26	-11
Credit National	P1	LIBID-15	LIBID-30	LIBID-30	-15
Denmark	P1/E-1+	LIBID-10	LIBID-20	LIBID-20	-10
EdF	A-1+/P1	LIBID-14	LIBID-20	LIBID-20	-6
ENEL	A-1+/P1	LIBID-9	LIBID-18	LIBID-14	-5
Ireland	A-1+/P1/E-1+	LIBID-6	LIBID-12	LIBID-10	-4
New Zealand	P1	LIBID-9	LIBID-13	LIBID-12	-3
NIB	P1	LIBID-9	LIBID-14	LIBID-12	-3
SNCF	P1	LIBID-12	LIBID-18	LIBID-16	-4
Spain	A-1+/P1	LIBID-10	LIBID-16	LIBID-12	-2
Sweden	A-1+/P1/E-1+	LIBID-15	LIBID-35	LIBID-30	-15
MEAN		LIBID-11	LIBID-21	LIBID-18	-7

Interestingly, however, the funds that rushed into this sector of the market as the equity markets fell do not appear to have returned once the equity markets eased in early 1988. Although Table 5.13 shows some increase in yields (fall in prices) in this sector of the market since the initial steep fall in yields (rise in prices), the market has still remained well below its pre-crash levels. This seems to indicate that much of the 'panic money' which flowed into the sovereign sector of the eurocommercial paper market after the October equity crash has remained in that market.

The corporate and bank sectors of the eurocommercial paper market also strengthened following the equity crash, although to a lesser extent than did the sovereign sector of the market. Interestingly, as Table 5.14 shows, the spread between top quality (ie A-1+/P-1/E-1+) paper and lesser rated paper has not widened substantially because of the crash, although absolute levels have fallen in line with the market. This indicates that all sectors of the eurocommercial paper market have benefited from the bear market in equities.

Table 5.14 The effect of the stock market crash of 1987 on the spread between top rated and lesser rated eurocommercial paper

Rating category	Av trading level of 3 month period prior to the crash	Av trrading level of 3 month period after the crash
A-1+ and/or P1 and/or E-1+	LIBOR-12	LIBOR-15
A-2 and/or P2 and/or E-2	LIBOR+5	LIBOR+2
A-3 and/or P3 and/or E-3	LIBOR+14	LIBOR+12

As can be seen from Table 5.14 the spread between first prime rated and second prime rated paper has remained the same at 17 basis points before and after the crash. The spread between second prime rated and third prime rated paper has widened slightly from 9 basis points before the crash to 10 basis points after. It would appear, therefore, that although third prime rated paper has suffered slightly because of the flight out of equities and in to quality short-term paper, all other sectors have benefited from the crash.

5.7.4 Summary

It was stated at the beginning of this section of the chapter that to the extent that investors in euronotes are ill-equipped to analyse credit risk, systemic risk could be increased. We stated that one possible way of containing any increase in systemic risk from this cause, may be to rate euronotes and eurocommercial paper. Ratings would communicate to the market whether its initital (perceived rating) credit assessment of the borrower (as determined by the bid yield) was in fact correct. If the actual credit rating was different to the market's 'perceived' credit rating, spreads on the bid yield should change. If the actual credit rating coincided with the market's perceived rating, spreads should not alter.

Our analysis has shown that credit ratings in the eurocommercial paper and euronote market, to date, appear to make little, if any, difference to the bid levels at which a borrower's notes trade. This would seem to imply that credit ratings in the market coincide closely with the market's perceived rating, at least in the high quality categories. There is, however, some indication that ratings may be more effective in the lower quality categories. On our data, ratings of

A2/P2 (or E2) or below, moved the issuers' bid yields significantly. This seems to indicate that in these lower rated categories the market's 'perceived' rating was different to the actual creditworthiness of the borrower. Ratings, here, may be more effective in containing any increase in systemic risk which the growth of the euronote market may have contributed towards. This conclusion is made tentatively because of the paucity of data in these lower rated categories.

Although the stock market crash of 1987 appears to have made little difference to the spread between top rated and lower rated borrowers, it is not insignificant that the eurocommercial paper market, on the whole, benefited from the crash. Traditionally, funds have flowed into gold and gilt-edged stocks in times of market recession, thereby restricting demand for corporate debt. The eurocommercial paper market appears to have provided an alternative home for this 'panic money': so keeping funds within the financial system. It could, therefore, be argued that the eurocommercial paper market has helped to contain any increase in systemic risk which the collapse of the equity markets may have caused.

5.8 Summary and Conclusions

The objective of this chapter was to examine features of the eurocommercial paper market that may affect systemic risk. The features examined were those of regulation, trading versus placement, clearing procedures, and credit ratings. Several conclusions may be drawn from this chapter.

It is clear that the growth of commercial paper world-wide represents a fundamental change in the funding patterns of large corporations.

The application of regulation (in the form of specific risk-assets ratios) does not appear to have increased fee levels for the euronote market or the different sectors of the market. Fee levels have continued on a steady, if somewhat downward, trend. Any possible reduction in systemic risk that may have resulted from the transferral of capital requirements to higher fee levels does not appear to have materialised. A case has subsequently been made for the introduction of a portfolio-based risk asset ratio system in relation to the portfolio structure of a bank's assets. This point will be returned to in Chapters 9 to 11.

The supposed liquidity of euronotes is questionable. The fact that an asset is marketable does not imply that it is liquid. Further, the fact that an asset is tradeable does not mean that capital to provide against potential losses can be reduced. The effect of a bear market with trading spreads widening could be disasterous for underwriting banks. As rates begin to rise, placing banks may find it increasingly difficult to place paper with investors. Notes will, therefore, be returned to underwriting banks just when they are shortest of funds. Under such a scenario systemic risk could be increased.

The euronote/eurocommercial paepr market has over US$ 60 billion of notes outstanding at any time. However there are over US$ 150 billion of facilities signed. If most of these facilities were to be drawn down then the clearance of even a proportion of the successful issuers could cause a major settlement failure as the clearing houses may be unable to handle such high capacity. Funds required immediately may be delayed for weeks, possibly causing systemic damage.

Credit ratings in the eurocommercial paper and euronote market appear to make little, if any, difference to the bid levels at which borrowers' notes trade. Ratings may, however, be more effective in the lower quality categories. Ratings here may be more effective in containing any increase in systemic risk which the growth of the euronote market may have contributed towards.

Furthermore, although the stock market crash of 1987 did not appear to affect the spread between first prime-rated and lower-rated paper, the eurocommercial paper market did provide a haven for 'panic money' in times of equity market crisis. To this extent the existence of a mature eurocommercial paper market may contribute to the stability of the financial system and so reduce systemic risk.

Appendix 5.1 Regulatory approaches to NIF underwriting commitments*

Belgium:	No capital adequacy requirements for underwriting commitments or off-balance-sheet business of this kind. Changes to the requirements are under consideration by the Commission Bancaire.
Canada:	Included in capital requirements in principle. Changes are under consideration by the Inspector General of Banks.
France:	Included among off-balance-sheet items subject to the solvency ratio with a weight of 5 per cent. If the facility is for a bank and 25 per cent if it is for a non-bank.
Germany:	The supervisory authorities have proposed that underwriting commitments should be made subject to capital adequacy requirements with a weight of 50 per cent. Hearings on this proposal will be held shortly.
Italy:	There are no capital adequacy requirements in Italy. Banks are subject to a rule that 'crediti di firma' in lire and foreign currency should not exceed 15 per cent of total deposits (excluding interbank). Although the issuance of NIFs does not come under these ceilings, banks in practice consider NIFs as 'crediti di firma'.
Japan:	At present claims on non-residents must not exceed 14 times capital. As from the beginning of May 1985 the authorities asked the Japanese banks to report, on a trial basis, their calculated risk asset ratio with the intention of introducing certain capital adequacy requirements in the future. Commitments under NIFs have a weighting of 30 per cent in this calculation. This compares with a weighting of 100 per cent for medium and long-term loans.
Luxembourg:	No capital requirements for off-balance-sheet business.
Netherlands:	Underwriting commitments attract a weight of 50 per cent in the computation of solvency ratios.
Sweden:	No capital adequacy requirements for underwriting commitments on off-balance-sheet business of this kind. Changes are under consideration.

Appendix 5.1 Regulatory approaches to NIF underwriting commitments* (continued)

Switzerland:	Guarantees are generally included within capital adequacy tests but commitments to lend may not be. Banks regard NIF underwriting commitments as commitments to lend
United Kingdom:	Holdings of notes are subject to capital requirements on the same basis as other loans. Commitments are subject to a risk asset weighting of 50 per cent.
United States:	Proposals for the inclusion of some off-balance-sheet items in risk asset ratio calculations were disclosed in January 1986. Commitments under NIFs would attract a weighting of 30 per cent.

Source: Bank for International Settlements (1986b, p 36)

Note: * In the absence of precise guidelines from regulatory authorities the treatment of NIFs in measurement of capital adequacy may depend in some countries on whether they are reported to the supervisory authorities as guarantees or commitments to lend

Appendix 5.2 **Mean monthly drawn and undrawn costs for the euronote market for January 1985 to December 1986**

Months	Undrawn cost basis points	Drawn cost basis points
1	12.8533	31.8333
2	13.9067	36.9067
3	12.7767	30.1833
4	12.5500	32.2967
5	10.9533	30.3400
6	14.6233	36.5800
7	14.7533	41.9100
8	13.6100	33.8600
9	17.1333	43.7533
10	12.5867	35.0467
11	13.5000	32.0233
12	13.5867	30.0967
13	11.6167	26.7300
14	12.5433	32.2033
15	14.3733	35.9200
16	10.5700	30.1233
17	11.3933	32.0967
18	21.5000	43.1333
19	10.0500	34.2833
20	20.2200	41.1967
21	11.5367	26.0600
22	9.4433	28.0433
23	9.2700	23.9867
24	10.2833	27.8133

Source: compiled from County NatWest Capital Markets' and Bank of America's Euronote pricing data bases

Appendix 5.3 Mean monthly drawn and undrawn costs for the sovereign sector of the euronote market for January 1985 to December 1986

Months	Undrawn cost basis points	Drawn cost basis points
1	10.67	23.67
2	19.14	50.39
3	8.25	21.75
4	19.07	46.57
5	9.75	26.75
6	9.23	29.94
7	8.25	27.00
8	9.23	29.94
9	13.95	40.62
10	6.80	29.93
11	9.78	29.16
12	9.23	29.94
13	7.66	23.08
14	11.28	30.40
15	8.07	30.57
16	9.23	29.94
17	5.91	17.47
18	9.23	29.94
19	7.00	39.50
20	9.23	29.94
21	4.97	16.22
22	5.89	16.89
23	5.50	15.50
24	3.42	15.92

Source: compiled for County NatWest Capital Markets' and Bank of America's euronote pricing data bases

Appendix 5.4 **Mean monthly drawn and undrawn costs for the corporate sector of the euronote market for January 1985 to December 1986**

Months	Undrawn cost basis points	Drawn cost basis points
1	14.00	33.69
2	11.32	34.32
3	13.16	33.35
4	11.45	31.94
5	12.86	35.27
6	16.21	41.37
7	14.00	46.72
8	14.68	36.19
9	13.49	36.68
10	14.11	37.53
11	12.60	33.27
12	19.83	42.40
13	13.76	33.68
14	17.78	40.14
15	12.87	30.01
16	11.10	31.55
17	13.60	37.59
18	13.81	37.00
19	10.65	33.35
20	13.35	33.68
21	13.64	35.96
22	10.91	35.91
23	10.21	33.42
24	10.51	32.07

Source: compiled from County NatWest Capital Markets' and Bank of America's euronote pricing data bases

Appendix 5.5 Mean monthly drawn and undrawn costs for the bank sector of the euronote market for January 1985 to December 1986

Months	Undrawn cost basis points	Drawn cost basis points
1	13.89	38.14
2	11.26	26.01
3	16.92	35.45
4	7.13	18.38
5	10.25	29.00
6	18.43	38.43
7	22.01	52.01
8	16.92	35.45
9	23.96	53.96
10	16.85	37.68
11	18.12	33.64
12	11.70	17.95
13	13.43	23.43
14	8.57	26.07
15	22.18	47.18
16	11.38	28.88
17	14.67	41.23
18	41.46	62.46
19	12.50	30.00
20	38.08	59.97
21	16.00	26.00
22	11.53	31.33
23	12.10	23.04
24	16.92	35.45

Source: compiled from County NatWest Capital Markets' and Bank of America's euronote pricing data bases

Rating worksheets

Illustrated on these pages are the financial analysis worksheets used by Standard & Poor's in the rating process for industrial companies.

COMPANY: ______________________

OPERATING ANALYSIS

	Date						
	Net Sales						
	Pretax Income						
	Tax Rate						
	Net Income						
	FIXED CHARGE COVERAGE:						
COVERAGE RATIOS	After Income Tax						
	Before Income Tax						
	Before Incl. Rents						
	Net Income						
	Adjustments:						
	Minority Interest						
	Unremitted Equity Income						
	Adjusted Net Income						
	Interest Charges						
	Available						
	Taxes						
	Pretax Available						
	Rentals						
	Interest Charges						
	Gross Charges						
	Adjusted Net Income						
	Taxes						
	Available						
	OPERATING ANALYSIS						

OPERATING RATIOS			%		%		%		%		%		%
	Oper. Income/Net Sales												
	Return on Permanent Capital												
	Receivable Turnover												
	Inventory Turnover												
	Finished Goods/Net Sales												

Appendix 5.6 continued

LIQUIDITY ANALYSIS

LIQUIDITY ANALYSIS												
Date												
LIQUIDITY RATIOS		%		%		%		%		%		%
Acid Test												
Current Ratio												
Cash Flow/LTD												
Cash Flow/Total Debt												
Cash Flow/Net Debt												

CASH FLOW DATA:						
Adjusted Net Income						
Depreciation						
Non-Current Deferred Taxes						
Cash Flow						
Cash Flow						
Minus: Replacement Deprec.						
Minus: Other Fixed Outlays						
Free Cash Flow						

CAPITALIZATION ANALYSIS

CAPITALIZATION:												
Date												
CAPITALIZATION		%		%		%		%		%		%
STD/Total Debt + Equity												
LTD/LTD + Equity												
Total Debt/Total Debt + Equity												
Net Debt/Adjusted Capitalization												
Total Liab./Tang Net Worth												

LTD ANALYSIS						
LONG-TERM DEBT:						
Mortgage-Secured LTD						
Unsecured LTD						
Capitalized Rents						
Subordinated LTD						
Total Long-Term Debt						
LTD MATURITY STRUCTURE:						
Year 1						
Year 2						
Year 3						
Year 4						
Year 5						

OBL ANALYSIS						
OFF BAL. SHEET LIAB.:						
External Debt of Captive Fin. Subs.						
Guarantees						
Take or Pay Contracts						
Throughput & Deficiency						
Unfunded Pension Benefits						
Capitalized Rents						
TOTAL OFF BAL. SHEET LIAB.:						

Appendix 5.7 Credit ratings in the euronote market to April 1987

Company	1st rating	Date	Notes issued	2nd rating	Date	3rd rating	Date
Allied Signal Inc	P-1	30.9.85	No issue	-	-	-	-
Arizona Public Services Co	P-2	26.1.82	No issue	-	-	-	-
Associates Corp of N America	P-1	21.7.72	No issue	A-1+	27.6.86	-	-
Atlantic Richfield Co	P-1	4.2.72	No issue	-	-	-	-
Australia & NZ Bank Group	P-1	25.11.86	No issue	A-1+	5.12.86	-	-
Australia Ind Devpt Corp	P-1	12.5.81	No issue	-	-	-	-
Australian Wheat Board	P-1	12.5.84	No data available	-	-	-	-
Avon Capital Corp	P-1	1.9.83	No issue	-	-	-	-
BP Capital BV	P-1	21.2.86	-	A-1+	28.2.86	E-1+	9.3.87
Baker International Corp	P-2	1.4.86	No issue	-	-	-	-
Bank of New Zealand	P-1	15.12.86	No issue	-	-	-	-
Bankers Trust New York Corp	P-1	14.7.72	No issue	-	-	-	-
Banque Indosuez	P-1	7.10.83	No issue	-	-	-	-
Bergen Bank	P-1	27.2.85	-	A-1+	5.9.86	-	-
Black & Decker Corp	P-2	26.1.83	No issue	-	-	-	-
Borden Inc	P-1	8.3.74	No issue	-	-	-	-
Bowater Incorporated	P-2	3.12.84	-	-	-	-	-
CBS Inc	P-2	3.7.85	No issue	-	-	-	-
CIT Group Holdings Inc	P-1	21.1.72	No issue	-	-	-	-
CSR Finance Ltd	P-1	20.3.85	-	A-1	3.5.85	-	-
Cadbury Schweppes plc	P-1	19.8.86	No issue	A-1	19.9.86	-	-
Caisse Nationale de Tele	P-1	11.4.77	No issue	-	-	-	-
Christiania Bank	P-1	3.10.83	No issue	A-1+	7.3.86	-	-
Chrysler Fincial Corp	P-2	4.1.85	No issue	A-2	26.9.86	-	-
Cigna Corp	P-1	27.8.82	No issue	-	-	-	-
Citicorp	P-1	8.9.72	-	-	-	-	-
Citizens & Southern	P-1	30.4.85	No issue	-	-	-	-

Appendix 5.7 Credit ratings in the euronote market to April 1987

Company	1st rating	Date	Notes issued	2nd rating	Date	3rd rating	Date
Colgate-Palm-olive Co	P-1	17.11.80	No issue	-	-	-	-
Commercial Credit Co	P-2	14.11.86	No issue	-	-	-	-
Commerzbank AG	P-1	22.12.86	No issue	-	-	-	-
Commonwealth Bank of Australia	P-1	21.1.83	-	A-1+	15.3.85	-	-
Comsat	P-1	31.8.83	No issue	-	-	-	-
Compagnie Bancaire	P-1	3.4.86	-	A-1+	24.10.86	-	-
Cooper Inds Inc	P-2	24.4.85	No issue	-	-	-	-
Copenhagen Handelsbanken	P-1	19.12.86	No issue	-	-	-	-
Corestates Capital Corp	P-1	23.4.84	No issue	-	-	-	-
Credit National	P-1	28.10.83	No data available	-	-	-	-
Deere & Co	P-2	22.1.85	-	-	-	-	-
Deere (John) Credit Co	P-2	22.1.85	-	-	-	-	-
Den Norske Creditbank	P-1	17.9.81	-	A-1+	26.7.85	-	-
Kingdom of Denmark	P-1	13.8.85	No issue	E-1	9.3.87	-	-
Dominion Resources Inc	P-1	14.12.83	No issue	-	-	-	-
EBS Finance Corp (Coca Cola)	P-1	23.8.85	-	A-1+	23.8.85	-	-
Eastman Kodak Co	P-1	23.7.84	No issue	E-1	9.3.87	-	-
Eksportfinans A/S	P-1	11.3.80	-	A-1+	20.2.87	-	-
Electricite de France	P-1	21.6.84	No issue	A-1+	13.2.87	-	-
Emerson Electrical Co	P-1	29.11.74	No issue	-	-	-	-
ENEL Commercial Paper	P-1	7.1.87	No issue	A-1	16.1.87	-	-
Ensearch Corp	P-2	19.4.85	No issue	-	-	-	-
Equitable Life (USA)	P-1	21.1.80	No issue	A-1	7.2.86	-	-
Ericsson Tele-fon AB	P-2	4.12.85	No issue	-	-	-	-
European Invest-ment Bank	P-1	5.12.84	No issue	-	-	-	-

Appendix 5.7 Credit ratings in the euronote market to April 1987

Company	1st rating	Date	Notes issued	2nd rating	Date	3rd rating	Date
Export Devpt Corp	P-1	22.12.78	No issue	-	-	-	-
Finnish Export Credit	P-1	12.1.83	No issue	-	-	-	-
First Kentucky Nat Corp	P-1	10.2.84	No issue	-	-	-	-
Fleet Fin Group	P-1	18.1.84	No issue	-	-	-	-
Ford Motor Credit Co	P-1	17.12.84	No issue	A-1+	26.9.86	-	-
Gasunie	P-1	10.1.86	No issue	-	-	-	-
General Dynamics Corp	P-1	14.1.81	No issue	-	-	-	-
General Electrical Co	P-1	2.11.73	No issue	-	-	-	-
General Instrument Corp	P-3	9.5.85	-	-	-	-	-
General Motors Accept Corp	P-1	30.11.71	-	A-1+	27.6.86	-	-
Gotabanken	P-1	19.12.86	No issue	A-1	8.11.85	E-1	9.3.87
Gothenburg (City of)	P-1	20.4.82	No issue	A-1+	1.2.86	-	-
Hammermill Paper Co	P-2	29.9.80	No issue	-	-	-	-
Hertz Corp	P-2	16.7.81	No issue	-	-	-	-
Holiday Inns Inc	P-2	16.3.83	No issue	-	-	-	-
Hospital Corp of America	P-2	4.2.86	No issue	-	-	-	-
Household Fin Corp	P-1	10.3.72	-	E-1	9.3.87	-	-
IBM Credit Corp	P-1	4.6.81	No issue	-	-	-	-
ICI Finance plc	P-1	30.1.78	-	-	-	-	-
ITT Finance Corp	P-1	29.10.75	No issue	-	-	-	-
Investors in Industry	P-1	12.3.81	No issue	-	-	-	-
Ireland	A-1+	7.11.86	T bills+63	P-1	4.12.86	E-1	9.3.87
Kansalis Osake Pankki	P-1	11.12.86	LIBID+0.01	-	-	E-1	9.3.87
Kansas City Power & Light	P-2	2.7.80	-	-	-	-	-
Koch Industries Inc	P-2	22.11.85	No issue	A-1	27.6.86	-	-
Landesbank Schleswig-holstein GZ	P-1	21.12.84	-	-	-	-	-

Appendix 5.7 Credit ratings in the euronote market to April 1987

Company	1st rating	Date	Notes issued	2nd rating	Date	3rd rating	Date
Lear Siegler Inc	NP	16.1.87	No issue	-	-	-	-
Lockheed Corp	P-2	31.7.86	No issue	-	-	-	-
Marriot Corp	P-2	7.3.80	No issue	-	-	-	-
Maryland Nat Corp	P-1	15.12.79	No issue	-	-	-	-
MCorp	P-2	21.10.86	-	-	-	-	-
Merrill Lynch & Co	P-1	14.10.76	-	A-1+	5.2.86	-	-
Midlantic Banks Inc	P-1	21.5.84	No issue	-	-	-	-
Morgan Stanley Group	P-1	4.10.86	No issue	A-1+	24.10.86	-	-
Nat Australia Bank Ltd	A-1	23.5.86	-	P-1	5.12.86	-	-
Nat Mutual Grp Finance Ltd	P-1	12.5.86	-	A-1	25.7.86		
Nat Nederlanden (US Holdings Inc)	P-1	18.3.82	-	-	-	-	-
Nestle Capital Corp	P-1	14.7.80	No issue	-	-	-	-
Govt of New Zealand	P-1	26.9.86	-	-	-	-	-
Nordbanken	A-1	29.8.86	No issue	P-1	19.12.86	-	-
Norddeutsche Landesbank GZ	P-1	6.7.83	No issue	-	-	-	-
Nordic Investment Bank	P-1	15.8.80	No issue	-	-	-	-
Northern Indiana Public Service Co	A-1	3.12.85	-	P-3	14.12.85	-	-
Nynex Corp	P-1	5.12.83	No issue	-	-	-	-
Occidental Petroleum Corp of California	P-3	16.12.86	No issue	-	-	-	-
Oesterreichishe Landerbank	P-1	3.6.86	No issue	-	-	-	-
Okobank	P-1	19.6.86	No issue	A-1	27.6.86	-	-
PHH Group Inc	A-1+	6.6.86	No issue	P-1	19.6.86	E-1	9.3.87
PPG Inds Inc	P-1	8.9.72	No issue	-	-	-	-
Paccar Finance Corp	P-1	5.9.78	No issue	-	-	-	-
Pacific Lighting Corp	P-1	2.6.72	No issue	-	-	-	-
Pacificorp	P-2	14.4.72	No issue	A-2	23.5.86	-	-
Pennwalt Corp	P-2	12.1.72	No issue	-	-	-	-

Appendix 5.7 Credit ratings in the euronote market to April 1987

Company	1st rating	Date	Notes issued	2nd rating	Date	3rd rating	Date
Piedmont Aviation Inc	P-2	27.9.85	-	-	-	-	-
Post-och Kreditbanken (PK Banken)	A-1	4.4.86	-	P-1	19.12.86	-	-
Postipankki	A-1+	17.10.86	-	P-1	11.12.86	-	-
Prudential Funding Corp	P-1	19.4.82	No issue	A-1	6.12.85	-	-
Queensland Electricity Commission	P-1	20.10.83	No issue	-	-	-	-
Reckitt & Coleman Finance BV	P-1	10.4.86	No issue	A-1	18.4.86	-	-
Redland Credit Corp	A-1	1.11.85	No issue	P-1	16.12.85	-	-
Renault Acceptance BV	P-1	11.10.77	No issue	-	-	-	-
Republic New York Corp	P-1	25.8.80	No issue	-	-	-	-
Royal Insurance plc	P-1	30.6.86	-	A-1	7.86	-	-
SKF AB	P-1	29.4.82	No issue	-	-	-	-
Scott Paper Co	P-2	30.9.85	No issue	-	-	-	-
Security Pacific Corp	P-1	21.9.73	-	-	-	-	-
SGA	A-1	17.10.86	No issue	P-1	29.10.86	-	-
Skandia International Capital Corp	A-1+	11.4.86	No issue	P-1	12.5.86	-	-
Skopbank	P-1	6.11.86	-	-	-	-	-
SNCF	P-1	26.2.79	No issue	-	-	-	-
Southland Corp	P-1	26.8.83	No issue	-	-	-	-
Spain (Kingdom of)	P-1	23.8.85	-	A-1+	13.12.85	-	-
Sparekassen SDS	P-1	27.8.86	No issue	A-1	29.8.86	-	-
State Bank of New South Wales	A-1+	2.5.86	-	P-1	9.12.86	-	-
Svenska Handelsbanken	A-1+	29.11.85	-	P-1	19.12.85	-	-
Swedbank	P-1	19.12.86	No issue	A-1	6.2.87	E-1+	9.3.87
Sweden (Kingdom of)	P-1	25.8.86	-	A-1+	29.8.86	-	-
Tenneco Inc	P-2	6.9.85	-	-	-	-	-
Texas Eastern Corp	P-1	5.12.84	No data available	-	-	-	-

Appendix 5.7 Credit ratings in the euronote market to April 1987

Company	1st rating	Date	Notes issued	2nd rating	Date	3rd rating	Date
Thomson-Brandt International BV	P-1	29.8.86	No issue	A-1	29.8.86	-	-
Time Inc	P-1	19.2.79	No issue	E-1	9.3.87	-	-
Total International Ltd	P-2	27.1.84	No issue	-	-	-	-
Transamerica Fin Corp	P-1	21.4.72	No issue	-	-	-	-
Transcontinental Gas Pipeline	P-2	26.5.82	No issue	-	-	-	-
Travellers Corp	P-1	31.12.71	No issue	-	-	-	-
US Bancorp	P-1	4.8.75	No issue	-	-	-	-
UT Financial Services Corp	P-1	22.4.85	No issue	-	-	-	-
Unigate BV	P-1	11.7.86	No issue	A-1	18.7.86	E-1	9.3.87
Unilever Capital Corp	P-1	1.5.84	-	E-1	9.3.87	-	-
Union Bank of Finland	P-1	11.12.86	LIBID+0.01	E-1	9.3.87	-	-
Union Oil Company of California	P-1	5.6.86	No issue	E-1	9.3.87	-	-
United Technologies Corp	P-1	27.4.80	-	-	-	-	-
Vermont Yankee Power Corp	P-1	29.10.85	No issue	-	-	-	-
Volvo AB	P-1	15.8.80	-	A-1+	30.5.86	E-1	9.3.87
Washington Post	P-1	4.8.80	No issue	A-1	3.1.86	-	-
Wells Fargo & Co	P-1	14.7.72	No issue	-	-	-	-
Westpac Banking Corp	P-1	15.12.86	-	-	-	-	-
Weyerhaeuser Co	P-1	12.1.73	No issue	-	-	-	-

Appendix 5.7 Credit ratings in the euronote market to April 1987

Company	1st rating	Date	Notes issued	2nd rating	Date	3rd rating	Date
ASEA Capital Corp BV	A-1+	30.1.87	No issue	-	-	-	-
Banco International SNC	A-1+	3.1.86	No issue	-	-	-	-
Banco Itau SA	A-1+	19.12.86	No issue	-	-	-	-
Calfed Inc	A-2/P-2	7.11.86	No issue	-	-	-	-
Eli Lilly & Co	A-1+	30.1.87	No issue	-	-	-	-
Kloeckner & Co Fin Services	A-1	26.9.86	No issue	-	-	-	-
Kredietbank NV	A-1	28.11.86	No issue	-	-	-	-
MCA Inc	A-1	20.2.87	No issue	-	-	-	-
Mass Transit Railway Corp	A-1	20.2.87	-	-	-	-	-
Panasonic Finance BV	A-1+	25.7.86	No issue	-	-	-	-
Petrobras	A-1+	30.1.87	No issue	-	-	-	-
Pfizer International Bank	A-1+	4.7.86	No issue	-	-	-	-
The Upjohn Co	A-1+	21.11.86	No issue	-	-	-	-
Argyl Group plc	E-2	9.3.87	-	-	-	-	-
ESAB	E-3+	9.3.87	-	-	-	-	-
Fisons Finance BV	E-1	9.3.87	-	-	-	-	-
Jaguar International Fin	E-2+	9.3.87	-	-	-	-	-
Ladbroke Group Finance BV	E-2+	9.3.87	-	-	-	-	-
MBS Finance Ltd	E-1	9.3.87	No issue	-	-	-	-

Source: compiled from Standard & Poor's Credit Overview International; Moody's Short-term Market Record, EuroRating's EuroRating's Report and International Financing Review

PART TWO

Introduction

The first part of this study was mainly concerned with identifying areas of the euronote market that may impact on systemic risk, either to increase it or to reduce it. It was not suggested that any of the areas examined would contribute to an increase or reduction in systemic risk, merely that they have the operational potential to affect systematic risk under certain market conditions. The conditions are those of high risk/low return, i.e. where returns are insufficient to account for the risks incurred.

The particular area of concern, as far as systemic risk is concerned, was identified as the underwriting of euronote facilities rather than the dealing and the placement of the underlying notes. To a certain extent the credit risk attached to investing in euronotes was seen to be reducable by the application of credit ratings in the lower quality sector of the market. In the higher quality sectors of the market credit risk appears to be more efficiently reflected in pricing.

It is not insignificant that the euronote market has not suffered from the stock market crash of 1987. In most areas it has actually strengthened as funds flowed into the market. Traditionally funds have flowed into gold and gilt-edged stocks in times of market recession, so effectively restricting companies' ability to raise marketable debt as demand fell. The euronote market appears to have provided an alternative home for this 'panic money', thereby keeping funds within the financial system. In this respect it could be argued that the euronote market actually contributed to the stability of the financial system in times of capital market crisis and so reduced systemic risk.

As the stock market fell sharply in 1987, the euronote market provided a haven for investors' funds due to the desirable characteristics of euronotes/eurocommercial paper, ie liquidity and short maturity paper. Under such circumstances euronote underwriters were redundant as demand outstripped supply. But what if a crisis was to occur in the euronote market? The first five chapters indicate that underwriting fees may be insufficient to reward underwriters for the risks they incur. In Chapter 3 it was seen that euronote facilities carry considerably lower country risk premia than do eurocredits (the funding instrument that they are largely replacing). This will only increase systemic risk if these premia are insufficient. Nevertheless, the very size of the differences charged between risk premiums in the euronote market and those in the eurocredit market for the same borrowers (sometimes 50 basis points lower in the euronote market) could be a cause for concern, and they certainly suggest the need for a more detailed examination of underwriting practices in the euronote market.

The concern with underwriting returns in the euronote market was further accentuated in Chapter 5. Prior to April 1985 there was no regulatory cost to underwriting euronotes. Following the application of risk asset ratios after April 1985 banks found themselves with a capital cost which had to be taken on to the balance sheet. These costs do not appear to have been passed on to borrowers in higher fees, but have been absorbed by the underwriting banks, thereby reducing further their already low renumeration on these facilities.

From our first five chapters it would appear that, of the various features of a euronote facility, the practice of underwriting these facilities may be the feature most likely to lead to an increase in systemic risk.

The second part of this thesis will therefore concentrate mainly on underwriting practices in the euronote market. The aim of this part of the thesis is to determine whether the returns to underwriting banks in the euronote market justify the risks incurred. If they do then systemic risk is not increased. It may even be reduced. If they do not, systemic risk may be increased. If the second is found to be the case then it will necessary to determine why banks undertake to underwrite euronote facilities at returns which do not appear to justify the risks incurred.

Various research methodologies are used to collect, test and investigate different data sets.

Chapter 6 explains how semi-structured interviews were used to convey our concern to the market and to elicit their responses. We felt it necessary to determine whether the areas of concern identified were also areas of concern for market practitioners. The semi-structured interviews were used as an exercise to gather both qualitative and quantitative data. If we were to determine whether underwriting returns were inadequate it was necessary also to obtain quantitative data on underwriting fees on a market basis. Although it was known that certain banks and securities houses collected these data, the data were not publicly available. It was felt that simply writing and asking for such sensitive information would invariably fail and that a more personal approach - where our work could be presented to the 'keepers' of this information as evidence of our intent - would be more successful. This is also an accepted methodological approach in business research of this kind.

The interviews were also used to gain a greater understanding of the operations of the market and to determine what market practitioners believed to be an 'adequate' return for underwriting a euronote facility as well as to learn how such returns are calculated. Evidence is sought as to the major factors affecting the pricing of euronote facilities.

Chapters 7 and 8 use the quantitative data collected through the semi-structured interviews to determine, on a simulation basis, whether returns to underwriting banks are adequate to compensate underwriters for the risks incurred through underwriting euronote facilities. Returns are viewed on a 'stand-alone' basis, ie outside of the customer relationship. In Chapter 7, returns to underwriters are calculated on a return on assets (ROA) basis, whereas in Chapter 8 returns are calculated on a return on exposure (ROX) basis. These were found to be the two major methodologies used in the market in order to calculate returns on underwriting facilities. They are explained in their respective chapters. The funding scenarios used in Chapters 7 and 8 are chosen not only to represent a feasible range of funding possibilities but also to highlight the systemic risk properties inherent in such funding scenarios and, indeed, in the application of the return methodologies themselves. A systemic gap is found to exist in the euronote market (the gap between required returns and actual returns).

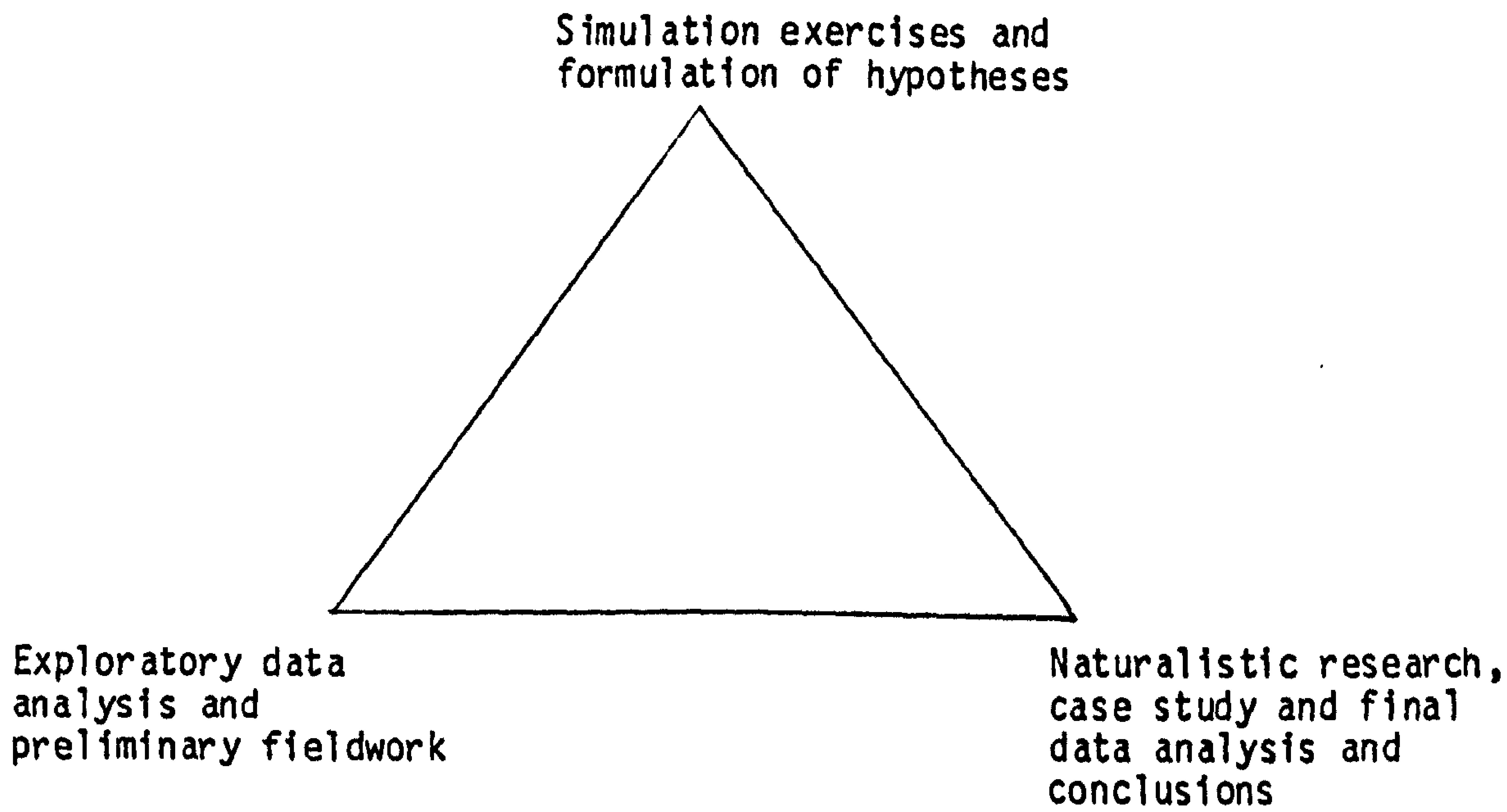
Chapter 9 reviews the bank and financial pricing literature to formulate two hypotheses to explain pricing in the euronote market. Evidence is drawn from the qualitative findings of the semi-structured interviews and the quantitative results of the simulation exercises to support the formulation of these hypotheses.

The two hypotheses are then tested in Chapter 10 through naturalistic (participant observation fieldwork) research methodologies. In an ideal setting it might have been preferable to begin our fieldwork along the lines of naturalistic examination, using this as a stage to identify loose hypotheses which could then be strengthened by more structured research at a later stage. Unfortunately, such naturalistic examination requires the observer to spend a considerable amount of time amongst the social agents being studied, but investment banks are high pressure and high risk environments. Not surprisingly, on reflection, an early approach to spend some time as an observer in these banks proved fruitless. It was only after initial contact, through semi-structured interviews, where the benefits of the study could be explained at first hand, that two banks agreed to allow such an incursion. The results of our period of observation revealed that a relationship pricing strategy is being employed by banks in the euronote market.

Chapter 11 extends the case study approach used in Chapter 10 to examine the profitability systems in place in the National Westminster Bank with a view to determining whether a relationship pricing strategy can be feasibly employed in the euronote market. If the systems are found to be adequate for the employment of such a strategy, then the systemic gap identified in Chapter 8 may prove to be bridgeable.

The study, therefore, employs a variety of research methodologies to collect data, formulate hypotheses and test these hypotheses. In this sense, the study has a triangulation aspect to it, ie exploratory data analysis and preliminary fieldwork; simulation exercises and formulation of hypotheses; and naturalistic research, case study and final data analysis and conclusions. This triangulation aspect is shown diagramatically in Figure A.

Figure A Triangulation of research methodology



Chapter 12 concludes the study and examines its limitations.

CHAPTER 6

THE PRELIMINARY FIELDWORK STAGE

6.1 Introduction

Research is the quest for knowledge through exploration and examination. Too often in the financial world this has been taken to mean simply the formulation of a theory which is used to establish a research problem, which is in turn translated into hypotheses and thence into dependent and independent variables. This is usually followed by precise and highly structured procedures for data collection after which the data are subjected to mathematical or statistical techniques, concluded by a quantitative validation of the hypotheses tested.

Perhaps the most outspoken modern day critics of such an unequivocal or unqualified research approach in the financial world have been Findlay III (1983) and Tomkins and Groves (1983). Although their critique of the so-called 'scientific'[1] method of research (outlined above) relates mainly to the academic accounting and finance fraternity, it has relevance to research in all areas of the social sciences that attempt to force data into predetermined moulds. Tomkins and Groves argue (1983, p 361):

> 'The academic accounting fraternity seems to be locked into a myopic view of what research is. It often seems to consider alternative quantitative techniques as the equivalent of the available range of research styles; or at least it often seems content to adopt one single stereotype of research style'.

In other areas of the social sciences, in particular sociology, the so-called scientific approach has never completely dominated the field and has become increasingly challenged by advocates of more

1 'Scientific' is used to refer to conventional research procedures adopted in the social sciences.

'naturalistic' research methodologies involving greater use of qualitative data. Blumer (1978, p 41) goes even further to challenge not only the abstract content of the scientific approach but its actual validity as a means of understanding social behaviour.

> 'this conventional protocol of scientific analysis is not suitable or satisfactory for the kind of analysis that is needed in direct examination of the empirical social world ... (it) forces ... data into an artificial framework that seriously limits and impairs general empirical analysis'.

Many financial economists have no direct contact with the firms they are studying. As Reid states (1986, p 1):

> 'their experience of the very object on which they lavish such intricate mathematical analysis is entirely second hand'.

In other words, the research model becomes a substitute for the intimate knowledge of the field being studied. To overcome such drawbacks, Blumer argues that the social scientist needs to adopt a more naturalistic mode of enquiry through exploration and examination.

Through exploration the social scientist gains,

> 'a clear understanding of how to pose the problem, what data are relevant and how to identify significant lines of relationships for closer inspections' (Blumer, 1978, p 39).

Exploration is then followed by examination which enquires deeper into the themes which emerge through the exploratory stage.

The importance of a naturalistic (exploratory) approach to research has also been recognised by Abdel-Khalik and Ajinkya (1979, p 19). They contend that:

> 'In situations where it is not feasible to develop theoretical models prior to empirical observation, the ... next best alternative (an exploratory approach) may be followed'.

As Tomkins and Groves (1983, p 365) point out, Abdel-Khalik and Ajinkya appear to be arguing that research may well begin with a 'naturalistic' research mode to identify hypotheses and then move into a 'scientific' mode to test the hypotheses. Tomkins and Groves (1983, p 365) see nothing wrong with this proposal,

> 'provided that, at the end of the naturalistic exploratory stage, one feels confident enough to adopt the view of the world and related set of ontological assumptions to enable the scientific approach to be used with validity'.

Blumer also sees this approach as preferable to purely scientific methods, saying (1978, p 41):

> 'to apply this conventional scheme (the so-called scientific method) to the account yielded by exploration would certainly be a gain over what is usually done'.

The proponents of the naturalistic style of research are not necessarily condemning the scientific method itself but rather the way it is often employed as a universal methodology capable of tackling all research problems. In certain cases, the scientific method may be inappropriate (for instance, where uncertainty prevails) or only partially applicable.

The approach taken within this thesis encompasses the research methodologies called for by Tomkins and Groves (1983) and Blumer (1978) and also the more scientific methodologies usually adopted by financial economists. In other words, a range of research methodologies are employed to explore and examine the area under study. We believe this to be important in a study of this kind where neither quantitative nor qualitative data are publicly available and where the nature of the research questions requires a wide selection of data to be collected.

The purpose of this chapter is to advance arguments for applying field research methods to the analysis of the financial environment and to outline one of the main methodologies used in this study: the semi-structured interview. We begin by examining the methodological issues which arise in the application of field research methods in general.

6.2 Methodological Issues[2]

An appropriate place to begin would be by defining the notions of a field and a site. Reid (1986, p 3) defines a field as:

> 'any clearly delineated area which may be the subject of social research'.

This might be interpreted in physical terms as a school, a factory or a bank, but is most likely to be interpreted in analytical terms, ie the university system in the United Kingdom, the motor car industry, or in our case the euronote market.

Unlike scientific research methodologies which tend to use secondary data collected for purposes different to those for which the researcher wishes to use the data, field research methodologies tend to discard the arms-length approach. The field researcher specialises in the collection of primary data, acquiring as he does so a first-hand experience of whatever social world is to be defined as the field. Any secondary data that are collected (ie mainly numerical data) are sought out for their particular applicability to the field. They should be used not as an alternative or substitute for the primary data but as an

2 This section draws on the work of Reid (1986); Glaser and Strauss (1967); Porter (1980) and Fry (1983) amongst others.

additional database to complement and if appropriate validate the primary database (see Tomkins and Groves, 1983, p 365).

Knowledge of the field is obtained by collecting data at a set of sites. A site can only be categorically defined within the context of the investigation. It could be described as a partitioning of the field. Within this study a site is defined as the euronote department of a bank participating in that market (or field).

Typically it is not possible to visit and explore all sites. Access may be limited as generally the consent of an individual or institution is required before access to the site is granted, and consent may be witheld. Even with consent it may not be economically viable to visit all sites given that the labour and financial resources of the researcher will be limited. For these reasons it is necessary to sample a number of sites from the overall population. The fieldworker is, therefore, faced with one of his first research problems - that of representativeness of the sites chosen.

To gain access to a site it is necessary to locate and contact the 'gatekeeper' (see Burgess, 1984, p 48). The gatekeeper is the person with the authority to permit access to the site. In the case of a school he would be the headmaster; if a prison, the warden and in our case, if a euronote department, the head of department.

It is worth noting that the gatekeeper will not always be the person best conversant with the site to be examined. For instance, the person to discuss production lags in a factory may be the production manager although he will almost certainly not be the gatekeeper to that particular site. This person (ie the one with whom the researcher should interact) will be called the 'key man'. Although the gatekeeper and the key man may be one and the same, in practice consent from the gatekeeper is likely to set up a chain of referrals to possible key men and one must use facilities of qualitative judgement to decide which of these referrals is worth persuing seriously.

As Reid (1986, p 4) emphasises, because information gathering proceeds in this way, it is often impossible to utilise techniques based on statistical sampling theory (eg stratified proportional random sampling). Instead the research proceeds by a variety of non-statistical sampling methods, including theoretical sampling (see Burgess, 1984, pp 54-56). Glaser and Strauss (1967) emphasise theoretical sampling as a means of generating and validating hypotheses.

The term 'theoretical sampling' can be misleading in that it describes a process which is most definitely empirical in nature. It requires that,

> 'sampling should be consciously organised to suggest, to develop, and to make precise, a theory about relationships in the universe of the investigation' (Reid, 1986, p 5).

With theoretical sampling the aim is to:

> 'obtain the best data one can, when one can, by a variety of strategies, and at the margin always try to edge towards acquiring especially informative data' (Reid, 1986, p 10).

Once data have been gathered by fieldwork methods, the researcher then faces the problem of generalisation from the sample obtained to the wider population under examination. However, the need to obtain a sample which is representative of the population should not override the opportunity to study so-called 'outliers'. These may be particularly informative. For instance, if an industrial economist was undertaking a study of why firms fail, firms of just average profitability might warrant less attention than their abundance might suggest. It may be more informative for the researcher to examine firms lying on the tails of the profitability distribution.

Theoretical sampling, then, realises the need to obtain the best data one can within the constraints of time and resources. Whilst the sample should be representative on the whole of the population, analysis of outliers is also recommended.

Samples gathered in this way are certainly non-probabilistic, and also judgemental. According to the methodology of Glaser and Strauss (1967) the researcher about to begin an empirical investigation should do so without any preconceptions about the appropriateness of any particular theoretical model. The investigation, they contend, should proceed by suggesting tentative hypotheses and then by modifying them in the light of the unfolding evidence. Glaser and Strauss are essentially concerned with an approach which Miles and Huberman (1984) call 'qualitative data analysis'.

It is important to point out that qualitative data analysis and naturalistic research are not necessarily the same. Naturalistic research is encompassed within the area of qualitative data analysis but is embodied at the more extreme end of the spectrum. It has as its main research tool, participant observation which will be discussed more fully in Chapter 10.

Ideally, a period as participant observer at various sites in the field should provide the researcher with the data necessary to construct a more formal data collection tool - such as a semi-structured interview - which could be aimed at collecting more precise data with which to formulate and (in some cases) even test hypotheses. By this means, the data are collected initially using only the very broadest economic perspective.

In this study such an approach was not possible at the initial fieldwork stage. Although a variety of banks within the euronote market were approached to participate in such an exercise, all declined (see Appendix 6.1 for example of letter sent out). Most banks declined on the premise that they could not possibly allow someone from outside the organisation to study their highly confidential operations. Others declined on the grounds that at the present time they could not see how such an exercise could benefit them but stated that if a positive return to them could be proven they may consider the request at a later stage. Many did, however, suggest that they would be willing to be interviewed.

For these reasons we were forced to rely on the evidence of the first five exploratory data chapters to compile the semi-structured interviews discussed later in this chapter.

Although, ideally, we would have preferred to spend some time in a participant observation role prior to the compilation of our semi-structured interviews, in achieving the final form of a theory no precise guidelines are offered, except that the theory should be stable in the face of new data and rich in detail. In achieving such detail, the collection of different 'slices of data' is favoured (see Tomkins and Groves, 1983; Abdel-Khalik and Ajinkya, 1979; Glaser and Strauss, 1967 and Reid, 1986). This is to argue in favour of using diverse methods for collecting data, with the purpose of gaining different perspectives on categories, or emerging hypotheses. In this study four slices of data were collected: from initial exploratory data analysis (mainly quantitative); from semi-structured interviews; from simulation experiments on the quantitative data collected through the semi-structured interviews; and through participant observation. The role of participant observation in this study was one of testing hypotheses rather than its traditional role of collecting data from which hypotheses may be formulated. However, as Becker (1979, p 321) emphasises:

> 'Participant observation may be used to either formulate or test hypotheses ... The observer may have his problem well worked out and be actively looking for evidence to test a hypothesis, or he may not be as yet aware of the problem'.

Becker (1979, p 321) goes to to contend that:

> '... a well formulated hypothesis makes possible a deliberate search for negative cases, particularly when other knowledge suggests likely areas in which to look for such evidence. This kind of search requires advanced conceptualisation of the problem, and evidence gathering in this way might carry greater weight for certain kinds of conclusions'.

This statement is not inconsistent with the naturalistic researchers' call for hypotheses to be formulated by first hand experience in the field. The hypotheses to be tested through participant observation will have been formulated from the data collected through initial fieldwork research, both qualitative and quantitative. Through this process it will be shown that qualitative and quantitative data are not substitutes for each other but should rather complement each other as essential counterparts of any research effort in the social sciences.

Glaser and Strauss (1967) dispute the criticism that theoretical sampling leads to 'unbounded relativism'. As Reid (1986, p 8) explains:

> 'The very strength of taking slices of data ... is that this tends to offset the bias of methods and to balance the misrepresentations of respondents against one another'.

By comparing different slices of data new perspectives can be achieved.

6.3 Construction of the Semi-structured Interviews

Up to this point attention has been concentrated on methodological issues, with only passing reference to empirical considerations. However, as Reid (1986, p 12) points out:

> 'mere methodological speculation can prove particularly fruitless unless tempered by the more concrete considerations of empirical enquiry'.

From this point forward, attention is directed at empirical considerations in the application of the semi-structured interview technique to the euronote market. However, the way in which the empirical enquiry proceeds should now be informed by a clear methodological position.

During 1986 the author undertook a detailed analysis of the various sectors of the euronote market and their relevance to systemic risk. This analysis used mainly publicly available information in the form of publications, transcripts of speeches and publicly available market data in an attempt to identify the main areas of concern as far as systemic risk is concerned. This analysis formed the basis of the first five exploratory data analysis chapters of the study (see Feeney, 1986). This early exploratory work led to the design of a semi-structured interview. The data obtained through this instrument, which were both quantitative (numeric) and qualitative (textual), were then mounted on a database.

It will be observed in this study that a certain degree of prior instrumentation (initial structuring of the proposed research) was favoured, although interviewees were given considerable scope to discuss what they felt to be most relevant. This latter point is important in the sense that without a certain degree of prior instrumentation the interview can become hard to decipher afterwards and topics which both parties may wish to discuss may never be raised, perhaps because the interviewee feels them to be too complex for the interviewer to understand. However, once in the interview it is important to allow the interviewee time to expand beyond the boundaries of prior instrumentation if he so wishes or to elucidate on particular areas within it.

The advantages of prior instrumentation have been well documented by Miles and Huberman (1984, pp 42-43) and include: avoiding superfluous information and facilitating comparability across studies.

In regard to the conduct of the fieldwork, general methodological guidelines were available from standard research texts like Leedy (1985). Recommendations followed included:

1 using the telephone as a follow-up to an introductory pre-letter

2 providing a reference in with the pre-letter

3 lowering the possible level of threat in an interview by beginning with general non-direct questions

The study was conducted only with the informed consent of the respondents. Respondents were given the assurance of complete confidentiality, and anonymity where desired.

Reference was made previously to 'gatekeepers'. The main gatekeeper in this study was almost invariably the head of the euronote department in the bank. It was a simple task to identify these gatekeepers, most appearing in financial magazines and journals on a regular basis. Where this was not so, a simple phone call to the bank's reception desk was all that was required.

There are some 300 banks participating in the euronote market although the market itself is dominated by the top fifteen. Time and resources precluded the study of the vast majority of these sites. The top fifteen banks were all targeted (all carrying over US$ 500 million worth of underwriting facilities on their books) as well as twenty middle runners (carrying between US $200 million and US$ 499 million of underwriting facilities on their books) and twenty small runners (carrying less than US$ 200 million on their books).

The sample was chosen not only to capture the richness of the market but also to examine some of the outlying market players. Having said this, the choice of sample was necessarily, to a certain extent, judgemental.

A standard 'pre-letter' was sent out to all potential respondents (see Appendix 6.2). In compiling the pre-letter general guidelines laid down by Jacobson (1986) were followed. These included: making the letter short; using letterhead stationery; starting with a personal salutation, and finishing with a personal signature in ink.

There is evidence to support the contention that pre-letters lower refusal rates, improve the quality of data and increase the co-operativeness of respondents (see, for example, Fry, 1983, pp 92-93). As well as signalling the authenticity of the study, pre-letters also allow the respondent to evaluate the prospect of his participation.

One week after the pre-letter was sent, the potential respondent was contacted by telephone in order to arrange an interview date for the semi-structured interview. In a few instances the 'gatekeeper' had passed on the pre-letter to a colleague as he felt ill-equipped to deal with the interview personally. In these cases the gatekeepers and the key men were seen to be different although in the majority of cases where the gatekeepers responded positively they agreed to meet the researcher personally.

Fry (1983, p 91) argues that:

> 'constructing an introductory message should command the same (or even more) attention as question design and arrangement ... the respondent may not even hear the bulk of the introductory message because he or she is so busy concentrating on whether or not to participate'.

In constructing the introductory telephone message, guidelines laid down by Fry (1983, chapter 4) and later reiterated by Reid (1986, p 17) were followed. These included: identifying the caller; explaining why the call is being made; explaining the type of information being sought; explaining the conditions (especially terms of confidentiality) under which the interview was to be conducted and explaining the benefits of participation. Additionally, where the gatekeeper had referred us to this contact, his/her name was mentioned in this respect and it was explained that the respondent had a free choice on the time of interview.

Where responses were positive a confirmatory letter with an outline of the interview agenda was sent to the respondent for his/her perusal prior to the interview with a note to the effect that this agenda was flexible and that he/she was free to talk about anything outside the agenda or to ignore areas which he/she would not wish to comment on (see Appendix 6.2).

6.3.1 Response rate

The response rate was satisfactory: 8 from 15 large players; 4 from 15 medium players and 3 from 15 small players agreed to participate providing an overall response rate of 34 per cent. The Bank of England also agreed to participate although the main results of this meeting (at this stage) were to confirm that the Bank of England was also concerned that returns to underwriters in the euronote market might be too low to account for risks incurred in that market. As such the data from the Bank of England interview are not written up separately.

Two respondents agreed to participate only on the grounds that 'anonymity' was also assured. This was agreed.

Not surprisingly the response rate for the small players in the market was very low (only 20 per cent). Their role in the euronote market is only minimal and most felt that the meeting would be unproductive. Conversely, the response rate for the large players was very good (54 per cent) reflecting the fact that they felt that they might gain something from such an interview. Interestingly, the mention that 'other large banks' had agreed to an interview was enough to sway most respondents in this category. Although the sample included only nineteen banks, between them they accounted for over 35 per cent of the total euronote underwriting market (see Appendix 6.3 for list of participants).

During interviews, interruptions were usually not a major problem although they did occur. This had no apparent effect on the flow or quality of data. Towards the end of the proceedings, the possibility of the interviewer taking part in a period of participant observation at some later date was broached. Most declined such a request but a few proved reasonably willing to grant the request under rules which were to be laid down if and when they were approached accordingly in the future.

6.3.2 The database

To facilitate the processing of data obtained from the semi-structured interviews, a computerised database was established on the Dec 20 system at the University College of North Wales. The database contains two different sets of records. The first set encompasses all the quantitative data collected thorugh the semi-structured interviews. This set of records which contains over 10,000 separate pieces of information was used to perform the simulation exercises explained in Chapters 7 and 8.

The second set of records encompasses all the qualitative (narrative) data acquired through the semi-structured interviews. This relates mainly to the text of notes obtained from these interviews. Originally this section of the database was set up as 19 different records, one for each interview. It was then collected together under three different sections, relating to the three main topics covered in the semi-structured interviews.

6.4 Semi-structured Interview Agenda

Although it is generally recommended that interviews be taped (see, for example, Jahoda <u>et al</u>, 1964, pp 228-30) it was decided that in this study the disadvantages of doing so outweighed the advantages. The first problem was by itself probably sufficient to eschew the use of a tape recorder: namely that consent would have been very hard to obtain. Like all financial markets, a certain amount of secrecy surrounds its internal operation. It was our intention to get underneath this shroud and to delve more deeply into the practical operations of the market and its players. Anything which could have caused tension or raised suspicion of our intentions would have been counterproductive. Indeed, even with consent the respondent might have held back sensitive information which may have been given more freely if not recorded for posterity on tape. Another disadvantage of using a tape recorder is apty documented by Reid (1986, p 32):

> 'It leads to the possibility that the interviewee's remarks may not be listened to carefully, because everything is going down on tape. The structure of the interview can therefore suffer, and the quality of data gathered is thereby reduced ... Further, specific information may be given to the interviewer more than once, though the respondent may not necessarily be aware that he is simply conveying the same information in a variety of different ways'.

Finally, there is the problem of the sheer volume of information collected on tape which makes generalisation and the establishment of relationships difficult.

It was for these reasons that a tape recorder was not used during the interviews. Instead field notes and debriefing were favoured. The model followed for recording notes was that proposed by Schatzman et al (1973, chapter 6). Firstly, rough field notes were jotted down in the particular area alloted for each agenda item. Following this, summary notes of greater detail and precision were written from field notes and memory. These were subsequently entered on to the database.

As just described, interviews involved working through an agenda whilst taking notes. Lofland (1971) proposed as a universal standard for agenda construction that no more than ten main topics be covered, with eight being the normal limit. In our agenda there were only three main topics which was found to be a practical limit.

Following proposals laid down by Reid (1986) a more detailed structure was obtained by using what Reid (1986, p 31) refers to as a 'nested or hierarchical arrangement'. This was achieved by using a 'probe' structure. For example, under risk one can probe further for risks to the investor compared to risks to the underwriter and how such risks are captured in pricing etc. Figure 6.1 presents a summary of the agenda used in the semi-structured interviews. The actual agenda is presented in Appendix 6.4.

Figure 6.1 Semi-structured interview agenda outline

1 Risk

1.1 To the investor
1.2 To the underwriter
1.3 To the placing agent
1.4 Systemic risk

2 Pricing

2.1 Of notes
2.2 Of underwriting

3 Competitive forces

3.1 Ease of entry
3.2 Ease of exit
3.3 The market/concentration

The summary agenda was sent to all respondents prior to the interview for their perusal. Naturally it was couched in general terms but it at least provided the respondent with an outline of the proposed meeting. The actual agenda was, to a certain extent, judgemental. There has been no study conducted in this area before.

There were a certain number of aims to the interviews: firstly, to determine whether the researcher was 'on the right tracks' in the sense of identifying the area of underwriting euronotes as the most likely (if any) to lead to an increase in systemic risk; secondly, to discover how price is determined and what is seen to be adequate; thirdly, to elicit views on systemic risk, and, finally, to gain a greater understanding of the structure and operations of the market.

To achieve these aims it was felt necessary to keep the agenda deliberately open compared to studies of industrial operations (such as Porter, 1980 and 1985) where the interview agenda is usually extremely detailed. The ultimate goal of this thesis is not just to provide a detailed manuscript of the operations of the euronote market but to tackle the question of systemic risk: something which studies of other industries, to our knowledge, have never addressed.

6.5 Presentation of the Data

Much thought was given to how the qualitative data of the interviews should be presented given that banks of very differing sizes were involved. One possibility would have been to present the data relating to large, medium and small banks separately. As it turned out this would have involved considerable repetition. It was decided, therefore, that the data should be presented (as far as possible) following the outline laid down by the agenda, highlighting points where different sized banks (or indeed banks of similar size) differed.

6.5.1 Risk

<u>6.5.1.1 The investor</u>

The consensus of opinion here was that the main risk to the investor in euronotes was credit risk. Having said this, most respondents believed this risk to be only minimal due mainly to the liquidity and short-term nature of the notes. A valid point, however, made on two occasions was that the risk faced by the investor is to a certain extent determined by the type of investor. A retail investor will usually 'buy and hold' until maturity. In such a case the main risk faced is undoubtedly credit risk. An institutional investor, on the other hand, is looking to 'take a turn', ie to on-sell the notes at a profit. In other words he plays the yield curve, buying when interest rates are high and selling when they fall, taking a small spread on the notes. For this type of investor interest rate risk is also relevant. If a house (securities house) books a considerable amount of notes in the hope that interest rates will fall and they do not, then it has two choices. It can either hold the notes to maturity at which time it will make its return, or it can sell the notes at a loss. In the first instance this may mean holding the notes for anything up to six months. For many securities houses this would be too much of a strain on their capital base. However, it was interesting to note that many houses actually refused to sell to other houses because it distorts prices in the secondary market as paper is sold on and on. As a result of this, most paper now ends up in the books of commercial banks or retail investors, both of which usually hold paper to maturity.

Risk measurement was not seen to be a problem with euronotes. Most respondents saw the market still as a 'prime name' market. Ratings were seen to be becoming more important but name recognition was undoubtedly the main benchmark by which risk was assessed. This feeling was borne out in our results of the previous chapter where a rating only really affected the price of paper in the lower quality categories. On several occasions respondents made the point that top quality names don't 'go bust' in three months. Furthermore, the only investors buying poor quality paper would be the commercial banks in order to gain a higher return. However, most commercial banks wouldn't buy this paper today without a rating.

All in all, risk to investors was seen to be minimised by the extent of liquidity in the market, the short-term nature of the notes and generally good quality paper. Many respondents questioned whether institutions who bought paper to sell on to other institutions could really be classified as investors but were actually dealers in their own right. For these institutions interest rate risk is a problem but no more so than it is in other markets such as CDs or eurobonds.

6.5.1.2 The underwriter

Although credit risk was seen to be more of a problem to the underwriter than the investor because of his longer term commitment to the borrower, the most important risk was seen to be what respondents referred to as 'market risk'. Market risk was generally defined as the risk that the market would turn against the underwriter, perhaps because of the collapse of a large borrower which would trigger panic selling, or because of the onset of a bear market in euronotes. In either case yields would have to rise on paper in the primary market to make it attractive to end investors. The point of crisis would come where yields in the primary market hit the 'strike offer yield' at which underwriters are committed to purchase paper. At this yield the underwriters are left holding paper that the market has already refused. Furthermore, since many underwriters are also committed to 'make a market' in their client's paper they will also be forced to purchase unwanted paper in the secondary market. In this scenario respondents stated that there would be a risk that the bank may not be able to fund its liabilities in the market at short notice. Hence, funding risk and market risk were seen to go hand in hand.

Much concern was also voiced about the advent of 'unlimited' programmes: euronote programmes with no maximum limit where the borrower could theoretically issue as much paper as desired irrespective of gearing, and the underwriters would be forced to purchase. Although such programmes are only made available to the very best names such as General Motors Acceptance Corporation (GMAC, the wholly-owned finance subsidiary of General Motors) it is significant that Standard & Poor's downgraded the debt rating of GMAC in January 1988 from A-1+ to A-1.

When asked why they underwrite euronotes, responses differed between different banks. Most of the larger banks argued that they had no choice: that if they did not do it somebody else would. They also stated that it was a good way into a relationship with attractive 'spin off' income. Many of the larger banks argued that without these 'spin offs' they wouldn't consider underwriting. As expected, the main 'spin off' was placement business.

Some smaller banks argued, also, that they had very little choice but to do some underwriting, but for a different reason. None of the smaller banks had actually ever lead managed a deal or approached a borrower directly for underwriting business. All of their underwriting business came through syndication, where the large banks were laying off some of the risk with other banks. These smaller banks argued that by refusing to take part in a syndication they would be in effect 'biting the hand that feeds them'. Indeed one respondent claimed that by refusing to take part in a 'ridiculously cut' (underpriced) deal not only had he never been approached again by that bank to participate in a syndication but also lost other 'perks' previously passed his way, such as tender panel membership.

It was interesting to note, that although the smaller banks felt obliged to participate in syndications, they were also the only banks to quote pricing as an incentive to underwrite a deal. Two in particular argued that they could get excellent returns on employed assets depending on whether or not they had to fund (see later on 'pricing').

On the question of risk measurement this proved to be a particularly 'hazy' area. All respondents agreed that there was no way that risk could be measured accurately with these facilities. Most said that although risk should be reflected through the price attached to the facility, this was not always so. There has never been a default in the euronote market and so there are no adverse statistics on which to base a measurement of risk: actuarial calculations are impractical. Most of the larger and medium-sized banks said they would look at such things as credit ratings, name recognition, how the potential borrower tended to fare in other markets, but that in fixing a price such matters took a back seat to what the market commanded, which was generally far less than they would like to see.

The smaller banks argued that it was not necessary for them to attempt to measure the risk attached to underwriting a particular facility as this risk assessment will have already been done by the lead manager and will therefore be priced accordingly. Given the responses of the larger banks which suggested that this was not so, the attitude of the smaller banks indicated a lack of knowledge on their part of risk assessment practices in their larger competitors.

6.5.1.3 The placing agent

All respondents commented that the practice of placing euronotes, by itself, was virtually risk-free unless the placing agent is also the underwriter. Placement of euronotes is conducted on a 'best efforts' basis only. Any notes which the placing agent cannot place are returned to the underwriter at the strike-offer yield. Alternatively, the placing agent may itself choose to purchase notes left unplaced. This, however, is not compulsory and the placing agent would only take this course of action where it felt it could still sell the notes at a profit at a later date. Having said this, many of the larger banks felt that there was a certain necessity for a placing agent to ensure that notes did not return to the underwriters on a regular basis. This would damage the credibility of the placing agent and possibly lead to the agent's dismissal from the facility.

Because of this need to appear as capable placers of paper, many placing agents have actually 'dumped' paper in the market when they could not sell it above the price at which it was bid for. This has been a particular problem for the tender panel system (a problem identified in Chapter 4) where placing agents have actually taken losses on paper rather than return the paper to the underwriters. The move away from the tender panel mechanism to one or two dealerships is partly removing this inefficiency in the placement mechanism.

6.5.1.4 Systemic risk

Most respondents were cognisant with the implications of systemic risk (a sudden and unexpected disequilibrium in the market) but referred to it as 'market risk'. The consensus of opinion was that as far as investors and placing agents were concerned, systemic risk was not a problem, but that for underwriters it was probably their main problem. One respondent made the comment that, although untested in law, material adverse change clauses may protect the underwriter in individual cases but that if the whole market was to go wrong then such clauses would be useless.

When probed as to whether they felt they were actually increasing risk within the system by underwriting euronotes, four respondents replied positively. Two in particular made the comment that by underwriting these issues at such low prices, any financial crisis would be concentrated within the banking system as opposed to being diversified throughout the system. Because of this concentration, system failure would be more probable. They felt that prices did not allow for adequate reserves to be compiled in order to withstand such a crisis and that central bank support may be required.

This led to the question of the role of lender-of-last-resort in this market. There is, as such, no lender-of-last-resort in the euronote market. However, respondents felt that the parent bank's own central bank would be responsible for this role.

Most respondents felt the probability of systemic failure to be very low and impossible to account for when deciding whether to underwrite an issue or not. Many respondents also felt that a lot rested on the returns gained on underwriting such facilities and whether these were adequate to compensate for the low probability of such a risk arising. Much depends here on how such returns are calculated. It was not surprising to hear that most of the small banks felt that returns were adequate to compensate for the risk of systems failure given that they had previously mentioned that they calculated returns on an ROA basis (see pricing).

When probed as to whether systemic risk was really a risk at all if they would be bailed out under such a scenario by the lender-of-last-resort, interestingly all felt that it was but for very individual reasons. Most respondents stated that if their bank had to be 'bailed out' due to severe losses in their department then they would certainly lose their jobs. In this sense, failure was a threat which most felt they had to guard against by not engaging in overtly 'risky' business.

6.5.2 Pricing

6.5.2.1 Notes

There was a firm consensus that as far as the eventual price of notes was concerned, this would be determined principally by demand and supply in the market. An issuer could not expect to double his supply of notes and obtain the same price. The price paid for notes, then, is, to a certain extent, determined by the aims of the borrower. If his primary aim is to gain the best price he can then he will invariably go the tender panel path, forcing a variety of banks and securities houses to bid against each other for the notes. Although this undoubtedly produces fine pricing it also leads to erratic distribution with notes often being 'dumped' in the market, thereby affecting later distribution.

If the main aim of the borrower, however, is to maintain a permanently diversified investor base then supply will be favoured over price. In this scenario a sole or multiple placing agency will be favoured.

Eventually, the price at which the notes settle in the market will be determined by demand and supply factors.

What is seen to be an 'adequate' return on the notes will also be determined by market factors, but also returns on substitute investments. Several respondents made the comment that the yield on euronotes could not vary substantially from the yield on US commercial paper as arbitrage between the two would bring yields back in line: the same would be true with euro-CDs.

Adequacy is always, to a certain degree, subjective. Adequacy of return can, of course, only be calculated in association with risk; both are meaningless by themselves. As risk is more easily judged on a three-month liquid asset then, one respondent commented, perhaps the best standard of adequacy is what the market is prepared to accept.

Where notes are rated then investors have a visibly quantifiable benchmark on which to determine a price. If a previously A1+ issue went for LIBOR-10 then a same rated issue will probably fetch a similar price (depending of course on current rates and the present demand for that issuer's paper).

The calculation of return on a euronote is simply that outlined in Chapter 5, equation (5.1).

6.5.2.2 Underwriting

An important consideration in the fixing of a price for an underwriting facility was found to be the customer relationship. Interestingly, many large and medium sized banks indicated that somewhere between 60 to 80 per cent of all underwriting business was obtained from existing customers who were replacing old credit lines with euronote facilities. The fear of losing the customer relationship (which was generally found to encompass a wide range of facilities from overdrafts to foreign exchange) was found to be an important factor in the pricing of these facilities. For this reason, and because of the competitive nature of the market many respondents felt that the price of underwriting facilities themselves provides an 'inadequate' return to compensate the underwriters for the risks incurred, but that prices were justifiable on an overall customer relationship basis. A main factor here was found to be the acquisition of placement business. Significantly all large and medium-sized banks stated that they would usually only accept underwriting business where the opportunity to place notes was offered. The revenue from this service was virtually risk-free in the sense that they would have to underwrite anyway any notes they could not place.

Given respondents' comments on the need to price in order to maintain customer relationships, the question of adequacy of return raised some interesting responses. Taking into account revenue from other parts of the customer relationship, most respondents were unable to determine a quantitative level of adequacy for an underwriting facility, arguing that this would have to be judged on an individual basis. In the end it was decided that the only way a direct level of adequacy could be estimated would be where the return from the facility was judged outside of the customer relationship. That is, the direct level of return from an underwriting facility that would justify the provision of that facility on its own merits. Even on this basis, in an area where risk is virtually unassessable, a price adequate to compensate for such risk is also extremely hard to quantify. The consensus of opinion was that on an individual basis there could be no firm standard of adequacy but that the underwriting portfolio should 'at least' yield a return in line with that of the bank's average return on assets of approximately 0.5 per cent. Most respondents felt that on a drawn basis a return of 0.5 per cent would be the minimum acceptable amount on the underwriting portfolio if viewed outside the customer relationship, and half this only where the facility was never drawn.

Interestingly, the smaller banks interviewed felt that, for them, the customer relationship was not as important. Many felt that they would be unlikely ever to secure placement business through the acceptance of a portion of the underwriting because of their smaller presence in the market. Significantly, the need to maintain good 'competitor relationships' was more important than the desire to establish good customer relationships in the market. To have good relationships with their larger competitors was important if they were to be offered a place in syndicated deals. Many remarked again that they depended for a large part of their business on invitations to join a syndicate of banks, whether it be in the euronote, eurobond, syndicated loan or other markets. Many feared that there would be repercussions of refusing to syndicate an underwriting facility in the euronote market, which would carry to other more profitable markets. Having said this, all small bank respondents felt that returns gained on underwriting euronotes were 'generally adequate'. They stated that returns of well over one per cent were achievable in many cases, depending on how the facility was drawn.

When probed as to how these returns were calculated it was again interesting to note the diversity of opinion between banks of different sizes. All small banks said that they use a simple ROA formula. Under the ROA methodology all returns to the underwriter are applied only to those assets actually funded. As this methodology is explained in detail in Chapter 7, it is not described in any detail here.

All of the other banks stated that they calculated return on a return on exposure (ROX) basis. Under the ROX methodology all returns are applied to the exposure of the underwriter as opposed to just the assets funded. The exposure of the underwriter is taken as the maximum amount on which he may be called to fund. As this methodology is explained in detail in Chapter 8, again it will not be covered in any detail here. Significantly the Bank of England expressed its definite preference for ROX over ROA for reasons expressed in the following two chapters.

During this section of each interview a request was made for market data to which the various return methodologies could be applied. On three occasions the researcher was successful - gaining data from County NatWest, Merrill Lynch and Bank of America.

6.5.3 Competitive forces

6.5.3.1 Ease of entry

As far as economies of scale were concerned, the consensus of opinion was that these were only relevant where banks were competing to gain the lead manager position on a euronote facility. In these circumstances the power to take a large slice of the underwriting business as well as the ability to convince other banks to join the syndicate was seen as extremely important. As far as simply underwriting was concerned, however, the only barrier to entry was seen to be capital. All respondents stated that where a borrower is just looking to underwrite a euronote programme, product differentiation is virtually impossible. Price is all important. In this sense the market is easy to enter if a bank is preparing to 'buy the business'. On this latter point several respondents commented on the deal struck by Manufacturers Hanover for Renfe (the Spanish state-owned railway company) in 1987. Fully drawn Manufacturers Hanover would receive just ten basis points on the deal. Most respondents saw this as suicidal pricing to 'buy in' to the market.

The only retaliation possible with such action is a price war. Most respondents stated that this was not an open policy of their bank and that to try to undercut a fully drawn return of ten basis points would do nobody any good. One comment worth mentioning was that although the top fifteen banks controlled over 50 per cent of the market, this had been achieved not so much through buying market share in order to increase prices later (as the strike offer yield is fixed at the outset) but simply because they have been able to take a higher proportion of underwriting on each facility due to their considerable capital resources. This has been a significant attraction to potential borrowers who like the lead bank to take the 'lions share' of the underwriting business.

Some of the smaller banks stated that far from underpricing to build up market share, the larger banks were able to keep most of the front-end fees and facility fees, passing on only a small proportion of these fees in syndication to the smaller banks. Surprisingly, the smaller banks still felt adequately renumerated for their part.

<u>6.5.3.2 Ease of exit</u>

As with most financial markets, entry was seen to be far easier than exit from the market. To exit from this market would mean the transfer of existing underwriting facilities. There is a facility known as a transferable revolving underwriting facility (TRUF) where the transfer of the underlying liability is possible. However, such transferability has to be agreed with the borrower prior to the signing of the facility. As such there are very few TRUFs in existence.

Transferability, however, is still possible using one of three methods borrowed from the syndicated loan market, sub-participation, assignment or novation, all of which have serious defects (see Feeney, 1986, pp 62-64).

Under the sub-participation method, the sub-participant makes a payment to the original lender in consideration of a right to receive a stream of payments in return, gauged, or measured, by the amounts of principal and interest received by the original lender from the borrower. With this method the sub-participant has no legal claim on the borrower or on the funds paid by the borrower to the original lender. A sub-participant is therefore taking a two-fold credit risk on both the borrower and the original lender. Furthermore, any protection given by contingency risk clauses in a loan agreement, such as material adverse change clauses, may not be passed on to a sub-participant.

For the above reasons, assignment was usually thought by respondents to be more acceptable, giving an enhanced degree of protection compared to the sub-participant because the rights and benefits of the assigner are simply transferred, but an assignee may still have no direct claim on the borrower or a direct interest in the funds paid to the lender by the borrower. Indeed, an assignment may also lead to stamp duty. It may turn out to be more costly than sub-participation.

Novation, on the other hand, involves the discharge of one obligation and the creation of an entirely new one, rather than simply the transfer of an existing liability. This method, although avoiding stamp duty, is cumbersome and requires the co-operation of the borrower and other underwriters (if the facility is syndicated). As a result, the structure has not been much used.

In theory, then, although exit from the market is possible through the transfer of existing underwriting obligations, in practice this is not always so. When probed as to whether it would be possible for a large bank to exit from the market through the transfer of its existing liabilities, most respondents agreed that this would be virtually impossible given the scale of transfers that would be required.

The other route out of a market is, of course, through failure. This again led us back to the question of whether the respondents felt they would be allowed to fail. Again, most respondents felt they would not be allowed to fail and therefore exit from the market through this route was not a possibility for the bank itself, although it was certainly a possibility for them if heavy losses were sustained in their department.

6.5.3.3 The market

There are about 300 banks in the euronote market although the top 50 have over 50 per cent of the entire underwriting business (see Appendix 6.5). Despite the multitude of banks in the market, the top twenty to thirty own over 90 per cent of all lead-manager mandates, passing down portions of the risk (and return) to members of a syndicate which they will have formed. Most respondents stated that it was virtually impossible to break the grip of these larger banks in terms of gaining lead mandates unless a bank was prepared to 'buy a deal', ie undercut the competition as did Manufacturers Hanover with the Renfe deal. However, again respondents stated that most lead mandates were won not so much on price, but on the portion of underwriting the potential lead manager was prepared to take on to its own books. Since only the very largest banks in the market could continually take very large portions of the underwriting it was not surprising that they won most of the lead-manager mandates.

The price, however, is often fixed in conjunction with the borrower and the bank arranging the facility (which will often be different to the lead bank) and so prices were seen to be kept very competitive.

There was much mention throughout the interviews of league tables and the need to be seen to be 'doing the business'. One respondent commented that it was not just a coincidence that the largest and cheapest facilities are contracted for in December of each year just before the end of year league tables are published in financial magazines such as Euromoney and The Banker. It is also interesting to note the number of new names on the Lead Manager League Tables at this time of year.

6.6 Preliminary Assessment of the Data

The data of the semi-structured interviews proved to be reassuring - in the sense that it confirmed the indications of our exploratory data analysis chapters that the area of concern as far as systemic risk is concerned is the underwriting of euronotes more so than the placement of notes or investment in notes. A greater insight was also gained into the pricing of euronotes and the market's views on risk and competition. Perhaps most rewarding, and surprising, was the evidence of differing views on how returns should be calculated to the underwriter. There was no clear reason for this divergence of opinion (mainly between large and small banks) and it is too early at this stage to postulate any hypothesis why this might be so.

As far as systemic risk was concerned there was a consensus of opinion that whether or not underwriting of euronotes led to an increase in systemic risk depended mainly on whether returns to the underwriter were adequate in the light of the risks he was facing. This view is totally consistent with the view expressed by the BIS (1986, p 199), ie:

> '... the question of whether new financial instruments contribute to an increase in systemic risk depends ... on whether they produce sufficient profit margins on average to cover potential losses from market, credit or other risks, both in the short and long-run'.

As far as adequacy was concerned, a minimum level of 0.5 per cent on a drawn basis was declared, although many smaller banks felt that this should be higher given that if they were to be asked to fund then they would be accepting a risk at a price already refused by the market. The figure of 0.5 per cent was, however, justified by two factors: firstly a 50 per cent risk assets ratio is now applied on all underwriting facilities and most respondents felt that a 0.5 per cent return would only just offset this cost. Secondly, 0.5 per cent is accepted as the average return on assets for most banks and respondents felt that in this market in particular an average return must at least be achieved in order to justify the participation in the market.

Most respondents felt that if a facility was never drawn that half the drawn return would be acceptable. Again, however, this is obviously to a large extent judgemental but does take into account that most banks saw that below 0.25 per cent they would not be able to cover costs. However, there was a consensus of opinion that where the facility was drawn at all then a 0.5 per cent return was a minimum requirement.

No questionnaire was presented to arrive at these figures as we felt that we would not be able to cover the range of possible returns. It was therefore decided to simply ask the question of what respondents saw to be adequate. It may be that the divergence of opinion between the large banks and the smaller banks is due to their differing methods of calculating returns. This will be tested in Chapters 7 and 8. Any hypotheses to be formulated from the data of the semi-structured interviews will be analysed in Chapters 7 and 8.

6.7 Summary and Conclusions

This chapter has served to advance arguments for applying field research methods - particularly in this case the semi-structured interview - to the analysis of the financial environment. Attention was concentrated not only on methodological issues but also on empirical considerations in the application of the semi-structured interview technique to the euronote market. The quantitative data collected through the semi-structured interviews provide the data base for the simulation exercises conducted in the following two chapters.

Chapters 7 and 8 employ the ROA and ROX methodologies found to be used in the market to calculate returns to the underwriter under different scenarios which have been chosen partly to emphasise the systemic risk properties of underwriting euronotes and also the systemic risk properties inherent in the return methodologies generally. Both ROA and ROX may appear similar to internal rate of return (IRR) calculations with the capital investment being assets funded under ROA, and exposure under ROX. However, whereas IRR is used to choose between different projects, this is certainly not the case with ROA or ROX. Underwriters have no choice as to their funding strategy: this will be scenario would be preferable. For instance, under a ROX methodology we shall see that higher returns are only achievable by funding more assets and hence taking greater risk. It is impossible to determine the probability of any one scenario arising. Any probabilities which could be attached would be at best inaccurate and at worst wholly misleading. For these reasons ROA and ROX cannot be viewed as proxies for IRR.

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INSTITUTE OF EUROPEAN FINANCE

DIRECTOR:
PROFESSOR E. P. M. GARDENER.

UNIVERSITY COLLEGE OF NORTH WALES
BANGOR, GWYNEDD, LL57 2DQ.

Our reference: Your reference:

Dear

I am studying for a PhD at Bangor in the general area of securitisation and the euronote market. My work entails documenting the market in some detail (something which to my knowledge has not been done previously). To be able to study the operations of the market in the depth required I will need to spend some time in the euronote department of various banks, primarily as an observer. I have already spent over a year studying available information on the market and would hope to be able to contribute as well as learn from my period within the market.

Both my supervisor, Professor E P M Gardener, and myself are aware of your bank's success within the euronote market and your unsurpassed knowledge of its operations. Professor Gardener therefore suggested to me that I might approach you to spend some time with your euronote team, in a purely observational role: perhaps for a week or so.

I realise that this is an unusual request and that you have no knowlege of my background other than that related to you in this letter. I can, of course, provide references to prove my qualifications to undertake such research. I can also assure you that my period with the bank would be treated as totally confidential and you would have the chance to see my work and results at every stage of their compilation. Although any data collected will be used only for my PhD, you will have the chance to vet anything that you are unhappy with.

Naturally you will need some time to consider my request so Professor Gardener or myself will telephone you approximately one week after you receive this letter in order to discuss it then.

The IEF is part of the School of Accounting, Banking and Economics (SABE), University College of North Wales, Bangor.
Chairman: Professor L. A. Winters, Director: Professor E. P. M. Gardener, Consultant Director: Professor J. R. S. Revell.

Telephone: (0248) 351151 (Ext. 2277 or 2278). Telex: 61100. Cable: Unicol Bangor. Bank Account No: 404530 90830038.

My apologies for any inconvenience, and I do appreciate any time that you may be able to allow me. I thank you in advance for your kind co-operation.

Yours sincerely

Paul Feeney

IEF

INSTITUTE OF EUROPEAN FINANCE

DIRECTOR:
PROFESSOR E. P. M. GARDENER.

UNIVERSITY COLLEGE OF NORTH WALES
BANGOR, GWYNEDD, LL57 2DG.

Our reference: Your reference:

PF/SAP

Dear

I am studying for a PhD at Bangor in the general area of securitisation in international banking, and Professor Ted Gardener (my supervisor) has suggested that you may be willing to give me a short interview in order to discuss relevant aspects of my research. My specific research interests are the comparative risks and profitability of Euronote (NIFs, RUFs, etc.) facilities for banks.

I am hoping to be in London for the week commencing ? , and I am planning to see a number of banks about my research. I will send you in advance of any interview a list of my particular research interests and associated questions, and you can decide in advance the areas you would be happy to discuss. The objective of these interviews is for me to gain a greater understanding and feel for how banks and the markets operate. Of course, I will treat the interview and our discussions as totally confidential.

If you feel that there is somebody in your oganisation who may be in a better position to see me, I would appreciate your advice. Professor Gardener or myself will telephone you approximately one week after you receive this letter in order to discuss this request.

My apologies for any inconvenience, and I do appreciate any time that you may be able to give me. I thank you in advance for your kind co-operation.

Yours sincerely,

Paul Feeney

The I E F is part of the School of Accounting, Banking and Economics (S A B E), University College of North Wales, Bangor.
Chairman: Professor L. A. Winters, Director: Professor E. P. M. Gardener, Consultant Director: Professor J. R. S. Revell.

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INSTITUTE OF EUROPEAN FINANCE

DIRECTOR:
PROFESSOR E. P. M. GARDENER.

UNIVERSITY COLLEGE OF NORTH WALES
BANGOR, GWYNEDD, LL57 2DG.

Our reference: Your reference:

PF/SAP

7 November 1986

Mr Bruce Chapman
Director
County NatWest
Drapers Gardens
12 Throgmorton Avenue
London
EC2P 2ES

Dear Mr Chapman

Following our telephone conversation relating to the arrangement of a date and time at which you would kindly be available to talk with me on the subject of 'Securitisation and the Euronote Market' (i.e. my doctoral research) I write to confirm our arrangement.

The date and time agreed upon was Thursday 4 December 1986 at 10.00 am. I also contacted Mr Keith Glover in connection with sterling commercial paper. He kindly agreed to make himself available at 10.00 am if required. Enclosed with this letter is a sheet containing a few questions which I will probably bring up at our meeting. If you are unhappy with any of these questions then I can be contacted on (0248) 351151 ext.539.

The meeting will, of course, be treated as totally confidential. Thank you for finding the time to speak to me, and I look forward to meeting you.

Yours sincerely

Paul Feeney

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Appendix 6.2 (cont)

TOPICS ON WHICH GENERAL QUESTIONS WILL BE ASKED

1 Risk

1.1 To the investor
1.2 To the underwriter
1.3 To the placing agent
1.4 Systemic risk

2 Pricing

2.1 Of notes
2.2 Of underwriting

3 Competitive forces

3.1 Ease of entry
3.2 Ease of exit
3.3 The market/concentration

This agenda is flexible and you are free to talk about any topics which you feel to be more significant within the euronote market or to avoid any areas you may not wish to comment on.

Thank you for your co-operation.

Appendix 6.3 List of participants in semi-structured interviews

Morgan Guaranty	Mr James J Fuschetti, Executive Director, Corporate Finance Mr Edmund Carton, Assistant Director, Commercial Paper
Merrill Lynch	Mr Kevin Regan, Executive Director
S G Warburg & Co Ltd	Mr James Hamilton, General Manager
Citicorp Investment Bank Ltd	Mr David Pritchard, Managing Director Mr Len Harwood, Executive Director, Commercial Paper
Bank of America International Ltd	Mr Ronald A Baker, Vice President, Capital Markets Mr D Kissane, Assistant Vice President, Money Markets
Canadian Imperial Bank of Commerce	Mr Geoffrey R Mountford, Director, Money Markets Mr David J Calver, Director, Money Markets and Floating Rates Assets
County NatWest Capital Markets Ltd	Mr Bruce Chapman, Director Mr Keith Glover, Director, Commercial Paper
Dean Witter Capital Markets Ltd	Mr M Jones, Vice President, Money Markets
Lloyds Merchant Bank Ltd	Mr Andrew Winckler, Director
Samuel Montagu & Co	Mr John M Neary, Director, Money Markets
Panmure Gordon & Co Ltd	Mr James Johnson, Chief Analyst, Money Markets
Chase Manhattan Bank Ltd	Mr H Bethe, Executive Director, Money Markets
Credit Suisse First Boston Ltd	Mr Andrew Reicher, Director
Bank of England	Mr J W C Osborn, Manager, Banking Supervision Division
National Westminster Bank plc	Mr A J W Watson, Assistant Treasurer
Shearson-Lehman Brothers	Anonymous
Bankers Trust	Anonymous

Appendix 6.4 Semi-structured interview agenda

1 Risk

1.1 The investor

Probe on:

Main risk to the investor
Reasons for investing in euronotes
Measurement of risk

1.2 The Underwriter

Probe on:

Main risk to the underwriter
Reasons for underwriting euronotes
Measurement of risk

1.3 The Placing Agent

Probe on:

Main risk to the placing agent
Reasons for placing euronotes
Measurement of risk

1.4 Systemic Risk

Probe on:

Extent to which this is viewed as a problem
Opinions on LLR

2 Pricing

2.1 Notes

Probe on:

How price is determined
Adequacy
Calculation of return

2.2 Underwriting

Probe on:

How price is determined
Adequacy
Calculation of return

3 Competitive Forces

3.1 Ease of entry

Probe on:

Economies of scale
Product differentiation
Capital requirements
Expected retaliation

3.2 Ease of exit

Probe on:

Transferability of liability
Cost of restructuring operations
Possibility of failure/being allowed to fail

3.3 The Market

Probe on:

Industry concentration and market share
Industry growth
Indicators of success

Appendix 6.5 Underwriter rankings January - December 1986

Ranked by volume

Rank	Bank	Amount $m	Number of transactions
1	Banque Nationale de Paris	1027.7	64
2	Credit Suisse	827.2	52
3	Orion Royal Bank/RBC	791.1	48
4	IBJ	760.6	58
5	Sumitomo Bank/Sumitomo Finance	757.3	50
6	Bankers Trust	707.0	51
7	Credit Lyonnais	687.9	55
8	Swiss Bank Corp/SBCI	659.8	38
9	Bank of America	654.3	38
10	CIBC Ltd	632.7	46
11	Algemene Bank Nederland	630.0	38
12	Toronto-Dominion International	628.0	31
13	Westpac Banking Corp	596.5	45
14	Banque Paribas	583.2	43
15	Bank of Tokyo	551.2	36
16	Amsterdam-Rotterdam Bank NV	550.0	31
17	Bank of Montreal	543.8	26
18	NatWest/County Bank	541.7	31
19	Fuji Bank	534.9	40
20	Barclays Bank	508.6	37
21	Societe Generale	502.6	37
22	First Interstate	499.9	23
23	Commerzbank	493.2	30
24	Citicorp	484.4	44
25	Banque Indosuez	474.4	44
26	Midland Bank Group	452.3	34
27	Dai-Ichi Kangyo Bank	427.2	35
28	LTCB	422.8	31
29	Sanwa Bank	422.2	37
30	Chase Manhattan	408.1	34
31	First Chicago	407.4	28
32	Security Pacific National Bank	403.8	24
33	Chemical Bank	402.8	25
34	Generale Bank	341.5	30
35	Mitsubishi Bank/Mitsubishi Finance	338.5	27
36	Deutsche Bank	334.6	17
37	WestLB	318.3	31
38	National Australia Bank	315.6	22
39	Saitama Bank	310.7	28
40	Mitsui Bank/Mitsui Finance	308.8	23
41	Hongkong & Shanghai Bank/Wardley	297.8	22
42	Continental Illinois	297.4	15
43	Morgan Guaranty	293.8	20
44	Kansallis-Osake-Pankki	283.9	32

Appendix 6.5 Underwriter rankings January - December 1986 continued

Ranked by volume

Rank	Bank	Amount $m	Number of transactions
45	CTB Australia	261.0	17
46	Credit Commercial de France	254.2	17
47	Lloyds Bank International	247.7	22
48	Bank of Nova Scotia	243.9	17
49	ANZ/Grindlays	243.0	17
50	Manufacturers Hanover	242.5	18
51	Tokai Bank	242.0	19
52	Standard Chartered Bank	240.9	24
53	Union Bank of Switzerland	228.4	17
54	Mitsubishi Trust & Banking Corp	226.3	12
55	Credit Agricole	215.5	14
56	Taiyo Kobe Bank	194.9	16
57	Nippon Credit Bank	189.5	10
58	Banco di Roma	188.1	16
59	Sumitomo Trust & Banking Co	183.3	15
60	Daiwa Bank	174.5	18
61	Irving Trust Co	171.7	10
62	Mitsui Trust	170.9	11
63	Dresdner Bank	158.1	10
64	Bank of New York	157.5	7
65	Banca Commerciale Italiana	133.9	8
66	Kyowa Bank	131.5	14
67	BHF-Bank	131.0	10
68	Arab Banking Corp	127.2	11
69	BSFE	126.2	10
70	CIC	126.1	9
71	Nederlandsche Middenstandsbank	122.4	6
72	State Bank of New South Wales	121.5	12
73	Italian Iternational Bank	118.4	10
74	Mellon Bank	115.9	5
75	PKbanken	115.3	12
76	SEB	114.0	14
77	Bank of New Zealand	112.8	9
78	Svenska Handelsbanken	111.8	14
79	Banque Bruxelles Lambert	110.2	6
80	Rural and Industries Bank of WA	108.2	7
81	Bank of Yokohama	103.0	10
82	Kredietbank	104.1	11
83	Rabobank Nederland	99.3	6
84	Banco di Napoli	97.5	8
85	Yasuda Trust & Banking Co	95.1	9
86	First National Bank of Boston	94.6	10
87	Bank of Scotland	94.6	9
88	Banco Exterior de Espana	89.7	1

Appendix 6.5 Underwriter rankings January - December 1986 continued

Ranked by volume

Rank	Bank	Amount $m	Number of transactions
89	Istituto Bancario San Paolo di Torino	88.9	9
90	Salomon Brothers	88.5	3
91	Banca Nazionale del Lavoro	87.9	8
92	Gulf International Bank	86.0	9
93	National Bank of Canada	83.9	5
94	Den Norske Creditbank	82.4	11
95	San Paolo Bank	81.7	10
96	Associated Japanese Bank	79.3	7
97	SG Warburg & Co	79.0	8
98	Gulf Bank	96.9	7
99	Kuwaiti French Bank	75.8	8
100	Bank of Ireland	75.5	7
	Other underwriters		
	Hambros Bank	74.1	6
	Caisses Centrale de Banques Populaires	73.5	4
	Banco di Bilbao	73.1	5
	Credit du Nord	69.7	10
	DG Bank	68.8	7
	Union Bank of Finland	68.6	9
	Banco di Sicilia	65.6	6
	Merrill Lynch	64.9	4
	Schroders	64.7	12
	Kleinwort Benson	64.4	9
	Trust Company Bank	62.8	2
	Chuo Trust & Banking Co	61.0	5
	Girozentrale Vienna	60.8	4
	Bayerishe Vereinsbank	59.9	6
	Banca Nazionale dell'Agricoltura	59.5	5
	PRIVATbanken	59.2	5
	Saudi International Bank	59.1	5
	Morgan Grenfell & Co	56.5	4
	Credito Italiano	55.5	5
	Union Bank of Norway	54.9	6
	Al Saudi Bank	54.8	4
	Oversea-Chinese Banking Corp	53.5	6
	Nomura Securities	52.6	7
	Postipankki	49.9	4
	State Bank of Victoria	49.3	3
	Creditanstalt-Bankverein	48.3	5
	Hang Seng Bank	48.3	8
	Great Pacific Capital	48.1	1

Appendix 6.5 Underwriter rankings January - December 1986 continued

Ranked by volume

Rank	Bank	Amount $m	Number of transactions
	Bergen Bank	46.3	6
	Banque Internationale a Luxembourg	46.3	5
	Bank of China	45.8	5
	Societe Generale Alsacienne de Banque	45.6	4
	Pittsburgh National Bank	44.1	1
	Malayan Banking Bhd	43.1	4
	Continental Bank of Canada	42.0	3
	American Express Bank	41.9	4
	Osterreichische Landerbank	41.9	7
	SwedBank	41.0	8
	Banco Hispano Americano	39.7	1
	Banca de Vizcaya	39.7	1
	Caja de Madrid	39.7	1
	Caja de Barcelona	39.8	1
	American Scandinavian Banking Corp	38.4	2
	Takugin International	38.4	5
	Burgan Bank	38.1	5
	Den Danske Bank	37.9	6
	BFCE	36.4	3
	Development Bank of Singapore	36.1	2
	First Austrian Bank	35.9	2
	Abu Dhabi International Bank	34.6	1
	American National Bank & Trust Co	34.6	1
	Banco Central of New York	34.6	1
	California First Bank	34.6	1
	First National State Bank (New Jersey)	34.6	1
	National Commercial Bank of SA	34.6	1
	Second National Bank of Seginaw	34.6	1
	Wells Fargo International Ltd	34.6	1
	BAII	33.9	3
	Crocker Bank	31.3	1
	Sparebanken Rogaland	30.9	6
	Banque Generale de Luxembourg	30.5	2
	ItaB Bank Group	29.6	3
	Banca Popolare di Milano	29.4	2
	Toyo Trust & Banking Co	29.2	4
	European American Bank	26.7	1
	MBank	25.5	2
	National Bank of Kuwait	25.3	4
	Tromso Sparebanken	25.2	5
	KIIC	24.7	4
	Invest Securities A/S	24.1	4
	Banco di Santo Spirito	24.0	1
	NM Rothschild & Sons	23.7	4

Appendix 6.5 Underwriter rankings January - December 1986 continued

Ranked by volume

Rank	Bank	Amount $m	Number of transactions
	Allied Irish Bank	22.4	3
	Christiania Bank	21.7	4
	NCNB National Bank of North Carolina	21.6	2
	National Bank of Canada	21.5	2
	Bank Mees & Hope	21.2	2
	First Maryland	20.7	2
	Banque Louis Drefus	20.0	1
	Banque Hervet	20.0	1
	Landesbanken	19.7	2
	Bank of Bahrain & Kuwait	19.0	3
	Copenhagen Handelsbank	18.9	3
	Alahli Bank of Kuwait	18.7	3
	Gulf Riyad Bank	18.7	2
	Kidder Peabody	18.5	2
	Capel Court	18.5	2
	Dean Witter Capital Markets - International	18.4	1
	Arab Bank Ltd	18.0	3
	Sparebanken Vest	17.5	2
	Sparekassen SDS	17.3	2
	Texas Commerce Bank	17.2	2
	BRED	17.0	7
	Caisse Centrale des Jardins du Quebec	16.7	1
	Norinchukin Bank	16.7	1
	Hokuriku Bank	16.7	1
	CDPQ	16.7	1
	Overseas Union Bank	16.6	3
	BAC-COB Savings Bank	15.6	2
	Yamaichi International	15.5	2
	Societe Europeenne de Banque	15.4	2
	Singapore Numura Merchant Banking Ltd	14.2	1
	Connecticut Bank & Trust Co	14.1	2
	Caisse d'Epargne de l'Etat	14.1	1
	F van Lanschot Bankers	14.1	1
	Nanyang Commercial Bank	13.7	2
	Saudi European Bank	13.5	1
	Bank of East Asia	13.5	3
	State Bank of India	13.2	2
	Allied Irish Investment Bank	13.1	1
	Sparebanken Midt-Norge	13.1	2
	Royal Bank of Scotland	13.0	1
	Scandinavia Bank	12.8	2
	A/S Bank	12.1	1
	Nikko	12.1	2

Appendix 6.5 Underwriter rankings January - December 1986 continued

Ranked by volume

Rank	Bank	Amount $m	Number of transactions
	Bayerische Landerbank	12.0	1
	Chicago-Tokyo Bank	12.0	1
	AGIFEL	11.7	2
	Handelsbanken	11.5	2
	PK Christiania	11.5	2
	National Bank of Oman	11.1	1
	Oman International	11.1	1
	Uni Insurance	10.9	2
	KDB International (Singapore) Ltd	10.7	5
	Banque Worms	10.6	2
	Bank Ekspor Impor Indonesia	10.5	1
	Bank Negara Indonesia	10.5	1
	Bank Bumipurta Malaysia	10.5	1
	Bank of Fukuoka	10.5	1
	Banque Francaise du Agriculture	10.5	1
	Irish Bank of Commerce	10.5	1
	Societe Industrielle de Banque	10.5	1
	State Bank of South Australia	10.5	1
	Shoko Chukin Bank	10.5	1
	Gotabanken	10.1	2
	China Development Finance	9.6	2
	Jardine Fleming & Co	9.0	2
	Tat Lee Bank	8.7	1
	Cjensidige Insurance A/S	8.6	2
	Australian-European Finance Corp	8.3	2
	Development Finance Corp of New Zealand	8.3	1
	Elders	8.3	1
	Hill Samuel & Co	8.3	1
	InterFirst Bank Dallas	8.3	1
	Marac Corp	8.3	1
	Vereins und Westbank	8.3	1
	UBAF Bank Group	8.3	2
	French-American Banking Corp	8.2	2
	EF Hutton	8.0	1
	Bank Ippa	7.9	1
	Korea Exchange Bank	7.7	2
	Rainier National Bank	7.7	1
	L'Europeenne de Banque	7.7	1
	Chemical-Sanwa Merchant Bank	7.7	1
	Zentralsparkasse und Kommerzialbank	7.7	1
	Rogalandsbanken	7.4	2
	Bank of Helsinki	7.2	2
	Banque de Neuflize Schlumberger Mallet	7.1	1
	Canadian Eastern Finance	7.1	1

Appendix 6.5 Underwriter rankings January - December 1986 continued

Ranked by volume

Rank	Bank	Amount $m	Number of transactions
	Banco Totta y Acores	6.3	1
	New Japan Securities	6.3	1
	Bank of Boston	6.3	1
	Deutsch-Scandinavische Bank	6.3	1
	Sundsvallsbanken	6.3	1
	CCIC Finance Ltd	6.0	1
	Ojensidige Insurance	6.0	1
	Sparebanken Nord	6.0	1
	Sparebanken Oslo Akershus	6.0	1
	Banco Atlantico	5.9	1
	Cater Allen Ltd	5.7	1
	King and Shaxon	5.7	1
	Smith St Aubyn & Co	5.7	1
	Union Discount Company of London	5.7	1
	Bank fur Arbeit und Wirtschaft	5.6	1
	Banco Espirito e Commercial de Lisboa	5.6	1
	Banco Nacional Ultramarino	5.6	1
	Australia Japanese Int Finance	5.6	1
	Banco Saudi Espanol	5.6	2
	Al Baab	5.6	1
	Berliner Bank	5.5	1
	Commerce Union Bank	5.5	1
	First Tennesse Bank	5.5	1
	Valley National Bank of Arizona	5.5	1
	Banque Continentale du Luxembourg	5.4	1
	National Bank of Greece	5.3	1
	Nippon Trust & Banking Co	5.3	1
	Bank of British Columbia	5.3	1
	Arab Hellenic Bank	5.3	1
	CARIPLO	5.3	1
	International Trade & Investment Co	5.3	1
	Iran Overseas Investment Bank	5.3	1
	KFTCIC	5.3	1
	Banca della Svizzera Italiana	5.0	1
	Commerce Bank of Singapore	5.0	1
	Gennossenschaftliche Zentralbank	5.0	1
	Kuwait Arab Bank	5.0	1
	Banque Nordeurope	4.8	1
	Banque de l'Union Europeenne	4.5	1
	Morgan Stanley International	4.5	1
	Singapore International Merchant Bankers	4.3	1
	Skanska Banken	3.9	1
	Forsta Sparebanken	3.8	1
	Republic Bank Dallas	3.8	1

Appendix 6.5 Underwriter rankings January - December 1986 continued

Ranked by volume

Rank	Bank	Amount $m	Number of transactions
	Bondernes Bank	3.7	1
	Samvirke Insurance	3.7	1
	Sparebanken Sor	3.7	1
	First Pacific Finance	3.2	1
	Kin Cheng Banking Group	3.2	1
	Sun Hung Kai	3.2	1
	Varde Bank	3.0	1
	Amagerbanken Aktieselshab	2.9	1
	Industrial & Commercial Bank	2.9	1
	Al-Bank Al-Saudi Al-Fransi	2.7	1
	Tunis International Bank	2.7	1
	Union de Banques a Paris	2.7	1
	Norddeutsche Landesbank	2.5	1
	Trinkhaus & Burkhardt	2.5	1

Source: Euromoney Capital Markets Annual

CHAPTER 7

MEASURING THE FINANCIAL RETURN TO UNDERWRITING BANKS ON A RETURN ON ASSETS METHODOLOGY: THE IMPLICATIONS FOR SYSTEMIC RISK

7.1 Introduction

For an institution as a whole, return on equity (ROE) is considered a key measure of performance. At this level, ROE may certainly be appropriate. It measures the success of the institution against its objectives. However, as Ernst and Whinney (1987, p.146) point out:

> 'Just as it is misleading to consider ROE without looking at its components, it is also misleading to consider an institution's performance without looking at the performance of its components.'

Ernst and Whinney (1987, pp.146-48) state that whilst ROE is appropriate at the organisational level, it fails as a performance measure below this level. However, if profitability is to be examined thoroughly:

> '... it must be examined below the organisational level (and) ... management effort therefore shifts to ROA.'

It is not surprising, then, that return on assets (ROA) was found to be widely employed in the euronote market (mainly by small banks).

The aim of this chapter is to use the quantitative data gathered in the semi-structured interviews (documented in Chapter 6) in order to determine whether the returns to underwriting banks are adequate as measured by a ROA methodology. If they are found to be adequate then it might be argued that, at least under the respective scenarios simulated, systemic risk is unlikely to be increased. If they are found to be inadequate we might argue that systemic risk is likely to be increased under these scenarios. There is some uncertainty as to how an underwriter's financial return should be calculated. The prevailing view of small bank respondents (and some larger banks) appears to be that the financial return to the underwriter is best measured by applying a ROA calculation (see, for example, Dungan, 1985, p 12). Under a ROA methodology all returns to the underwriter (from the front-end fees, facility fees and maximum margins) are applied only to those assets actually funded. It is also an objective of this chapter to identify and emphasise the drawbacks of using a ROA methodology in order to calculate the return to underwriting banks in a euronote facility.

When employing a ROA methodology to determine whether the return to the underwriting banks is adequate to compensate for the risks incurred, a problem arises. The problem relates to the determinancy of adequacy. As emphasised in responses from semi-structured interviews, commercial banks generally require a minimum average return on total assets of approximately 0.5 per cent. Naturally, adequacy will also be determined by the proportion of costs which are allocated to certain services. Where technology is concerned, for instance, a 0.5 per cent return on assets may be insufficient to recoup the costs associated with starting up the systems. Similarly, if a bank was to make a loan to a company with doubtful creditworthiness, a 0.5 per cent return on assets would be considered generally to be totally insufficient for the risks incurred. On the other hand, a straightforward loan to a top quality company would probably carry a premium of just below 0.5 per cent. Obviously, adequacy is to a large extent subjective and deal-specific.

However, when an underwriter is asked to fund his commitment in a euronote facility, he is being asked to purchase notes which the market has already refused. In other words, the market is turning down the credit at the price offered. It would seem highly unlikely that underwriting banks would be able to sell these notes other than at a loss (if they could sell them at all) especially since skilled, professional investment banks with market placing power will have already tried and failed. Under these conditions it does not seem unreasonable to argue that, when asked to fund, underwriters in the euronote market should receive at least the average minimum total ROA of 0.5 per cent generally required by large commercial banks. This being so, an adequate rate of return, for the purposes of our initial analysis, will be set at a return of 0.5 per cent or more when drawn. In keeping with the findings of the semi-structured interviews an undrawn return of half that (ie 0.25 per cent) will be taken as a minimum standard of adequacy only where the facility is never drawn. The results of the semi-structured interviews revealed that most respondents believed that returns of at least these levels would have to be gained on the underwriting portfolio if that portfolio is to be looked at on a stand alone basis; i.e. as separate from the customer relationship.

A second problem arises in choosing the scenarios to simulate. There are an infinite number of possible funding scenarios which could be employed in calculating a return to the underwriters. The problem lies in choosing a limited number of scenarios which simulate an effective range of funding possibilities, whilst also highlighting factors that may provide an undication that the underwriting of euronote facilities on a ROA basis may lead to an increase in systemic risk - possibly by providing underwriters with misleading information on which to base their underwriting decisions. The funding scenarios chosen are as follows:

1 If all funds were drawn at the end of the first month and the underwriter was forced to continue to fund until the maturity of the facility (worst case scenario)
2 If no funds were drawn (best case scenario)
3 If all funds were drawn for a period of 1 year throughout the life of the facility
4 If all funds were drawn once each year for a three-month period only
5 If 50 per cent of the facility was drawn once each year for a three-month period only

These scenarios simulate an effective range of funding possibilities from best scenario (where systemic risk implications may be minor) to a worst-case scenario where systemic risk implications are major, i.e. funding risk and credit risk are maximised.

The researcher was able to construct and simulate these scenarios because of the provision of non-publicly available pricing data kindly provided by NatWest Investment Bank, Bank of America Capital Markets and Merrill Lynch Capital Markets collected through the semi-structured interviews. The data cover prices for all euronote facilities signed between January 1985 and January 1987.

7.2 Simulation and Experimentation

Where research is to be conducted to analyse a business problem with a number of unknown variables, a simulation approach may be employed. The essence of the simulation approach involves conducting experiments (simulations) on a mathematical model of the system being studied. By employing a simulation approach, the model building process may be divided into its smaller component units, which may in turn be combined in an operationally useful sequence. These component units may then be analysed in a structured manner through the resulting simulation model. There are basically three main methods of simulation. These are Monte Carlo, operational gaming and system simulation. The current research is concerned primarily with the last.

With system simulation, real-world data are processed through a model that is itself a representation of the system or environment under analysis. It is this type of simulation that will be conducted in this chapter and the next. The model produces a series of results (outputs) based on the sample of inputs. As with other methods of research, the RIRO dictim will still apply, that is, 'rubbish in, rubbish out'. A high quality of input data is essential if good results are to be expected. Fortunately, our data input set comprises total market pricing data for all euronote facilities signed between January 1985 and January 1987: it is both detailed and comprehensive.

A system simulation technique provides a kind of laboratory where controlled experiments can be conducted. It may also be more easily understood by practitioners than more arcane mathematical or statistical tools. This is of particular importance to our study where fieldwork methods of research have been employed within our total research effort. Indeed, simulation may offer a particularly useful vehicle for possibly new directions in applied and practical methods of research that have been proposed in the literature (see Tomkins and Groves, 1983). A financial simulation model offers a potentially powerful communications interface between researchers and practitioners: an interface which will be employed within this study by running the quantitative data gathered in the field through ROA (and later ROX) formulae under different funding scenarios. It is not, however, a forecasting tool. The simulations to follow are not forecasts or estimations. No estimate is made as to the probability of each arising: such an estimate would be at best arbitrary and at worst misleading.

The kind of funding possibilities facing underwriting banks in the euronote market seem particularly appropriate for exploration by simulation as there are no actual data on which one may gauge the probability of these events occurring. They are characterised by uncertainty (see Chapter 9). Alternative possibilities based on a mixture of facts and assumptions can be explored. But simulation cannot produce optimum solutions to a problem, and the process can be very time-consuming.

Having said this, simulation can be a very useful research technique under the kind of conditions mentioned earlier. What is not so clear is the formal 'experimentation value' of such research. Although setting up 'What if ...?' simulations can be a very useful exercise, their experimental content may be comparatively restricted. We, therefore, need to consider what kind of simulation experiment is possible for more formal research purposes with this kind of model.

We can categorise experimental research designs into three basic types, depending on their respective control characteristics: pre-experiments, true experiments and quasi-experiments. All three main distinctions between these kinds of basic experiment concern the degree of control that the researcher has over the 'validity problems' that are central to experimental design.

There are a number of levels and kinds of validity that are relevant to formal experimental design. Emory (1980, p 332) summarises four basic types of validity:

1 internal validity

2 external validity

3 statistical conclusion validity

4 construct validity

External validity is most applicable to our study. Experiments are said to have high internal validity if the researcher has confidence that the experimental treatment has been the reason why the dependent variable has changed. High external validity is concerned with how generalisable the results are to the entire population. Much of the formal literature in the area of business research relates to the design and conduct of quasi- experiments and true experiments in the setting of field research in areas like marketing.

Although the scenarios can be chosen to research their systemic risk implications, it is impossible to predict the probability of their occurrence. The simulation exercises turn the problem around to ask not what is the probability of their occurrence, but rather what would the situation be if they did. In the face of uncertainty, estimating probabilities and scenarios is difficult, perhaps impossible. By turning the problem around and examining the implications of unforseeable events occurring we are able to examine the systemic risk potential inherent in different scenarios.

These initial considerations on experimental design are at least a caution in the setting up and interpretation of the simulation exercises that will shortly be described. However, as Gardener (1987, p 21) points out:

> '... a great deal of research in the social sciences must always remain questionable in a strict scientific sense; criticisms can always be made. If all these views were taken to heart there would be very little formal research undertaken. Practical reseach usually involves some compromise, and a primary desideratum for researchers is to be aware of the extent and nature of such compromises.'

Against this background, we should be careful about the use of terms 'experiment' and 'scientific'. The question must be raised as to how scientific is our own research. Our own research does satisfy three basic conditions for a scientific experiment: it is public in the sense that it is explained and repeatable; it produces measurements or results designed to address a specific question; and it uses real-world data for the population under study.

Although one can argue that these experiments are scientific, they are, to a certain extent, a very restricted kind of 'scientific experiment'. It is true that different kinds of experiment will address different types of questions. The type of simulations conducted in this study are essentially exploratory (or Baconian) experiments. They are 'What if ...?' experiments. Our concerns in this context are the volume, time and exposure effects of draw-down rates on the financial returns to underwriting banks in the euronote market. The results of the simulation experiments (in this chapter and the next) will be fed back to market practitioners for their opinions and suggestions. This should increase the external validity of the simulation experiments and, indeed, our entire research effort.

7.3 The Return on Assets Scenarios: Methodology and Presentation of Results

The scenarios are, naturally, not all-encompassing, but provide a feasible range of funding possibilities which will probe for systemic risk potential. Support is taken for conducting these scenario experiments from the BIS (1986a, p 4):

> 'Banks may wish to assess (and set limits on) their total volume of commitments in terms of their perceived funding capacity, perhaps assessing this on a 'worst case' basis and revising it in line with market conditions and actual draw down.'

Although an individual bank may assess its own exposure in this way, this may bear little relevance to the exposure of the entire market. It is this latter type of exposure which may affect systemic risk.

The quantitative database established on the Dec 20 computer at the University College of North Wales (subsequent to our semi-structured interviews) was used to compute each scenario. The database was comprised of full fee data for each euronote facility established in the market between December 1985 and January 1987 along with the stated amount and maturity of each facility. Five data columns were thus established on the original database, relating to: the amount of the facility; the maturity of the facility; the maximum margin achievable on the notes; the front-end fee; and the facility fee.

Working on these five original data columns, other columns were compiled, depending on the requirements of the scenario. For example, in scenario 1 (worst-case scenario) it was necessary to discover the maximum drawn cost of each facility. This was achieved by adding all three fee columns together to form a new column to give the maximum percentage return achievable. This was in turn converted to a dollar value by multiplying this column by the column relating to the amount of each facility. All scenarios were conducted on this basis with new data columns compiled from the original database depending on the requirements of the particular scenario.

The following scenarios make use of the total market pricing data established on the original database. Table 7.1 identifes the different objectives of each scenario.

7.3.1 Scenario 1 (ROA)

To compute the first (worst case) scenario (where all funds are drawn at the end of the first month and not paid back until the maturity of the facility) the front-end fee, facility fee, maximum margin, committed values and maturities were used for each facility (387 facilities in all) from the data collected in the fieldwork stage. When an underwriter is asked to fund his commitment, he receives all three fees (the front-end fee, the facility fee and the maximum margin on the notes). The formula for calculating the ROA in this (worst case) scenario is as follows:

$$\text{ROA} = \frac{\text{(front end fees + facility fees + maximum margins) x committed value}}{\text{committed value}} \times \frac{100}{1} \qquad \text{... (7.1)}$$

$$= \frac{\text{(undrawn cost + maximum margin) x committed value}}{\text{committed value}} \times \frac{100}{1} \qquad \text{... (7.2)}$$

Table 7.1

SCENARIO OBJECTIVES

1	2	3	4	5
Identifies the return achievable under the worst case scenario where notes are drawn against underwriters on day one and rolled over continously until maturity.	Identifies the return achievable under the best case scenario where the underwriters are never asked to fund their commitments.	Examines the affect on an underwriter's return of reducing the funding period.	Examines the affect on underwriter's return of staggering the funding period.	Examines the affect on an underwriter's return of staggering the funding period and reducing the funded amount.

$$= \frac{\text{fully drawn cost x committed value}}{\text{committed value}} \times \frac{100}{1} \qquad \ldots (7.3)$$

$$= \text{fully drawn cost x } \frac{100}{1} \qquad \ldots (7.4)$$

Source: Merrill Lynch Capital Markets International

This formula was applied to the total market data. As the total market data consists of data for 387 facilities, it was not feasible to show all of these data in the main text. For expositional purposes, only data and results for the first four facilities, the last two facilities and the mean for each complete column are shown in Table 7.2 below (see Appendix 7.1 for the presentation of the complete table).

The final row provides us with the mean value of each column for the full market data (as presented in Appendix 7.1). The final column gives the ROA for each individual facility. A mean of this column provides us with the overall market ROA per annum of 0.32824 per cent.

On our standard of adequacy (a ROA of at least 0.5 per cent) a return of 0.32824 per cent would seem to be quite inadequate. This conclusion is accentuated all the more by the fact that this scenario has been calculated on a worst-case basis. The most conceivable time for this scenario to occur would be in times of financial crises. In such a situaton, on our calculations, the market would only receive a return of 0.32824 per cent on its assets.

In conclusion for this scenario, we would argue that on a worst-case basis (where the entire market is required to fund fully its

Table 7.2 **Computation of return on assets when all funds are drawn at the end of the first month and not paid back until the maturity of the facility**

Amount $m	Years	Maximum margin %	Front-end fee + facility fee %	Front-end fee + facility fee x amount $m	Front-end fee + facility fee + maximum margin + amount $m	$\frac{\text{Front-end fee + facility fee + maximum margin x amount}}{\text{amount}} \times \frac{100}{1}$ = ROA %
80.0	3.0	0.001250	0.001000	0.08000	0.18000	0.22500
50.0	15.0	0.001000	0.000792	0.03960	0.08960	0.17920
125.0	3.0	0.002000	0.000667	0.08337	0.33338	0.26670
100.0	5.0	0.001250	0.002400	0.24000	0.36500	0.36500
...	...	...	...	...	...	...
...	...	...	...	...	...	...
150.0	5.0	0.002500	0.002075	0.31125	0.68625	0.45750
250.0	2.0	0.001500	0.000875	0.21875	0.59375	0.23750
Mean 159.40	5.4443	0.0021291	0.0012438	0.19380	0.55029	0.32824

commitments until maturity) the per annum ROA appears to be inadequate to compensate for the risks incurred. In this sense systemic risk may be increased. Whether the banks could or could not survive such a scenario would be dependent on their capital bases and, not least, the position of the LLR: these points will be discussed later. At this stage it seems prudent to argue that a return of 0.32824 per cent is inadequate for this market.

7.3.2 Scenario 2 (ROA)

To compute the second (best case) scenario (where no funds are drawn), only the front-end fees and facility fees had to be calculated for each facility (not a maximum margin). These are the only fees the underwriter receives if he is never asked to fund his commitment. These fees were then added together to give the total 'undrawn' cost for each individual facility (these figures are presented in the fourth column of Table 7.2). The front-end fees and facility fees were then multiplied by the amount of the facility (column 1 of Table 7.2) to give the total monetary return on the facility per annum (column 5 of Table 7.2). The mean of this column gives the average monetary return per annum for the euronote market when no assets are funded. The mean was found to be US $193,800 (see Appendix 7.1 for the presentation of the complete table). In order to give a per cent return on assets, this figure has to be applied to those assets actually funded. Since no assets are funded in this scenario, this, theoretically, leaves the underwriters with an infinite ROA. Under this scenario, using a ROA methodology, the underwriters would appear to be getting effectively 'money for nothing'.

In conclusion for this scenario, we would argue that on a best-case basis (where no assets are ever funded) using a ROA methodology, the per annum return on assets to the euronote market appears to be sufficiently adequate to compensate for the risks incurred. If one accepts the ROA methodology, it is unlikely that systemic risk would be increased by a situation where no assets are funded in the euronote market. The point raised by presenting this scenario, however, is that a methodology that lulls an underwriter into believing that an infinite ROA is achievable carries its own systemic risk properties. This will be discussed in the conclusion to this chapter.

7.3.3 Scenario 3 (ROA)

To compute the third scenario (where all funds are drawn for a period of 1 year throughout the life of the facility) the front-end fee, facility fee, maximum margin, total committed value and maturity were taken for each facility.

As with scenarios 1 and 2, all fees (including the maximum margin) are applied only to those assets actually funded. The front-end fees and facility fees are calculated for the full committed value each year. The maximum margin is calculated for the one year that the full commitment is drawn. The two totals are then added together and applied only to those assets actually funded. The formula for calculating the ROA in this scenario is as follows:

$$\text{ROA} = \frac{\begin{pmatrix}\text{Front-end fees + facility fees}\\ \text{x committed value}\end{pmatrix} + \begin{pmatrix}\text{maximum margin}\\ \text{x draw-down}\end{pmatrix}}{\text{draw-down}} \times \frac{100}{1} \quad \ldots (7.5)$$

$$= \text{(undrawn cost x committed value)} + \text{maximum margin} \times \frac{100}{1} \quad \ldots (7.6)$$

Source: Merrill Lynch Capital Markets International

This formula was applied to the total market data. For expositional purposes, only the data and results for the first four facilities, the last two facilities and the mean for each complete column are shown in Table 7.3 below (see Appendix 7.2 for the presentation of the complete table).

The final row provides us with the mean value of each column for the full market data (as presented in Appendix 7.2). The final column gives the ROA for each individual facility. The mean of this column provides us with the overall market ROA per annum of 0.88818 per cent. On our standard of adequacy (an ROA of at least 0.5 per cent), a return of 0.88818 per cent would appear to be adequate. One fact which is materialising with the use of a ROA methodology to calculate the return to underwriting banks is that the less the underwriters are asked to fund their commitments, the higher their ROA. This is proven mathematically through the simple application of the ROA formula. Since in this scenario underwriters are only asked to fund the full commitment for one year, all the front-end fees and facility fees (paid each year irrespective of draw down) are applied to that amount for that period as is the maximum margin on the notes.

In conclusion for this scenario, we would argue that (where all funds are drawn for a period of one year throughout the life of the facility) using a ROA methodology, the per annum ROA to the euronote

Table 7.3 Computation of return on assets when all funds are drawn for a period of one year throughout the life of the facility

Amount $m	Years	Maximum margin %	Front-end fee + facility fee %	Front-end fee+ facility fee x amount x years $m	Maximum margin x amount $m	Total monetary value $m	ROA %
80.0	3.0	0.001250	0.0010000	0.2400	0.10000	0.3400	0.42500
50.0	15.0	0.001000	0.0007920	0.5940	0.05000	0.6440	1.28800
125.0	3.0	0.002000	0.0006670	0.2501	0.25000	0.5001	0.40009
100.0	5.0	0.001250	0.0024000	1.2000	0.12500	1.3250	1.32500
...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...
150.0	5.0	0.002500	0.0020750	1.5562	0.37500	1.9312	1.28750
250.0	2.0	0.001500	0.0008750	0.4375	0.37500	0.8125	0.32500
MEAN 159.40	5.4443	0.002129	0.0012438	1.1602	0.33840	1.5263	0.88818

market appears to be sufficiently adequate to compensate for the risks incurred. If one accepts the ROA methodology, it would seem unlikely that systemic risk would be increased by a situation where all funds are drawn for a period of one year throughout the life of each euronote facility.

7.3.4 Scenario 4 (ROA)

To compute scenario 4 (where all funds are drawn once each year for a three-month period only) - like scenarios 1, 2 and 3 - all fees (including maximum margins) are applied only to those assets actually funded. Under this scenario, however, all funds are drawn for a three-month period each year. All fees have, therefore, to be applied to the drawdown. The formula for calculating the ROA in this scenario is as follows:

$$\text{ROA} = \frac{(\text{undrawn cost} \times \text{committed value}) + (\text{maximum margin} \times \text{draw down divided by } 4)}{\text{draw down}} \times \frac{100}{1} \quad \ldots (7.7)$$

$$= (\text{undrawn cost} \times \text{committed value}) + (\text{maximum margin divided by } 4) \times \frac{100}{1} \quad \ldots (7.8)$$

Source: Merrill Lynch Capital Markets International

This formula was applied to the total market data. The data and results for the first four facilities, the last two facilities and the mean for each complete column are shown in Table 7.4 (see Appendix 7.3 for the presentation of the complete table).

Table 7.4 Computation of return on assets when all funds are drawn once each year for a three-month period only

Maximum margin %	Front-end fee + facility fee %	Front-end fee+ facility fee x draw down $m	Draw down $m	Maximum margin divided by 4 x draw down $m	Total monetary value $m	ROA %
0.001250	0.0010000	0.2400	240.0	0.0750	0.3150	0.131250
0.001000	0.0007920	0.5940	750.0	0.1875	0.7815	0.104200
0.002000	0.0006670	0.2501	375.0	0.1875	0.4376	0.116693
0.001250	0.0024000	1.2000	500.0	0.1563	1.3563	0.271260
...	...	...	...	...	...	...
...	...	...	...	...	...	...
0.002500	0.0020750	1.5562	750.0	0.4688	2.0250	0.270000
0.001500	0.0008750	0.4375	500.0	0.1875	0.6250	0.125000
MEAN						
0.0021291	0.0012438	1.1602	966.52	0.5070	1.7265	0.17562

The final row provides us with the mean value of each column for the full market data (as presented in Appendix 7.3). The final column gives the ROA for each individual facility. The mean of this column provides the overall market ROA per annum of 0.17526 per cent. On our standard of adequacy (a ROA of at least 0.5 per cent), a return of 0.17526 per cent appears inadequate to compensate for the risks incurred.

We can observe from this scenario that applying the ROA methodology strictly means that if the underwriters are only asked to fund for a proportion of the year, the ROA is further reduced. In this scenario, the market only funds for a period of three months per year. This does not mean that the market receives a quarter of its fully drawn return each year (which was calculated in scenario 1 as 0.32824 per cent) as the front-end fees and facility fees are paid irrespective of draw down. Rather, it receives a quarter of its drawn cost less its undrawn cost.

In conclusion to this scenario, we would argue that (where all funds are drawn each year for a three month period only) using a ROA methodology, the per annum ROA to the euronote market appears to be inadequate to compensate for the risks incurred. In this sense, systemic risk may be increased.

7.3.5 Scenario 5 (ROA)

The purpose of this scenario is to highlight what we consider to be a fundamental weakness in the ROA methodology: namely that it takes no account of the amount of assets funded in its calculation of ROA. The critical factor is maturity.

As with scenarios 1, 2, 3 and 4, all fees (including maximum margins) are applied only to those assets actually funded. The important factor, however, is the length of time for which these assets are funded.

The procedure for calculating an underwriter's ROA under this scenario is exactly the same as the procedure employed for calculating the return on assets under scenario 4. The front-end fees and facility fees are calculated for the full committed amount each year. The maximum margin is calculated for the three month period each year that the full commitment is drawn. The two figures are added together and may be applied to the drawdown. The formula for calculating the ROA under this scenario is the same as in scenario 4:

$$\text{ROA} = \frac{(\text{undrawn cost x committed value}) + (\text{maximum margin x draw down divided by 4})}{\text{draw down}} \times \frac{100}{1} \qquad \text{... (7.9)}$$

$$= (\text{undrawn cost x committed value}) + (\text{maximum margin divided by 4}) \times \frac{100}{1} \qquad \text{... (7.10)}$$

Source: Merrill Lynch Capital Markets International

Applying this formula to the total market data leaves us with exactly the same ROA as was achieved in scenario 4, ie 0.17526 per cent. The fact that the drawdown is now exactly half of what it previously was is of no consequence in the ROA methodology.

In conclusion to this scenario we would argue that (where 50 per cent of every facility is drawn once each year for a three month period only) using a ROA methodology, the per annum return on assets to the euronote market appears to be inadequate to compensate for the risks incurred. In this sense, systemic risk may be increased.

7.4 Summary and Conclusions

The scenarios conducted in this chapter are not all-encompassing: nor do we claim them to be. What we do claim is that they simulate an effective range of funding possibilities (feasible events) in the euronote market that serve to highlight the danger that the application of a ROA methdology may lead underwriters into a false sense of security as far as the profitability of these facilities is concerned. Similarly, the choice of a measure of adequacy is to a certain extent subjective but market determined, and factually defended.

The funding scenarios not only simulate an effective range of funding possibilities but also highlight a number of significant flaws in the ROA methodology. The results for scenarios 1 to 5 on a ROA basis are displayed in Table 7.5 below.

Table 7.5 Return on assets for scenarios 1 to 5

Scenario		ROA (%)
1	(fully drawn)	0.32824
2	(no draw down)	$\propto$
3	(drawn for 1 year)	0.88818
4	(fully drawn for 3 months each year)	0.17526
5	(50 per cent drawn for 3 months each year)	0.17526

Table 7.5 shows that (on our standard of adequacy of 0.5 per cent) the use of a ROA methodology provides an adequate return in only two cases: scenario 2 and scenario 3. In scenarios 1, 4 and 5 the ROA is below 0.5 per cent. We are reminded here of the BIS' (1986b, pp 200-02) warning that the underpricing of new financial instruments may contribute to an increase in systemic risk. The results of scenarios 1, 4 and 5 would seem to suggest that under these funding scenarios the growth of the euronote market may contribute to an increase in systemic risk. One particularly disturbing result in this context is that of scenario 1.

Scenario 1 represents what might be termed the 'disaster scenario' where all the euronote market is asked to meet its commitments fully for their entire duration. Under this 'disaster scenario', applying a ROA methodology, the euronote market would only receive an average ROA of 0.32824 per cent, substantially below our standard of adequacy of 0.5 per cent. It might reasonably be argued that in times of crises, the return to the market should be substantially higher than that received during other periods of time. If anything, the opposite appears to be true when employing a ROA methodology to calculate the return to the euronote market.

There are, however, a number of significant flaws in the ROA methodology which our funding scenarios have identified. To begin with, it is noticeable that an underwriter's ROA is almost totally dependent on the number of years over which he is asked to fund his commitment. The amount he is asked to fund has virtually no relevance in the calculation of a ROA. This flaw is emphasised particularly in scenario 5 (where 50 per cent of the facility is drawn once each year for a three month period only). The formula for the calculation of the ROA under this scenario is exactly the same as that in scenario 4 (where all funds are drawn once each year for a three month period only). No account is taken of the fact that only 50 per cent of the facility is funded each year in scenario 5 as compared to the full amount in scenario 4.

In scenario 3 (where all funds are drawn for one year only throughout the life of the facility) all fees are applied only to the amount funded for that one year. No account is taken of exposure over subsequent years. As such, the ROA of 0.88818 per cent is almost certainly inflated. This flaw is accentuated further in scenario 2. Since under a ROA methodology all fees are applied only to those assets actually funded, then if no assets are funded underwriters are left, theoretically, with an infinite ROA. It is reasonable to assume, however, that large multinational companies do not give money away for nothing. Even in a situation where a company may not immediately require an underwriter to fund his commitment, the company is still paying for a commitment to fund if necessary. In other words, the company is paying for the underwriter's exposure to that company. Banks employing a ROA methodology may decide to underwrite an issue under the impression that their return is more than adequate. In reality, such a return methodology takes no account of the underwriter's exposure. Underwriters may, therefore, be applying the return to only a small proportion of the risk which they are being paid to assume. The scenarios chosen highlight how returns can be grossly inflated by applying them only to assets actually funded: in the extreme case providing an infinite ROA. By doing so, the scenarios also emphasise the systemic risk properties inherent in the ROA methodology.

It is our belief that any methodology employed to calculate the return to underwriting banks in the euronote market should take account of both exposure and the period of that exposure. It is for this reason that we now turn our attention to the second return methodology employed in the market for calculating returns to underwriting banks: a return on exposure (ROX) methodology. In the following chapter ROX will be explained and the five funding scenarios will be re-run using a ROX methodology.

Appendix 7.1 ROA data and results for scenarios 1 and 2

Amount $	Yrs	M Marg %	U cost %	U cost x amount $	D cost x amount $	ROA %
80.0	3.0	0.001250	0.0010000	0.08000	0.18000	0.22500
50.0	15.0	0.001000	0.0007920	0.03960	0.08960	0.17920
125.0	3.0	0.002000	0.0006670	0.08337	0.33338	0.26670
100.0	5.0	0.001250	0.0024000	0.24000	0.36500	0.36500
250.0	10.0	*	*	*	*	*
200.0	5.0	0.001000	0.0008750	0.17500	0.37500	0.18750
80.0	5.0	0.002500	0.0012500	0.10000	0.30000	0.37500
250.0	8.0	0.003750	0.0025780	0.64450	1.58200	0.63280
500.0	5.0	*	0.0006250	0.31250	*	*
100.0	5.0	0.000800	0.0007250	0.07250	0.15250	0.15250
300.0	10.0	0.003250	0.0010000	0.30000	1.27500	0.42500
125.0	7.0	0.002000	*	*	*	*
45.0	5.0	0.003500	0.0030000	0.13500	0.29250	0.65000
200.0	8.0	0.000500	0.0008500	0.17000	0.27000	0.13500
750.0	10.0	0.000800	0.0008000	0.60000	1.20000	0.16000
12.5	5.0	0.001500	0.0006880	0.00860	0.02735	0.21880
400.0	10.0	0.004000	0.0015630	0.62520	2.22520	0.55630
200.0	7.0	0.001500	*	*	*	*
500.0	10.0	0.001250	*	*	*	*
1500.0	6.0	0.001625	*	*	*	*
340.0	5.0	0.001875	0.0008250	0.28050	0.91800	0.27000
500.0	10.0	0.002875	0.0007440	0.37200	1.80950	0.36190
100.0	7.0	0.003250	0.0024290	0.24290	0.56790	0.56790
350.0	10.0	0.001875	0.0010130	0.35455	1.01080	0.28880
100.0	2.0	0.000625	0.0003125	0.03125	0.09375	0.09375
1300.0	8.0	0.004375	0.0008780	1.14140	6.82890	0.52530
85.0	5.0	0.002250	0.0008250	0.07012	0.26137	0.30749
700.0	10.0	0.002000	0.0006000	0.42000	1.82000	0.26000
400.0	10.0	0.002000	0.0006630	0.26520	1.06520	0.26630
350.0	10.0	0.001250	*	*	*	*
200.0	3.0	0.002500	0.0015000	0.30000	0.80000	0.40000
100.0	5.0	0.001125	0.0006250	0.06250	0.17500	0.17500
2000.0	8.5	0.001750	0.0005980	1.19600	4.69600	0.23480
500.0	10.0	0.001750	0.0010750	0.53750	1.41250	0.28250
75.0	7.0	0.002250	0.0010710	0.08032	0.24907	0.33209
70.0	5.0	0.001000	*	*	*	*
500.0	7.0	0.002500	0.0013930	0.69650	1.94650	0.38930
1000.0	5.5	0.002250	0.0008070	0.80700	3.05700	0.30570
75.0	7.0	0.002500	*	*	*	*
40.0	7.0	0.002000	*	*	*	*
100.0	5.5	0.000625	0.0006140	0.06140	0.12390	0.12390
100.0	5.0	0.001125	0.0005880	0.05880	0.17130	0.17130
350.0	8.0	0.001875	0.0006160	0.21560	0.87185	0.24910
500.0	8.0	0.001000	0.0005440	0.27200	0.77200	0.15440
300.0	7.0	0.001500	0.0008860	0.26580	0.71580	0.23860
45.0	5.0	0.010000	*	*	*	*

Appendix 7.1 ROA data and results for scenarios 1 and 2

Amount $	Yrs	M Marg %	U cost %	U cost x amount $	D cost x amount $	ROA %
60.0	5.0	0.002500	0.0007750	0.04650	0.19650	0.32750
80.0	4.5	0.004000	*	*	*	*
30.0	2.0	0.000625	*	*	*	*
300.0	10.0	0.001000	0.0004930	0.14790	0.44790	0.14930
400.0	10.0	0.001250	0.0005000	0.20000	0.70000	0.17500
150.0	7.0	0.001100	0.0005890	0.08835	0.25335	0.16890
200.0	10.0	0.001000	0.0005500	0.11000	0.31000	0.15500
315.0	6.0	0.001250	0.0003420	0.10773	0.50148	0.15920
75.0	7.0	0.004000	*	*	*	*
50.0	7.0	0.001875	*	*	*	*
20.0	5.0	0.003750	0.0015500	0.03100	0.10600	0.53000
75.0	3.0	0.001250	0.0014170	0.10627	0.20003	0.26671
65.0	5.0	0.001250	0.0012000	0.07800	0.15925	0.24500
100.0	2.0	0.001250	0.0006250	0.06250	0.18750	0.18750
100.0	2.0	0.001250	*	*	*	*
25.0	7.0	0.001875	*	*	*	*
100.0	7.0	0.001500	0.0014290	0.14290	0.29290	0.29290
50.0	5.0	0.001500	0.0008250	0.04125	0.11625	0.23250
150.0	2.0	0.001250	*	*	*	*
75.0	5.0	0.001000	0.0007130	0.05347	0.12847	0.17129
25.0	5.0	0.001250	*	*	*	*
100.0	5.0	0.001875	0.0007750	0.07750	0.26500	0.26500
100.0	5.0	0.002500	*	*	*	*
40.0	3.0	0.002000	*	*	*	*
50.0	5.0	0.001000	0.0007750	0.03875	0.08875	0.17750
20.0	3.0	0.003000	0.0023960	0.04792	0.10792	0.53960
35.0	3.0	0.002500	0.0022920	0.08022	0.16772	0.47920
100.0	5.0	*	0.0014750	0.14750	*	*
30.0	5.0	0.001000	0.0015500	0.04650	0.07650	0.25500
100.0	5.0	0.002750	0.0014250	0.14250	0.41750	0.41750
50.0	2.0	0.000625	*	*	*	*
50.0	3.0	0.002500	0.0026050	0.13025	0.25525	0.51050
60.0	4.0	*	0.0015630	0.09378	*	*
30.0	5.0	0.001500	0.0015000	0.04500	0.09000	0.30000
40.0	3.0	0.000625	0.0011700	0.04680	0.07180	0.17950
50.0	5.0	0.001000	*	*	*	*
50.0	5.0	0.002500	0.0010750	0.05375	0.17875	0.35750
50.0	5.0	0.001000	*	*	*	*
20.0	5.0	0.002500	*	*	*	*
50.0	3.0	0.000625	*	*	*	*
60.0	3.0	0.002250	*	*	*	*
150.0	6.0	0.001875	0.0013130	0.19695	0.47820	0.31880
100.0	5.0	0.002500	0.0013750	0.13750	0.38750	0.38750
300.0	5.0	0.001500	0.0007500	0.22500	0.67500	0.22500
50.0	3.0	0.002250	0.0018330	0.09165	0.20415	0.40830
155.0	5.0	0.003375	*	*	*	*

Appendix 7.1 ROA data and results for scenarios 1 and 2

Amount $	Yrs	M Marg %	U cost %	U cost x amount $	D cost x amount $	ROA %
30.0	3.0	0.002500	0.0024080	0.07224	0.14724	0.49080
50.0	5.0	0.002500	0.0006430	0.03215	0.15715	0.31430
*	3.0	0.002500	*	*	*	*
15.0	3.0	0.002500	0.0015830	0.02374	0.06125	0.40833
30.0	5.0	0.001000	0.0015750	0.04725	0.07725	0.25750
100.0	4.0	0.002000	0.0013750	0.13750	0.33750	0.33750
35.0	5.0	0.001750	0.0012500	0.04375	0.10500	0.30000
100.0	5.0	0.000750	0.0012500	0.12500	0.20000	0.20000
100.0	2.0	0.000625	*	*	*	*
100.0	5.0	0.000750	0.0008350	0.08350	0.15850	0.15850
25.0	1.0	0.007500	*	*	*	*
100.0	5.0	0.001750	0.0017850	0.17850	0.35350	0.35350
200.0	3.0	0.001500	0.0018330	0.36660	0.66660	0.33330
40.0	3.0	0.001000	0.0016000	0.06400	0.10400	0.26000
100.0	5.0	0.000400	0.0003125	0.03125	0.07125	0.07125
35.0	5.0	0.001500	*	*	*	*
25.0	5.0	0.002500	0.0012000	0.03000	0.09250	0.37000
100.0	5.0	0.003000	0.0012750	0.12750	0.42750	0.42750
100.0	5.0	0.002500	*	*	*	*
30.0	5.0	0.001000	*	*	*	*
325.0	5.0	0.001000	*	*	*	*
25.0	7.0	0.000500	0.0014290	0.03572	0.04823	0.19292
13.0	6.0	0.001875	*	*	*	*
80.0	3.0	0.002500	*	*	*	*
400.0	10.0	0.001250	0.0010000	0.40000	0.90000	0.22500
50.0	3.0	0.002500	0.0009380	0.04690	0.17190	0.34380
400.0	7.0	0.001500	0.0022680	0.90720	1.50720	0.37680
75.0	10.0	0.002000	0.0013750	0.10312	0.25313	0.33751
75.0	7.0	0.003250	0.0011430	0.08573	0.32948	0.43931
22.0	3.0	0.003000	*	*	*	*
50.0	7.0	0.001000	*	*	*	*
50.0	7.0	0.002000	0.0013930	0.06965	0.16965	0.33930
150.0	5.0	0.001875	0.0007250	0.10875	0.39000	0.26000
75.0	5.0	0.001875	0.0009500	0.07125	0.21188	0.28251
100.0	3.0	0.001250	0.0013330	0.13330	0.25830	0.25830
70.0	2.0	0.001250	*	*	*	*
45.0	5.0	0.001250	0.0015000	0.06750	0.12375	0.27500
125.0	4.0	0.002500	0.0025000	0.31250	0.62500	0.50000
50.0	4.0	0.002500	0.0017190	0.08595	0.21095	0.42190
155.0	2.0	0.003750	*	*	*	*
50.0	3.0	0.002500	*	*	*	*
75.0	5.0	0.001875	0.0007500	0.05625	0.19687	0.26249
65.0	7.0	0.001875	0.0006960	0.04524	0.16712	0.25711
150.0	5.0	0.001500	0.0014500	0.21750	0.44250	0.29500
67.0	5.0	0.002500	*	*	*	*
100.0	7.0	0.002500	0.0011790	0.11790	0.36790	0.36790

Appendix 7.1 ROA data and results for scenarios 1 and 2

Amount $	Yrs	M Marg %	U cost %	U cost x amount $	D cost x amount $	ROA %
225.0	5.0	0.001875	0.0007500	0.16875	0.59062	0.26250
50.0	8.0	0.001000	*	*	*	*
100.0	5.0	0.001000	0.0012000	0.12000	0.22000	0.22000
125.0	5.0	0.001875	0.0007125	0.08906	0.32344	0.25875
400.0	10.0	0.001250	0.0007400	0.29600	0.79600	0.19900
450.0	7.0	0.003000	0.0011250	0.50625	1.85625	0.41250
200.0	5.0	0.003500	0.0015000	0.30000	1.00000	0.50000
25.0	5.0	0.002000	0.0031000	0.07750	0.12750	0.51000
1200.0	3.0	0.002000	0.0014000	1.68000	4.08000	0.34000
150.0	5.0	0.001725	0.0013250	0.19875	0.45750	0.30500
150.0	7.0	0.002000	0.0013930	0.20895	0.50895	0.33930
30.0	3.0	0.001875	0.0010420	0.03126	0.08751	0.29170
62.5	5.0	0.002500	0.0008500	0.05313	0.20937	0.33499
60.0	3.0	*	*	*	*	*
85.0	3.0	0.002500	0.0012500	0.10625	0.31875	0.37500
100.0	5.0	0.002200	0.0009750	0.09750	0.31750	0.31750
150.0	5.0	0.001500	0.0005630	0.08445	0.30945	0.20630
50.0	10.0	0.001563	0.0010260	0.05130	0.12945	0.25890
100.0	7.0	0.001250	0.0014820	0.14820	0.27320	0.27320
75.0	7.0	0.001000	0.0009640	0.07230	0.14730	0.19640
125.0	5.0	0.001875	0.0007250	0.09062	0.32500	0.26000
62.5	5.0	0.001500	0.0009000	0.05625	0.15000	0.24000
500.0	7.0	0.001250	0.0005200	0.26000	0.88500	0.17700
150.0	7.0	0.003750	0.0013320	0.19980	0.76230	0.50820
400.0	5.0	0.001000	0.0013750	0.55000	0.95000	0.23750
1300.0	5.0	0.002250	0.0019750	2.56750	5.49250	0.42250
360.0	5.0	0.002000	0.0010000	0.36000	1.08000	0.30000
50.0	5.0	0.002000	*	*	*	*
200.0	5.0	0.001875	0.0008650	0.17300	0.54800	0.27400
50.0	3.0	0.001250	*	*	*	*
25.0	5.5	0.002000	0.0008180	0.02045	0.07045	0.28180
200.0	5.0	0.001250	0.0011250	0.22500	0.47500	0.23750
200.0	5.0	0.001375	*	*	*	*
200.0	5.0	0.001750	0.0010800	0.21600	0.56600	0.28300
56.0	3.0	0.002500	*	*	*	*
75.0	5.0	0.001000	0.0009510	0.07133	0.14633	0.19511
170.0	3.0	0.001250	0.0009000	0.15300	0.36550	0.21500
87.5	2.5	0.003000	*	*	*	*
300.0	3.0	0.001500	0.0012080	0.36240	0.81240	0.27080
130.0	8.0	0.003750	*	*	*	*
175.0	5.0	0.002000	0.0011650	0.20387	0.55387	0.31650
125.0	4.0	0.005000	*	*	*	*
220.0	5.0	0.002750	*	*	*	*
50.0	3.0	0.003250	*	*	*	*
90.0	7.0	0.001000	*	*	*	*
300.0	7.0	0.002500	0.0018570	0.55710	1.30710	0.43570

Appendix 7.1 ROA data and results for scenarios 1 and 2

Amount $	Yrs	M Marg %	U cost %	U cost x amount $	D cost x amount $	ROA %
35.0	3.0	0.004500	*	*	*	*
37.5	7.0	0.002500	0.0011430	0.04286	0.13661	0.36429
45.0	3.0	0.002500	*	*	*	*
55.0	4.0	0.001000	0.0014500	0.07975	0.13475	0.24500
125.0	5.0	0.001875	0.0008250	0.10312	0.33750	0.27000
400.0	5.0	0.002500	*	*	*	*
200.0	5.0	0.002500	*	*	*	*
300.0	5.0	0.003500	0.0014100	0.42300	1.47300	0.49100
150.0	5.0	0.001750	0.0014250	0.21375	0.47625	0.31750
630.0	4.0	0.002500	0.0007780	0.49014	2.06514	0.32780
100.0	5.0	0.002500	*	*	*	*
100.0	3.0	0.005500	*	*	*	*
97.5	8.5	0.007500	*	*	*	*
20.0	3.0	0.002500	0.0016670	0.03334	0.08334	0.41670
60.0	2.0	0.001000	0.0014690	0.08814	0.14814	0.24690
200.0	10.0	0.002000	0.0012125	0.24250	0.64250	0.32125
195.0	7.0	0.002750	0.0013750	0.26812	0.80437	0.41250
100.0	7.0	0.001750	0.0008000	0.08000	0.25500	0.25500
150.0	8.0	0.003750	*	*	*	*
400.0	4.0	0.003500	*	*	*	*
60.0	5.0	0.003250	0.0014380	0.08628	0.28128	0.46880
50.0	1.0	0.002000	*	*	*	*
50.0	2.0	0.001250	*	*	*	*
100.0	7.0	0.001500	*	*	*	*
50.0	5.0	0.001563	*	*	*	*
22.0	10.0	0.002000	0.0011000	0.02420	0.06820	0.31000
75.0	5.0	0.002000	*	*	*	*
125.0	3.0	0.001250	0.0012500	0.15625	0.31250	0.25000
125.0	3.0	0.003000	0.0010210	0.12763	0.50262	0.40210
200.0	5.0	0.002000	0.0011500	0.23000	0.63000	0.31500
65.0	5.0	0.002500	0.0010050	0.06532	0.22783	0.35051
300.0	7.0	0.002750	*	*	*	*
110.0	7.0	0.002500	0.0008930	0.09823	0.37323	0.33930
60.0	5.0	0.002500	*	*	*	*
38.0	6.0	0.001875	0.0014170	0.05385	0.12510	0.32921
75.0	8.5	0.005500	0.0020070	0.15052	0.56302	0.75069
140.0	5.0	0.002000	0.0013700	0.19180	0.47180	0.33700
65.0	5.0	0.001875	0.0007950	0.05167	0.17355	0.26700
110.0	7.0	0.002500	0.0016070	0.17677	0.45177	0.41070
75.0	5.0	0.003000	*	*	*	*
60.0	5.0	0.001500	0.0010250	0.06150	0.15150	0.25250
700.0	10.0	0.001250	0.0011030	0.77210	1.64710	0.23530
320.0	7.0	0.003500	0.0023570	0.75424	1.87424	0.58570
50.0	7.0	0.001250	0.0006960	0.03480	0.09730	0.19460
*	3.0	0.002500	0.0012500	*	*	*
*	8.0	0.001875	0.0014060	*	*	*

Appendix 7.1 ROA data and results for scenarios 1 and 2

Amount $	Yrs	M Marg %	U cost %	U cost x amount $	D cost x amount $	ROA %
100.0	3.0	0.002500	*	*	*	*
100.0	3.0	0.001250	0.0014170	0.14170	0.26670	0.26670
70.0	5.0	0.003000	0.0016000	0.11200	0.32200	0.46000
30.0	5.0	0.003500	0.0023750	0.07125	0.17625	0.58750
100.0	10.0	0.001875	0.0008750	0.08750	0.27500	0.27500
50.0	5.0	0.003750	0.0014000	0.07000	0.25750	0.51500
22.0	5.0	0.003750	0.0025000	0.05500	0.13750	0.62500
100.0	5.0	0.001500	*	*	*	*
100.0	5.0	0.002000	0.0014250	0.14250	0.34250	0.34250
50.0	5.0	0.003500	*	*	*	*
400.0	3.0	0.001250	0.0011700	0.46800	0.96800	0.24200
220.0	5.0	0.002250	0.0012000	0.26400	0.75900	0.34500
350.0	5.0	0.002500	0.0009380	0.32830	1.20330	0.34380
75.0	5.0	0.001500	0.0012000	0.09000	0.20250	0.27000
70.0	2.0	0.000625	*	*	*	*
30.0	3.0	0.001250	0.0012670	0.03801	0.07551	0.25170
50.0	3.0	0.001000	0.0008330	0.04165	0.09165	0.18330
175.0	5.0	0.001250	0.0013750	0.24062	0.45937	0.26250
100.0	5.0	0.001500	*	*	*	*
125.0	5.0	0.001000	*	*	*	*
105.0	8.0	0.001750	0.0010310	0.10826	0.29201	0.27810
20.0	4.0	0.001500	*	*	*	*
225.0	4.0	0.001500	0.0008910	0.20047	0.53798	0.23910
100.0	5.0	0.001750	*	*	*	*
70.0	5.0	0.002500	0.0015000	0.10500	0.28000	0.40000
30.0	5.0	0.000875	*	*	*	*
1000.0	3.0	0.002250	0.0014580	1.45800	3.70800	0.37080
140.0	8.0	0.000750	0.0040310	0.56434	0.66934	0.47810
100.0	3.0	0.002625	0.0017500	0.17500	0.43750	0.43750
50.0	3.0	0.001250	*	*	*	*
100.0	3.0	0.001200	*	*	*	*
70.0	7.0	0.002000	0.0009560	0.06692	0.20692	0.29560
25.0	3.0	0.006250	0.0022920	0.05730	0.21355	0.85420
300.0	5.0	0.002000	*	*	*	*
200.0	5.0	0.002000	*	*	*	*
70.0	3.0	0.002000	*	*	*	*
60.0	5.0	0.001750	0.0011000	0.06600	0.17100	0.28500
18.0	3.0	0.000563	*	*	*	*
25.0	3.0	0.002500	0.0016670	0.04168	0.10417	0.41668
110.0	7.0	0.001500	*	*	*	*
25.0	2.0	0.001250	*	*	*	*
143.0	10.0	0.001875	0.0007710	0.11025	0.37838	0.26460
43.0	3.0	0.003000	0.0016670	0.07168	0.20068	0.46670
100.0	1.0	0.003500	*	*	*	*
100.0	3.0	0.002500	0.0013250	0.13250	0.38250	0.38250
45.0	12.0	0.001000	*	*	*	*

Appendix 7.1 ROA data and results for scenarios 1 and 2

Amount $	Yrs	M Marg %	U cost %	U cost x amount $	D cost x amount $	ROA %
300.0	14.0	0.002000	0.0011570	0.34710	0.94710	0.31570
40.0	7.0	0.002000	0.0011070	0.04428	0.12428	0.31070
25.0	3.0	0.002500	0.0016670	0.04168	0.10417	0.41668
85.0	5.0	0.003000	0.0042500	0.36125	0.61625	0.72500
100.0	5.0	0.001000	0.0007750	0.07750	0.17750	0.17750
280.0	6.0	0.004250	*	*	*	*
85.0	2.0	0.001875	0.0006250	0.05312	0.21250	0.25000
100.0	5.0	0.002000	0.0011250	0.11250	0.31250	0.31250
30.0	3.0	0.002500	*	*	*	*
50.0	5.0	0.001000	0.0009380	0.04690	0.09690	0.19380
250.0	5.0	0.001500	0.0007750	0.19375	0.56875	0.22750
13.0	5.0	*	0.0021250	0.02763	*	*
72.5	5.0	0.001250	*	*	*	*
70.0	5.0	0.001875	*	*	*	*
45.0	5.0	0.001875	*	*	*	*
100.0	5.0	0.001500	0.0006500	0.06500	0.21500	0.21500
250.0	10.0	0.001375	0.0006630	0.16575	0.50950	0.20380
145.0	8.0	0.002500	0.0009750	0.14137	0.50388	0.34750
50.0	5.0	0.001875	0.0011000	0.05500	0.14875	0.29750
100.0	10.0	0.001500	0.0011250	0.11250	0.26250	0.26250
500.0	1.0	0.001500	0.0007750	0.38750	1.13750	0.22750
150.0	3.0	0.003000	0.0020000	0.30000	0.75000	0.50000
110.0	5.0	0.001500	*	*	*	*
*	*	0.001250	*	*	*	*
60.0	3.0	0.004000	0.0020000	0.12000	0.36000	0.60000
450.0	5.0	0.002500	0.0007070	0.31815	1.44315	0.32070
100.0	8.0	0.002000	0.0014070	0.14070	0.34070	0.34070
200.0	7.0	0.001750	0.0006820	0.13640	0.48640	0.24320
100.0	5.0	0.001500	*	*	*	*
75.0	6.0	0.001250	0.0011250	0.08437	0.17812	0.23749
30.0	3.0	0.001250	0.0014580	0.04374	0.08124	0.27080
25.0	3.0	0.002500	0.0016670	0.04168	0.10417	0.41668
75.0	4.0	0.005000	0.0009500	0.07125	0.44625	0.59500
100.0	1.0	0.002500	*	*	*	*
100.0	3.0	0.002000	0.0011700	0.11700	0.31700	0.31700
75.0	5.0	0.002000	0.0013300	0.09975	0.24975	0.33300
36.0	7.0	0.001750	0.0011430	0.04115	0.10415	0.28931
40.0	6.0	0.001500	*	*	*	*
300.0	7.0	0.002500	0.0007440	0.22320	0.97320	0.32440
45.0	5.0	0.001750	0.0007250	0.03263	0.11137	0.24749
45.0	5.0	0.004000	0.0026250	0.11812	0.29812	0.66249
185.0	7.0	0.001875	0.0011070	0.20479	0.55167	0.29820
30.0	10.0	0.003000	*	*	*	*
500.0	5.0	0.002250	0.0014000	0.70000	1.82500	0.36500
400.0	4.0	0.003500	*	*	*	*
100.0	5.0	0.003250	0.0019250	0.19250	0.51750	0.51750

Appendix 7.1 ROA data and results for scenarios 1 and 2

Amount $	Yrs	M Marg %	U cost %	U cost x amount $	D cost x amount $	ROA %
100.0	7.0	0.003250	0.0014820	0.14820	0.47320	0.47320
125.0	11.0	0.001750	0.0023410	0.29262	0.51138	0.40910
125.0	5.0	0.001500	0.0008500	0.10625	0.29375	0.23500
150.0	7.0	0.002370	*	*	*	*
60.0	3.0	0.003750	0.0020000	0.12000	0.34500	0.57500
75.0	2.5	0.008500	0.0065000	0.48750	1.12500	1.50000
200.0	5.0	0.002500	0.0011500	0.23000	0.73000	0.36500
30.0	7.0	0.001750	0.0013930	0.04179	0.09429	0.31430
150.0	5.0	0.000625	0.0009050	0.13575	0.22950	0.15300
25.0	30.0	0.003000	0.0012500	0.03125	0.10625	0.42500
320.0	5.0	0.000500	*	*	*	*
110.0	5.0	0.001500	0.0008000	0.08800	0.25300	0.23000
75.0	7.0	0.002000	*	*	*	*
45.0	2.0	0.001875	0.0006250	0.02812	0.11250	0.25000
200.0	6.0	0.003450	0.0008880	0.17760	0.86760	0.43380
350.0	5.0	0.003500	0.0012750	0.44625	1.67125	0.47750
160.0	5.0	0.004500	0.0016700	0.26720	0.98720	0.61700
120.0	8.0	0.002750	0.0012500	0.15000	0.48000	0.40000
125.0	5.0	0.001750	0.0010800	0.13500	0.35375	0.28300
75.0	10.0	0.003000	0.0015750	0.11812	0.34313	0.45751
185.0	5.0	0.002000	*	*	*	*
*	5.0	0.001200	*	*	*	*
75.0	5.0	0.001500	0.0012000	0.09000	0.20250	0.27000
*	7.0	0.001250	0.0013210	*	*	*
375.0	5.0	0.004000	*	*	*	*
150.0	5.0	0.001750	*	*	*	*
35.0	5.0	0.002000	0.0013750	0.04812	0.11813	0.33751
100.0	5.0	0.002250	0.0012000	0.12000	0.34500	0.34500
350.0	5.0	0.002500	*	*	*	*
250.0	5.0	0.001875	*	*	*	*
60.0	3.0	*	0.0011670	0.07002	*	*
75.0	7.0	0.001000	0.0008930	0.06698	0.14198	0.18931
50.0	5.0	0.002500	0.0012000	0.06000	0.18500	0.37000
300.0	8.0	0.001500	0.0010660	0.31980	0.76980	0.25660
*	7.0	0.005000	0.0011270	*	*	*
100.0	3.0	0.002500	0.0009580	0.09580	0.34580	0.34580
125.0	5.0	0.010000	*	*	*	*
300.0	7.0	0.001500	0.0011070	0.33210	0.78210	0.26070
130.0	8.0	0.001125	0.0007000	0.09100	0.23725	0.18250
200.0	7.0	0.000800	0.0004640	0.09280	0.25280	0.12640
100.0	10.0	0.001000	*	*	*	*
*	5.0	0.001250	0.0006060	*	*	*
105.0	5.0	0.000563	0.0007750	0.08138	0.14049	0.13380
140.0	4.0	0.002500	0.0014370	0.20118	0.55118	0.39370
127.0	8.0	0.001750	0.0007030	0.08928	0.31153	0.24530
142.0	5.0	0.001500	*	*	*	*

Appendix 7.1 ROA data and results for scenarios 1 and 2

Amount $	Yrs	M Marg %	U cost %	U cost x amount $	D cost x amount $	ROA %
*	5.0	0.002000	0.0013000	*	*	*
200.0	5.0	0.002500	0.0011250	0.22500	0.72500	0.36250
100.0	5.0	0.002500	0.0011250	0.11250	0.36250	0.36250
200.0	7.0	0.002250	0.0008570	0.17140	0.62140	0.31070
50.0	5.0	0.002000	0.0008250	0.04125	0.14125	0.28250
40.0	3.0	0.002250	*	*	*	*
38.0	5.0	0.002500	0.0015000	0.05700	0.15200	0.40000
50.0	10.0	0.001000	0.0005875	0.02937	0.07937	0.15874
125.0	5.0	0.001500	*	*	*	*
35.0	5.0	0.001500	0.0011750	0.04112	0.09363	0.26751
105.0	3.0	0.001500	0.0006190	0.06499	0.22250	0.21190
250.0	7.0	0.005000	*	*	*	*
170.0	7.0	0.005000	*	*	*	*
355.0	7.0	0.001250	*	*	*	*
57.0	5.0	0.001500	0.0010800	0.06156	0.14706	0.25800
70.0	5.0	0.001500	*	*	*	*
100.0	5.0	0.001750	0.0014000	0.14000	0.31500	0.31500
150.0	5.0	0.002500	0.0020750	0.31125	0.68625	0.45750
250.0	2.0	0.001500	0.0008750	0.21875	0.59375	0.23750

Appendix 7.2 ROA data and results for scenario 3

Amount $	Yrs	M Marg %	U cost %	U cost x draw -down $	M marg x amount $	Total value $	ROA %
80.0	3.0	0.001250	0.0010000	0.2400	0.10000	0.3400	0.42500
50.0	15.0	0.001000	0.0007920	0.5940	0.05000	0.6440	1.28800
125.0	3.0	0.002000	0.0006670	0.2501	0.25000	0.5001	0.40009
100.0	5.0	0.001250	0.0024000	1.2000	0.12500	1.3250	1.32500
250.0	10.0	*	*	*	*	*	*
200.0	5.0	0.001000	0.0008750	0.8750	0.20000	1.0750	0.53750
80.0	5.0	0.002500	0.0012500	0.5000	0.20000	0.7000	0.87500
250.0	8.0	0.003750	0.0025780	5.1560	0.93750	6.0935	2.43740
500.0	5.0	*	0.0006250	1.5625	*	*	*
100.0	5.0	0.000800	0.0007250	0.3625	0.08000	0.4425	0.44250
300.0	10.0	0.003250	0.0010000	3.0000	0.97500	3.9750	1.32500
125.0	7.0	0.002000	*	*	0.25000	*	*
45.0	5.0	0.003500	0.0030000	0.6750	0.15750	0.8325	1.85000
200.0	8.0	0.000500	0.0008500	1.3600	0.10000	1.4600	0.73000
750.0	10.0	0.000800	0.0008000	6.0000	0.60000	6.6000	0.88000
12.5	5.0	0.001500	0.0006880	0.0430	0.01875	0.0618	0.49400
400.0	10.0	0.004000	0.0015630	6.2520	1.60000	7.8520	1.96300
200.0	7.0	0.001500	*	*	0.30000	*	*
500.0	10.0	0.001250	*	*	0.62500	*	*
1500.0	6.0	0.001625	*	*	2.43750	*	*
340.0	5.0	0.001875	0.0008250	1.4025	0.63750	2.0400	0.60000
500.0	10.0	0.002875	0.0007440	3.7200	1.43750	5.1575	1.03150
100.0	7.0	0.003250	0.0024290	1.7003	0.32500	2.0253	2.02530
350.0	10.0	0.001875	0.0010130	3.5455	0.65625	4.2018	1.20050
100.0	2.0	0.000625	0.0003125	0.0625	0.06250	0.1250	0.12500
1300.0	8.0	0.004375	0.0008780	9.1312	5.68750	14.8187	1.13990
85.0	5.0	0.002250	0.0008250	0.3506	0.19125	0.5419	0.63747
700.0	10.0	0.002000	0.0006000	4.2000	1.40000	5.6000	0.80000
400.0	10.0	0.002000	0.0006630	2.6520	0.80000	3.4520	0.86300
350.0	10.0	0.001250	*	*	0.43750	*	*
200.0	3.0	0.002500	0.0015000	0.9000	0.50000	1.4000	0.70000
100.0	5.0	0.001125	0.0006250	0.3125	0.11250	0.4250	0.42500
2000.0	8.5	0.001750	0.0005980	10.1660	3.50000	13.6660	0.68330
500.0	10.0	0.001750	0.0010750	5.3750	0.87500	6.2500	1.25000
75.0	7.0	0.002250	0.0010710	0.5622	0.16875	0.7310	0.97465
70.0	5.0	0.001000	*	*	0.07000	*	*
500.0	7.0	0.002500	0.0013930	4.8755	1.25000	6.1255	1.22510
1000.0	5.5	0.002250	0.0008070	4.4385	2.25000	6.6885	0.66885
75.0	7.0	0.002500	*	*	0.18750	*	*
40.0	7.0	0.002000	*	*	0.08000	*	*
100.0	5.5	0.000625	0.0006140	0.3377	0.06250	0.4002	0.40020
100.0	5.0	0.001125	0.0005880	0.2940	0.11250	0.4065	0.40650
350.0	8.0	0.001875	0.0006160	1.7248	0.65625	2.3811	0.68030
500.0	8.0	0.001000	0.0005440	2.1760	0.50000	2.6760	0.53520
300.0	7.0	0.001500	0.0008860	1.8606	0.45000	2.3106	0.77020

Appendix 7.2 ROA data and results for scenario 3

Amount $	Yrs	M Marg %	U cost %	U cost x draw -down $	M marg x amount $	Total value $	ROA %
45.0	5.0	0.010000	*	*	0.45000	*	*
60.0	5.0	0.002500	0.0007750	0.2325	0.15000	0.3825	0.63750
80.0	4.5	0.004000	*	*	0.32000	*	*
30.0	2.0	0.000625	*	*	0.01875	*	*
300.0	10.0	0.001000	0.0004930	1.4790	0.30000	1.7790	0.59300
400.0	10.0	0.001250	0.0005000	2.0000	0.50000	2.5000	0.62500
150.0	7.0	0.001100	0.0005890	0.6184	0.16500	0.7835	0.52230
200.0	10.0	0.001000	0.0005500	1.1000	0.20000	1.3000	0.65000
315.0	6.0	0.001250	0.0003420	0.6464	0.39375	1.0401	0.33020
75.0	7.0	0.004000	*	*	0.30000	*	*
50.0	7.0	0.001875	*	*	0.09375	*	*
20.0	5.0	0.003750	0.0015500	0.1550	0.07500	0.2300	1.15000
75.0	3.0	0.001250	0.0014170	0.3188	0.09375	0.4126	0.55008
65.0	5.0	0.001250	0.0012000	0.3900	0.08125	0.4713	0.72500
100.0	2.0	0.001250	0.0006250	0.1250	0.12500	0.2500	0.25000
100.0	2.0	0.001250	*	*	0.12500	*	*
25.0	7.0	0.001875	*	*	0.04688	*	*
100.0	7.0	0.001500	0.0014290	1.0003	0.15000	1.1503	1.15030
50.0	5.0	0.001500	0.0008250	0.2063	0.07500	0.2813	0.56250
150.0	2.0	0.001250	*	*	0.18750	*	*
75.0	5.0	0.001000	0.0007130	0.2674	0.07500	0.3424	0.45647
25.0	5.0	0.001250	*	*	0.03125	*	*
100.0	5.0	0.001875	0.0007750	0.3875	0.18750	0.5750	0.57500
100.0	5.0	0.002500	*	*	0.25000	*	*
40.0	3.0	0.002000	*	*	0.08000	*	*
50.0	5.0	0.001000	0.0007750	0.1938	0.05000	0.2438	0.48750
20.0	3.0	0.003000	0.0023960	0.1438	0.06000	0.2038	1.01880
35.0	3.0	0.002500	0.0022920	0.2407	0.08750	0.3282	0.93760
100.0	5.0	*	0.0014750	0.7375	*	*	*
30.0	5.0	0.001000	0.0015500	0.2325	0.03000	0.2625	0.87500
100.0	5.0	0.002750	0.0014250	0.7125	0.27500	0.9875	0.98750
50.0	2.0	0.000625	*	*	0.03125	*	*
50.0	3.0	0.002500	0.0026050	0.3908	0.12500	0.5158	1.03150
60.0	4.0	*	0.0015630	0.3751	*	*	*
30.0	5.0	0.001500	0.0015000	0.2250	0.04500	0.2700	0.90000
40.0	3.0	0.000625	0.0011700	0.1404	0.02500	0.1654	0.41350
50.0	5.0	0.001000	*	*	0.05000	*	*
50.0	5.0	0.002500	0.0010750	0.2688	0.12500	0.3938	0.78750
50.0	5.0	0.001000	*	*	0.05000	*	*
20.0	5.0	0.002500	*	*	0.05000	*	*
50.0	3.0	0.000625	*	*	0.03125	*	*
60.0	3.0	0.002250	*	*	0.13500	*	*
150.0	6.0	0.001875	0.0013130	1.1817	0.28125	1.4629	0.97530
100.0	5.0	0.002500	0.0013750	0.6875	0.25000	0.9375	0.93750
300.0	5.0	0.001500	0.0007500	1.1250	0.45000	1.5750	0.52500

Appendix 7.2 ROA data and results for scenario 3

Amount $	Yrs	M Marg %	U cost %	U cost x draw -down $	M marg x amount $	Total value $	ROA %
50.0	3.0	0.002250	0.0018330	0.2749	0.11250	0.3875	0.77490
155.0	5.0	0.003375	*	*	0.52312	*	*
30.0	3.0	0.002500	0.0024080	0.2167	0.07500	0.2917	0.97240
50.0	5.0	0.002500	0.0006430	0.1608	0.12500	0.2858	0.57150
*	3.0	0.002500	*	*	*	*	*
15.0	3.0	0.002500	0.0015830	0.0712	0.03750	0.1087	0.72480
30.0	5.0	0.001000	0.0015750	0.2362	0.03000	0.2663	0.88750
100.0	4.0	0.002000	0.0013750	0.5500	0.20000	0.7500	0.75000
35.0	5.0	0.001750	0.0012500	0.2188	0.06125	0.2800	0.80000
100.0	5.0	0.000750	0.0012500	0.6250	0.07500	0.7000	0.70000
100.0	2.0	0.000625	*	*	0.06250	*	*
100.0	5.0	0.000750	0.0008350	0.4175	0.07500	0.4925	0.49250
25.0	1.0	0.007500	*	*	0.18750	*	*
100.0	5.0	0.001750	0.0017850	0.8925	0.17500	1.0675	1.06750
200.0	3.0	0.001500	0.0018330	1.0998	0.30000	1.3998	0.69990
40.0	3.0	0.001000	0.0016000	0.1920	0.04000	0.2320	0.58000
100.0	5.0	0.000400	0.0003125	0.1563	0.04000	0.1963	0.19625
35.0	5.0	0.001500	*	*	0.05250	*	*
25.0	5.0	0.002500	0.0012000	0.1500	0.06250	0.2125	0.85000
100.0	5.0	0.003000	0.0012750	0.6375	0.30000	0.9375	0.93750
100.0	5.0	0.002500	*	*	0.25000	*	*
30.0	5.0	0.001000	*	*	0.03000	*	*
325.0	5.0	0.001000	*	*	0.32500	*	*
25.0	7.0	0.000500	0.0014290	0.2500	0.01250	0.2625	1.05016
13.0	6.0	0.001875	*	*	0.02437	*	*
80.0	3.0	0.002500	*	*	0.20000	*	*
400.0	10.0	0.001250	0.0010000	4.0000	0.50000	4.5000	1.12500
50.0	3.0	0.002500	0.0009380	0.1407	0.12500	0.2657	0.53140
400.0	7.0	0.001500	0.0022680	6.3504	0.60000	6.9504	1.73760
75.0	10.0	0.002000	0.0013750	1.0312	0.15000	1.1812	1.57493
75.0	7.0	0.003250	0.0011430	0.6001	0.24375	0.8439	1.12515
22.0	3.0	0.003000	*	*	0.06600	*	*
50.0	7.0	0.001000	*	*	0.05000	*	*
50.0	7.0	0.002000	0.0013930	0.4876	0.10000	0.5876	1.17510
150.0	5.0	0.001875	0.0007250	0.5437	0.28125	0.8250	0.55000
75.0	5.0	0.001875	0.0009500	0.3562	0.14063	0.4969	0.66250
100.0	3.0	0.001250	0.0013330	0.3999	0.12500	0.5249	0.52490
70.0	2.0	0.001250	*	*	0.08750	*	*
45.0	5.0	0.001250	0.0015000	0.3375	0.05625	0.3938	0.87500
125.0	4.0	0.002500	0.0025000	1.2500	0.31250	1.5625	1.25000
50.0	4.0	0.002500	0.0017190	0.3438	0.12500	0.4688	0.93760
155.0	2.0	0.003750	*	*	0.58125	*	*
50.0	3.0	0.002500	*	*	0.12500	*	*
75.0	5.0	0.001875	0.0007500	0.2813	0.14063	0.4219	0.56250
65.0	7.0	0.001875	0.0006960	0.3167	0.12187	0.4386	0.67470

Appendix 7.2 ROA data and results for scenario 3

Amount $	Yrs	M Marg %	U cost %	U cost x draw -down $	M marg x amount $	Total value $	ROA %
150.0	5.0	0.001500	0.0014500	1.0875	0.22500	1.3125	0.87500
67.0	5.0	0.002500	*	*	0.16750	*	*
100.0	7.0	0.002500	0.0011790	0.8253	0.25000	1.0753	1.07530
225.0	5.0	0.001875	0.0007500	0.8438	0.42187	1.2656	0.56250
50.0	8.0	0.001000	*	*	0.05000	*	*
100.0	5.0	0.001000	0.0012000	0.6000	0.10000	0.7000	0.70000
125.0	5.0	0.001875	0.0007125	0.4453	0.23437	0.6797	0.54374
400.0	10.0	0.001250	0.0007400	2.9600	0.50000	3.4600	0.86500
450.0	7.0	0.003000	0.0011250	3.5438	1.35000	4.8938	1.08750
200.0	5.0	0.003500	0.0015000	1.5000	0.70000	2.2000	1.10000
25.0	5.0	0.002000	0.0031000	0.3875	0.05000	0.4375	1.75000
1200.0	3.0	0.002000	0.0014000	5.0400	2.40000	7.4400	0.62000
150.0	5.0	0.001725	0.0013250	0.9938	0.25875	1.2525	0.83500
150.0	7.0	0.002000	0.0013930	1.4626	0.30000	1.7627	1.17510
30.0	3.0	0.001875	0.0010420	0.0938	0.05625	0.1500	0.50010
62.5	5.0	0.002500	0.0008500	0.2657	0.15625	0.4219	0.67504
60.0	3.0	*	*	*	*	*	*
85.0	3.0	0.002500	0.0012500	0.3188	0.21250	0.5312	0.62500
100.0	5.0	0.002200	0.0009750	0.4875	0.22000	0.7075	0.70750
150.0	5.0	0.001500	0.0005630	0.4223	0.22500	0.6472	0.43150
50.0	10.0	0.001563	0.0010260	0.5130	0.07815	0.5912	1.18230
100.0	7.0	0.001250	0.0014820	1.0374	0.12500	1.1624	1.16240
75.0	7.0	0.001000	0.0009640	0.5061	0.07500	0.5811	0.77480
125.0	5.0	0.001875	0.0007250	0.4531	0.23437	0.6875	0.54998
62.5	5.0	0.001500	0.0009000	0.2813	0.09375	0.3750	0.60000
500.0	7.0	0.001250	0.0005200	1.8200	0.62500	2.4450	0.48900
150.0	7.0	0.003750	0.0013320	1.3986	0.56250	1.9611	1.30740
400.0	5.0	0.001000	0.0013750	2.7500	0.40000	3.1500	0.78750
1300.0	5.0	0.002250	0.0019750	12.8375	2.92500	15.7625	1.21250
360.0	5.0	0.002000	0.0010000	1.8000	0.72000	2.5200	0.70000
50.0	5.0	0.002000	*	*	0.10000	*	*
200.0	5.0	0.001875	0.0008650	0.8650	0.37500	1.2400	0.62000
50.0	3.0	0.001250	*	*	0.06250	*	*
25.0	5.5	0.002000	0.0008180	0.1125	0.05000	0.1625	0.64990
200.0	5.0	0.001250	0.0011250	1.1250	0.25000	1.3750	0.68750
200.0	5.0	0.001375	*	*	0.27500	*	*
200.0	5.0	0.001750	0.0010800	1.0800	0.35000	1.4300	0.71500
56.0	3.0	0.002500	*	*	0.14000	*	*
75.0	5.0	0.001000	0.0009510	0.3567	0.07500	0.4317	0.57553
170.0	3.0	0.001250	0.0009000	0.4590	0.21250	0.6715	0.39500
87.5	2.5	0.003000	*	*	0.26250	*	*
300.0	3.0	0.001500	0.0012080	1.0872	0.45000	1.5372	0.51240
130.0	8.0	0.003750	*	*	0.48750	*	*
175.0	5.0	0.002000	0.0011650	1.0194	0.35000	1.3694	0.78249
125.0	4.0	0.005000	*	*	0.62500	*	*

Appendix 7.2 ROA data and results for scenario 3

Amount $	Yrs	M Marg %	U cost %	U cost x draw -down $	M marg x amount $	Total value $	ROA %
220.0	5.0	0.002750	*	*	0.60500	*	*
50.0	3.0	0.003250	*	*	0.16250	*	*
90.0	7.0	0.001000	*	*	0.09000	*	*
300.0	7.0	0.002500	0.0018570	3.8997	0.75000	4.6497	1.54990
35.0	3.0	0.004500	*	*	0.15750	*	*
37.5	7.0	0.002500	0.0011430	0.3000	0.09375	0.3938	1.05005
45.0	3.0	0.002500	*	*	0.11250	*	*
55.0	4.0	0.001000	0.0014500	0.3190	0.05500	0.3740	0.68000
125.0	5.0	0.001875	0.0008250	0.5156	0.23437	0.7500	0.59998
400.0	5.0	0.002500	*	*	1.00000	*	*
200.0	5.0	0.002500	*	*	0.50000	*	*
300.0	5.0	0.003500	0.0014100	2.1150	1.05000	3.1650	1.05500
150.0	5.0	0.001750	0.0014250	1.0688	0.26250	1.3313	0.88750
630.0	4.0	0.002500	0.0007780	1.9606	1.57500	3.5356	0.56120
100.0	5.0	0.002500	*	*	0.25000	*	*
100.0	3.0	0.005500	*	*	0.55000	*	*
97.5	8.5	0.007500	*	*	0.73125	*	*
20.0	3.0	0.002500	0.0016670	0.1000	0.05000	0.1500	0.75010
60.0	2.0	0.001000	0.0014690	0.1763	0.06000	0.2363	0.39380
200.0	10.0	0.002000	0.0012125	2.4250	0.40000	2.8250	1.41250
195.0	7.0	0.002750	0.0013750	1.8768	0.53625	2.4131	1.23748
100.0	7.0	0.001750	0.0008000	0.5600	0.17500	0.7350	0.73500
150.0	8.0	0.003750	*	*	0.56250	*	*
400.0	4.0	0.003500	*	*	1.40000	*	*
60.0	5.0	0.003250	0.0014380	0.4314	0.19500	0.6264	1.04400
50.0	1.0	0.002000	*	*	0.10000	*	*
50.0	2.0	0.001250	*	*	0.06250	*	*
100.0	7.0	0.001500	*	*	0.15000	*	*
50.0	5.0	0.001563	*	*	0.07815	*	*
22.0	10.0	0.002000	0.0011000	0.2420	0.04400	0.2860	1.30000
75.0	5.0	0.002000	*	*	0.15000	*	*
125.0	3.0	0.001250	0.0012500	0.4688	0.15625	0.6250	0.50000
125.0	3.0	0.003000	0.0010210	0.3829	0.37500	0.7579	0.60631
200.0	5.0	0.002000	0.0011500	1.1500	0.40000	1.5500	0.77500
65.0	5.0	0.002500	0.0010050	0.3266	0.16250	0.4891	0.75246
300.0	7.0	0.002750	*	*	0.82500	*	*
110.0	7.0	0.002500	0.0008930	0.6876	0.27500	0.9626	0.87510
60.0	5.0	0.002500	*	*	0.15000	*	*
38.0	6.0	0.001875	0.0014170	0.3231	0.07125	0.3943	1.03776
75.0	8.5	0.005500	0.0020070	1.2794	0.41250	1.6919	2.25589
140.0	5.0	0.002000	0.0013700	0.9590	0.28000	1.2390	0.88500
65.0	5.0	0.001875	0.0007950	0.2584	0.12187	0.3802	0.58496
110.0	7.0	0.002500	0.0016070	1.2374	0.27500	1.5124	1.37490
75.0	5.0	0.003000	*	*	0.22500	*	*
60.0	5.0	0.001500	0.0010250	0.3075	0.09000	0.3975	0.66250

Appendix 7.2 ROA data and results for scenario 3

Amount $	Yrs	M Marg %	U cost %	U cost x draw -down $	M marg x amount $	Total value $	ROA %
700.0	10.0	0.001250	0.0011030	7.7210	0.87500	8.5960	1.22800
320.0	7.0	0.003500	0.0023570	5.2797	1.12000	6.3997	1.99990
50.0	7.0	0.001250	0.0006960	0.2436	0.06250	0.3061	0.61220
*	3.0	0.002500	0.0012500	*	*	*	*
*	8.0	0.001875	0.0014060	*	*	*	*
100.0	3.0	0.002500	*	*	0.25000	*	*
100.0	3.0	0.001250	0.0014170	0.4251	0.12500	0.5501	0.55010
70.0	5.0	0.003000	0.0016000	0.5600	0.21000	0.7700	1.10000
30.0	5.0	0.003500	0.0023750	0.3562	0.10500	0.4613	1.53750
100.0	10.0	0.001875	0.0008750	0.8750	0.18750	1.0625	1.06250
50.0	5.0	0.003750	0.0014000	0.3500	0.18750	0.5375	1.07500
22.0	5.0	0.003750	0.0025000	0.2750	0.08250	0.3575	1.62500
100.0	5.0	0.001500	*	*	0.15000	*	*
100.0	5.0	0.002000	0.0014250	0.7125	0.20000	0.9125	0.91250
50.0	5.0	0.003500	*	*	0.17500	*	*
400.0	3.0	0.001250	0.0011700	1.4040	0.50000	1.9040	0.47600
220.0	5.0	0.002250	0.0012000	1.3200	0.49500	1.8150	0.82500
350.0	5.0	0.002500	0.0009380	1.6415	0.87500	2.5165	0.71900
75.0	5.0	0.001500	0.0012000	0.4500	0.11250	0.5625	0.75000
70.0	2.0	0.000625	*	*	0.04375	*	*
30.0	3.0	0.001250	0.0012670	0.1140	0.03750	0.1515	0.50510
50.0	3.0	0.001000	0.0008330	0.1250	0.05000	0.1750	0.34990
175.0	5.0	0.001250	0.0013750	1.2031	0.21875	1.4218	0.81249
100.0	5.0	0.001500	*	*	0.15000	*	*
125.0	5.0	0.001000	*	*	0.12500	*	*
105.0	8.0	0.001750	0.0010310	0.8661	0.18375	1.0498	0.99984
20.0	4.0	0.001500	*	*	0.03000	*	*
225.0	4.0	0.001500	0.0008910	0.8019	0.33750	1.1394	0.50639
100.0	5.0	0.001750	*	*	0.17500	*	*
70.0	5.0	0.002500	0.0015000	0.5250	0.17500	0.7000	1.00000
30.0	5.0	0.000875	*	*	0.02625	*	*
1000.0	3.0	0.002250	0.0014580	4.3740	2.25000	6.6240	0.66240
140.0	8.0	0.000750	0.0040310	4.5147	0.10500	4.6197	3.29980
100.0	3.0	0.002625	0.0017500	0.5250	0.26250	0.7875	0.78750
50.0	3.0	0.001250	*	*	0.06250	*	*
100.0	3.0	0.001200	*	*	0.12000	*	*
70.0	7.0	0.002000	0.0009560	0.4684	0.14000	0.6084	0.86920
25.0	3.0	0.006250	0.0022920	0.1719	0.15625	0.3282	1.31260
300.0	5.0	0.002000	*	*	0.60000	*	*
200.0	5.0	0.002000	*	*	0.40000	*	*
70.0	3.0	0.002000	*	*	0.14000	*	*
60.0	5.0	0.001750	0.0011000	0.3300	0.10500	0.4350	0.72500
18.0	3.0	0.000563	*	*	0.01013	*	*
25.0	3.0	0.002500	0.0016670	0.1250	0.06250	0.1875	0.75016
110.0	7.0	0.001500	*	*	0.16500	*	*

Appendix 7.2 ROA data and results for scenario 3

Amount $	Yrs	M Marg %	U cost %	U cost x draw -down $	M marg x amount $	Total value $	ROA %
25.0	2.0	0.001250	*	*	0.03125	*	*
143.0	10.0	0.001875	0.0007710	1.1025	0.26812	1.3706	0.95848
43.0	3.0	0.003000	0.0016670	0.2150	0.12900	0.3440	0.80009
100.0	1.0	0.003500	*	*	0.35000	*	*
100.0	3.0	0.002500	0.0013250	0.3975	0.25000	0.6475	0.64750
45.0	12.0	0.001000	*	*	0.04500	*	*
300.0	14.0	0.002000	0.0011570	4.8594	0.60000	5.4594	1.81980
40.0	7.0	0.002000	0.0011070	0.3100	0.08000	0.3900	0.97490
25.0	3.0	0.002500	0.0016670	0.1250	0.06250	0.1875	0.75016
85.0	5.0	0.003000	0.0042500	1.8063	0.25500	2.0613	2.42500
100.0	5.0	0.001000	0.0007750	0.3875	0.10000	0.4875	0.48750
280.0	6.0	0.004250	*	*	1.19000	*	*
85.0	2.0	0.001875	0.0006250	0.1062	0.15937	0.2656	0.31249
100.0	5.0	0.002000	0.0011250	0.5625	0.20000	0.7625	0.76250
30.0	3.0	0.002500	*	*	0.07500	*	*
50.0	5.0	0.001000	0.0009380	0.2345	0.05000	0.2845	0.56900
250.0	5.0	0.001500	0.0007750	0.9687	0.37500	1.3437	0.53750
13.0	5.0	*	0.0021250	0.1381	*	*	*
72.5	5.0	0.001250	*	*	0.09062	*	*
70.0	5.0	0.001875	*	*	0.13125	*	*
45.0	5.0	0.001875	*	*	0.08438	*	*
100.0	5.0	0.001500	0.0006500	0.3250	0.15000	0.4750	0.47500
250.0	10.0	0.001375	0.0006630	1.6575	0.34375	2.0013	0.80050
145.0	8.0	0.002500	0.0009750	1.1310	0.36250	1.4935	1.02997
50.0	5.0	0.001875	0.0011000	0.2750	0.09375	0.3688	0.73750
100.0	10.0	0.001500	0.0011250	1.1250	0.15000	1.2750	1.27500
500.0	1.0	0.001500	0.0007750	0.3875	0.75000	1.1375	0.22750
150.0	3.0	0.003000	0.0020000	0.9000	0.45000	1.3500	0.90000
110.0	5.0	0.001500	*	*	0.16500	*	*
*	*	0.001250	*	*	*	*	*
60.0	3.0	0.004000	0.0020000	0.3600	0.24000	0.6000	1.00000
450.0	5.0	0.002500	0.0007070	1.5908	1.12500	2.7158	0.60350
100.0	8.0	0.002000	0.0014070	1.1256	0.20000	1.3256	1.32560
200.0	7.0	0.001750	0.0006820	0.9548	0.35000	1.3048	0.65240
100.0	5.0	0.001500	*	*	0.15000	*	*
75.0	6.0	0.001250	0.0011250	0.5062	0.09375	0.6000	0.79996
30.0	3.0	0.001250	0.0014580	0.1312	0.03750	0.1687	0.56240
25.0	3.0	0.002500	0.0016670	0.1250	0.06250	0.1875	0.75016
75.0	4.0	0.005000	0.0009500	0.2850	0.37500	0.6600	0.88000
100.0	1.0	0.002500	*	*	0.25000	*	*
100.0	3.0	0.002000	0.0011700	0.3510	0.20000	0.5510	0.55100
75.0	5.0	0.002000	0.0013300	0.4988	0.15000	0.6488	0.86500
36.0	7.0	0.001750	0.0011430	0.2880	0.06300	0.3510	0.97514
40.0	6.0	0.001500	*	*	0.06000	*	*
300.0	7.0	0.002500	0.0007440	1.5624	0.75000	2.3124	0.77080

Appendix 7.2 ROA data and results for scenario 3

Amount $	Yrs	M Marg %	U cost %	U cost x draw -down $	M marg x amount $	Total value $	ROA %
45.0	5.0	0.001750	0.0007250	0.1631	0.07875	0.2419	0.53756
45.0	5.0	0.004000	0.0026250	0.5906	0.18000	0.7706	1.71244
185.0	7.0	0.001875	0.0011070	1.4335	0.34687	1.7804	0.96238
30.0	10.0	0.003000	*	*	0.09000	*	*
500.0	5.0	0.002250	0.0014000	3.5000	1.12500	4.6250	0.92500
400.0	4.0	0.003500	*	*	1.40000	*	*
100.0	5.0	0.003250	0.0019250	0.9625	0.32500	1.2875	1.28750
100.0	7.0	0.003250	0.0014820	1.0374	0.32500	1.3624	1.36240
125.0	11.0	0.001750	0.0023410	3.2188	0.21875	3.4376	2.75006
125.0	5.0	0.001500	0.0008500	0.5312	0.18750	0.7187	0.57500
150.0	7.0	0.002370	*	*	0.35550	*	*
60.0	3.0	0.003750	0.0020000	0.3600	0.22500	0.5850	0.97500
75.0	2.5	0.008500	0.0065000	1.2187	0.63750	1.8563	2.47500
200.0	5.0	0.002500	0.0011500	1.1500	0.50000	1.6500	0.82500
30.0	7.0	0.001750	0.0013930	0.2925	0.05250	0.3450	1.15010
150.0	5.0	0.000625	0.0009050	0.6787	0.09375	0.7725	0.51500
25.0	30.0	0.003000	0.0012500	0.9375	0.07500	1.0125	4.05000
320.0	5.0	0.000500	*	*	0.16000	*	*
110.0	5.0	0.001500	0.0008000	0.4400	0.16500	0.6050	0.55000
75.0	7.0	0.002000	*	*	0.15000	*	*
45.0	2.0	0.001875	0.0006250	0.0562	0.08438	0.1406	0.31248
200.0	6.0	0.003450	0.0008880	1.0656	0.69000	1.7556	0.87780
350.0	5.0	0.003500	0.0012750	2.2313	1.22500	3.4563	0.98750
160.0	5.0	0.004500	0.0016700	1.3360	0.72000	2.0560	1.28500
120.0	8.0	0.002750	0.0012500	1.2000	0.33000	1.5300	1.27500
125.0	5.0	0.001750	0.0010800	0.6750	0.21875	0.8938	0.71500
75.0	10.0	0.003000	0.0015750	1.1812	0.22500	1.4062	1.87493
185.0	5.0	0.002000	*	*	0.37000	*	*
*	5.0	0.001200	*	*	*	*	*
75.0	5.0	0.001500	0.0012000	0.4500	0.11250	0.5625	0.75000
*	7.0	0.001250	0.0013210	*	*	*	*
375.0	5.0	0.004000	*	*	1.50000	*	*
150.0	5.0	0.001750	*	*	0.26250	*	*
35.0	5.0	0.002000	0.0013750	0.2406	0.07000	0.3106	0.88743
100.0	5.0	0.002250	0.0012000	0.6000	0.22500	0.8250	0.82500
350.0	5.0	0.002500	*	*	0.87500	*	*
250.0	5.0	0.001875	*	*	0.46875	*	*
60.0	3.0	*	0.0011670	0.2101	*	*	*
75.0	7.0	0.001000	0.0008930	0.4689	0.07500	0.5439	0.72515
50.0	5.0	0.002500	0.0012000	0.3000	0.12500	0.4250	0.85000
300.0	8.0	0.001500	0.0010660	2.5584	0.45000	3.0084	1.00280
*	7.0	0.005000	0.0011270	*	*	*	*
100.0	3.0	0.002500	0.0009580	0.2874	0.25000	0.5374	0.53740
125.0	5.0	0.010000	*	*	1.25000	*	*
300.0	7.0	0.001500	0.0011070	2.3247	0.45000	2.7747	0.92490

Appendix 7.2 ROA data and results for scenario 3

Amount $	Yrs	M Marg %	U cost %	U cost x draw -down $	M marg x amount $	Total value $	ROA %
130.0	8.0	0.001125	0.0007000	0.7280	0.14625	0.8742	0.67250
200.0	7.0	0.000800	0.0004640	0.6496	0.16000	0.8096	0.40480
100.0	10.0	0.001000	*	*	0.10000	*	*
*	5.0	0.001250	0.0006060	*	*	*	*
105.0	5.0	0.000563	0.0007750	0.4069	0.05911	0.4660	0.44382
140.0	4.0	0.002500	0.0014370	0.8047	0.35000	1.1547	0.82480
127.0	8.0	0.001750	0.0007030	0.7142	0.22225	0.9365	0.73739
142.0	5.0	0.001500	*	*	0.21300	*	*
*	5.0	0.002000	0.0013000	*	*	*	*
200.0	5.0	0.002500	0.0011250	1.1250	0.50000	1.6250	0.81250
100.0	5.0	0.002500	0.0011250	0.5625	0.25000	0.8125	0.81250
200.0	7.0	0.002250	0.0008570	1.1998	0.45000	1.6498	0.82490
50.0	5.0	0.002000	0.0008250	0.2063	0.10000	0.3063	0.61250
40.0	3.0	0.002250	*	*	0.09000	*	*
38.0	5.0	0.002500	0.0015000	0.2850	0.09500	0.3800	1.00000
50.0	10.0	0.001000	0.0005875	0.2937	0.05000	0.3437	0.68740
125.0	5.0	0.001500	*	*	0.18750	*	*
35.0	5.0	0.001500	0.0011750	0.2056	0.05250	0.2581	0.73743
105.0	3.0	0.001500	0.0006190	0.1950	0.15750	0.3525	0.33569
250.0	7.0	0.005000	*	*	1.25000	*	*
170.0	7.0	0.005000	*	*	0.85000	*	*
355.0	7.0	0.001250	*	*	0.44375	*	*
57.0	5.0	0.001500	0.0010800	0.3078	0.08550	0.3933	0.69000
70.0	5.0	0.001500	*	*	0.10500	*	*
100.0	5.0	0.001750	0.0014000	0.7000	0.17500	0.8750	0.87500
150.0	5.0	0.002500	0.0020750	1.5562	0.37500	1.9312	1.28750
250.0	2.0	0.001500	0.0008750	0.4375	0.37500	0.8125	0.32500

Appendix 7.3 ROA data and results for scenario 4

M marg %	U cost %	U cost x draw -down $	Draw -down $	M marg/4 x draw -down $	Total value $	ROA %
0.001250	0.0010000	0.2400	240.0	0.0750	0.3150	0.131250
0.001000	0.0007920	0.5940	750.0	0.1875	0.7815	0.104200
0.002000	0.0006670	0.2501	375.0	0.1875	0.4376	0.116693
0.001250	0.0024000	1.2000	500.0	0.1563	1.3563	0.271260
*	*	*	2500.0	*	*	*
0.001000	0.0008750	0.8750	1000.0	0.2500	1.1250	0.112500
0.002500	0.0012500	0.5000	400.0	0.2500	0.7500	0.187500
0.003750	0.0025780	5.1560	2000.0	1.8750	7.0310	0.351550
*	0.0006250	1.5625	2500.0	*	*	*
0.000800	0.0007250	0.3625	500.0	0.1000	0.4625	0.092500
0.003250	0.0010000	3.0000	3000.0	2.4375	5.4375	0.181250
0.002000	*	*	875.0	0.4375	*	*
0.003500	0.0030000	0.6750	225.0	0.1969	0.8719	0.387511
0.000500	0.0008500	1.3600	1600.0	0.2000	1.5600	0.097500
0.000800	0.0008000	6.0000	7500.0	1.5000	7.5000	0.100000
0.001500	0.0006880	0.0430	62.5	0.0234	0.0664	0.106240
0.004000	0.0015630	6.2520	4000.0	4.0000	10.2520	0.256300
0.001500	*	*	1400.0	0.5250	*	*
0.001250	*	*	5000.0	1.5625	*	*
0.001625	*	*	9000.0	3.6562	*	*
0.001875	0.0008250	1.4025	1700.0	0.7969	2.1994	0.129376
0.002875	0.0007440	3.7200	5000.0	3.5937	7.3138	0.146276
0.003250	0.0024290	1.7003	700.0	0.5687	2.2690	0.324143
0.001875	0.0010130	3.5455	3500.0	1.6406	5.1861	0.148174
0.000625	0.0003125	0.0625	200.0	0.0313	0.0938	0.046900
0.004375	0.0008780	9.1312	10400.0	11.3750	20.5062	0.197175
0.002250	0.0008250	0.3506	425.0	0.2391	0.5897	0.138753
0.002000	0.0006000	4.2000	7000.0	3.5000	7.7000	0.110000
0.002000	0.0006630	2.6520	4000.0	2.0000	4.6520	0.116300
0.001250	*	*	3500.0	1.0937	*	*
0.002500	0.0015000	0.9000	600.0	0.3750	1.2750	0.212500
0.001125	0.0006250	0.3125	500.0	0.1406	0.4531	0.090620
0.001750	0.0005980	10.1660	17000.0	7.4375	17.6035	0.103550
0.001750	0.0010750	5.3750	5000.0	2.1875	7.5625	0.151250
0.002250	0.0010710	0.5622	525.0	0.2953	0.8575	0.163333
0.001000	*	*	350.0	0.0875	*	*
0.002500	0.0013930	4.8755	3500.0	2.1875	7.0630	0.201800
0.002250	0.0008070	4.4385	5500.0	3.0938	7.5322	0.136949
0.002500	*	*	525.0	0.3281	*	*
0.002000	*	*	280.0	0.1400	*	*
0.000625	0.0006140	0.3377	550.0	0.0859	0.4236	0.077018
0.001125	0.0005880	0.2940	500.0	0.1406	0.4346	0.086920
0.001875	0.0006160	1.7248	2800.0	1.3125	3.0373	0.108475
0.001000	0.0005440	2.1760	4000.0	1.0000	3.1760	0.079400
0.001500	0.0008860	1.8606	2100.0	0.7875	2.6481	0.126100

Appendix 7.3 ROA data and results for scenario 4

M marg %	U cost %	U cost x draw -down $	Draw -down $	M marg/4 x draw -down $	Total value $	ROA %
0.010000	*	*	225.0	0.5625	*	*
0.002500	0.0007750	0.2325	300.0	0.1875	0.4200	0.140000
0.004000	*	*	360.0	0.3600	*	*
0.000625	*	*	60.0	0.0094	*	*
0.001000	0.0004930	1.4790	3000.0	0.7500	2.2290	0.074300
0.001250	0.0005000	2.0000	4000.0	1.2500	3.2500	0.081250
0.001100	0.0005890	0.6184	1050.0	0.2888	0.9072	0.086400
0.001000	0.0005500	1.1000	2000.0	0.5000	1.6000	0.080000
0.001250	0.0003420	0.6464	1890.0	0.5906	1.2370	0.065450
0.004000	*	*	525.0	0.5250	*	*
0.001875	*	*	350.0	0.1641	*	*
0.003750	0.0015500	0.1550	100.0	0.0938	0.2488	0.248800
0.001250	0.0014170	0.3188	225.0	0.0703	0.3891	0.172933
0.001250	0.0012000	0.3900	325.0	0.1016	0.4916	0.151262
0.001250	0.0006250	0.1250	200.0	0.0625	0.1875	0.093750
0.001250	*	*	200.0	0.0625	*	*
0.001875	*	*	175.0	0.0820	*	*
0.001500	0.0014290	1.0003	700.0	0.2625	1.2628	0.180400
0.001500	0.0008250	0.2063	250.0	0.0938	0.3001	0.120040
0.001250	*	*	300.0	0.0938	*	*
0.001000	0.0007130	0.2674	375.0	0.0938	0.3611	0.096293
0.001250	*	*	125.0	0.0391	*	*
0.001875	0.0007750	0.3875	500.0	0.2344	0.6219	0.124380
0.002500	*	*	500.0	0.3125	*	*
0.002000	*	*	120.0	0.0600	*	*
0.001000	0.0007750	0.1938	250.0	0.0625	0.2563	0.102520
0.003000	0.0023960	0.1438	60.0	0.0450	0.1888	0.314667
0.002500	0.0022920	0.2407	105.0	0.0656	0.3063	0.291714
*	0.0014750	0.7375	500.0	*	*	*
0.001000	0.0015500	0.2325	150.0	0.0375	0.2700	0.180000
0.002750	0.0014250	0.7125	500.0	0.3438	1.0562	0.211240
0.000625	*	*	100.0	0.0156	*	*
0.002500	0.0026050	0.3908	150.0	0.0938	0.4845	0.323000
*	0.0015630	0.3751	240.0	*	*	*
0.001500	0.0015000	0.2250	150.0	0.0563	0.2813	0.187533
0.000625	0.0011700	0.1404	120.0	0.0188	0.1592	0.132667
0.001000	*	*	250.0	0.0625	*	*
0.002500	0.0010750	0.2688	250.0	0.1563	0.4250	0.170000
0.001000	*	*	250.0	0.0625	*	*
0.002500	*	*	100.0	0.0625	*	*
0.000625	*	*	150.0	0.0234	*	*
0.002250	*	*	180.0	0.1013	*	*
0.001875	0.0013130	1.1817	900.0	0.4219	1.6036	0.178178
0.002500	0.0013750	0.6875	500.0	0.3125	1.0000	0.200000
0.001500	0.0007500	1.1250	1500.0	0.5625	1.6875	0.112500

Appendix 7.3 ROA data and results for scenario 4

M marg %	U cost %	U cost x draw -down $	Draw -down $	M marg/4 x draw -down $	Total value $	ROA %
0.002250	0.0018330	0.2749	150.0	0.0844	0.3593	0.239533
0.003375	*	*	775.0	0.6539	*	*
0.002500	0.0024080	0.2167	90.0	0.0563	0.2729	0.303222
0.002500	0.0006430	0.1608	250.0	0.1563	0.3171	0.126840
0.002500	*	*	*	*	*	*
0.002500	0.0015830	0.0712	45.0	0.0281	0.0993	0.220667
0.001000	0.0015750	0.2362	150.0	0.0375	0.2737	0.182467
0.002000	0.0013750	0.5500	400.0	0.2000	0.7500	0.187500
0.001750	0.0012500	0.2188	175.0	0.0766	0.2954	0.168800
0.000750	0.0012500	0.6250	500.0	0.0938	0.7187	0.143740
0.000625	*	*	200.0	0.0313	*	*
0.000750	0.0008350	0.4175	500.0	0.0938	0.5113	0.102260
0.007500	*	*	25.0	0.0469	*	*
0.001750	0.0017850	0.8925	500.0	0.2188	1.1113	0.222260
0.001500	0.0018330	1.0998	600.0	0.2250	1.3248	0.220800
0.001000	0.0016000	0.1920	120.0	0.0300	0.2220	0.185000
0.000400	0.0003125	0.1563	500.0	0.0500	0.2063	0.041260
0.001500	*	*	175.0	0.0656	*	*
0.002500	0.0012000	0.1500	125.0	0.0781	0.2281	0.182480
0.003000	0.0012750	0.6375	500.0	0.3750	1.0125	0.202500
0.002500	*	*	500.0	0.3125	*	*
0.001000	*	*	150.0	0.0375	*	*
0.001000	*	*	1625.0	0.4063	*	*
0.000500	0.0014290	0.2500	175.0	0.0219	0.2719	0.155371
0.001875	*	*	78.0	0.0366	*	*
0.002500	*	*	240.0	0.1500	*	*
0.001250	0.0010000	4.0000	4000.0	1.2500	5.2500	0.131250
0.002500	0.0009380	0.1407	150.0	0.0938	0.2344	0.156267
0.001500	0.0022680	6.3504	2800.0	1.0500	7.4004	0.264300
0.002000	0.0013750	1.0312	750.0	0.3750	1.4062	0.187493
0.003250	0.0011430	0.6001	525.0	0.4266	1.0267	0.195562
0.003000	*	*	66.0	0.0495	*	*
0.001000	*	*	350.0	0.0875	*	*
0.002000	0.0013930	0.4876	350.0	0.1750	0.6626	0.189314
0.001875	0.0007250	0.5437	750.0	0.3516	0.8953	0.119373
0.001875	0.0009500	0.3562	375.0	0.1758	0.5320	0.141867
0.001250	0.0013330	0.3999	300.0	0.0938	0.4936	0.164533
0.001250	*	*	140.0	0.0437	*	*
0.001250	0.0015000	0.3375	225.0	0.0703	0.4078	0.181244
0.002500	0.0025000	1.2500	500.0	0.3125	1.5625	0.312500
0.002500	0.0017190	0.3438	200.0	0.1250	0.4688	0.234400
0.003750	*	*	310.0	0.2906	*	*
0.002500	*	*	150.0	0.0938	*	*
0.001875	0.0007500	0.2813	375.0	0.1758	0.4571	0.121893
0.001875	0.0006960	0.3167	455.0	0.2133	0.5300	0.116484

Appendix 7.3 ROA data and results for scenario 4

M marg %	U cost %	U cost x draw -down $	Draw -down $	M marg/4 x draw -down $	Total value $	ROA %
0.001500	0.0014500	1.0875	750.0	0.2813	1.3687	0.182493
0.002500	*	*	335.0	0.2094	*	*
0.002500	0.0011790	0.8253	700.0	0.4375	1.2628	0.180400
0.001875	0.0007500	0.8438	1125.0	0.5273	1.3711	0.121876
0.001000	*	*	400.0	0.1000	*	*
0.001000	0.0012000	0.6000	500.0	0.1250	0.7250	0.145000
0.001875	0.0007125	0.4453	625.0	0.2930	0.7383	0.118128
0.001250	0.0007400	2.9600	4000.0	1.2500	4.2100	0.105250
0.003000	0.0011250	3.5438	3150.0	2.3625	5.9063	0.187502
0.003500	0.0015000	1.5000	1000.0	0.8750	2.3750	0.237500
0.002000	0.0031000	0.3875	125.0	0.0625	0.4500	0.360000
0.002000	0.0014000	5.0400	3600.0	1.8000	6.8400	0.190000
0.001725	0.0013250	0.9938	750.0	0.3234	1.3172	0.175627
0.002000	0.0013930	1.4626	1050.0	0.5250	1.9876	0.189295
0.001875	0.0010420	0.0938	90.0	0.0422	0.1360	0.151111
0.002500	0.0008500	0.2657	312.5	0.1953	0.4610	0.147520
*	*	*	180.0	*	*	*
0.002500	0.0012500	0.3188	255.0	0.1594	0.4782	0.187529
0.002200	0.0009750	0.4875	500.0	0.2750	0.7625	0.152500
0.001500	0.0005630	0.4223	750.0	0.2813	0.7036	0.093813
0.001563	0.0010260	0.5130	500.0	0.1954	0.7084	0.141680
0.001250	0.0014820	1.0374	700.0	0.2188	1.2562	0.179457
0.001000	0.0009640	0.5061	525.0	0.1313	0.6374	0.121410
0.001875	0.0007250	0.4531	625.0	0.2930	0.7461	0.119376
0.001500	0.0009000	0.2813	312.5	0.1172	0.3985	0.127520
0.001250	0.0005200	1.8200	3500.0	1.0937	2.9138	0.083251
0.003750	0.0013320	1.3986	1050.0	0.9844	2.3830	0.226952
0.001000	0.0013750	2.7500	2000.0	0.5000	3.2500	0.162500
0.002250	0.0019750	12.8375	6500.0	3.6562	16.4937	0.253749
0.002000	0.0010000	1.8000	1800.0	0.9000	2.7000	0.150000
0.002000	*	*	250.0	0.1250	*	*
0.001875	0.0008650	0.8650	1000.0	0.4688	1.3338	0.133380
0.001250	*	*	150.0	0.0469	*	*
0.002000	0.0008180	0.1125	137.5	0.0688	0.1813	0.131855
0.001250	0.0011250	1.1250	1000.0	0.3125	1.4375	0.143750
0.001375	*	*	1000.0	0.3438	*	*
0.001750	0.0010800	1.0800	1000.0	0.4375	1.5175	0.151750
0.002500	*	*	168.0	0.1050	*	*
0.001000	0.0009510	0.3567	375.0	0.0938	0.4505	0.120133
0.001250	0.0009000	0.4590	510.0	0.1594	0.6184	0.121255
0.003000	*	*	218.8	0.1641	*	*
0.001500	0.0012080	1.0872	900.0	0.3375	1.4247	0.158300
0.003750	*	*	1040.0	0.9750	*	*
0.002000	0.0011650	1.0194	875.0	0.4375	1.4569	0.166503
0.005000	*	*	500.0	0.6250	*	*

Appendix 7.3 ROA data and results for scenario 4

M marg %	U cost %	U cost x draw -down $	Draw -down $	M marg/4 x draw -down $	Total value $	ROA %
0.002750	*	*	1100.0	0.7563	*	*
0.003250	*	*	150.0	0.1219	*	*
0.001000	*	*	630.0	0.1575	*	*
0.002500	0.0018570	3.8997	2100.0	1.3125	5.2122	0.248200
0.004500	*	*	105.0	0.1181	*	*
0.002500	0.0011430	0.3000	262.5	0.1641	0.4641	0.176800
0.002500	*	*	135.0	0.0844	*	*
0.001000	0.0014500	0.3190	220.0	0.0550	0.3740	0.170000
0.001875	0.0008250	0.5156	625.0	0.2930	0.8086	0.129376
0.002500	*	*	2000.0	1.2500	*	*
0.002500	*	*	1000.0	0.6250	*	*
0.003500	0.0014100	2.1150	1500.0	1.3125	3.4275	0.228500
0.001750	0.0014250	1.0688	750.0	0.3281	1.3969	0.186253
0.002500	0.0007780	1.9606	2520.0	1.5750	3.5356	0.140302
0.002500	*	*	500.0	0.3125	*	*
0.005500	*	*	300.0	0.4125	*	*
0.007500	*	*	828.8	1.5539	*	*
0.002500	0.0016670	0.1000	60.0	0.0375	0.1375	0.229167
0.001000	0.0014690	0.1763	120.0	0.0300	0.2063	0.171917
0.002000	0.0012125	2.4250	2000.0	1.0000	3.4250	0.171250
0.002750	0.0013750	1.8768	1365.0	0.9384	2.8152	0.206242
0.001750	0.0008000	0.5600	700.0	0.3063	0.8663	0.123757
0.003750	*	*	1200.0	1.1250	*	*
0.003500	*	*	1600.0	1.4000	*	*
0.003250	0.0014380	0.4314	300.0	0.2437	0.6751	0.225033
0.002000	*	*	50.0	0.0250	*	*
0.001250	*	*	100.0	0.0313	*	*
0.001500	*	*	700.0	0.2625	*	*
0.001563	*	*	250.0	0.0977	*	*
0.002000	0.0011000	0.2420	220.0	0.1100	0.3520	0.160000
0.002000	*	*	375.0	0.1875	*	*
0.001250	0.0012500	0.4688	375.0	0.1172	0.5860	0.156267
0.003000	0.0010210	0.3829	375.0	0.2813	0.6641	0.177093
0.002000	0.0011500	1.1500	1000.0	0.5000	1.6500	0.165000
0.002500	0.0010050	0.3266	325.0	0.2031	0.5297	0.162985
0.002750	*	*	2100.0	1.4438	*	*
0.002500	0.0008930	0.6876	770.0	0.4813	1.1689	0.151805
0.002500	*	*	300.0	0.1875	*	*
0.001875	0.0014170	0.3231	228.0	0.1069	0.4300	0.188597
0.005500	0.0020070	1.2794	637.5	0.8766	2.1560	0.338196
0.002000	0.0013700	0.9590	700.0	0.3500	1.3090	0.187000
0.001875	0.0007950	0.2584	325.0	0.1523	0.4107	0.126369
0.002500	0.0016070	1.2374	770.0	0.4813	1.7187	0.223208
0.003000	*	*	375.0	0.2813	*	*
0.001500	0.0010250	0.3075	300.0	0.1125	0.4200	0.140000

Appendix 7.3 ROA data and results for scenario 4

M marg %	U cost %	U cost x draw -down $	Draw -down $	M marg/4 x draw -down $	Total value $	ROA %
0.001250	0.0011030	7.7210	7000.0	2.1875	9.9085	0.141550
0.003500	0.0023570	5.2797	2240.0	1.9600	7.2397	0.323201
0.001250	0.0006960	0.2436	350.0	0.1094	0.3530	0.100857
0.002500	0.0012500	*	*	*	*	*
0.001875	0.0014060	*	*	*	*	*
0.002500	*	*	300.0	0.1875	*	*
0.001250	0.0014170	0.4251	300.0	0.0938	0.5189	0.172967
0.003000	0.0016000	0.5600	350.0	0.2625	0.8225	0.235000
0.003500	0.0023750	0.3562	150.0	0.1312	0.4875	0.325000
0.001875	0.0008750	0.8750	1000.0	0.4688	1.3437	0.134370
0.003750	0.0014000	0.3500	250.0	0.2344	0.5844	0.233760
0.003750	0.0025000	0.2750	110.0	0.1031	0.3781	0.343727
0.001500	*	*	500.0	0.1875	*	*
0.002000	0.0014250	0.7125	500.0	0.2500	0.9625	0.192500
0.003500	*	*	250.0	0.2188	*	*
0.001250	0.0011700	1.4040	1200.0	0.3750	1.7790	0.148250
0.002250	0.0012000	1.3200	1100.0	0.6188	1.9388	0.176255
0.002500	0.0009380	1.6415	1750.0	1.0937	2.7352	0.156297
0.001500	0.0012000	0.4500	375.0	0.1406	0.5906	0.157493
0.000625	*	*	140.0	0.0219	*	*
0.001250	0.0012670	0.1140	90.0	0.0281	0.1421	0.157889
0.001000	0.0008330	0.1250	150.0	0.0375	0.1625	0.108333
0.001250	0.0013750	1.2031	875.0	0.2734	1.4765	0.168743
0.001500	*	*	500.0	0.1875	*	*
0.001000	*	*	625.0	0.1563	*	*
0.001750	0.0010310	0.8661	840.0	0.3675	1.2336	0.146857
0.001500	*	*	80.0	0.0300	*	*
0.001500	0.0008910	0.8019	900.0	0.3375	1.1394	0.126600
0.001750	*	*	500.0	0.2188	*	*
0.002500	0.0015000	0.5250	350.0	0.2188	0.7437	0.212486
0.000875	*	*	150.0	0.0328	*	*
0.002250	0.0014580	4.3740	3000.0	1.6875	6.0615	0.202050
0.000750	0.0040310	4.5147	1120.0	0.2100	4.7247	0.421848
0.002625	0.0017500	0.5250	300.0	0.1969	0.7219	0.240633
0.001250	*	*	150.0	0.0469	*	*
0.001200	*	*	300.0	0.0900	*	*
0.002000	0.0009560	0.4684	490.0	0.2450	0.7134	0.145592
0.006250	0.0022920	0.1719	75.0	0.1172	0.2891	0.385467
0.002000	*	*	1500.0	0.7500	*	*
0.002000	*	*	1000.0	0.5000	*	*
0.002000	*	*	210.0	0.1050	*	*
0.001750	0.0011000	0.3300	300.0	0.1312	0.4613	0.153767
0.000563	*	*	54.0	0.0076	*	*
0.002500	0.0016670	0.1250	75.0	0.0469	0.1719	0.229200
0.001500	*	*	770.0	0.2888	*	*

Appendix 7.3 ROA data and results for scenario 4

M marg %	U cost %	U cost x draw -down $	Draw -down $	M marg/4 x draw -down $	Total value $	ROA %
0.001250	*	*	50.0	0.0156	*	*
0.001875	0.0007710	1.1025	1430.0	0.6703	1.7728	0.123972
0.003000	0.0016670	0.2150	129.0	0.0967	0.3117	0.241628
0.003500	*	*	100.0	0.0875	*	*
0.002500	0.0013250	0.3975	300.0	0.1875	0.5850	0.195000
0.001000	*	*	540.0	0.1350	*	*
0.002000	0.0011570	4.8594	4200.0	2.1000	6.9594	0.165700
0.002000	0.0011070	0.3100	280.0	0.1400	0.4500	0.160714
0.002500	0.0016670	0.1250	75.0	0.0469	0.1719	0.229200
0.003000	0.0042500	1.8063	425.0	0.3187	2.1251	0.500023
0.001000	0.0007750	0.3875	500.0	0.1250	0.5125	0.102500
0.004250	*	*	1680.0	1.7850	*	*
0.001875	0.0006250	0.1062	170.0	0.0797	0.1859	0.109353
0.002000	0.0011250	0.5625	500.0	0.2500	0.8125	0.162500
0.002500	*	*	90.0	0.0563	*	*
0.001000	0.0009380	0.2345	250.0	0.0625	0.2970	0.118800
0.001500	0.0007750	0.9687	1250.0	0.4688	1.4375	0.115000
*	0.0021250	0.1381	65.0	*	*	*
0.001250	*	*	362.5	0.1133	*	*
0.001875	*	*	350.0	0.1641	*	*
0.001875	*	*	225.0	0.1055	*	*
0.001500	0.0006500	0.3250	500.0	0.1875	0.5125	0.102500
0.001375	0.0006630	1.6575	2500.0	0.8594	2.5169	0.100676
0.002500	0.0009750	1.1310	1160.0	0.7250	1.8560	0.160000
0.001875	0.0011000	0.2750	250.0	0.1172	0.3922	0.156880
0.001500	0.0011250	1.1250	1000.0	0.3750	1.5000	0.150000
0.001500	0.0007750	0.3875	500.0	0.1875	0.5750	0.115000
0.003000	0.0020000	0.9000	450.0	0.3375	1.2375	0.275000
0.001500	*	*	550.0	0.2063	*	*
0.001250	*	*	*	*	*	*
0.004000	0.0020000	0.3600	180.0	0.1800	0.5400	0.300000
0.002500	0.0007070	1.5908	2250.0	1.4062	2.9971	0.133204
0.002000	0.0014070	1.1256	800.0	0.4000	1.5256	0.190700
0.001750	0.0006820	0.9548	1400.0	0.6125	1.5673	0.111950
0.001500	*	*	500.0	0.1875	*	*
0.001250	0.0011250	0.5062	450.0	0.1406	0.6468	0.143733
0.001250	0.0014580	0.1312	90.0	0.0281	0.1593	0.177000
0.002500	0.0016670	0.1250	75.0	0.0469	0.1719	0.229200
0.005000	0.0009500	0.2850	300.0	0.3750	0.6600	0.220000
0.002500	*	*	100.0	0.0625	*	*
0.002000	0.0011700	0.3510	300.0	0.1500	0.5010	0.167000
0.002000	0.0013300	0.4988	375.0	0.1875	0.6863	0.183013
0.001750	0.0011430	0.2880	252.0	0.1103	0.3982	0.158016
0.001500	*	*	240.0	0.0900	*	*
0.002500	0.0007440	1.5624	2100.0	1.3125	2.8749	0.136900

Appendix 7.3 ROA data and results for scenario 4

M marg %	U cost %	U cost x draw -down $	Draw -down $	M marg/4 x draw -down $	Total value $	ROA %
0.001750	0.0007250	0.1631	225.0	0.0984	0.2615	0.116222
0.004000	0.0026250	0.5906	225.0	0.2250	0.8156	0.362489
0.001875	0.0011070	1.4335	1295.0	0.6070	2.0405	0.157568
0.003000	*	*	300.0	0.2250	*	*
0.002250	0.0014000	3.5000	2500.0	1.4062	4.9062	0.196248
0.003500	*	*	1600.0	1.4000	*	*
0.003250	0.0019250	0.9625	500.0	0.4063	1.3687	0.273740
0.003250	0.0014820	1.0374	700.0	0.5687	1.6062	0.229457
0.001750	0.0023410	3.2188	1375.0	0.6016	3.8204	0.277847
0.001500	0.0008500	0.5312	625.0	0.2344	0.7656	0.122496
0.002370	*	*	1050.0	0.6221	*	*
0.003750	0.0020000	0.3600	180.0	0.1688	0.5288	0.293778
0.008500	0.0065000	1.2187	187.5	0.3984	1.6171	0.862453
0.002500	0.0011500	1.1500	1000.0	0.6250	1.7750	0.177500
0.001750	0.0013930	0.2925	210.0	0.0919	0.3844	0.183048
0.000625	0.0009050	0.6787	750.0	0.1172	0.7959	0.106120
0.003000	0.0012500	0.9375	750.0	0.5625	1.5000	0.200000
0.000500	*	*	1600.0	0.2000	*	*
0.001500	0.0008000	0.4400	550.0	0.2063	0.6463	0.117509
0.002000	*	*	525.0	0.2625	*	*
0.001875	0.0006250	0.0562	90.0	0.0422	0.0984	0.109333
0.003450	0.0008880	1.0656	1200.0	1.0350	2.1006	0.175050
0.003500	0.0012750	2.2313	1750.0	1.5312	3.7626	0.215006
0.004500	0.0016700	1.3360	800.0	0.9000	2.2360	0.279500
0.002750	0.0012500	1.2000	960.0	0.6600	1.8600	0.193750
0.001750	0.0010800	0.6750	625.0	0.2734	0.9484	0.151744
0.003000	0.0015750	1.1812	750.0	0.5625	1.7437	0.232493
0.002000	*	*	925.0	0.4625	*	*
0.001200	*	*	*	*	*	*
0.001500	0.0012000	0.4500	375.0	0.1406	0.5906	0.157493
0.001250	0.0013210	*	*	*	*	*
0.004000	*	*	1875.0	1.8750	*	*
0.001750	*	*	750.0	0.3281	*	*
0.002000	0.0013750	0.2406	175.0	0.0875	0.3281	0.187486
0.002250	0.0012000	0.6000	500.0	0.2813	0.8813	0.176260
0.002500	*	*	1750.0	1.0937	*	*
0.001875	*	*	1250.0	0.5859	*	*
*	0.0011670	0.2101	180.0	*	*	*
0.001000	0.0008930	0.4689	525.0	0.1313	0.6001	0.114305
0.002500	0.0012000	0.3000	250.0	0.1563	0.4563	0.182520
0.001500	0.0010660	2.5584	2400.0	0.9000	3.4584	0.144100
0.005000	0.0011270	*	*	*	*	*
0.002500	0.0009580	0.2874	300.0	0.1875	0.4749	0.158300
0.010000	*	*	625.0	1.5625	*	*
0.001500	0.0011070	2.3247	2100.0	0.7875	3.1122	0.148200

Appendix 7.3 ROA data and results for scenario 4

M marg %	U cost %	U cost x draw -down $	Draw -down $	M marg/4 x draw -down $	Total value $	ROA %
0.001125	0.0007000	0.7280	1040.0	0.2925	1.0205	0.098125
0.000800	0.0004640	0.6496	1400.0	0.2800	0.9296	0.066400
0.001000	*	*	1000.0	0.2500	*	*
0.001250	0.0006060	*	*	*	*	*
0.000563	0.0007750	0.4069	525.0	0.0739	0.4808	0.091581
0.002500	0.0014370	0.8047	560.0	0.3500	1.1547	0.206196
0.001750	0.0007030	0.7142	1016.0	0.4445	1.1587	0.114045
0.001500	*	*	710.0	0.2663	*	*
0.002000	0.0013000	*	*	*	*	*
0.002500	0.0011250	1.1250	1000.0	0.6250	1.7500	0.175000
0.002500	0.0011250	0.5625	500.0	0.3125	0.8750	0.175000
0.002250	0.0008570	1.1998	1400.0	0.7875	1.9873	0.141950
0.002000	0.0008250	0.2063	250.0	0.1250	0.3313	0.132520
0.002250	*	*	120.0	0.0675	*	*
0.002500	0.0015000	0.2850	190.0	0.1187	0.4038	0.212526
0.001000	0.0005875	0.2937	500.0	0.1250	0.4187	0.083740
0.001500	*	*	625.0	0.2344	*	*
0.001500	0.0011750	0.2056	175.0	0.0656	0.2712	0.154971
0.001500	0.0006190	0.1950	315.0	0.1181	0.3131	0.099397
0.005000	*	*	1750.0	2.1875	*	*
0.005000	*	*	1190.0	1.4875	*	*
0.001250	*	*	2485.0	0.7766	*	*
0.001500	0.0010800	0.3078	285.0	0.1069	0.4147	0.145509
0.001500	*	*	350.0	0.1312	*	*
0.001750	0.0014000	0.7000	500.0	0.2188	0.9187	0.183740
0.002500	0.0020750	1.5562	750.0	0.4688	2.0250	0.270000
0.001500	0.0008750	0.4375	500.0	0.1875	0.6250	0.125000

CHAPTER 8

MEASURING THE FINACIAL RETURN TO UNDERWRITING BANKS ON A RETURN ON EXPOSURE METHODOLOGY: THE IMPLICATIONS FOR SYSTEMIC RISK

8.1 Introduction

The aim of this chapter is to determine whether the returns to underwriting banks in the euronote market are adequate to compensate for the risks incurred measured by a return on exposure (ROX) methodology. If returns are found to be adequate under the funding scenarios chosen, this might provide support for the view that the growth of the euronote market has not contributed to an increase in systemic risk. If the returns to the market are found to be inadequate, this might, conversely, provide support for the view that the growth of the euronote market has contributed to an increase in systemic risk.

The methodology employed in this chapter to calculate the return to underwriting banks in the euronote market is a return on exposure (ROX) technique found to be employed in the market mainly by the large bank respondents, and favoured by the Bank of England. ROX is different to ROA where all fees are applied only to those assets actually funded. Under ROX all fees are applied to the exposure of the underwriter to the borrower. ROX recognises that even where an underwriter is only called upon to fund a portion of the facility he is still exposed to the possibility of being called upon tomorrow to fund the facility in its entirety. The facility fee is paid to compensate the underwriter not just for his exposure to what he has already funded but also to what he may be called upon to fund under the terms of the contract. All front-end fees and facility fees (undrawn cost) are calculated for each year on the full amount of the facility (as with ROA), but are then divided by the number of years of the facility to give the return on exposure each year (unlike ROA where all front-end fees and facility fees are multiplied by the number of years and then simply applied to the amount drawn for a particular length of time). Under an ROX methodology all maximum margins are calcuated for the number of years that the facility is drawn (as with ROA), but are then divided by the number of years of the facility to provide a per annum return on exposure (unlike ROA where all maximum margins are simply multiplied by the number of years and then applied to the amount drawn for a particular length of time). Finally, under an ROX methodology, all fees are applied to the yearly exposure of the facility as opposed to the drawdown of the facility. The methodology of ROX will become more apparent as each funding scenario is conducted on an ROX basis.

Our standard of adequacy will remain at 0.5 per cent return, this time on exposure not just funded assets where the facility is drawn, and 0.25 per cent only where the facility is never drawn. The funding strategies are the same as those employed in the previous chapter, namely:

1 If all funds were drawn at the end of the first month and the underwriter was forced to continue to fund until the maturity of the facility (worst case scenario)
2 If no funds were drawn (best case scenario)
3 If all funds were drawn for a period of one year throughout the life of the facility
4 If all funds were drawn once each year for a three month period only
5 If 50 per cent of the facility was drawn once each year for a three month period only

8.2 The Return on Exposure Scenarios: Methodology and Presentation of Results

The following scenarios make use of the same total market pricing data used in the previous chapter. Unlike the previous chapter, however, the scenarios are conducted on an ROX, not an ROA basis. It will be argued that ROX provides a more relevant methodology with which to calculate the financial return to the underwriting banks in a euronote facility. As emphasised in Chapter 6, ROX (like ROA) is not a proxy for IRR. The underwriter has no choice over his funding strategy. This is wholly determined by uncertain market conditions. Also, a higher ROX under one scenario does not necessarily indicate that this scenario is preferable to another as it may be that higher risk is also faced in such a scenario. The standard of adequacy is only a guideline below which market practitioners would accept systemic risk may be increased.

8.2.1 Scenario 1 (ROX)

The computation of ROX for the first (worst case) scenario (where all funds are drawn at the end of the first month and not paid back until the maturity of the facility) follows exactly the same procedure as ROA for the same scenario in the previous chapter.

$$\text{ROX} = \frac{\text{(front-end fees + facility fees + maximum margins)} \times \text{yearly exposure}}{\text{yearly exposure}} \times \frac{100}{1} \qquad \ldots (8.1)$$

$$= \text{undrawn cost} + \text{maximum margin} \times \frac{100}{1} \qquad \ldots (8.2)$$

$$= \text{fully drawn cost} \times \frac{100}{1} \qquad \ldots (8.3)$$

The 'yearly exposure' used in this scenario is equivalent to the 'committed value' used in the ROA computation of the same scenario in the previous chapter. Both cancel out.

Since the formula for calculating an ROX under this scenario is exactly the same as the formula used to calculate an ROA under the same scenario in the previous chapter, and the formula is being applied to the same data, the return will also be the same, 0.32824 per cent. The return to the euronote market under this worst case scenario (where the entire market is required to fund fully its commitments until maturity) appears to be inadequate - measured by our standard of adequacy of a return of 0.5 per cent - on both an ROA and an ROX basis.

However, by using an ROA methodology to calculate the return to underwriting banks, it is possible to get returns of both higher and lower than this 'worst case' rate under different funding scenarios. It will soon become clear that a 'worst case' return of 0.32824 per cent is the highest return possible under an ROX methodology. Under an ROX methodology the more the underwriters have to fund, and the longer they are asked to fund, the higher will be their ROX up to a maximum ROX of 0.32824 per cent.

In conclusion to this scenario, we would argue that on a worst case basis (where the entire market is required to fund fully its commitments until maturity) the per annum return on exposure of 0.32824 per cent appears to be inadequate to compensate for the risks incurred. In this sense, systemic risk may be increased.

8.2.2 Scenario 2 (ROX)

To compute the second (best case) scenario (where no funds are drawn), only the front-end fees and facility fees had to be calculated for each facility (as was the case for the ROA methodology for the same scenario in the previous chapter). Again, these are the only fees that the underwriter receives if he never has to fund his commitment. These fees were then added together to give the total undrawn cost for each individual facility (figures presented in the fourth column of Table 7.1). So far, the methodolgy for calculating the ROX for the euronote market under this scenario is exactly the same as the methodology employed to calculate the ROA for the euronote market under the same scenario in the previous chapter. The next step in the ROA methodology was to multiply the undrawn cost by the committed amount to give an average 'monetary' return per annum for the euronote market when no assets are funded. To provide a percentage ROA, however, under the ROA methodology, the column depicting undrawn cost X amount (column 5 in Table 7.1) has to be applied to those assets actually funded. Since no assets are funded under this scenario this left us with an infinite ROA. Under an ROX methodology, however, all returns are applied not to assets funded but to yearly exposure. Yearly exposure is the same as the committed amount. The formula for calculating the ROX under this scenario can thus be written:

$$\text{ROX} = \frac{\text{front-end fees + facility fees x yearly exposure}}{\text{yearly exposure}} \times \frac{100}{1} \qquad \ldots (8.4)$$

$$= \text{undrawn cost} \times \frac{100}{1} \qquad \ldots (8.5)$$

For expositional purposes the first four columns of Table 7.1 are reprinted below in Table 8.1. The ROX for the market is computed simply by taking a mean of column 4 (front-end fees + facility fees). This leaves us with an ROX under this (best case) scenario of 0.12438 per cent, as compared to an infinite ROA under this scenario in the previous chapter.

Table 8.1 Computation of return on exposure when no funds are drawn

Amount $m	Years	Maximum margin %	Front-end fee + facility fee %
80.0	3.0	0.001250	0.001000
50.0	15.0	0.001000	0.000792
125.0	3.0	0.002000	0.000667
100.0	5.0	0.001250	0.002400
...	...	...	...
...	...	...	...
150.0	5.0	0.002500	0.0020750
250.0	2.0	0.001500	0.0008750
MEAN 159.40	5.4443	0.0021291	0.0012438

In conclusion to this scenario, we would argue that on a best case basis (where no assets are funded) using an ROX methodology, the per annum ROX to the euronote market appears to be inadequate to compensate for the risks incurred (as measured by our standard of adequacy of 0.25 per cent ROX). Even where no assets are funded, an ROX of 0.12438 per cent per annum appears to be dangerously low for a market which is exposed to the possibility of having to fund over US $61 billion each year. With such low returns (given a 0.5 per cent capital cost), it is unlikely that capital could be accumulated to provide against potential losses. In this sense systemic risk may be increased.

8.2.3 Scenario 3 (ROX)

To compute the third scenario on an ROX basis (where all funds are drawn for a period of one year throughout the life of the facility), the front-end fee, facility fee, maximum margin, total committed value and maturity were calculated for each facility (as was the case with the ROA methodology for the same scenario in the previous chapter).

With the ROX methodology all front-end fees and facility fees are applied to exposure not just assets funded. In other words, the front-end fees and facility fees are added together and multiplied by the exposure each year (same as the committed value) and then divided by the yearly exposure to give a per annum ROX. Not surprisingly, it may seem futile to multiply a figure by a number and then divide it by the same number. The result is the same as if the figure was in no way amended. The procedure is simply related to show the reader that under an ROX methodology it is not sufficient simply to multiply the undrawn cost (front-end fees and facility fees) by the number of years of the facility, and then apply that number to the assets funded. This will invariably provide an inflated return. It will become clear that under the ROX methodology, the undrawn ROX is always the same under any scenario.

In a similar way, the maximum margins are multiplied by the amount of assets funded (as was the case with the ROA methodology) but are then divided by the number of years of the facility to provide a per annum ROX. The formula for calculating the ROX under this scenario (where all funds are drawn for a period of one year throughout the life of the facility) is as follows:

$$\text{ROX} = \frac{(\text{front-end fees} + \text{facility fees} \times \text{exposure}) + (\text{maximum margins} \times \text{assets funded divided by years})}{\text{exposure}} \times \frac{100}{1} \quad \ldots (8.6)$$

$$= \frac{(\text{undrawn cost} \times \text{exposure}) + (\text{maximum margins} \times \text{assets funded divided by years})}{\text{exposure}} \times \frac{100}{1} \quad \ldots (8.7)$$

$$= \text{undrawn cost} + (\text{maximum margins} \times \text{assets funded divided by years}) \times \frac{100}{1} \quad \ldots (8.8)$$

In this scenario the assets funded are equivalent to the yearly exposure. So, for this particular scenario the formula can be reduced still further to read:

$$\text{ROX} = \text{undrawn cost} + \text{maximum margins divided by years} \times \frac{100}{1} \quad \ldots (8.9)$$

This formula was applied to the total market data. To present all of these data in the main text would, once again, have meant presenting data for 387 facilities. Again, this was not feasible. For expositional purposes, and in keeping with the presentation of data in the preceeding chapter, only the data and results for the first four facilities, the last two facilities and the mean for each complete column are shown in Table 8.2 (see Appendix 8.1 for the presentation of the complete table).

The final row provides us with the mean value of each column for the full market data (as presented in Appendix 8.1). The final column gives the ROX for each individual facility. The mean of this column provides us with the overall market ROX per annum of 0.16731 per cent.

On our standard of adequacy (an ROX of at least 0.5 per cent when funded), an ROX of 0.16731 per cent appears to be quite inadequate to compensate for the risks incurred and is even below our minimum standard of adequacy of 0.25 per cent for totally unfunded facilities. This conclusion, once more, contradicts the conclusion arrived at by applying an ROA methodology to the same scenario in the previous chapter.

The ROX methodology acknowledges that front-end fees and facility fees are not just paid as return for funding the facility; rather they are paid for the commitment to fund each year if and when required up to the exposure of the underwriter. As such they may not simply be applied only to those assets actually funded, but to the exposure of the underwriter per annum.

Table 8.2 Computation of return on exposure when all funds are drawn for a period of one year throughout the life of the facility

Amount (yearly exposure)	Years	Maximum margin	Front-end fee + facility fee	Front-end fee + facility fee x exposure	Maximum margin x assets funded divided by years	Total monetary value	ROX
$m		%	%	$m	$m	$m	%
80.0	3.0	0.001250	0.0010000	0.08000	0.033333	0.11333	0.141667
50.0	15.0	0.001000	0.0007920	0.03960	0.003333	0.04293	0.085867
125.0	3.0	0.002000	0.0006670	0.08337	0.083333	0.16671	0.133367
100.0	5.0	0.001250	0.0024000	0.24000	0.025000	0.26500	0.265000
...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...
150.0	5.0	0.002500	0.0020750	0.31125	0.075000	0.38625	0.257500
250.0	2.0	0.001500	0.0008750	0.21875	0.187500	0.40625	0.162500
MEAN 159.40	5.4443	0.0021291	0.0012438	0.19380	0.068400	0.26347	0.16731

Similarly, any returns received from the maximum margin on funding assets should be divided by the number of years of the facility to provide a return per annum.

In conclusion to this scenario, we would argue that (where all funds are drawn for a period of one year throughout the life of the facility) using an ROX methodology, the per annum ROX to the euronote market appears to be inadequate to compensate for the risks incurred. In this sense, systemic risk may be increased.

8.2.4 Scenario 4 (ROX)

To compute scenario 4 (where all funds are drawn once each year for a three month period only) the front-end fee, facility fee, maximum margin, total committed value and maturity were calculated for each facility (as was the case for the ROA methodology for the same scenario in the previous chapter).

As with the previous ROX scenarios, all front-end fees and facility fees are applied directly to yearly exposure. The maximum margins are multiplied by the amount of assets funded and then divided by the number of years of the facility to give a per annum return. This figure is then applied to exposure. Under this scenario, however, all funds are drawn only for a three-month period each year. The maximum margins have, therefore, to be calculated accordingly. The formula for calculating the ROX under this scenario is as follows:

$$\text{ROX} = \frac{\begin{array}{c}\text{(front-end fees + facility fees x exposure) + (maximum} \\ \text{margins divided by 4 x assets funded divided by years)}\end{array}}{\text{exposure}} \times \frac{100}{1} \quad \ldots (8.10)$$

$$= \text{undrawn cost} + (\text{maximum margin divided by } 4 \times \text{assets funded divided by years}) \times \frac{100}{1} \quad \ldots (8.11)$$

In this particular scenario all assets are funded each year for a three month period. Since the three month period is accounted for by dividing the maximum margins by 4, we can further reduce the formula if we take 'assets funded' as equivalent to assets funded on a per annum basis (which equates 'assets funded' to exposure in this scenario) and then eliminate 'years' from the numerator. The revised formula now reads:

$$\text{ROX} = \text{undrawn cost} + \text{maximum margins divided by } 4 \times \text{assets funded per annum} \times \frac{100}{1} \quad \ldots (8.12)$$

This formula was applied to the total market data. Again, it was not feasible to provide the data and results for 387 facilities in the main text. As before, only the data and results for the first four facilities, the last two facilities and the mean for each complete column are shown in Table 8.3 below (see Appendix 8.2 for the presentation of the complete table).

As with previous scenarios, the final row provides us with the mean value of each column for the complete market data (as presented in this case in Appendix 8.2). The final column gives the ROX for each individual facility. The mean of this column provides us with the overall market ROX per annum of 0.17526 per cent.

Table 8.3 **Computation of return on exposure where all funds are drawn once each year for a three month period only**

Amount (yearly exposure)	Years	Maximum margin	Front-end fee + facility fee	Front-end fee + facility fee x exposure	Maximum margin x assets funded divided by 4	Total monetary value	ROX
$m		%	%	$m	$m	$m	%
80.0	3.0	0.001250	0.0010000	0.08000	0.02500	0.10500	0.131250
50.0	15.0	0.001000	0.0007920	0.03960	0.01250	0.05210	0.104198
125.0	3.0	0.002000	0.0006670	0.08337	0.06250	0.14587	0.116696
100.0	5.0	0.001250	0.0024000	0.24000	0.03125	0.27125	0.271250
...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...
150.0	5.0	0.002500	0.0020750	0.31125	0.40500	0.40500	0.270000
250.0	2.0	0.001500	0.0008750	0.21875	0.31250	0.31250	0.125000
MEAN 159.40	5.4443	0.0021291	0.0012438	0.19380	0.28385	0.28385	0.17526

This is exactly the same as the return calculated under the ROA methodology for the same scenario in the previous chapter. It becomes more apparent, then, that under certain scenarios the returns calculated under the ROA methodology and the returns calculated under the ROX methodology will be the same. This will always be true where the entire facility is drawn at least once each year for the full duration of the facility.

One feature which is becoming apparent with the ROX methodology is that the more assets the market is asked to fund, and the longer the period of time over which the market is asked to fund, the higher will be the ROX to the market, up to a maximum ROX of 0.32824 per cent where all assets are funded for the entire duration of the facility. This is consistent in the sense that the greater risk the underwriter assumes through funding more assets, the greater is his return.

In conclusion to this scenario we would argue that (where all funds are drawn each year for a three month period only) using an ROX methodology, the per annum ROX to the euronote market of 0.17526 per cent appears to be inadequate, even against our undrawn standard adequacy, to compensate for the risks incurred. In this sense, systemic risk may be increased.

8.2.5 Scenario 5 (ROX)

To compute scenario 5 (where 50 per cent of the facility is drawn once each year for a three month period only), the front-end fee, facility fee, maximum margin, committed value and maturity were once more calculated for each facility.

This scenario will further emphasise one of the main conclusions of the previous scenario, that ROX takes into account both maturity and assets funded as well as exposure in its calculation of the financial return to underwriting banks.

It is not possible to equate the 'assets funded' category to 'exposure' (as we did in the previous scenario), because only 50 per cent of the facility is drawn each year for a three month period. The formula for this scenario must, therefore, be written:

$$\text{ROX} = \frac{\text{(front-end fees + facility fees x exposure) + (maximum margins divided by 4 x assets funded divided by years)}}{\text{exposure}} \times \frac{100}{1} \qquad \text{... (8.13)}$$

$$= \text{undrawn cost + (maximum margins divided by 4 x assets funded divided by years)} \times \frac{100}{1} \qquad \text{... (8.14)}$$

The formula was applied to the total market data. In keeping with the presentation of previous results, only the data and results for the first four facilities, the last two facilities and the mean for each complete column are presented in Table 8.4 below (see Appendix 8.3 for the presentation of the complete table).

Once more, the final row provides us with the mean value of each column for the complete market data. The final column gives the ROX for each individual facility.

Table 8.4 Computation of return on exposure where 50 per cent of the facility is drawn each year for a three month period only

Amount (yearly exposure) $m	Years	Maximum margin %	Front-end fee + facility fee $m	Front-end fee + facility fee x exposure $m	Maximum margin divided by 4 x assets funded divided by years $m	Total monetary value $m	ROX %
80.0	3.0	0.001250	0.0010000	0.08000	0.012500	0.09250	0.115625
50.0	15.0	0.001000	0.0007920	0.03960	0.006250	0.04585	0.091700
125.0	3.0	0.002000	0.0006670	0.08337	0.031250	0.11462	0.091696
100.0	5.0	0.001250	0.0024000	0.24000	0.015625	0.25563	0.255625
...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...
150.0	5.0	0.002500	0.0020750	0.31125	0.046875	0.35813	0.238750
250.0	2.0	0.001500	0.0008750	0.21875	0.046875	0.26562	0.106250
MEAN 159.40	5.4443	0.0021291	0.0012438	0.19380	0.042300	0.23944	0.14977

The mean of this column provides us with an overall market ROX per annum under this scenario of 0.14977 per cent. This figure is different to the return calculated under the ROA methodology for the same scenario in the previous chapter of 0.17526 per cent. The reason for the difference is that by applying fees to exposure as opposed to merely assets funded, ROX takes into account assets funded as well as maturity in its calculation of returns to underwriting banks.

In conclusion to this scenario we would argue that (where 50 per cent of funds are drawn each year for a three month period only) using an ROX methodology, the per annum ROX to the euronote market of 0.14977 per cent appears to be inadequate to compensate for the risks incurred. In this sense, systemic risk may be increased.

8.3 Summary and Conclusions

The results for scenarios 1 to 5 on an ROX basis are presented in Table 8.5 below.

Table 8.5 ROX for scenarios 1 to 5

Scenario		ROX (%)
1	(fully drawn)	0.32824
2	(no draw down)	0.12438
3	(drawn for 1 year)	0.16731
4	(fully drawn for 3 months of each year)	0.17526
5	(50 per cent drawn for 3 months of each year)	0.14977

What can be seen from Table 8.5 is that the ROX increases/falls as the amount of assets funded for a particular number of years increases/falls. In scenario 4, for instance, more assets are funded for a slightly longer period of time than in scenario 3. The ROX in scenario 4 is, therefore, slightly higher than in scenario 3. The reason it is not higher still is because in scenario 4 all assets are funded only for a three month period each year. Similarly the ROX for scenario 5 is below that for scenario 4 as only half the amount of assets are funded each year. The reason the ROX for scenario 5 is not exactly half of that for scenario 4 is that the amount of assets funded only affects the return attributable to the maximum margin and not the front-end fees or facility fees.

The ROX methodology reveals that underwriters in the euronote market are indeed rewarded for funding more assets over longer periods of time but only to a maximum ROX of 0.32824 per cent where all assets are funded for the full duration of the facility. Nor does the ROX ever fall below a market average of 0.12438 per cent where no assets are ever funded.

Again, a particularly disturbing result is that of scenario 1. An ROX (and ROA) of 0.32824 per cent seems to be totally inadequate as a market return in times of financial crisis which is the most likely time that such a scenario would come to fruition.

Although we do not claim our standard of adequacy (of 0.5 per cent return) to be a totally objective measure, even if it were to be reduced substantially, the returns in our ROX scenarios would still be inadequate. Furthermore, as emphasised in Chapter 4, many banks must now maintain capital measures up to 0.5 per cent against their euronote exposures. This, if factored in to the calculation would further reduce the bank's ROX.

ROX is also a more systematic method of calculating the financial return to an underwriter. If we compare the ROX results with the ROA results we can see that some of the ROA results are highly variable (see Table 8.6 below).

Table 8.6 ROA and ROX for Scenarios 1 to 5

Scenario		ROA %	ROX %
1	(fully drawn)	0.32824	0.32824
2	(no draw down)	$\propto$	0.12438
3	(drawn for 1 year)	0.88818	0.16731
4	(fully drawn for 3 months of each year)	0.17526	0.17526
5	(50 per cent drawn for 3 months of each year)	0.17526	0.14977

Both ROA and ROX methodologies provide the same results when the facilities are fully drawn. For other scenarios, however, results vary dramatically - in particular, the results of scenarios 2 and 3. By applying all fees just to assets funded, an infinite return on assets is possible under the ROA methodology. We believe this to be a dangerous flaw in the ROA methodology.

With ROX, all possible market returns will lie within a boundary of 0.12438 per cent (where no assets are funded) and 0.32824 per cent (where all assets are funded over the duration of the facility).

All ROX results are well below our standard of adequacy for this market. This would seem to add support to the hypothesis that the growth of the euronote market may contribute to an increase in systemic risk.

We have been dealing in this chapter and the previous chapters with total market data. As mentioned previously, however, the euronote market comprises three main sectors: the sovereign sector, the bank sector and the corporate sector. It is possible that returns in one or two of these sectors are pulling down overall market returns. In order to explore this hypothesis, the market data were broken down into their three respective sectors. Scenarios 1 to 5 were re-run once more on an ROX basis - first for the sovereign sector, then for the bank sector and finally for the corporate sector of the euronote market. The ROX results for these three sectors under the respective scenarios are displayed alongside the ROX results for the entire market in Table 8.7 below.

Table 8.7 ROX for entire market, sovereign sector, bank sector and corporate sector (for scenarios 1 to 5)

Scenario		Market	Sovereign	Bank	Corporate
1	(fully drawn)	0.32824	0.28444	0.31173	0.34180
2	(no draw down)	0.12438	0.09683	0.13680	0.12805
3	(drawn for 1 year)	0.16731	0.12754	0.17921	0.17402
4	(fully drawn for 3 months each year)	0.17526	0.14436	0.17990	0.18141
5	(50 per cent drawn for 3 months each year)	0.14977	0.12101	0.15793	0.15471

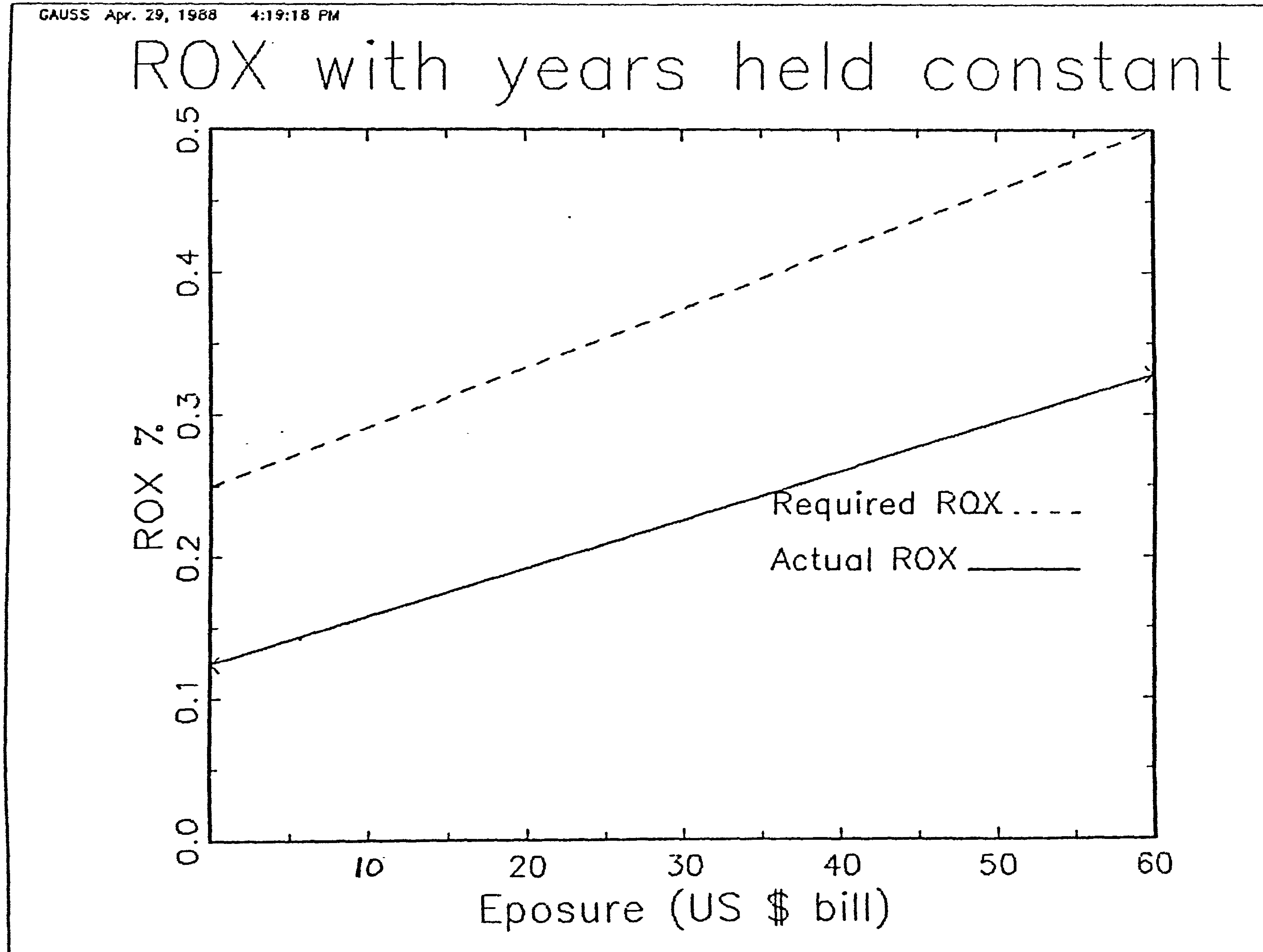
From Table 8.7 we can observe that the sovereign sector of the euronote market provides the least financial return to underwriting banks: always a few points below the market. Prices in the corporate sector, on the other hand, are always slightly above the market. Prices in neither of these sectors, however, appear to affect significantly overall market ROX. It would not be feasible to present all the data for the sovereign, corporate and bank sectors for scenarios 1 to 5 (even in an appendix). Data are, therefore, available on request.

We would conclude that (measured on an ROX basis) prices in the euronote market do not appear to be adequate sufficiently to compensate underwriters for the risks incurred when viewed outside the customer relationship. This 'underpricing' does not appear to be due to low prices in one sector of the market pulling down prices in other sectors. On this evidence, the growth of the euronote market may contribute to an increase in systemic risk.

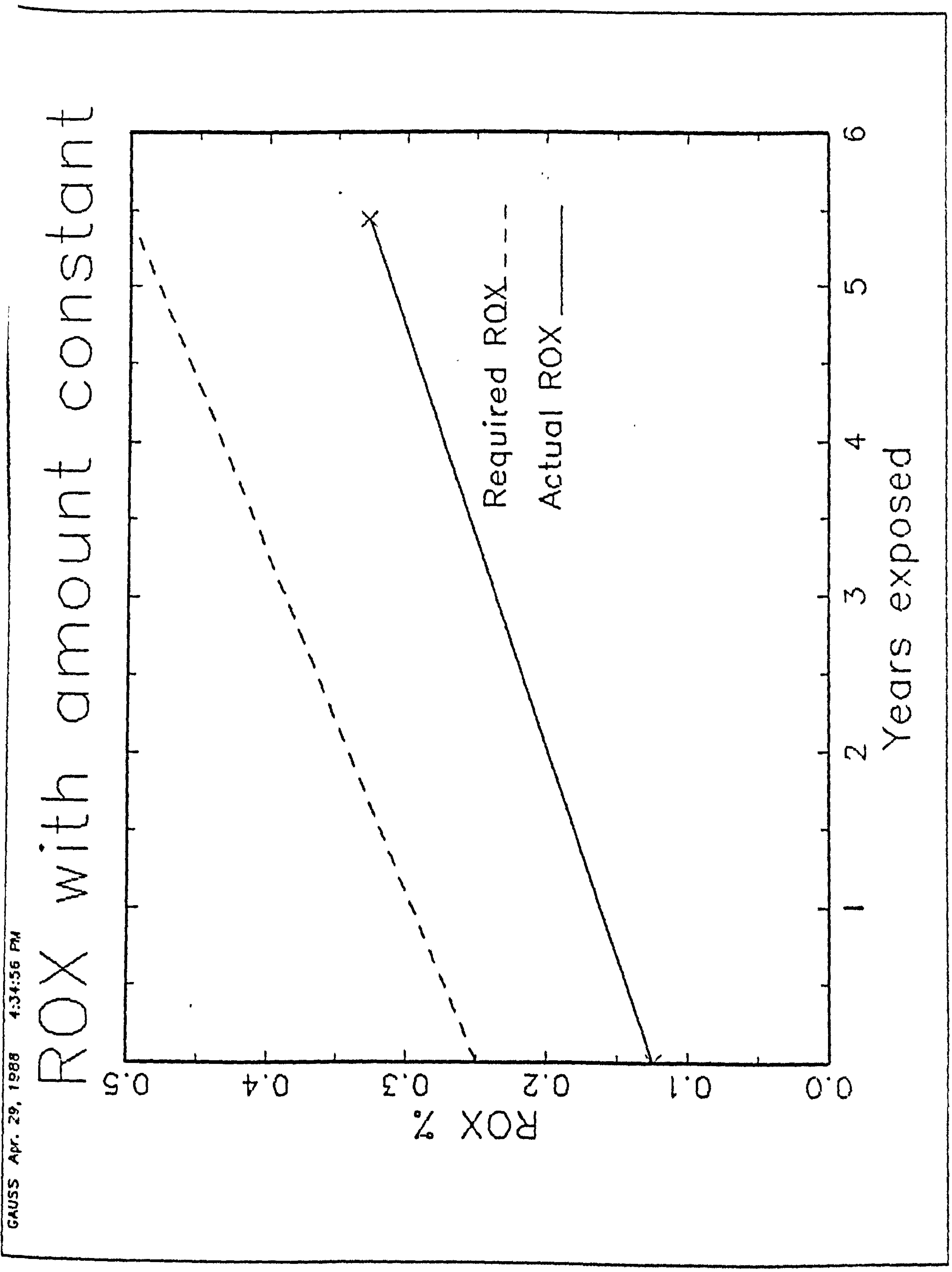
The returns to an underwriter on a ROX basis can be shown graphically to increase as the underwriter's exposure (amount funded X years) increases. In Figure 8.1 years are held constant at the market mean of 5.44 years to show how ROX increases as the amount funded increases. In Figure 8.2 the amount funded is held constant at US$ 60.014 billion (the total amount which the euronote market is committed to fund should it be called upon to do so) to show how ROX increases the longer the underwriter is asked to fund his commitment.

The five funding scenarios analysed in this chapter served to emphasise how different funding strategies affect the ROX. The points at which the ROX for the five scenarios intersect the actual ROX line for the market are marked by a number and a cross in Figures 8.1 and 8.2. Significantly, the actual ROX line for the market is well below

Figure 8.1



GAUSS Apr. 29, 1988 4:19:18 PM
ROX with years held constant
ROX %
0.0
0.1
0.2
0.3
0.4
0.5
10
20
30
40
50
60
Eposure (US $ bill)
Required ROX ....
Actual ROX


GAUSS Apr. 29, 1988 4:34:56 PM
ROX with amount constant
Required ROX
Actual ROX
ROX %
0.0
0.1
0.2
0.3
0.4
0.5
Years exposed
1
2
3
4
5
6

the ROX said to be required by the market (dotted line) in both figures. The gap between the two lines (actual ROX and required ROX) will be referred to as the 'systemic gap', ie the amount by which the actual ROX would have to be increased to prevent any increase in systemic risk arising from the growth of the euronote market.

The line depicting the required market return is, to a certain extent, a theoretical construction. Market respondents argued that where the facility was drawn then a minimum return of 0.5 per cent would be required. This was seen to be a minimum standard of adequacy irrespective of how much of the facility was drawn. This unwillingness to stipulate lower returns in the face of lower exposure was due to respondents' uncertainty about the probability of various exposure scenarios occurring. As a 'rule of thumb', therefore, a standard of adequacy was given on a drawn and undrawn basis only.

Even on an undrawn basis where underwriters are never asked to fund their commitments there is still a need to recoup capital costs, particularly since the application of risk asset ratios, hence the 0.25 per cent unfunded return required by the market. For theoretical exposition, however, the required ROX lines in Figures 8.1 and 8.2 have been drawn to represent differing exposure levels between the unexposed and fully exposed scenarios. Even on this basis it is noticeable that the actual market ROX line is well below the required market ROX line.

Judged on the market's required minimum standards of adequacy it would appear that a 'systemic gap' has developed in the euronote market. It may be that this gap is closed by the transfer of returns from other parts of the customer relationship to the euronote market. This is an empirical question and will be discussed in the following two chapters.

For the present time, however, it is important to note that such transfer of returns will only close the systemic gap where the 'portfolio return' from the customer relationship is more than adequate to compensate for the 'portfolio risk' from that relationship. If such transfer of returns is not possible or if it is inadequate to close the systemic gap then the gap will be more analogous to Van Horne's (1985) financial 'bubble' which may eventually burst so leading to a systemic crisis. If a transfer of returns can close the gap then it may be more analogous to Van Horne's financial 'balloons' that will eventually deflate (close the gap) as the market matures.

It is important to note that the systemic gap does not equate to the systemic risk existing in the financial system or even in the euronote market for that matter. The systemic gap merely indicates the potential 'increase' in systemic risk brought about by the practice of underpricing in the euronote market. The closure of this gap would offset the increase in systemic risk which underpricing in the euronote market may have contributed to but would not eliminate the systemic risk inherent in the system.

Figures 8.1 and 8.2 highlighted the main limitation of the ROX methodology. Under the ROX methodology the return gained on $10 billion drawn for five years is the same as the return on $50 billion drawn for one year. It is arguable, however, that the latter places more funding pressure on the underwriters and so risk may be greater in such a scenario. ROX views the two similarly for return calculations. This is the main reason why the term 'exposure' is favoured to that of 'risk'.

ROX should also not be confused with the risk-return models of financial economic theory such as the capital asset pricing model (CAPM). Under CAPM assets can be identified with risk-return features different to those found on the securities market line and can be added to a portfolio of assets in accordance with these characteristics. A euronote underwriter has absolutely no choice, or knowledge, of his funding strategy or exposure. This will be determined by uncertain market conditions. The actual return to the underwriter can only be shown ex post and this will depend on how much of the facility the underwriter is asked to fund and for how long. The actual ROX lines in Figures 8.1 and 8.2 merely depict the ROX from an infinite number of feasible funding scenarios. As the underwriter has no knowledge as to the probability of any one scenario occurring it would be wrong to use ROX as a forecasting model. For these same reasons ROX cannot be seen as a proxy for IRR.

The question still to answer is why underwriters are prepared to accept such low returns for their services in the euronote market? The possibility of customer relationship pricing has already been mentioned briefly and it will be explored more fully in the following chapters. By drawing on the qualitative and quantitative findings of the last three chapters, Chapter 9 will seek to formulate hypotheses to explain the reason for the existence of the systemic gap identified in the euronote market. The hypotheses formulated will then be tested in the market and our results presented to the market to complete the triangulation research approach adopted in this study.

Appendix 8.1 ROX data and results for scenario 3

Exposure $	Yrs	M Marg %	U cost %	U cost x exposure $	M marg x assets /years $	Total volume $	ROX %
80.0	3.0	0.001250	0.0010000	0.08000	0.033333	0.11333	0.141667
50.0	15.0	0.001000	0.0007920	0.03960	0.003333	0.04293	0.085867
125.0	3.0	0.002000	0.0006670	0.08337	0.083333	0.16671	0.133367
100.0	5.0	0.001250	0.0024000	0.24000	0.025000	0.26500	0.265000
250.0	10.0	*	*	*	*	*	*
200.0	5.0	0.001000	0.0008750	0.17500	0.040000	0.21500	0.107500
80.0	5.0	0.002500	0.0012500	0.10000	0.040000	0.14000	0.175000
250.0	8.0	0.003750	0.0025780	0.64450	0.117188	0.76169	0.304675
500.0	5.0	*	0.0006250	0.31250	*	*	*
100.0	5.0	0.000800	0.0007250	0.07250	0.016000	0.08850	0.088500
300.0	10.0	0.003250	0.0010000	0.30000	0.097500	0.39750	0.132500
125.0	7.0	0.002000	*	*	0.035714	*	*
45.0	5.0	0.003500	0.0030000	0.13500	0.031500	0.16650	0.370000
200.0	8.0	0.000500	0.0008500	0.17000	0.012500	0.18250	0.091250
750.0	10.0	0.000800	0.0008000	0.60000	0.060000	0.66000	0.088000
12.5	5.0	0.001500	0.0006880	0.00860	0.003750	0.01235	0.098800
400.0	10.0	0.004000	0.0015630	0.62520	0.160000	0.78520	0.196300
200.0	7.0	0.001500	*	*	0.042857	*	*
500.0	10.0	0.001250	*	*	0.062500	*	*
1500.0	6.0	0.001625	*	*	0.406250	*	*
340.0	5.0	0.001875	0.0008250	0.28050	0.127500	0.40800	0.120000
500.0	10.0	0.002875	0.0007440	0.37200	0.143750	0.51575	0.103150
100.0	7.0	0.003250	0.0024290	0.24290	0.046429	0.28933	0.289329
350.0	10.0	0.001875	0.0010130	0.35455	0.065625	0.42018	0.120050
100.0	2.0	0.000625	0.0003125	0.03125	0.031250	0.06250	0.062500
1300.0	8.0	0.004375	0.0008780	1.14140	0.710938	1.85234	0.142487
85.0	5.0	0.002250	0.0008250	0.07012	0.038250	0.10837	0.127500
700.0	10.0	0.002000	0.0006000	0.42000	0.140000	0.56000	0.080000
400.0	10.0	0.002000	0.0006630	0.26520	0.080000	0.34520	0.086300
350.0	10.0	0.001250	*	*	0.043750	*	*
200.0	3.0	0.002500	0.0015000	0.30000	0.166667	0.46667	0.233333
100.0	5.0	0.001125	0.0006250	0.06250	0.022500	0.08500	0.085000
2000.0	8.5	0.001750	0.0005980	1.19600	0.411765	1.60776	0.080388
500.0	10.0	0.001750	0.0010750	0.53750	0.087500	0.62500	0.125000
75.0	7.0	0.002250	0.0010710	0.08032	0.024107	0.10443	0.139243
70.0	5.0	0.001000	*	*	0.014000	*	*
500.0	7.0	0.002500	0.0013930	0.69650	0.178571	0.87507	0.175014
1000.0	5.5	0.002250	0.0008070	0.80700	0.409091	1.21609	0.121609
75.0	7.0	0.002500	*	*	0.026786	*	*
40.0	7.0	0.002000	*	*	0.011429	*	*
100.0	5.5	0.000625	0.0006140	0.06140	0.011364	0.07276	0.072764
100.0	5.0	0.001125	0.0005880	0.05880	0.022500	0.08130	0.081300
350.0	8.0	0.001875	0.0006160	0.21560	0.082031	0.29763	0.085038
500.0	8.0	0.001000	0.0005440	0.27200	0.062500	0.33450	0.066900
300.0	7.0	0.001500	0.0008860	0.26580	0.064286	0.33009	0.110029

Appendix 8.1 ROX data and results for scenario 3

Exposure $	Yrs	M Marg %	U cost %	U cost x exposure $	M marg x assets /years $	Total volume $	ROX %
45.0	5.0	0.010000	*	*	0.090000	*	*
60.0	5.0	0.002500	0.0007750	0.04650	0.030000	0.07650	0.127500
80.0	4.5	0.004000	*	*	0.071111	*	*
30.0	2.0	0.000625	*	*	0.009375	*	*
300.0	10.0	0.001000	0.0004930	0.14790	0.030000	0.17790	0.059300
400.0	10.0	0.001250	0.0005000	0.20000	0.050000	0.25000	0.062500
150.0	7.0	0.001100	0.0005890	0.08835	0.023571	0.11192	0.074614
200.0	10.0	0.001000	0.0005500	0.11000	0.020000	0.13000	0.065000
315.0	6.0	0.001250	0.0003420	0.10773	0.065625	0.17336	0.055033
75.0	7.0	0.004000	*	*	0.042857	*	*
50.0	7.0	0.001875	*	*	0.013393	*	*
20.0	5.0	0.003750	0.0015500	0.03100	0.015000	0.04600	0.230000
75.0	3.0	0.001250	0.0014170	0.10627	0.031250	0.13753	0.183367
65.0	5.0	0.001250	0.0012000	0.07800	0.016250	0.09425	0.145000
100.0	2.0	0.001250	0.0006250	0.06250	0.062500	0.12500	0.125000
100.0	2.0	0.001250	*	*	0.062500	*	*
25.0	7.0	0.001875	*	*	0.006697	*	*
100.0	7.0	0.001500	0.0014290	0.14290	0.021429	0.16433	0.164329
50.0	5.0	0.001500	0.0008250	0.04125	0.015000	0.05625	0.112500
150.0	2.0	0.001250	*	*	0.093750	*	*
75.0	5.0	0.001000	0.0007130	0.05347	0.015000	0.06848	0.091300
25.0	5.0	0.001250	*	*	0.006250	*	*
100.0	5.0	0.001875	0.0007750	0.07750	0.037500	0.11500	0.115000
100.0	5.0	0.002500	*	*	0.050000	*	*
40.0	3.0	0.002000	*	*	0.026667	*	*
50.0	5.0	0.001000	0.0007750	0.03875	0.010000	0.04875	0.097500
20.0	3.0	0.003000	0.0023960	0.04792	0.020000	0.06792	0.339600
35.0	3.0	0.002500	0.0022920	0.08022	0.029167	0.10939	0.312533
100.0	5.0	*	0.0014750	0.14750	*	*	*
30.0	5.0	0.001000	0.0015500	0.04650	0.006000	0.05250	0.175000
100.0	5.0	0.002750	0.0014250	0.14250	0.055000	0.19750	0.197500
50.0	2.0	0.000625	*	*	0.015625	*	*
50.0	3.0	0.002500	0.0026050	0.13025	0.041667	0.17192	0.343833
60.0	4.0	*	0.0015630	0.09378	*	*	*
30.0	5.0	0.001500	0.0015000	0.04500	0.009000	0.05400	0.180000
40.0	3.0	0.000625	0.0011700	0.04680	0.008333	0.05513	0.137833
50.0	5.0	0.001000	*	*	0.010000	*	*
50.0	5.0	0.002500	0.0010750	0.05375	0.025000	0.07875	0.157500
50.0	5.0	0.001000	*	*	0.010000	*	*
20.0	5.0	0.002500	*	*	0.010000	*	*
50.0	3.0	0.000625	*	*	0.010417	*	*
60.0	3.0	0.002250	*	*	0.045000	*	*
150.0	6.0	0.001875	0.0013130	0.19695	0.046875	0.24383	0.162550
100.0	5.0	0.002500	0.0013750	0.13750	0.050000	0.18750	0.187500
300.0	5.0	0.001500	0.0007500	0.22500	0.090000	0.31500	0.105000

Appendix 8.1 ROX data and results for scenario 3

Exposure $	Yrs	M Marg %	U cost %	U cost x exposure $	M marg x assets /years $	Total volume $	ROX %
50.0	3.0	0.002250	0.0018330	0.09165	0.037500	0.12915	0.258300
155.0	5.0	0.003375	*	*	0.104624	*	*
30.0	3.0	0.002500	0.0024080	0.07224	0.025000	0.09724	0.324133
50.0	5.0	0.002500	0.0006430	0.03215	0.025000	0.05715	0.114300
*	3.0	0.002500	*	*	*	*	*
15.0	3.0	0.002500	0.0015830	0.02374	0.012500	0.03624	0.241633
30.0	5.0	0.001000	0.0015750	0.04725	0.006000	0.05325	0.177500
100.0	4.0	0.002000	0.0013750	0.13750	0.050000	0.18750	0.187500
35.0	5.0	0.001750	0.0012500	0.04375	0.012250	0.05600	0.160000
100.0	5.0	0.000750	0.0012500	0.12500	0.015000	0.14000	0.140000
100.0	2.0	0.000625	*	*	0.031250	*	*
100.0	5.0	0.000750	0.0008350	0.08350	0.015000	0.09850	0.098500
25.0	1.0	0.007500	*	*	0.187500	*	*
100.0	5.0	0.001750	0.0017850	0.17850	0.035000	0.21350	0.213500
200.0	3.0	0.001500	0.0018330	0.36660	0.100000	0.46660	0.233300
40.0	3.0	0.001000	0.0016000	0.06400	0.013333	0.07733	0.193333
100.0	5.0	0.000400	0.0003125	0.03125	0.008000	0.03925	0.039250
35.0	5.0	0.001500	*	*	0.010500	*	*
25.0	5.0	0.002500	0.0012000	0.03000	0.012500	0.04250	0.170000
100.0	5.0	0.003000	0.0012750	0.12750	0.060000	0.18750	0.187500
100.0	5.0	0.002500	*	*	0.050000	*	*
30.0	5.0	0.001000	*	*	0.006000	*	*
325.0	5.0	0.001000	*	*	0.065000	*	*
25.0	7.0	0.000500	0.0014290	0.03573	0.001786	0.03751	0.150043
13.0	6.0	0.001875	*	*	0.004062	*	*
80.0	3.0	0.002500	*	*	0.066667	*	*
400.0	10.0	0.001250	0.0010000	0.40000	0.050000	0.45000	0.112500
50.0	3.0	0.002500	0.0009380	0.04690	0.041667	0.08857	0.177133
400.0	7.0	0.001500	0.0022680	0.90720	0.085714	0.99291	0.248229
75.0	10.0	0.002000	0.0013750	0.10312	0.015000	0.11812	0.157500
75.0	7.0	0.003250	0.0011430	0.08572	0.034821	0.12055	0.160729
22.0	3.0	0.003000	*	*	0.022000	*	*
50.0	7.0	0.001000	*	*	0.007143	*	*
50.0	7.0	0.002000	0.0013930	0.06965	0.014286	0.08394	0.167871
150.0	5.0	0.001875	0.0007250	0.10875	0.056250	0.16500	0.110000
75.0	5.0	0.001875	0.0009500	0.07125	0.028126	0.09938	0.132501
100.0	3.0	0.001250	0.0013330	0.13330	0.041667	0.17497	0.174967
70.0	2.0	0.001250	*	*	0.043750	*	*
45.0	5.0	0.001250	0.0015000	0.06750	0.011250	0.07875	0.175000
125.0	4.0	0.002500	0.0025000	0.31250	0.078125	0.39062	0.312500
50.0	4.0	0.002500	0.0017190	0.08595	0.031250	0.11720	0.234400
155.0	2.0	0.003750	*	*	0.290625	*	*
50.0	3.0	0.002500	*	*	0.041667	*	*
75.0	5.0	0.001875	0.0007500	0.05625	0.028126	0.08438	0.112501
65.0	7.0	0.001875	0.0006960	0.04524	0.017410	0.06265	0.096385

Appendix 8.1 ROX data and results for scenario 3

Exposure $	Yrs	M Marg %	U cost %	U cost x exposure $	M marg x assets /years $	Total volume $	ROX %
150.0	5.0	0.001500	0.0014500	0.21750	0.045000	0.26250	0.175000
67.0	5.0	0.002500	*	*	0.033500	*	*
100.0	7.0	0.002500	0.0011790	0.11790	0.035714	0.15361	0.153614
225.0	5.0	0.001875	0.0007500	0.16875	0.084374	0.25312	0.112500
50.0	8.0	0.001000	*	*	0.006250	*	*
100.0	5.0	0.001000	0.0012000	0.12000	0.020000	0.14000	0.140000
125.0	5.0	0.001875	0.0007125	0.08906	0.046874	0.13594	0.108749
400.0	10.0	0.001250	0.0007400	0.29600	0.050000	0.34600	0.086500
450.0	7.0	0.003000	0.0011250	0.50625	0.192857	0.69911	0.155357
200.0	5.0	0.003500	0.0015000	0.30000	0.140000	0.44000	0.220000
25.0	5.0	0.002000	0.0031000	0.07750	0.010000	0.08750	0.350000
1200.0	3.0	0.002000	0.0014000	1.68000	0.800000	2.48000	0.206667
150.0	5.0	0.001725	0.0013250	0.19875	0.051750	0.25050	0.167000
150.0	7.0	0.002000	0.0013930	0.20895	0.042857	0.25181	0.167871
30.0	3.0	0.001875	0.0010420	0.03126	0.018750	0.05001	0.166700
62.5	5.0	0.002500	0.0008500	0.05313	0.031250	0.08438	0.135000
60.0	3.0	*	*	*	*	*	*
85.0	3.0	0.002500	0.0012500	0.10625	0.070833	0.17708	0.208333
100.0	5.0	0.002200	0.0009750	0.09750	0.044000	0.14150	0.141500
150.0	5.0	0.001500	0.0005630	0.08445	0.045000	0.12945	0.086300
50.0	10.0	0.001563	0.0010260	0.05130	0.007815	0.05912	0.118230
100.0	7.0	0.001250	0.0014820	0.14820	0.017857	0.16606	0.166057
75.0	7.0	0.001000	0.0009640	0.07230	0.010714	0.08301	0.110686
125.0	5.0	0.001875	0.0007250	0.09062	0.046874	0.13750	0.109999
62.5	5.0	0.001500	0.0009000	0.05625	0.018750	0.07500	0.120000
500.0	7.0	0.001250	0.0005200	0.26000	0.089286	0.34929	0.069857
150.0	7.0	0.003750	0.0013320	0.19980	0.080357	0.28016	0.186771
400.0	5.0	0.001000	0.0013750	0.55000	0.080000	0.63000	0.157500
1300.0	5.0	0.002250	0.0019750	2.56750	0.585000	3.15250	0.242500
360.0	5.0	0.002000	0.0010000	0.36000	0.144000	0.50400	0.140000
50.0	5.0	0.002000	*	*	0.020000	*	*
200.0	5.0	0.001875	0.0008650	0.17300	0.075000	0.24800	0.124000
50.0	3.0	0.001250	*	*	0.020833	*	*
25.0	5.5	0.002000	0.0008180	0.02045	0.009091	0.02954	0.118164
200.0	5.0	0.001250	0.0011250	0.22500	0.050000	0.27500	0.137500
200.0	5.0	0.001375	*	*	0.055000	*	*
200.0	5.0	0.001750	0.0010800	0.21600	0.070000	0.28600	0.143000
56.0	3.0	0.002500	*	*	0.046667	*	*
75.0	5.0	0.001000	0.0009510	0.07133	0.015000	0.08633	0.115100
170.0	3.0	0.001250	0.0009000	0.15300	0.070833	0.22383	0.131667
87.5	2.5	0.003000	*	*	0.105000	*	*
300.0	3.0	0.001500	0.0012080	0.36240	0.150000	0.51240	0.170800
130.0	8.0	0.003750	*	*	0.060938	*	*
175.0	5.0	0.002000	0.0011650	0.20388	0.070000	0.27387	0.156500
125.0	4.0	0.005000	*	*	0.156250	*	*

Appendix 8.1 ROX data and results for scenario 3

Exposure $	Yrs	M Marg %	U cost %	U cost x exposure $	M marg x assets /years $	Total volume $	ROX %
220.0	5.0	0.002750	*	*	0.121000	*	*
50.0	3.0	0.003250	*	*	0.054167	*	*
90.0	7.0	0.001000	*	*	0.012857	*	*
300.0	7.0	0.002500	0.0018570	0.55710	0.107143	0.66424	0.221414
35.0	3.0	0.004500	*	*	0.052500	*	*
37.5	7.0	0.002500	0.0011430	0.04286	0.013393	0.05626	0.150014
45.0	3.0	0.002500	*	*	0.037500	*	*
55.0	4.0	0.001000	0.0014500	0.07975	0.013750	0.09350	0.170000
125.0	5.0	0.001875	0.0008250	0.10312	0.046874	0.15000	0.119999
400.0	5.0	0.002500	*	*	0.200000	*	*
200.0	5.0	0.002500	*	*	0.100000	*	*
300.0	5.0	0.003500	0.0014100	0.42300	0.210000	0.63300	0.211000
150.0	5.0	0.001750	0.0014250	0.21375	0.052500	0.26625	0.177500
630.0	4.0	0.002500	0.0007780	0.49014	0.393750	0.88389	0.140300
100.0	5.0	0.002500	*	*	0.050000	*	*
100.0	3.0	0.005500	*	*	0.183333	*	*
97.5	8.5	0.007500	*	*	0.086029	*	*
20.0	3.0	0.002500	0.0016670	0.03334	0.016667	0.05001	0.250033
60.0	2.0	0.001000	0.0014690	0.08814	0.030000	0.11814	0.196900
200.0	10.0	0.002000	0.0012125	0.24250	0.040000	0.28250	0.141250
195.0	7.0	0.002750	0.0013750	0.26812	0.076607	0.34473	0.176786
100.0	7.0	0.001750	0.0008000	0.08000	0.025000	0.10500	0.105000
150.0	8.0	0.003750	*	*	0.070313	*	*
400.0	4.0	0.003500	*	*	0.350000	*	*
60.0	5.0	0.003250	0.0014380	0.08628	0.039000	0.12528	0.208800
50.0	1.0	0.002000	*	*	0.100000	*	*
50.0	2.0	0.001250	*	*	0.031250	*	*
100.0	7.0	0.001500	*	*	0.021429	*	*
50.0	5.0	0.001563	*	*	0.015630	*	*
22.0	10.0	0.002000	0.0011000	0.02420	0.004400	0.02860	0.130000
75.0	5.0	0.002000	*	*	0.030000	*	*
125.0	3.0	0.001250	0.0012500	0.15625	0.052083	0.20833	0.166667
125.0	3.0	0.003000	0.0010210	0.12763	0.125000	0.25263	0.202100
200.0	5.0	0.002000	0.0011500	0.23000	0.080000	0.31000	0.155000
65.0	5.0	0.002500	0.0010050	0.06532	0.032500	0.09782	0.150500
300.0	7.0	0.002750	*	*	0.117857	*	*
110.0	7.0	0.002500	0.0008930	0.09823	0.039286	0.13752	0.125014
60.0	5.0	0.002500	*	*	0.030000	*	*
38.0	6.0	0.001875	0.0014170	0.05385	0.011875	0.06572	0.172950
75.0	8.5	0.005500	0.0020070	0.15052	0.048529	0.19905	0.265406
140.0	5.0	0.002000	0.0013700	0.19180	0.056000	0.24780	0.177000
65.0	5.0	0.001875	0.0007950	0.05167	0.024374	0.07605	0.116998
110.0	7.0	0.002500	0.0016070	0.17677	0.039286	0.21606	0.196414
75.0	5.0	0.003000	*	*	0.045000	*	*
60.0	5.0	0.001500	0.0010250	0.06150	0.018000	0.07950	0.132500

Appendix 8.1 ROX data and results for scenario 3

Exposure $	Yrs	M Marg %	U cost %	U cost x exposure $	M marg x assets /years $	Total volume $	ROX %
700.0	10.0	0.001250	0.0011030	0.77210	0.087500	0.85960	0.122800
320.0	7.0	0.003500	0.0023570	0.75424	0.160000	0.91424	0.285700
50.0	7.0	0.001250	0.0006960	0.03480	0.008929	0.04373	0.087457
*	3.0	0.002500	0.0012500	*	*	*	*
*	8.0	0.001875	0.0014060	*	*	*	*
100.0	3.0	0.002500	*	*	0.083333	*	*
100.0	3.0	0.001250	0.0014170	0.14170	0.041667	0.18337	0.183367
70.0	5.0	0.003000	0.0016000	0.11200	0.042000	0.15400	0.220000
30.0	5.0	0.003500	0.0023750	0.07125	0.021000	0.09225	0.307500
100.0	10.0	0.001875	0.0008750	0.08750	0.018750	0.10625	0.106250
50.0	5.0	0.003750	0.0014000	0.07000	0.037500	0.10750	0.215000
22.0	5.0	0.003750	0.0025000	0.05500	0.016500	0.07150	0.325000
100.0	5.0	0.001500	*	*	0.030000	*	*
100.0	5.0	0.002000	0.0014250	0.14250	0.040000	0.18250	0.182500
50.0	5.0	0.003500	*	*	0.035000	*	*
400.0	3.0	0.001250	0.0011700	0.46800	0.166667	0.63467	0.158667
220.0	5.0	0.002250	0.0012000	0.26400	0.099000	0.36300	0.165000
350.0	5.0	0.002500	0.0009380	0.32830	0.175000	0.50330	0.143800
75.0	5.0	0.001500	0.0012000	0.09000	0.022500	0.11250	0.150000
70.0	2.0	0.000625	*	*	0.021875	*	*
30.0	3.0	0.001250	0.0012670	0.03801	0.012500	0.05051	0.168367
50.0	3.0	0.001000	0.0008330	0.04165	0.016667	0.05832	0.116633
175.0	5.0	0.001250	0.0013750	0.24062	0.043750	0.28437	0.162500
100.0	5.0	0.001500	*	*	0.030000	*	*
125.0	5.0	0.001000	*	*	0.025000	*	*
105.0	8.0	0.001750	0.0010310	0.10826	0.022969	0.13122	0.124975
20.0	4.0	0.001500	*	*	0.007500	*	*
225.0	4.0	0.001500	0.0008910	0.20047	0.084375	0.28485	0.126600
100.0	5.0	0.001750	*	*	0.035000	*	*
70.0	5.0	0.002500	0.0015000	0.10500	0.035000	0.14000	0.200000
30.0	5.0	0.000875	*	*	0.005250	*	*
1000.0	3.0	0.002250	0.0014580	1.45800	0.750000	2.20800	0.220800
140.0	8.0	0.000750	0.0040310	0.56434	0.013125	0.57747	0.412475
100.0	3.0	0.002625	0.0017500	0.17500	0.087500	0.26250	0.262500
50.0	3.0	0.001250	*	*	0.020833	*	*
100.0	3.0	0.001200	*	*	0.040000	*	*
70.0	7.0	0.002000	0.0009560	0.06692	0.020000	0.08692	0.124171
25.0	3.0	0.006250	0.0022920	0.05730	0.052083	0.10938	0.437533
300.0	5.0	0.002000	*	*	0.120000	*	*
200.0	5.0	0.002000	*	*	0.080000	*	*
70.0	3.0	0.002000	*	*	0.046667	*	*
60.0	5.0	0.001750	0.0011000	0.06600	0.021000	0.08700	0.145000
18.0	3.0	0.000563	*	*	0.003377	*	*
25.0	3.0	0.002500	0.0016670	0.04168	0.020833	0.06251	0.250033
110.0	7.0	0.001500	*	*	0.023571	*	*

Appendix 8.1   ROX data and results for scenario 3

Exposure $	Yrs	M Marg %	U cost %	U cost x exposure $	M marg x assets /years $	Total volume $	ROX %
25.0	2.0	0.001250	*	*	0.015625	*	*
143.0	10.0	0.001875	0.0007710	0.11025	0.026812	0.13706	0.095850
43.0	3.0	0.003000	0.0016670	0.07168	0.043000	0.11468	0.266700
100.0	1.0	0.003500	*	*	0.350000	*	*
100.0	3.0	0.002500	0.0013250	0.13250	0.083333	0.21583	0.215833
45.0	12.0	0.001000	*	*	0.003750	*	*
300.0	14.0	0.002000	0.0011570	0.34710	0.042857	0.38996	0.129986
40.0	7.0	0.002000	0.0011070	0.04428	0.011429	0.05571	0.139271
25.0	3.0	0.002500	0.0016670	0.04168	0.020833	0.06251	0.250033
85.0	5.0	0.003000	0.0042500	0.36125	0.051000	0.41225	0.485000
100.0	5.0	0.001000	0.0007750	0.07750	0.020000	0.09750	0.097500
280.0	6.0	0.004250	*	*	0.198333	*	*
85.0	2.0	0.001875	0.0006250	0.05312	0.079685	0.13281	0.156247
100.0	5.0	0.002000	0.0011250	0.11250	0.040000	0.15250	0.152500
30.0	3.0	0.002500	*	*	0.025000	*	*
50.0	5.0	0.001000	0.0009380	0.04690	0.010000	0.05690	0.113800
250.0	5.0	0.001500	0.0007750	0.19375	0.075000	0.26875	0.107500
13.0	5.0	*	0.0021250	0.02763	*	*	*
72.5	5.0	0.001250	*	*	0.018124	*	*
70.0	5.0	0.001875	*	*	0.026250	*	*
45.0	5.0	0.001875	*	*	0.016876	*	*
100.0	5.0	0.001500	0.0006500	0.06500	0.030000	0.09500	0.095000
250.0	10.0	0.001375	0.0006630	0.16575	0.034375	0.20012	0.080050
145.0	8.0	0.002500	0.0009750	0.14137	0.045313	0.18669	0.128750
50.0	5.0	0.001875	0.0011000	0.05500	0.018750	0.07375	0.147500
100.0	10.0	0.001500	0.0011250	0.11250	0.015000	0.12750	0.127500
500.0	1.0	0.001500	0.0007750	0.38750	0.750000	1.13750	0.227500
150.0	3.0	0.003000	0.0020000	0.30000	0.150000	0.45000	0.300000
110.0	5.0	0.001500	*	*	0.033000	*	*
*	*	0.001250	*	*	*	*	*
60.0	3.0	0.004000	0.0020000	0.12000	0.080000	0.20000	0.333333
450.0	5.0	0.002500	0.0007070	0.31815	0.225000	0.54315	0.120700
100.0	8.0	0.002000	0.0014070	0.14070	0.025000	0.16570	0.165700
200.0	7.0	0.001750	0.0006820	0.13640	0.050000	0.18640	0.093200
100.0	5.0	0.001500	*	*	0.030000	*	*
75.0	6.0	0.001250	0.0011250	0.08437	0.015625	0.10000	0.133333
30.0	3.0	0.001250	0.0014580	0.04374	0.012500	0.05624	0.187467
25.0	3.0	0.002500	0.0016670	0.04168	0.020833	0.06251	0.250033
75.0	4.0	0.005000	0.0009500	0.07125	0.093750	0.16500	0.220000
100.0	1.0	0.002500	*	*	0.250000	*	*
100.0	3.0	0.002000	0.0011700	0.11700	0.066667	0.18367	0.183667
75.0	5.0	0.002000	0.0013300	0.09975	0.030000	0.12975	0.173000
36.0	7.0	0.001750	0.0011430	0.04115	0.009000	0.05015	0.139300
40.0	6.0	0.001500	*	*	0.010000	*	*
300.0	7.0	0.002500	0.0007440	0.22320	0.107143	0.33034	0.110114

Appendix 8.1 ROX data and results for scenario 3

Exposure $	Yrs	M Marg %	U cost %	U cost x exposure $	M marg x assets /years $	Total volume $	ROX %
45.0	5.0	0.001750	0.0007250	0.03263	0.015750	0.04838	0.107500
45.0	5.0	0.004000	0.0026250	0.11812	0.036000	0.15413	0.342500
185.0	7.0	0.001875	0.0011070	0.20480	0.049553	0.25435	0.137485
30.0	10.0	0.003000	*	*	0.009000	*	*
500.0	5.0	0.002250	0.0014000	0.70000	0.225000	0.92500	0.185000
400.0	4.0	0.003500	*	*	0.350000	*	*
100.0	5.0	0.003250	0.0019250	0.19250	0.065000	0.25750	0.257500
100.0	7.0	0.003250	0.0014820	0.14820	0.046429	0.19463	0.194629
125.0	11.0	0.001750	0.0023410	0.29262	0.019886	0.31251	0.250009
125.0	5.0	0.001500	0.0008500	0.10625	0.037500	0.14375	0.115000
150.0	7.0	0.002370	*	*	0.050786	*	*
60.0	3.0	0.003750	0.0020000	0.12000	0.075000	0.19500	0.325000
75.0	2.5	0.008500	0.0065000	0.48750	0.255000	0.74250	0.990000
200.0	5.0	0.002500	0.0011500	0.23000	0.100000	0.33000	0.165000
30.0	7.0	0.001750	0.0013930	0.04179	0.007500	0.04929	0.164300
150.0	5.0	0.000625	0.0009050	0.13575	0.018750	0.15450	0.103000
25.0	30.0	0.003000	0.0012500	0.03125	0.002500	0.03375	0.135000
320.0	5.0	0.000500	*	*	0.032000	*	*
110.0	5.0	0.001500	0.0008000	0.08800	0.033000	0.12100	0.110000
75.0	7.0	0.002000	*	*	0.021429	*	*
45.0	2.0	0.001875	0.0006250	0.02812	0.042190	0.07032	0.156256
200.0	6.0	0.003450	0.0008880	0.17760	0.115000	0.29260	0.146300
350.0	5.0	0.003500	0.0012750	0.44625	0.245000	0.69125	0.197500
160.0	5.0	0.004500	0.0016700	0.26720	0.144000	0.41120	0.257000
120.0	8.0	0.002750	0.0012500	0.15000	0.041250	0.19125	0.159375
125.0	5.0	0.001750	0.0010800	0.13500	0.043750	0.17875	0.143000
75.0	10.0	0.003000	0.0015750	0.11812	0.022500	0.14063	0.187500
185.0	5.0	0.002000	*	*	0.074000	*	*
*	5.0	0.001200	*	*	*	*	*
75.0	5.0	0.001500	0.0012000	0.09000	0.022500	0.11250	0.150000
*	7.0	0.001250	0.0013210	*	*	*	*
375.0	5.0	0.004000	*	*	0.300000	*	*
150.0	5.0	0.001750	*	*	0.052500	*	*
35.0	5.0	0.002000	0.0013750	0.04812	0.014000	0.06213	0.177500
100.0	5.0	0.002250	0.0012000	0.12000	0.045000	0.16500	0.165000
350.0	5.0	0.002500	*	*	0.175000	*	*
250.0	5.0	0.001875	*	*	0.093750	*	*
60.0	3.0	*	0.0011670	0.07002	*	*	*
75.0	7.0	0.001000	0.0008930	0.06697	0.010714	0.07769	0.103586
50.0	5.0	0.002500	0.0012000	0.06000	0.025000	0.08500	0.170000
300.0	8.0	0.001500	0.0010660	0.31980	0.056250	0.37605	0.125350
*	7.0	0.005000	0.0011270	*	*	*	*
100.0	3.0	0.002500	0.0009580	0.09580	0.083333	0.17913	0.179133
125.0	5.0	0.010000	*	*	0.250000	*	*
300.0	7.0	0.001500	0.0011070	0.33210	0.064286	0.39639	0.132129

Appendix 8.1 ROX data and results for scenario 3

Exposure $	Yrs	M Marg %	U cost %	U cost x exposure $	M marg x assets /years $	Total volume $	ROX %
130.0	8.0	0.001125	0.0007000	0.09100	0.018281	0.10928	0.084062
200.0	7.0	0.000800	0.0004640	0.09280	0.022857	0.11566	0.057829
100.0	10.0	0.001000	*	*	0.010000	*	*
*	5.0	0.001250	0.0006060	*	*	*	*
105.0	5.0	0.000563	0.0007750	0.08138	0.011822	0.09320	0.088759
140.0	4.0	0.002500	0.0014370	0.20118	0.087500	0.28868	0.206200
127.0	8.0	0.001750	0.0007030	0.08928	0.027781	0.11706	0.092175
142.0	5.0	0.001500	*	*	0.042600	*	*
*	5.0	0.002000	0.0013000	*	*	*	*
200.0	5.0	0.002500	0.0011250	0.22500	0.100000	0.32500	0.162500
100.0	5.0	0.002500	0.0011250	0.11250	0.050000	0.16250	0.162500
200.0	7.0	0.002250	0.0008570	0.17140	0.064286	0.23569	0.117843
50.0	5.0	0.002000	0.0008250	0.04125	0.020000	0.06125	0.122500
40.0	3.0	0.002250	*	*	0.030000	*	*
38.0	5.0	0.002500	0.0015000	0.05700	0.019000	0.07600	0.200000
50.0	10.0	0.001000	0.0005875	0.02937	0.005000	0.03438	0.068750
125.0	5.0	0.001500	*	*	0.037500	*	*
35.0	5.0	0.001500	0.0011750	0.04112	0.010500	0.05162	0.147500
105.0	3.0	0.001500	0.0006190	0.06499	0.052500	0.11750	0.111900
250.0	7.0	0.005000	*	*	0.178571	*	*
170.0	7.0	0.005000	*	*	0.121429	*	*
355.0	7.0	0.001250	*	*	0.063393	*	*
57.0	5.0	0.001500	0.0010800	0.06156	0.017100	0.07866	0.138000
70.0	5.0	0.001500	*	*	0.021000	*	*
100.0	5.0	0.001750	0.0014000	0.14000	0.035000	0.17500	0.175000
150.0	5.0	0.002500	0.0020750	0.31125	0.075000	0.38625	0.257500
250.0	2.0	0.001500	0.0008750	0.21875	0.187500	0.40625	0.162500

Appendix 8.2 ROX data and results for scenario 4

Exposure $	Yrs	M marg %	U cost %	U cost x exposure $	M marg x assets/4 $	Total volume $	ROX %
80.0	3.0	0.001250	0.0010000	0.08000	0.02500	0.10500	0.131250
50.0	15.0	0.001000	0.0007920	0.03960	0.01250	0.05210	0.104198
125.0	3.0	0.002000	0.0006670	0.08337	0.06250	0.14587	0.116696
100.0	5.0	0.001250	0.0024000	0.24000	0.03125	0.27125	0.271250
250.0	10.0	*	*	*	*	*	*
200.0	5.0	0.001000	0.0008750	0.17500	0.05000	0.22500	0.112500
80.0	5.0	0.002500	0.0012500	0.10000	0.05000	0.15000	0.187500
250.0	8.0	0.003750	0.0025780	0.64450	0.23438	0.87888	0.351550
500.0	5.0	*	0.0006250	0.31250	*	*	*
100.0	5.0	0.000800	0.0007250	0.07250	0.02000	0.09250	0.092500
300.0	10.0	0.003250	0.0010000	0.30000	0.24375	0.54375	0.181250
125.0	7.0	0.002000	*	*	0.06250	*	*
45.0	5.0	0.003500	0.0030000	0.13500	0.03937	0.17438	0.387500
200.0	8.0	0.000500	0.0008500	0.17000	0.02500	0.19500	0.097500
750.0	10.0	0.000800	0.0008000	0.60000	0.15000	0.75000	0.100000
12.5	5.0	0.001500	0.0006880	0.00860	0.00469	0.01329	0.106300
400.0	10.0	0.004000	0.0015630	0.62520	0.40000	1.02520	0.256300
200.0	7.0	0.001500	*	*	0.07500	*	*
500.0	10.0	0.001250	*	*	0.15625	*	*
1500.0	6.0	0.001625	*	*	0.60938	*	*
340.0	5.0	0.001875	0.0008250	0.28050	0.15937	0.43988	0.129375
500.0	10.0	0.002875	0.0007440	0.37200	0.35937	0.73138	0.146275
100.0	7.0	0.003250	0.0024290	0.24290	0.08125	0.32415	0.324151
350.0	10.0	0.001875	0.0010130	0.35455	0.16406	0.51861	0.148175
100.0	2.0	0.000625	0.0003125	0.03125	0.01562	0.04688	0.046875
1300.0	8.0	0.004375	0.0008780	1.14140	1.42188	2.56328	0.197175
85.0	5.0	0.002250	0.0008250	0.07012	0.04781	0.11793	0.138744
700.0	10.0	0.002000	0.0006000	0.42000	0.35000	0.77000	0.110000
400.0	10.0	0.002000	0.0006630	0.26520	0.20000	0.46520	0.116300
350.0	10.0	0.001250	*	*	0.10937	*	*
200.0	3.0	0.002500	0.0015000	0.30000	0.12500	0.42500	0.212500
100.0	5.0	0.001125	0.0006250	0.06250	0.02813	0.09063	0.090625
2000.0	8.5	0.001750	0.0005980	1.19600	0.87500	2.07100	0.103550
500.0	10.0	0.001750	0.0010750	0.53750	0.21875	0.75625	0.151250
75.0	7.0	0.002250	0.0010710	0.08032	0.04219	0.12251	0.163343
70.0	5.0	0.001000	*	*	0.01750	*	*
500.0	7.0	0.002500	0.0013930	0.69650	0.31250	1.00900	0.201800
1000.0	5.5	0.002250	0.0008070	0.80700	0.56250	1.36950	0.136950
75.0	7.0	0.002500	*	*	0.04688	*	*
40.0	7.0	0.002000	*	*	0.02000	*	*
100.0	5.5	0.000625	0.0006140	0.06140	0.01563	0.07703	0.077026
100.0	5.0	0.001125	0.0005880	0.05880	0.02813	0.08692	0.086925
350.0	8.0	0.001875	0.0006160	0.21560	0.16406	0.37966	0.108475
500.0	8.0	0.001000	0.0005440	0.27200	0.12500	0.39700	0.079400
300.0	7.0	0.001500	0.0008860	0.26580	0.11250	0.37830	0.126100
45.0	5.0	0.010000	*	*	0.11250	*	*

Appendix 8.2 ROX data and results for scenario 4

Exposure $	Yrs	M marg %	U cost %	U cost x exposure $	M marg x assets/4 $	Total volume $	ROX %
60.0	5.0	0.002500	0.0007750	0.04650	0.03750	0.08400	0.140000
80.0	4.5	0.004000	*	*	0.08000	*	*
30.0	2.0	0.000625	*	*	0.00469	*	*
300.0	10.0	0.001000	0.0004930	0.14790	0.07500	0.22290	0.074300
400.0	10.0	0.001250	0.0005000	0.20000	0.12500	0.32500	0.081250
150.0	7.0	0.001100	0.0005890	0.08835	0.04125	0.12960	0.086399
200.0	10.0	0.001000	0.0005500	0.11000	0.05000	0.16000	0.080000
315.0	6.0	0.001250	0.0003420	0.10773	0.09844	0.20617	0.065450
75.0	7.0	0.004000	*	*	0.07500	*	*
50.0	7.0	0.001875	*	*	0.02344	*	*
20.0	5.0	0.003750	0.0015500	0.03100	0.01875	0.04975	0.248750
75.0	3.0	0.001250	0.0014170	0.10627	0.02344	0.12971	0.172943
65.0	5.0	0.001250	0.0012000	0.07800	0.02031	0.09831	0.151250
100.0	2.0	0.001250	0.0006250	0.06250	0.03125	0.09375	0.093750
100.0	2.0	0.001250	*	*	0.03125	*	*
25.0	7.0	0.001875	*	*	0.01172	*	*
100.0	7.0	0.001500	0.0014290	0.14290	0.03750	0.18040	0.180401
50.0	5.0	0.001500	0.0008250	0.04125	0.01875	0.06000	0.120000
150.0	2.0	0.001250	*	*	0.04688	*	*
75.0	5.0	0.001000	0.0007130	0.05347	0.01875	0.07222	0.096293
25.0	5.0	0.001250	*	*	0.00781	*	*
100.0	5.0	0.001875	0.0007750	0.07750	0.04688	0.12438	0.124375
100.0	5.0	0.002500	*	*	0.06250	*	*
40.0	3.0	0.002000	*	*	0.02000	*	*
50.0	5.0	0.001000	0.0007750	0.03875	0.01250	0.05125	0.102500
20.0	3.0	0.003000	0.0023960	0.04792	0.01500	0.06292	0.314600
35.0	3.0	0.002500	0.0022920	0.08022	0.02188	0.10210	0.291701
100.0	5.0	*	0.0014750	0.14750	*	*	*
30.0	5.0	0.001000	0.0015500	0.04650	0.00750	0.05400	0.180000
100.0	5.0	0.002750	0.0014250	0.14250	0.06875	0.21125	0.211250
50.0	2.0	0.000625	*	*	0.00781	*	*
50.0	3.0	0.002500	0.0026050	0.13025	0.03125	0.16150	0.323001
60.0	4.0	*	0.0015630	0.09378	*	*	*
30.0	5.0	0.001500	0.0015000	0.04500	0.01125	0.05625	0.187500
40.0	3.0	0.000625	0.0011700	0.04680	0.00625	0.05305	0.132624
50.0	5.0	0.001000	*	*	0.01250	*	*
50.0	5.0	0.002500	0.0010750	0.05375	0.03125	0.08500	0.170000
50.0	5.0	0.001000	*	*	0.01250	*	*
20.0	5.0	0.002500	*	*	0.01250	*	*
50.0	3.0	0.000625	*	*	0.00781	*	*
60.0	3.0	0.002250	*	*	0.03375	*	*
150.0	6.0	0.001875	0.0013130	0.19695	0.07031	0.26726	0.178175
100.0	5.0	0.002500	0.0013750	0.13750	0.06250	0.20000	0.200000
300.0	5.0	0.001500	0.0007500	0.22500	0.11250	0.33750	0.112500
50.0	3.0	0.002250	0.0018330	0.09165	0.02813	0.11978	0.239550
155.0	5.0	0.003375	*	*	0.13078	*	*

Appendix 8.2 ROX data and results for scenario 4

Exposure $	Yrs	M marg %	U cost %	U cost x exposure $	M marg x assets/4 $	Total volume $	ROX %
30.0	3.0	0.002500	0.0024080	0.07224	0.01875	0.09099	0.303300
50.0	5.0	0.002500	0.0006430	0.03215	0.03125	0.06340	0.126800
*	3.0	0.002500	*	*	*	*	*
15.0	3.0	0.002500	0.0015830	0.02374	0.00938	0.03311	0.220767
30.0	5.0	0.001000	0.0015750	0.04725	0.00750	0.05475	0.182500
100.0	4.0	0.002000	0.0013750	0.13750	0.05000	0.18750	0.187500
35.0	5.0	0.001750	0.0012500	0.04375	0.01531	0.05906	0.168750
100.0	5.0	0.000750	0.0012500	0.12500	0.01875	0.14375	0.143750
100.0	2.0	0.000625	*	*	0.01562	*	*
100.0	5.0	0.000750	0.0008350	0.08350	0.01875	0.10225	0.102250
25.0	1.0	0.007500	*	*	0.04688	*	*
100.0	5.0	0.001750	0.0017850	0.17850	0.04375	0.22225	0.222250
200.0	3.0	0.001500	0.0018330	0.36660	0.07500	0.44160	0.220800
40.0	3.0	0.001000	0.0016000	0.06400	0.01000	0.07400	0.184999
100.0	5.0	0.000400	0.0003125	0.03125	0.01000	0.04125	0.041250
35.0	5.0	0.001500	*	*	0.01312	*	*
25.0	5.0	0.002500	0.0012000	0.03000	0.01562	0.04563	0.182500
100.0	5.0	0.003000	0.0012750	0.12750	0.07500	0.20250	0.202500
100.0	5.0	0.002500	*	*	0.06250	*	*
30.0	5.0	0.001000	*	*	0.00750	*	*
325.0	5.0	0.001000	*	*	0.08125	*	*
25.0	7.0	0.000500	0.0014290	0.03573	0.00313	0.03886	0.155422
13.0	6.0	0.001875	*	*	0.00609	*	*
80.0	3.0	0.002500	*	*	0.05000	*	*
400.0	10.0	0.001250	0.0010000	0.40000	0.12500	0.52500	0.131250
50.0	3.0	0.002500	0.0009380	0.04690	0.03125	0.07815	0.156301
400.0	7.0	0.001500	0.0022680	0.90720	0.15000	1.05720	0.264300
75.0	10.0	0.002000	0.0013750	0.10312	0.03750	0.14062	0.187493
75.0	7.0	0.003250	0.0011430	0.08572	0.06094	0.14666	0.195542
22.0	3.0	0.003000	*	*	0.01650	*	*
50.0	7.0	0.001000	*	*	0.01250	*	*
50.0	7.0	0.002000	0.0013930	0.06965	0.02500	0.09465	0.189301
150.0	5.0	0.001875	0.0007250	0.10875	0.07031	0.17906	0.119375
75.0	5.0	0.001875	0.0009500	0.07125	0.03516	0.10641	0.141877
100.0	3.0	0.001250	0.0013330	0.13330	0.03125	0.16455	0.164550
70.0	2.0	0.001250	*	*	0.02187	*	*
45.0	5.0	0.001250	0.0015000	0.06750	0.01406	0.08156	0.181250
125.0	4.0	0.002500	0.0025000	0.31250	0.07812	0.39062	0.312500
50.0	4.0	0.002500	0.0017190	0.08595	0.03125	0.11720	0.234400
155.0	2.0	0.003750	*	*	0.14531	*	*
50.0	3.0	0.002500	*	*	0.03125	*	*
75.0	5.0	0.001875	0.0007500	0.05625	0.03516	0.09141	0.121877
65.0	7.0	0.001875	0.0006960	0.04524	0.03047	0.07571	0.116473
150.0	5.0	0.001500	0.0014500	0.21750	0.05625	0.27375	0.182500
67.0	5.0	0.002500	*	*	0.04188	*	*
100.0	7.0	0.002500	0.0011790	0.11790	0.06250	0.18040	0.180400

Appendix 8.2 ROX data and results for scenario 4

Exposure $	Yrs	M marg %	U cost %	U cost x exposure $	M marg x assets/4 $	Total volume $	ROX %
225.0	5.0	0.001875	0.0007500	0.16875	0.10547	0.27422	0.121874
50.0	8.0	0.001000	*	*	0.01250	*	*
100.0	5.0	0.001000	0.0012000	0.12000	0.02500	0.14500	0.145000
125.0	5.0	0.001875	0.0007125	0.08906	0.05859	0.14765	0.118122
400.0	10.0	0.001250	0.0007400	0.29600	0.12500	0.42100	0.105250
450.0	7.0	0.003000	0.0011250	0.50625	0.33750	0.84375	0.187500
200.0	5.0	0.003500	0.0015000	0.30000	0.17500	0.47500	0.237500
25.0	5.0	0.002000	0.0031000	0.07750	0.01250	0.09000	0.360000
1200.0	3.0	0.002000	0.0014000	1.68000	0.60000	2.28000	0.190000
150.0	5.0	0.001725	0.0013250	0.19875	0.06469	0.26344	0.175625
150.0	7.0	0.002000	0.0013930	0.20895	0.07500	0.28395	0.189300
30.0	3.0	0.001875	0.0010420	0.03126	0.01406	0.04532	0.151075
62.5	5.0	0.002500	0.0008500	0.05313	0.03906	0.09219	0.147508
60.0	3.0	*	*	*	*	*	*
85.0	3.0	0.002500	0.0012500	0.10625	0.05312	0.15937	0.187500
100.0	5.0	0.002200	0.0009750	0.09750	0.05500	0.15250	0.152500
150.0	5.0	0.001500	0.0005630	0.08445	0.05625	0.14070	0.093800
50.0	10.0	0.001563	0.0010260	0.05130	0.01954	0.07084	0.141675
100.0	7.0	0.001250	0.0014820	0.14820	0.03125	0.17945	0.179450
75.0	7.0	0.001000	0.0009640	0.07230	0.01875	0.09105	0.121399
125.0	5.0	0.001875	0.0007250	0.09062	0.05859	0.14921	0.119370
62.5	5.0	0.001500	0.0009000	0.05625	0.02344	0.07969	0.127500
500.0	7.0	0.001250	0.0005200	0.26000	0.15625	0.41625	0.083250
150.0	7.0	0.003750	0.0013320	0.19980	0.14062	0.34042	0.226950
400.0	5.0	0.001000	0.0013750	0.55000	0.10000	0.65000	0.162500
1300.0	5.0	0.002250	0.0019750	2.56750	0.73125	3.29875	0.253750
360.0	5.0	0.002000	0.0010000	0.36000	0.18000	0.54000	0.150000
50.0	5.0	0.002000	*	*	0.02500	*	*
200.0	5.0	0.001875	0.0008650	0.17300	0.09375	0.26675	0.133375
50.0	3.0	0.001250	*	*	0.01562	*	*
25.0	5.5	0.002000	0.0008180	0.02045	0.01250	0.03295	0.131801
200.0	5.0	0.001250	0.0011250	0.22500	0.06250	0.28750	0.143750
200.0	5.0	0.001375	*	*	0.06875	*	*
200.0	5.0	0.001750	0.0010800	0.21600	0.08750	0.30350	0.151750
56.0	3.0	0.002500	*	*	0.03500	*	*
75.0	5.0	0.001000	0.0009510	0.07133	0.01875	0.09008	0.120107
170.0	3.0	0.001250	0.0009000	0.15300	0.05312	0.20612	0.121250
87.5	2.5	0.003000	*	*	0.06562	*	*
300.0	3.0	0.001500	0.0012080	0.36240	0.11250	0.47490	0.158300
130.0	8.0	0.003750	*	*	0.12188	*	*
175.0	5.0	0.002000	0.0011650	0.20388	0.08750	0.29138	0.166503
125.0	4.0	0.005000	*	*	0.15625	*	*
220.0	5.0	0.002750	*	*	0.15125	*	*
50.0	3.0	0.003250	*	*	0.04063	*	*
90.0	7.0	0.001000	*	*	0.02250	*	*
300.0	7.0	0.002500	0.0018570	0.55710	0.18750	0.74460	0.248200

Appendix 8.2 ROX data and results for scenario 4

Exposure $	Yrs	M marg %	U cost %	U cost x exposure $	M marg x assets/4 $	Total volume $	ROX %
35.0	3.0	0.004500	*	*	0.03937	*	*
37.5	7.0	0.002500	0.0011430	0.04286	0.02344	0.06630	0.176794
45.0	3.0	0.002500	*	*	0.02813	*	*
55.0	4.0	0.001000	0.0014500	0.07975	0.01375	0.09350	0.170000
125.0	5.0	0.001875	0.0008250	0.10312	0.05859	0.16171	0.129370
400.0	5.0	0.002500	*	*	0.25000	*	*
200.0	5.0	0.002500	*	*	0.12500	*	*
300.0	5.0	0.003500	0.0014100	0.42300	0.26250	0.68550	0.228500
150.0	5.0	0.001750	0.0014250	0.21375	0.06562	0.27938	0.186250
630.0	4.0	0.002500	0.0007780	0.49014	0.39375	0.88389	0.140300
100.0	5.0	0.002500	*	*	0.06250	*	*
100.0	3.0	0.005500	*	*	0.13750	*	*
97.5	8.5	0.007500	*	*	0.18281	*	*
20.0	3.0	0.002500	0.0016670	0.03334	0.01250	0.04584	0.229201
60.0	2.0	0.001000	0.0014690	0.08814	0.01500	0.10314	0.171900
200.0	10.0	0.002000	0.0012125	0.24250	0.10000	0.34250	0.171250
195.0	7.0	0.002750	0.0013750	0.26812	0.13406	0.40218	0.206247
100.0	7.0	0.001750	0.0008000	0.08000	0.04375	0.12375	0.123750
150.0	8.0	0.003750	*	*	0.14063	*	*
400.0	4.0	0.003500	*	*	0.35000	*	*
60.0	5.0	0.003250	0.0014380	0.08628	0.04875	0.13503	0.225050
50.0	1.0	0.002000	*	*	0.02500	*	*
50.0	2.0	0.001250	*	*	0.01562	*	*
100.0	7.0	0.001500	*	*	0.03750	*	*
50.0	5.0	0.001563	*	*	0.01954	*	*
22.0	10.0	0.002000	0.0011000	0.02420	0.01100	0.03520	0.160000
75.0	5.0	0.002000	*	*	0.03750	*	*
125.0	3.0	0.001250	0.0012500	0.15625	0.03906	0.19531	0.156250
125.0	3.0	0.003000	0.0010210	0.12763	0.09375	0.22138	0.177104
200.0	5.0	0.002000	0.0011500	0.23000	0.10000	0.33000	0.165000
65.0	5.0	0.002500	0.0010050	0.06532	0.04062	0.10594	0.162992
300.0	7.0	0.002750	*	*	0.20625	*	*
110.0	7.0	0.002500	0.0008930	0.09823	0.06875	0.16698	0.151800
60.0	5.0	0.002500	*	*	0.03750	*	*
38.0	6.0	0.001875	0.0014170	0.05385	0.01781	0.07166	0.188586
75.0	8.5	0.005500	0.0020070	0.15052	0.10312	0.25364	0.338192
140.0	5.0	0.002000	0.0013700	0.19180	0.07000	0.26180	0.187000
65.0	5.0	0.001875	0.0007950	0.05167	0.03047	0.08214	0.126365
110.0	7.0	0.002500	0.0016070	0.17677	0.06875	0.24552	0.223200
75.0	5.0	0.003000	*	*	0.05625	*	*
60.0	5.0	0.001500	0.0010250	0.06150	0.02250	0.08400	0.140000
700.0	10.0	0.001250	0.0011030	0.77210	0.21875	0.99085	0.141550
320.0	7.0	0.003500	0.0023570	0.75424	0.28000	1.03424	0.323200
50.0	7.0	0.001250	0.0006960	0.03480	0.01563	0.05043	0.100851
*	3.0	0.002500	0.0012500	*	*	*	*
*	8.0	0.001875	0.0014060	*	*	*	*

Appendix 8.2 ROX data and results for scenario 4

Exposure $	Yrs	M marg %	U cost %	U cost x exposure $	M marg x assets/4 $	Total volume $	ROX %
100.0	3.0	0.002500	*	*	0.06250	*	*
100.0	3.0	0.001250	0.0014170	0.14170	0.03125	0.17295	0.172950
70.0	5.0	0.003000	0.0016000	0.11200	0.05250	0.16450	0.235000
30.0	5.0	0.003500	0.0023750	0.07125	0.02625	0.09750	0.325000
100.0	10.0	0.001875	0.0008750	0.08750	0.04688	0.13438	0.134375
50.0	5.0	0.003750	0.0014000	0.07000	0.04688	0.11688	0.233750
22.0	5.0	0.003750	0.0025000	0.05500	0.02063	0.07563	0.343750
100.0	5.0	0.001500	*	*	0.03750	*	*
100.0	5.0	0.002000	0.0014250	0.14250	0.05000	0.19250	0.192500
50.0	5.0	0.003500	*	*	0.04375	*	*
400.0	3.0	0.001250	0.0011700	0.46800	0.12500	0.59300	0.148250
220.0	5.0	0.002250	0.0012000	0.26400	0.12375	0.38775	0.176250
350.0	5.0	0.002500	0.0009380	0.32830	0.21875	0.54705	0.156300
75.0	5.0	0.001500	0.0012000	0.09000	0.02813	0.11813	0.157500
70.0	2.0	0.000625	*	*	0.01094	*	*
30.0	3.0	0.001250	0.0012670	0.03801	0.00938	0.04739	0.157950
50.0	3.0	0.001000	0.0008330	0.04165	0.01250	0.05415	0.108300
175.0	5.0	0.001250	0.0013750	0.24062	0.05469	0.29531	0.168747
100.0	5.0	0.001500	*	*	0.03750	*	*
125.0	5.0	0.001000	*	*	0.03125	*	*
105.0	8.0	0.001750	0.0010310	0.10826	0.04594	0.15420	0.146855
20.0	4.0	0.001500	*	*	0.00750	*	*
225.0	4.0	0.001500	0.0008910	0.20047	0.08438	0.28484	0.126598
100.0	5.0	0.001750	*	*	0.04375	*	*
70.0	5.0	0.002500	0.0015000	0.10500	0.04375	0.14875	0.212500
30.0	5.0	0.000875	*	*	0.00656	*	*
1000.0	3.0	0.002250	0.0014580	1.45800	0.56250	2.02050	0.202050
140.0	8.0	0.000750	0.0040310	0.56434	0.02625	0.59059	0.421850
100.0	3.0	0.002625	0.0017500	0.17500	0.06562	0.24062	0.240625
50.0	3.0	0.001250	*	*	0.01562	*	*
100.0	3.0	0.001200	*	*	0.03000	*	*
70.0	7.0	0.002000	0.0009560	0.06692	0.03500	0.10192	0.145600
25.0	3.0	0.006250	0.0022920	0.05730	0.03906	0.09636	0.385449
300.0	5.0	0.002000	*	*	0.15000	*	*
200.0	5.0	0.002000	*	*	0.10000	*	*
70.0	3.0	0.002000	*	*	0.03500	*	*
60.0	5.0	0.001750	0.0011000	0.06600	0.02625	0.09225	0.153750
18.0	3.0	0.000563	*	*	0.00253	*	*
25.0	3.0	0.002500	0.0016670	0.04168	0.01562	0.05730	0.229219
110.0	7.0	0.001500	*	*	0.04125	*	*
25.0	2.0	0.001250	*	*	0.00781	*	*
143.0	10.0	0.001875	0.0007710	0.11025	0.06703	0.17728	0.123972
43.0	3.0	0.003000	0.0016670	0.07168	0.03225	0.10393	0.241698
100.0	1.0	0.003500	*	*	0.08750	*	*
100.0	3.0	0.002500	0.0013250	0.13250	0.06250	0.19500	0.195000
45.0	12.0	0.001000	*	*	0.01125	*	*

Appendix 8.2 ROX data and results for scenario 4

Exposure $	Yrs	M marg %	U cost %	U cost x exposure $	M marg x assets/4 $	Total volume $	ROX %
300.0	14.0	0.002000	0.0011570	0.34710	0.15000	0.49710	0.165700
40.0	7.0	0.002000	0.0011070	0.04428	0.02000	0.06428	0.160702
25.0	3.0	0.002500	0.0016670	0.04168	0.01562	0.05730	0.229219
85.0	5.0	0.003000	0.0042500	0.36125	0.06375	0.42500	0.500000
100.0	5.0	0.001000	0.0007750	0.07750	0.02500	0.10250	0.102500
280.0	6.0	0.004250	*	*	0.29750	*	*
85.0	2.0	0.001875	0.0006250	0.05312	0.03984	0.09296	0.109368
100.0	5.0	0.002000	0.0011250	0.11250	0.05000	0.16250	0.162500
30.0	3.0	0.002500	*	*	0.01875	*	*
50.0	5.0	0.001000	0.0009380	0.04690	0.01250	0.05940	0.118800
250.0	5.0	0.001500	0.0007750	0.19375	0.09375	0.28750	0.115000
13.0	5.0	*	0.0021250	0.02763	*	*	*
72.5	5.0	0.001250	*	*	0.02265	*	*
70.0	5.0	0.001875	*	*	0.03281	*	*
45.0	5.0	0.001875	*	*	0.02110	*	*
100.0	5.0	0.001500	0.0006500	0.06500	0.03750	0.10250	0.102500
250.0	10.0	0.001375	0.0006630	0.16575	0.08594	0.25169	0.100675
145.0	8.0	0.002500	0.0009750	0.14137	0.09063	0.23200	0.159997
50.0	5.0	0.001875	0.0011000	0.05500	0.02344	0.07844	0.156875
100.0	10.0	0.001500	0.0011250	0.11250	0.03750	0.15000	0.150000
500.0	1.0	0.001500	0.0007750	0.38750	0.18750	0.57500	0.115000
150.0	3.0	0.003000	0.0020000	0.30000	0.11250	0.41250	0.275000
110.0	5.0	0.001500	*	*	0.04125	*	*
*	*	0.001250	*	*	*	*	*
60.0	3.0	0.004000	0.0020000	0.12000	0.06000	0.18000	0.300000
450.0	5.0	0.002500	0.0007070	0.31815	0.28125	0.59940	0.133200
100.0	8.0	0.002000	0.0014070	0.14070	0.05000	0.19070	0.190700
200.0	7.0	0.001750	0.0006820	0.13640	0.08750	0.22390	0.111950
100.0	5.0	0.001500	*	*	0.03750	*	*
75.0	6.0	0.001250	0.0011250	0.08437	0.02344	0.10781	0.143743
30.0	3.0	0.001250	0.0014580	0.04374	0.00938	0.05312	0.177050
25.0	3.0	0.002500	0.0016670	0.04168	0.01562	0.05730	0.229219
75.0	4.0	0.005000	0.0009500	0.07125	0.09375	0.16500	0.220000
100.0	1.0	0.002500	*	*	0.06250	*	*
100.0	3.0	0.002000	0.0011700	0.11700	0.05000	0.16700	0.167000
75.0	5.0	0.002000	0.0013300	0.09975	0.03750	0.13725	0.183000
36.0	7.0	0.001750	0.0011430	0.04115	0.01575	0.05690	0.158056
40.0	6.0	0.001500	*	*	0.01500	*	*
300.0	7.0	0.002500	0.0007440	0.22320	0.18750	0.41070	0.136900
45.0	5.0	0.001750	0.0007250	0.03263	0.01969	0.05232	0.116261
45.0	5.0	0.004000	0.0026250	0.11812	0.04500	0.16312	0.362489
185.0	7.0	0.001875	0.0011070	0.20480	0.08672	0.29152	0.157577
30.0	10.0	0.003000	*	*	0.02250	*	*
500.0	5.0	0.002250	0.0014000	0.70000	0.28125	0.98125	0.196250
400.0	4.0	0.003500	*	*	0.35000	*	*
100.0	5.0	0.003250	0.0019250	0.19250	0.08125	0.27375	0.273750

Appendix 8.2 ROX data and results for scenario 4

Exposure $	Yrs	M marg %	U cost %	U cost x exposure $	M marg x assets/4 $	Total volume $	ROX %
100.0	7.0	0.003250	0.0014820	0.14820	0.08125	0.22945	0.229451
125.0	11.0	0.001750	0.0023410	0.29262	0.05469	0.34731	0.277845
125.0	5.0	0.001500	0.0008500	0.10625	0.04688	0.15313	0.122500
150.0	7.0	0.002370	*	*	0.08888	*	*
60.0	3.0	0.003750	0.0020000	0.12000	0.05625	0.17625	0.293750
75.0	2.5	0.008500	0.0065000	0.48750	0.15937	0.64688	0.862500
200.0	5.0	0.002500	0.0011500	0.23000	0.12500	0.35500	0.177500
30.0	7.0	0.001750	0.0013930	0.04179	0.01312	0.05491	0.183050
150.0	5.0	0.000625	0.0009050	0.13575	0.02344	0.15919	0.106125
25.0	30.0	0.003000	0.0012500	0.03125	0.01875	0.05000	0.200000
320.0	5.0	0.000500	*	*	0.04000	*	*
110.0	5.0	0.001500	0.0008000	0.08800	0.04125	0.12925	0.117500
75.0	7.0	0.002000	*	*	0.03750	*	*
45.0	2.0	0.001875	0.0006250	0.02812	0.02110	0.04922	0.109367
200.0	6.0	0.003450	0.0008880	0.17760	0.17250	0.35010	0.175050
350.0	5.0	0.003500	0.0012750	0.44625	0.30625	0.75250	0.215000
160.0	5.0	0.004500	0.0016700	0.26720	0.18000	0.44720	0.279500
120.0	8.0	0.002750	0.0012500	0.15000	0.08250	0.23250	0.193750
125.0	5.0	0.001750	0.0010800	0.13500	0.05469	0.18969	0.151750
75.0	10.0	0.003000	0.0015750	0.11812	0.05625	0.17437	0.232493
185.0	5.0	0.002000	*	*	0.09250	*	*
*	5.0	0.001200	*	*	*	*	*
75.0	5.0	0.001500	0.0012000	0.09000	0.02813	0.11813	0.157500
*	7.0	0.001250	0.0013210	*	*	*	*
375.0	5.0	0.004000	*	*	0.37500	*	*
150.0	5.0	0.001750	*	*	0.06562	*	*
35.0	5.0	0.002000	0.0013750	0.04812	0.01750	0.06562	0.187486
100.0	5.0	0.002250	0.0012000	0.12000	0.05625	0.17625	0.176250
350.0	5.0	0.002500	*	*	0.21875	*	*
250.0	5.0	0.001875	*	*	0.11719	*	*
60.0	3.0	*	0.0011670	0.07002	*	*	*
75.0	7.0	0.001000	0.0008930	0.06697	0.01875	0.08572	0.114293
50.0	5.0	0.002500	0.0012000	0.06000	0.03125	0.09125	0.182500
300.0	8.0	0.001500	0.0010660	0.31980	0.11250	0.43230	0.144100
*	7.0	0.005000	0.0011270	*	*	*	*
100.0	3.0	0.002500	0.0009580	0.09580	0.06250	0.15830	0.158300
125.0	5.0	0.010000	*	*	0.31250	*	*
300.0	7.0	0.001500	0.0011070	0.33210	0.11250	0.44460	0.148200
130.0	8.0	0.001125	0.0007000	0.09100	0.03656	0.12756	0.098125
200.0	7.0	0.000800	0.0004640	0.09280	0.04000	0.13280	0.066400
100.0	10.0	0.001000	*	*	0.02500	*	*
*	5.0	0.001250	0.0006060	*	*	*	*
105.0	5.0	0.000563	0.0007750	0.08138	0.01478	0.09616	0.091579
140.0	4.0	0.002500	0.0014370	0.20118	0.08750	0.28868	0.206200
127.0	8.0	0.001750	0.0007030	0.08928	0.05556	0.14484	0.114049
142.0	5.0	0.001500	*	*	0.05325	*	*

Appendix 8.2 ROX data and results for scenario 4

Exposure $	Yrs	M marg %	U cost %	U cost x exposure $	M marg x assets/4 $	Total volume $	ROX %
*	5.0	0.002000	0.0013000	*	*	*	*
200.0	5.0	0.002500	0.0011250	0.22500	0.12500	0.35000	0.175000
100.0	5.0	0.002500	0.0011250	0.11250	0.06250	0.17500	0.175000
200.0	7.0	0.002250	0.0008570	0.17140	0.11250	0.28390	0.141950
50.0	5.0	0.002000	0.0008250	0.04125	0.02500	0.06625	0.132500
40.0	3.0	0.002250	*	*	0.02250	*	*
38.0	5.0	0.002500	0.0015000	0.05700	0.02375	0.08075	0.212500
50.0	10.0	0.001000	0.0005875	0.02937	0.01250	0.04187	0.083740
125.0	5.0	0.001500	*	*	0.04688	*	*
35.0	5.0	0.001500	0.0011750	0.04112	0.01312	0.05424	0.154986
105.0	3.0	0.001500	0.0006190	0.06499	0.03937	0.10436	0.099395
250.0	7.0	0.005000	*	*	0.31250	*	*
170.0	7.0	0.005000	*	*	0.21250	*	*
355.0	7.0	0.001250	*	*	0.11094	*	*
57.0	5.0	0.001500	0.0010800	0.06156	0.02138	0.08294	0.145500
70.0	5.0	0.001500	*	*	0.02625	*	*
100.0	5.0	0.001750	0.0014000	0.14000	0.04375	0.18375	0.183750
150.0	5.0	0.002500	0.0020750	0.31125	0.09375	0.40500	0.270000
250.0	2.0	0.001500	0.0008750	0.21875	0.09375	0.31250	0.125000

Appendix 8.3 ROX data and results for scenario 5

Exposure $	Yrs	M marg %	U cost %	U cost x exposure $	M marg x assets /8 $	Total volume $	ROX %
80.0	3.0	0.001250	0.0010000	0.08000	0.012500	0.09250	0.115625
50.0	15.0	0.001000	0.0007920	0.03960	0.006250	0.04585	0.091700
125.0	3.0	0.002000	0.0006670	0.08337	0.031250	0.11462	0.091696
100.0	5.0	0.001250	0.0024000	0.24000	0.015625	0.25563	0.255625
250.0	10.0	*	*	*	*	*	*
200.0	5.0	0.001000	0.0008750	0.17500	0.025000	0.20000	0.100000
80.0	5.0	0.002500	0.0012500	0.10000	0.025000	0.12500	0.156250
250.0	8.0	0.003750	0.0025780	0.64450	0.117190	0.76169	0.304676
500.0	5.0	*	0.0006250	0.31250	*	*	*
100.0	5.0	0.000800	0.0007250	0.07250	0.010000	0.08250	0.082500
300.0	10.0	0.003250	0.0010000	0.30000	0.121875	0.42188	0.140625
125.0	7.0	0.002000	*	*	0.031250	*	*
45.0	5.0	0.003500	0.0030000	0.13500	0.019685	0.15469	0.343744
200.0	8.0	0.000500	0.0008500	0.17000	0.012500	0.18250	0.091250
750.0	10.0	0.000800	0.0008000	0.60000	0.075000	0.67500	0.090000
12.5	5.0	0.001500	0.0006880	0.00860	0.002345	0.01095	0.087560
400.0	10.0	0.004000	0.0015630	0.62520	0.200000	0.82520	0.206300
200.0	7.0	0.001500	*	*	0.037500	*	*
500.0	10.0	0.001250	*	*	0.078125	*	*
1500.0	6.0	0.001625	*	*	0.304690	*	*
340.0	5.0	0.001875	0.0008250	0.28050	0.079685	0.36018	0.105937
500.0	10.0	0.002875	0.0007440	0.37200	0.179685	0.55169	0.110337
100.0	7.0	0.003250	0.0024290	0.24290	0.040625	0.28352	0.283525
350.0	10.0	0.001875	0.0010130	0.35455	0.082030	0.43658	0.124737
100.0	2.0	0.000625	0.0003125	0.03125	0.007810	0.03906	0.039060
1300.0	8.0	0.004375	0.0008780	1.14140	0.710940	1.85234	0.142488
85.0	5.0	0.002250	0.0008250	0.07012	0.023905	0.09403	0.110618
700.0	10.0	0.002000	0.0006000	0.42000	0.175000	0.59500	0.085000
400.0	10.0	0.002000	0.0006630	0.26520	0.100000	0.36520	0.091300
350.0	10.0	0.001250	*	*	0.054685	*	*
200.0	3.0	0.002500	0.0015000	0.30000	0.062500	0.36250	0.181250
100.0	5.0	0.001125	0.0006250	0.06250	0.014065	0.07656	0.076565
2000.0	8.5	0.001750	0.0005980	1.19600	0.437500	1.63350	0.081675
500.0	10.0	0.001750	0.0010750	0.53750	0.109375	0.64688	0.129375
75.0	7.0	0.002250	0.0010710	0.08032	0.021095	0.10142	0.135220
70.0	5.0	0.001000	*	*	0.008750	*	*
500.0	7.0	0.002500	0.0013930	0.69650	0.156250	0.85275	0.170550
1000.0	5.5	0.002250	0.0008070	0.80700	0.281250	1.08825	0.108825
75.0	7.0	0.002500	*	*	0.023440	*	*
40.0	7.0	0.002000	*	*	0.010000	*	*
100.0	5.5	0.000625	0.0006140	0.06140	0.007815	0.06921	0.069215
100.0	5.0	0.001125	0.0005880	0.05880	0.014065	0.07287	0.072865
350.0	8.0	0.001875	0.0006160	0.21560	0.082030	0.29763	0.085037
500.0	8.0	0.001000	0.0005440	0.27200	0.062500	0.33450	0.066900
300.0	7.0	0.001500	0.0008860	0.26580	0.056250	0.32205	0.107350

Appendix 8.3 ROX data and results for scenario 5

Exposure $	Yrs	M marg %	U cost %	U cost x exposure $	M marg x assets /8 $	Total volume $	ROX %
45.0	5.0	0.010000	*	*	0.056250	*	*
60.0	5.0	0.002500	0.0007750	0.04650	0.018750	0.06525	0.108750
80.0	4.5	0.004000	*	*	0.040000	*	*
30.0	2.0	0.000625	*	*	0.002345	*	*
300.0	10.0	0.001000	0.0004930	0.14790	0.037500	0.18540	0.061800
400.0	10.0	0.001250	0.0005000	0.20000	0.062500	0.26250	0.065625
150.0	7.0	0.001100	0.0005890	0.08835	0.020625	0.10898	0.072650
200.0	10.0	0.001000	0.0005500	0.11000	0.025000	0.13500	0.067500
315.0	6.0	0.001250	0.0003420	0.10773	0.049220	0.15695	0.049825
75.0	7.0	0.004000	*	*	0.037500	*	*
50.0	7.0	0.001875	*	*	0.011720	*	*
20.0	5.0	0.003750	0.0015500	0.03100	0.009375	0.04038	0.201875
75.0	3.0	0.001250	0.0014170	0.10627	0.011720	0.11799	0.157320
65.0	5.0	0.001250	0.0012000	0.07800	0.010155	0.08816	0.135623
100.0	2.0	0.001250	0.0006250	0.06250	0.015625	0.07812	0.078125
100.0	2.0	0.001250	*	*	0.015625	*	*
25.0	7.0	0.001875	*	*	0.005860	*	*
100.0	7.0	0.001500	0.0014290	0.14290	0.018750	0.16165	0.161650
50.0	5.0	0.001500	0.0008250	0.04125	0.009375	0.05063	0.101250
150.0	2.0	0.001250	*	*	0.023440	*	*
75.0	5.0	0.001000	0.0007130	0.05347	0.009375	0.06284	0.083793
25.0	5.0	0.001250	*	*	0.003905	*	*
100.0	5.0	0.001875	0.0007750	0.07750	0.023440	0.10094	0.100940
100.0	5.0	0.002500	*	*	0.031250	*	*
40.0	3.0	0.002000	*	*	0.010000	*	*
50.0	5.0	0.001000	0.0007750	0.03875	0.006250	0.04500	0.090000
20.0	3.0	0.003000	0.0023960	0.04792	0.007500	0.05542	0.277100
35.0	3.0	0.002500	0.0022920	0.08022	0.010940	0.09116	0.260457
100.0	5.0	*	0.0014750	0.14750	*	*	*
30.0	5.0	0.001000	0.0015500	0.04650	0.003750	0.05025	0.167500
100.0	5.0	0.002750	0.0014250	0.14250	0.034375	0.17687	0.176875
50.0	2.0	0.000625	*	*	0.003905	*	*
50.0	3.0	0.002500	0.0026050	0.13025	0.015625	0.14588	0.291750
60.0	4.0	*	0.0015630	0.09378	*	*	*
30.0	5.0	0.001500	0.0015000	0.04500	0.005625	0.05063	0.168750
40.0	3.0	0.000625	0.0011700	0.04680	0.003125	0.04992	0.124812
50.0	5.0	0.001000	*	*	0.006250	*	*
50.0	5.0	0.002500	0.0010750	0.05375	0.015625	0.06938	0.138750
50.0	5.0	0.001000	*	*	0.006250	*	*
20.0	5.0	0.002500	*	*	0.006250	*	*
50.0	3.0	0.000625	*	*	0.003905	*	*
60.0	3.0	0.002250	*	*	0.016875	*	*
150.0	6.0	0.001875	0.0013130	0.19695	0.035155	0.23211	0.154737
100.0	5.0	0.002500	0.0013750	0.13750	0.031250	0.16875	0.168750
300.0	5.0	0.001500	0.0007500	0.22500	0.056250	0.28125	0.093750

Appendix 8.3 ROX data and results for scenario 5

Exposure $	Yrs	M marg %	U cost %	U cost x exposure $	M marg x assets /8 $	Total volume $	ROX %
50.0	3.0	0.002250	0.0018330	0.09165	0.014065	0.10571	0.211430
155.0	5.0	0.003375	*	*	0.065390	*	*
30.0	3.0	0.002500	0.0024080	0.07224	0.009375	0.08162	0.272050
50.0	5.0	0.002500	0.0006430	0.03215	0.015625	0.04778	0.095550
*	3.0	0.002500	*	*	*	*	*
15.0	3.0	0.002500	0.0015830	0.02374	0.004690	0.02843	0.189533
30.0	5.0	0.001000	0.0015750	0.04725	0.003750	0.05100	0.170000
100.0	4.0	0.002000	0.0013750	0.13750	0.025000	0.16250	0.162500
35.0	5.0	0.001750	0.0012500	0.04375	0.007655	0.05140	0.146871
100.0	5.0	0.000750	0.0012500	0.12500	0.009375	0.13438	0.134375
100.0	2.0	0.000625	*	*	0.007810	*	*
100.0	5.0	0.000750	0.0008350	0.08350	0.009375	0.09287	0.092875
25.0	1.0	0.007500	*	*	0.023440	*	*
100.0	5.0	0.001750	0.0017850	0.17850	0.021875	0.20037	0.200375
200.0	3.0	0.001500	0.0018330	0.36660	0.037500	0.40410	0.202050
40.0	3.0	0.001000	0.0016000	0.06400	0.005000	0.06900	0.172500
100.0	5.0	0.000400	0.0003125	0.03125	0.005000	0.03625	0.036250
35.0	5.0	0.001500	*	*	0.006560	*	*
25.0	5.0	0.002500	0.0012000	0.03000	0.007810	0.03781	0.151240
100.0	5.0	0.003000	0.0012750	0.12750	0.037500	0.16500	0.165000
100.0	5.0	0.002500	*	*	0.031250	*	*
30.0	5.0	0.001000	*	*	0.003750	*	*
325.0	5.0	0.001000	*	*	0.040625	*	*
25.0	7.0	0.000500	0.0014290	0.03573	0.001565	0.03730	0.149180
13.0	6.0	0.001875	*	*	0.003045	*	*
80.0	3.0	0.002500	*	*	0.025000	*	*
400.0	10.0	0.001250	0.0010000	0.40000	0.062500	0.46250	0.115625
50.0	3.0	0.002500	0.0009380	0.04690	0.015625	0.06253	0.125050
400.0	7.0	0.001500	0.0022680	0.90720	0.075000	0.98220	0.245550
75.0	10.0	0.002000	0.0013750	0.10312	0.018750	0.12187	0.162493
75.0	7.0	0.003250	0.0011430	0.08572	0.030470	0.11619	0.154920
22.0	3.0	0.003000	*	*	0.008250	*	*
50.0	7.0	0.001000	*	*	0.006250	*	*
50.0	7.0	0.002000	0.0013930	0.06965	0.012500	0.08215	0.164300
150.0	5.0	0.001875	0.0007250	0.10875	0.035155	0.14390	0.095937
75.0	5.0	0.001875	0.0009500	0.07125	0.017580	0.08883	0.118440
100.0	3.0	0.001250	0.0013330	0.13330	0.015625	0.14893	0.148925
70.0	2.0	0.001250	*	*	0.010935	*	*
45.0	5.0	0.001250	0.0015000	0.06750	0.007030	0.07453	0.165622
125.0	4.0	0.002500	0.0025000	0.31250	0.039060	0.35156	0.281248
50.0	4.0	0.002500	0.0017190	0.08595	0.015625	0.10158	0.203150
155.0	2.0	0.003750	*	*	0.072655	*	*
50.0	3.0	0.002500	*	*	0.015625	*	*
75.0	5.0	0.001875	0.0007500	0.05625	0.017580	0.07383	0.098440
65.0	7.0	0.001875	0.0006960	0.04524	0.015235	0.06047	0.093038

Appendix 8.3 ROX data and results for scenario 5

Exposure $	Yrs	M marg %	U cost %	U cost x exposure $	M marg x assets /8 $	Total volume $	ROX %
150.0	5.0	0.001500	0.0014500	0.21750	0.028125	0.24563	0.163750
67.0	5.0	0.002500	*	*	0.020940	*	*
100.0	7.0	0.002500	0.0011790	0.11790	0.031250	0.14915	0.149150
225.0	5.0	0.001875	0.0007500	0.16875	0.052735	0.22149	0.098438
50.0	8.0	0.001000	*	*	0.006250	*	*
100.0	5.0	0.001000	0.0012000	0.12000	0.012500	0.13250	0.132500
125.0	5.0	0.001875	0.0007125	0.08906	0.029295	0.11835	0.094684
400.0	10.0	0.001250	0.0007400	0.29600	0.062500	0.35850	0.089625
450.0	7.0	0.003000	0.0011250	0.50625	0.168750	0.67500	0.150000
200.0	5.0	0.003500	0.0015000	0.30000	0.087500	0.38750	0.193750
25.0	5.0	0.002000	0.0031000	0.07750	0.006250	0.08375	0.335000
1200.0	3.0	0.002000	0.0014000	1.68000	0.300000	1.98000	0.165000
150.0	5.0	0.001725	0.0013250	0.19875	0.032345	0.23110	0.154063
150.0	7.0	0.002000	0.0013930	0.20895	0.037500	0.24645	0.164300
30.0	3.0	0.001875	0.0010420	0.03126	0.007030	0.03829	0.127633
62.5	5.0	0.002500	0.0008500	0.05313	0.019530	0.07266	0.116256
60.0	3.0	*	*	*	*	*	*
85.0	3.0	0.002500	0.0012500	0.10625	0.026560	0.13281	0.156247
100.0	5.0	0.002200	0.0009750	0.09750	0.027500	0.12500	0.125000
150.0	5.0	0.001500	0.0005630	0.08445	0.028125	0.11258	0.075050
50.0	10.0	0.001563	0.0010260	0.05130	0.009770	0.06107	0.122140
100.0	7.0	0.001250	0.0014820	0.14820	0.015625	0.16383	0.163825
75.0	7.0	0.001000	0.0009640	0.07230	0.009375	0.08168	0.108900
125.0	5.0	0.001875	0.0007250	0.09062	0.029295	0.11992	0.095932
62.5	5.0	0.001500	0.0009000	0.05625	0.011720	0.06797	0.108752
500.0	7.0	0.001250	0.0005200	0.26000	0.078125	0.33812	0.067625
150.0	7.0	0.003750	0.0013320	0.19980	0.070310	0.27011	0.180073
400.0	5.0	0.001000	0.0013750	0.55000	0.050000	0.60000	0.150000
1300.0	5.0	0.002250	0.0019750	2.56750	0.365625	2.93313	0.225625
360.0	5.0	0.002000	0.0010000	0.36000	0.090000	0.45000	0.125000
50.0	5.0	0.002000	*	*	0.012500	*	*
200.0	5.0	0.001875	0.0008650	0.17300	0.046875	0.21987	0.109937
50.0	3.0	0.001250	*	*	0.007810	*	*
25.0	5.5	0.002000	0.0008180	0.02045	0.006250	0.02670	0.106800
200.0	5.0	0.001250	0.0011250	0.22500	0.031250	0.25625	0.128125
200.0	5.0	0.001375	*	*	0.034375	*	*
200.0	5.0	0.001750	0.0010800	0.21600	0.043750	0.25975	0.129875
56.0	3.0	0.002500	*	*	0.017500	*	*
75.0	5.0	0.001000	0.0009510	0.07133	0.009375	0.08071	0.107607
170.0	3.0	0.001250	0.0009000	0.15300	0.026560	0.17956	0.105624
87.5	2.5	0.003000	*	*	0.032810	*	*
300.0	3.0	0.001500	0.0012080	0.36240	0.056250	0.41865	0.139550
130.0	8.0	0.003750	*	*	0.060940	*	*
175.0	5.0	0.002000	0.0011650	0.20388	0.043750	0.24763	0.141503
125.0	4.0	0.005000	*	*	0.078125	*	*

Appendix 8.3 ROX data and results for scenario 5

Exposure $	Yrs	M marg %	U cost %	U cost x exposure $	M marg x assets /8 $	Total volume $	ROX %
220.0	5.0	0.002750	*	*	0.075625	*	*
50.0	3.0	0.003250	*	*	0.020315	*	*
90.0	7.0	0.001000	*	*	0.011250	*	*
300.0	7.0	0.002500	0.0018570	0.55710	0.093750	0.65085	0.216950
35.0	3.0	0.004500	*	*	0.019685	*	*
37.5	7.0	0.002500	0.0011430	0.04286	0.011720	0.05458	0.145547
45.0	3.0	0.002500	*	*	0.014065	*	*
55.0	4.0	0.001000	0.0014500	0.07975	0.006875	0.08663	0.157500
125.0	5.0	0.001875	0.0008250	0.10312	0.029295	0.13241	0.105932
400.0	5.0	0.002500	*	*	0.125000	*	*
200.0	5.0	0.002500	*	*	0.062500	*	*
300.0	5.0	0.003500	0.0014100	0.42300	0.131250	0.55425	0.184750
150.0	5.0	0.001750	0.0014250	0.21375	0.032810	0.24656	0.164373
630.0	4.0	0.002500	0.0007780	0.49014	0.196875	0.68701	0.109050
100.0	5.0	0.002500	*	*	0.031250	*	*
100.0	3.0	0.005500	*	*	0.068750	*	*
97.5	8.5	0.007500	*	*	0.091405	*	*
20.0	3.0	0.002500	0.0016670	0.03334	0.006250	0.03959	0.197950
60.0	2.0	0.001000	0.0014690	0.08814	0.007500	0.09564	0.159400
200.0	10.0	0.002000	0.0012125	0.24250	0.050000	0.29250	0.146250
195.0	7.0	0.002750	0.0013750	0.26812	0.067030	0.33515	0.171872
100.0	7.0	0.001750	0.0008000	0.08000	0.021875	0.10187	0.101875
150.0	8.0	0.003750	*	*	0.070315	*	*
400.0	4.0	0.003500	*	*	0.175000	*	*
60.0	5.0	0.003250	0.0014380	0.08628	0.024375	0.11066	0.184425
50.0	1.0	0.002000	*	*	0.012500	*	*
50.0	2.0	0.001250	*	*	0.007810	*	*
100.0	7.0	0.001500	*	*	0.018750	*	*
50.0	5.0	0.001563	*	*	0.009770	*	*
22.0	10.0	0.002000	0.0011000	0.02420	0.005500	0.02970	0.135000
75.0	5.0	0.002000	*	*	0.018750	*	*
125.0	3.0	0.001250	0.0012500	0.15625	0.019530	0.17578	0.140624
125.0	3.0	0.003000	0.0010210	0.12763	0.046875	0.17450	0.139604
200.0	5.0	0.002000	0.0011500	0.23000	0.050000	0.28000	0.140000
65.0	5.0	0.002500	0.0010050	0.06532	0.020310	0.08563	0.131738
300.0	7.0	0.002750	*	*	0.103125	*	*
110.0	7.0	0.002500	0.0008930	0.09823	0.034375	0.13261	0.120550
60.0	5.0	0.002500	*	*	0.018750	*	*
38.0	6.0	0.001875	0.0014170	0.05385	0.008905	0.06275	0.165145
75.0	8.5	0.005500	0.0020070	0.15052	0.051560	0.20208	0.269440
140.0	5.0	0.002000	0.0013700	0.19180	0.035000	0.22680	0.162000
65.0	5.0	0.001875	0.0007950	0.05167	0.015235	0.06690	0.102931
110.0	7.0	0.002500	0.0016070	0.17677	0.034375	0.21114	0.191950
75.0	5.0	0.003000	*	*	0.028125	*	*
60.0	5.0	0.001500	0.0010250	0.06150	0.011250	0.07275	0.121250

Appendix 8.3 ROX data and results for scenario 5

Exposure $	Yrs	M marg %	U cost %	U cost x exposure $	M marg x assets /8 $	Total volume $	ROX %
700.0	10.0	0.001250	0.0011030	0.77210	0.109375	0.88147	0.125925
320.0	7.0	0.003500	0.0023570	0.75424	0.140000	0.89424	0.279450
50.0	7.0	0.001250	0.0006960	0.03480	0.007815	0.04262	0.085230
*	3.0	0.002500	0.0012500	*	*	*	*
*	8.0	0.001875	0.0014060	*	*	*	*
100.0	3.0	0.002500	*	*	0.031250	*	*
100.0	3.0	0.001250	0.0014170	0.14170	0.015625	0.15732	0.157325
70.0	5.0	0.003000	0.0016000	0.11200	0.026250	0.13825	0.197500
30.0	5.0	0.003500	0.0023750	0.07125	0.013125	0.08438	0.281250
100.0	10.0	0.001875	0.0008750	0.08750	0.023440	0.11094	0.110940
50.0	5.0	0.003750	0.0014000	0.07000	0.023440	0.09344	0.186880
22.0	5.0	0.003750	0.0025000	0.05500	0.010315	0.06532	0.296886
100.0	5.0	0.001500	*	*	0.018750	*	*
100.0	5.0	0.002000	0.0014250	0.14250	0.025000	0.16750	0.167500
50.0	5.0	0.003500	*	*	0.021875	*	*
400.0	3.0	0.001250	0.0011700	0.46800	0.062500	0.53050	0.132625
220.0	5.0	0.002250	0.0012000	0.26400	0.061875	0.32588	0.148125
350.0	5.0	0.002500	0.0009380	0.32830	0.109375	0.43767	0.125050
75.0	5.0	0.001500	0.0012000	0.09000	0.014065	0.10407	0.138753
70.0	2.0	0.000625	*	*	0.005470	*	*
30.0	3.0	0.001250	0.0012670	0.03801	0.004690	0.04270	0.142333
50.0	3.0	0.001000	0.0008330	0.04165	0.006250	0.04790	0.095800
175.0	5.0	0.001250	0.0013750	0.24062	0.027345	0.26796	0.153123
100.0	5.0	0.001500	*	*	0.018750	*	*
125.0	5.0	0.001000	*	*	0.015625	*	*
105.0	8.0	0.001750	0.0010310	0.10826	0.022970	0.13123	0.124981
20.0	4.0	0.001500	*	*	0.003750	*	*
225.0	4.0	0.001500	0.0008910	0.20047	0.042190	0.24266	0.107849
100.0	5.0	0.001750	*	*	0.021875	*	*
70.0	5.0	0.002500	0.0015000	0.10500	0.021875	0.12687	0.181250
30.0	5.0	0.000875	*	*	0.003280	*	*
1000.0	3.0	0.002250	0.0014580	1.45800	0.281250	1.73925	0.173925
140.0	8.0	0.000750	0.0040310	0.56434	0.013125	0.57746	0.412475
100.0	3.0	0.002625	0.0017500	0.17500	0.032810	0.20781	0.207810
50.0	3.0	0.001250	*	*	0.007810	*	*
100.0	3.0	0.001200	*	*	0.015000	*	*
70.0	7.0	0.002000	0.0009560	0.06692	0.017500	0.08442	0.120600
25.0	3.0	0.006250	0.0022920	0.05730	0.019530	0.07683	0.307320
300.0	5.0	0.002000	*	*	0.075000	*	*
200.0	5.0	0.002000	*	*	0.050000	*	*
70.0	3.0	0.002000	*	*	0.017500	*	*
60.0	5.0	0.001750	0.0011000	0.06600	0.013125	0.07913	0.131875
18.0	3.0	0.000563	*	*	0.001265	*	*
25.0	3.0	0.002500	0.0016670	0.04168	0.007810	0.04949	0.197960
110.0	7.0	0.001500	*	*	0.020625	*	*

Appendix 8.3 ROX data and results for scenario 5

Exposure $	Yrs	M marg %	U cost %	U cost x exposure $	M marg x assets /8 $	Total volume $	ROX %
25.0	2.0	0.001250	*	*	0.003905	*	*
143.0	10.0	0.001875	0.0007710	0.11025	0.033515	0.14377	0.100535
43.0	3.0	0.003000	0.0016670	0.07168	0.016125	0.08781	0.204198
100.0	1.0	0.003500	*	*	0.043750	*	*
100.0	3.0	0.002500	0.0013250	0.13250	0.031250	0.16375	0.163750
45.0	12.0	0.001000	*	*	0.005625	*	*
300.0	14.0	0.002000	0.0011570	0.34710	0.075000	0.42210	0.140700
40.0	7.0	0.002000	0.0011070	0.04428	0.010000	0.05428	0.135700
25.0	3.0	0.002500	0.0016670	0.04168	0.007810	0.04949	0.197960
85.0	5.0	0.003000	0.0042500	0.36125	0.031875	0.39313	0.462500
100.0	5.0	0.001000	0.0007750	0.07750	0.012500	0.09000	0.090000
280.0	6.0	0.004250	*	*	0.148750	*	*
85.0	2.0	0.001875	0.0006250	0.05312	0.019920	0.07304	0.085929
100.0	5.0	0.002000	0.0011250	0.11250	0.025000	0.13750	0.137500
30.0	3.0	0.002500	*	*	0.009375	*	*
50.0	5.0	0.001000	0.0009380	0.04690	0.006250	0.05315	0.106300
250.0	5.0	0.001500	0.0007750	0.19375	0.046875	0.24062	0.096250
13.0	5.0	*	0.0021250	0.02763	*	*	*
72.5	5.0	0.001250	*	*	0.011325	*	*
70.0	5.0	0.001875	*	*	0.016405	*	*
45.0	5.0	0.001875	*	*	0.010550	*	*
100.0	5.0	0.001500	0.0006500	0.06500	0.018750	0.08375	0.083750
250.0	10.0	0.001375	0.0006630	0.16575	0.042970	0.20872	0.083488
145.0	8.0	0.002500	0.0009750	0.14137	0.045315	0.18668	0.128748
50.0	5.0	0.001875	0.0011000	0.05500	0.011720	0.06672	0.133440
100.0	10.0	0.001500	0.0011250	0.11250	0.018750	0.13125	0.131250
500.0	1.0	0.001500	0.0007750	0.38750	0.093750	0.48125	0.096250
150.0	3.0	0.003000	0.0020000	0.30000	0.056250	0.35625	0.237500
110.0	5.0	0.001500	*	*	0.020625	*	*
*	*	0.001250	*	*	*	*	*
60.0	3.0	0.004000	0.0020000	0.12000	0.030000	0.15000	0.250000
450.0	5.0	0.002500	0.0007070	0.31815	0.140625	0.45878	0.101950
100.0	8.0	0.002000	0.0014070	0.14070	0.025000	0.16570	0.165700
200.0	7.0	0.001750	0.0006820	0.13640	0.043750	0.18015	0.090075
100.0	5.0	0.001500	*	*	0.018750	*	*
75.0	6.0	0.001250	0.0011250	0.08437	0.011720	0.09609	0.128120
30.0	3.0	0.001250	0.0014580	0.04374	0.004690	0.04843	0.161433
25.0	3.0	0.002500	0.0016670	0.04168	0.007810	0.04949	0.197960
75.0	4.0	0.005000	0.0009500	0.07125	0.046875	0.11812	0.157500
100.0	1.0	0.002500	*	*	0.031250	*	*
100.0	3.0	0.002000	0.0011700	0.11700	0.025000	0.14200	0.142000
75.0	5.0	0.002000	0.0013300	0.09975	0.018750	0.11850	0.158000
36.0	7.0	0.001750	0.0011430	0.04115	0.007875	0.04902	0.136181
40.0	6.0	0.001500	*	*	0.007500	*	*
300.0	7.0	0.002500	0.0007440	0.22320	0.093750	0.31695	0.105650

Appendix 8.3 ROX data and results for scenario 5

Exposure	Yrs	M marg	U cost	U cost x exposure	M marg x assets /8	Total volume	ROX
$		%	%	$	$	$	%
45.0	5.0	0.001750	0.0007250	0.03263	0.009845	0.04248	0.094389
45.0	5.0	0.004000	0.0026250	0.11812	0.022500	0.14062	0.312489
185.0	7.0	0.001875	0.0011070	0.20480	0.043360	0.24816	0.134141
30.0	10.0	0.003000	*	*	0.011250	*	*
500.0	5.0	0.002250	0.0014000	0.70000	0.140625	0.84062	0.168125
400.0	4.0	0.003500	*	*	0.175000	*	*
100.0	5.0	0.003250	0.0019250	0.19250	0.040625	0.23313	0.233125
100.0	7.0	0.003250	0.0014820	0.14820	0.040625	0.18883	0.188825
125.0	11.0	0.001750	0.0023410	0.29262	0.027345	0.31997	0.255972
125.0	5.0	0.001500	0.0008500	0.10625	0.023440	0.12969	0.103752
150.0	7.0	0.002370	*	*	0.044440	*	*
60.0	3.0	0.003750	0.0020000	0.12000	0.028125	0.14812	0.246875
75.0	2.5	0.008500	0.0065000	0.48750	0.079685	0.56719	0.756247
200.0	5.0	0.002500	0.0011500	0.23000	0.062500	0.29250	0.146250
30.0	7.0	0.001750	0.0013930	0.04179	0.006560	0.04835	0.161167
150.0	5.0	0.000625	0.0009050	0.13575	0.011720	0.14747	0.098313
25.0	30.0	0.003000	0.0012500	0.03125	0.009375	0.04063	0.162500
320.0	5.0	0.000500	*	*	0.020000	*	*
110.0	5.0	0.001500	0.0008000	0.08800	0.020625	0.10863	0.098750
75.0	7.0	0.002000	*	*	0.018750	*	*
45.0	2.0	0.001875	0.0006250	0.02812	0.010550	0.03867	0.085933
200.0	6.0	0.003450	0.0008880	0.17760	0.086250	0.26385	0.131925
350.0	5.0	0.003500	0.0012750	0.44625	0.153125	0.59938	0.171250
160.0	5.0	0.004500	0.0016700	0.26720	0.090000	0.35720	0.223250
120.0	8.0	0.002750	0.0012500	0.15000	0.041250	0.19125	0.159375
125.0	5.0	0.001750	0.0010800	0.13500	0.027345	0.16235	0.129876
75.0	10.0	0.003000	0.0015750	0.11812	0.028125	0.14625	0.194993
185.0	5.0	0.002000	*	*	0.046250	*	*
*	5.0	0.001200	*	*	*	*	*
75.0	5.0	0.001500	0.0012000	0.09000	0.014065	0.10407	0.138753
*	7.0	0.001250	0.0013210	*	*	*	*
375.0	5.0	0.004000	*	*	0.187500	*	*
150.0	5.0	0.001750	*	*	0.032810	*	*
35.0	5.0	0.002000	0.0013750	0.04812	0.008750	0.05687	0.162486
100.0	5.0	0.002250	0.0012000	0.12000	0.028125	0.14812	0.148125
350.0	5.0	0.002500	*	*	0.109375	*	*
250.0	5.0	0.001875	*	*	0.058595	*	*
60.0	3.0	*	0.0011670	0.07002	*	*	*
75.0	7.0	0.001000	0.0008930	0.06697	0.009375	0.07634	0.101793
50.0	5.0	0.002500	0.0012000	0.06000	0.015625	0.07563	0.151250
300.0	8.0	0.001500	0.0010660	0.31980	0.056250	0.37605	0.125350
*	7.0	0.005000	0.0011270	*	*	*	*
100.0	3.0	0.002500	0.0009580	0.09580	0.031250	0.12705	0.127050
125.0	5.0	0.010000	*	*	0.156250	*	*
300.0	7.0	0.001500	0.0011070	0.33210	0.056250	0.38835	0.129450

Appendix 8.3 ROX data and results for scenario 5

Exposure $	Yrs	M marg %	U cost %	U cost x exposure $	M marg x assets /8 $	Total volume $	ROX %
130.0	8.0	0.001125	0.0007000	0.09100	0.018280	0.10928	0.084062
200.0	7.0	0.000800	0.0004640	0.09280	0.020000	0.11280	0.056400
100.0	10.0	0.001000	*	*	0.012500	*	*
*	5.0	0.001250	0.0006060	*	*	*	*
105.0	5.0	0.000563	0.0007750	0.08138	0.007390	0.08877	0.084543
140.0	4.0	0.002500	0.0014370	0.20118	0.043750	0.24493	0.174950
127.0	8.0	0.001750	0.0007030	0.08928	0.027780	0.11706	0.092173
142.0	5.0	0.001500	*	*	0.026625	*	*
*	5.0	0.002000	0.0013000	*	*	*	*
200.0	5.0	0.002500	0.0011250	0.22500	0.062500	0.28750	0.143750
100.0	5.0	0.002500	0.0011250	0.11250	0.031250	0.14375	0.143750
200.0	7.0	0.002250	0.0008570	0.17140	0.056250	0.22765	0.113825
50.0	5.0	0.002000	0.0008250	0.04125	0.012500	0.05375	0.107500
40.0	3.0	0.002250	*	*	0.011250	*	*
38.0	5.0	0.002500	0.0015000	0.05700	0.011875	0.06887	0.181250
50.0	10.0	0.001000	0.0005875	0.02937	0.006250	0.03562	0.071240
125.0	5.0	0.001500	*	*	0.023440	*	*
35.0	5.0	0.001500	0.0011750	0.04112	0.006560	0.04768	0.136229
105.0	3.0	0.001500	0.0006190	0.06499	0.019685	0.08467	0.080643
250.0	7.0	0.005000	*	*	0.156250	*	*
170.0	7.0	0.005000	*	*	0.106250	*	*
355.0	7.0	0.001250	*	*	0.055470	*	*
57.0	5.0	0.001500	0.0010800	0.06156	0.010690	0.07225	0.126754
70.0	5.0	0.001500	*	*	0.013125	*	*
100.0	5.0	0.001750	0.0014000	0.14000	0.021875	0.16187	0.161875
150.0	5.0	0.002500	0.0020750	0.31125	0.046875	0.35813	0.238750
250.0	2.0	0.001500	0.0008750	0.21875	0.046875	0.26562	0.106250

CHAPTER 9

EXAMINATION OF BANK PRICING STRATEGIES AND FORMULATION OF HYPOTHESES

9.1 Introduction

The aim of this chapter is to examine the bank pricing literature and, drawing on the results of the previous three chapters, formulate hypotheses that might help to explain why underwriting banks in the euronote market are prepared to accept such low returns for their services, which has in turn led to the development of a systemic gap in this market when viewed on direct returns. These hypotheses will then be tested through naturalistic research in the following chapter and our results presented to the market, thereby completing the triangulation approach to research adopted in this study.

Competition in banking markets is removing the traditional regulatory barriers which previously safeguarded commonality in pricing strategies between banks in specific market areas. With the trend towards deregulation in the banking industry, new competitors have been able to use cost advantages to price their product(s) with the aim of capturing market share relative to those institutions which were still bundling their products together. Other competitors have used differentiated service quality, whilst maintaining price, as a means of targeting specific areas of the retail and wholesale markets.

Furthermore, due to the trends identified in Chapter 1 of this study (securitisation, disintermediation, the perceived reduced creditworthiness of the banking system, etc) banks have come to rely less on interest income and more on fee-based income. This is not just observable in the euronote market, but in many other off-balance sheet (OBS) markets. Here, pricing strategies have tended to be one of two types. The first type is based on skill. In this type of pricing strategy, product or service differentiation is achieved by the creation of unique services provided by differing levels of individual expertise. This type of pricing strategy has been largely predominant in the corporate market, where merchant or investment banks have capitalised on relative skill differentials. The second type of pricing strategy in the fee-based category has been aimed at gaining market share, mainly by the large commercial banks. They have used their placing power and ability to commit funds from their own asset bases to accomplish this end. With this in mind, the various pricing objectives open to a bank (and indeed any corporation) are discussed in the following section.

9.2 Pricing Objectives

In this section we will rely heavily on pricing evidence from the manufacturing industry to support our claim that, in the long-run, profit maximisation is the most plausible of pricing objectives.

9.2.1 Profit maximisation

In the traditional theory of the firm, the firm seeks to maximise profit in the short-run. The firm also determines quantities of output and level of prices with certain knowledge of future costs and revenues. Under these two simplifying assumptions, the firm can accurately predict price and output under different market conditions.

The profit maximising assumption, however, is not meant to depict accurately the price motivation of management within real firms. As Dorward (1987, p 11) emphasises:

> '... it represents a simplification or distillation of the complexity of motives and their trade-offs which exist within

real-life business organisations. It states not that real firms are profit maximisers, but only that the profit-maximising assumption provides a meaningful abstraction by which to predict the pricing and output behaviour of real firms when reacting to given changes in the conditions determining costs and revenues.'

As Dorward points out, essentially the profit maximising assumption is an abstraction from reality with which pricing behaviour may be predicted (Dorward, 1986, p 10).

The Machlup and Lester (1946) debate is also relevant here. Lester argued that firms do not equate marginal revenue to marginal cost in practice. This point was accepted by Machlup, but Machlup contended that marginal revenue and marginal cost were still useful tools. He states (1946, pp 519-20):

'To recognise the study of certain types of merely 'traditional' conduct as legitimately within the province of economic theory is one thing; it is another to accept as correct the interpretations of business behaviour offered by the critics of marginal analysis. Unable to see how marginal analysis can be applied to their material, these critics have concluded that marginalism should be discarded. It can be shown, however, that the alleged 'inapplicability' of marginal analysis is often due to a failure to understand it, to faulty research techniques, or to mistaken interpretations of findings'.

This point is similar to that made by Dorward. The marginalist assumption does not state that firms equate marginal revenue to marginal cost in practice, but rather that marginalism provides a meaningful abstraction by which to predict price and output.

9.2.2 Short-run profit maximisation and price prediction

If R represents total revenue and C represents total costs, the total profit of a firm can be written:

$$\pi = R - C \qquad \text{... (9.1)}$$

Maximum profits are determined by selecting an output, Q, where marginal revenue, R/ Q, equals marginal cost, C/ Q. This profit-maximising output can be found by differentiating equation (9.1) with respect to Q to give marginal profit and then setting this equal to zero before solving for Q.

$$\frac{\delta \pi}{\delta Q} = \frac{\delta R}{\delta Q} - \frac{\delta C}{\delta Q} = 0 \qquad \text{... (9.2)}$$

From equation (9.2) we can predict changes in output and price. As Dorward (1987, p 110) emphasises:

> 'As marginal revenue and marginal cost define the slopes of the total revenue and total cost curves respectively ... the only factors of change which will affect the profit-maximising price or output will be those affecting the rate of change of total cost in respect of changing output'.

We can, therefore, make the following predictions:

1. If demand increases, $\delta R/\delta Q$ will increase and so output and price will increase
2. If variable costs increase, $\delta C/\delta Q$ will increase and so output will decrease and price will increase
3. An increase in fixed costs will not affect $\delta C/\delta Q$ and so output and price will not change
4. An increase in the rate of profits tax will not affect $\delta R/\delta Q$ or $\delta C/\delta Q$ and so output and prices will not change

Despite its widespread acceptance among academic economists, the profit maximisation assumption has been subjected to three major criticisms. First, being a static theory it ignores the dynamic nature of business behaviour - like charging relatively high prices in the short-run may lead to an influx of new competitors causing relatively low prices to be charged in the long-run. Second, if the certainty assumption is dropped, there will no longer be an objectively based, unique, price-output prediction, but many possible prices, each dependent on the subjective risk attitude of individual managers. Third, it fails to take account of circumstances where managers wish to maximise some other objective such as current sales or growth. Such alternative motivational assumptions will result in different pricing predictions from those given above (Dorward, 1987, p 11). These criticisms will be examined in the following sections.

The dynamic approach to profit maximisation, while implying a long-run pricing strategy, does not imply a specific price at a given point in time. It is quite possible, therefore, that a long-run price path will be chosen in the knowledge that it will be accompanied by a series of short-run tactical price decisions. One example here would be price discounting (see, for example, Rao, 1984).

Furthermore, one cannot sensibly discuss long-run pricing without taking into account the uncertainty affecting future revenues and costs. For example, a skimming price strategy of charging high prices now to those with immediate needs and low prices later to those who can afford to wait may have to be abandoned because new competitors may have made unexpected price cuts. Under conditions of uncertainty, an objective present value criterion is transformed into one of subjective evaluation, dependent upon the assumed risk attitude of management. As a result:

> '... the important characteristic of making generally acceptable price predictions for a given point in time has been lost. Given uncertainty, the long-run model is only usefully applicable to the selection of a rather generalised and somewhat subjectively based pricing strategy' (Dorward, 1987, p 12).

Uncertainty increases with time. As uncertainty devalues longer-term profits, a strategy of charging relatively low prices to improve market penetration will have a higher probability of being rejected the longer it takes to build up a dominant and profitable market share.

9.2.3 Management objectives in pricing

In 1957 Dahrendorff, in his theory of post-industrial society (building on previous work, particularly that of Berle and Means, 1932), argued that ownership was now separated in large corporations. One result of this separation of ownership and control was that management found itself with sufficient discretion to pursue its own motivations at the expense of the owners' profit maximisation objective. Management motivations are summarised by Marris (1964, Chapter 2) as power, prestige, salary and security from takeover. These motives are, however, difficult to evaluate in terms of the traditional theory of the firm as they do not easily translate into recognisable variables such as profit, sales, output or growth (Dorward, 1987, p 13).

A more popular view is that managers satisfy their utility through seeking to increase the size of the firm. Roberts (1956), McGuire, Chui and Elbing (1962) and Marris (1964) all found significant correlations between executive income and corporate sales. On the basis of this empirical work and a number of other detailed studies of actual business organisations, various managerial models of the firm have been developed, based on the maximisation of an objective function in which profit features as a constraint not an objective. The three main examples are:

1 Baumol's (1959) sales maximisation model, which contends that managers of large corporations seek to maximise total revenues rather than total profits;

2 Williamson's (1963) model of managerial discretion, which contends that managerial motives tend to be realised in the form of expense preference behaviour (such as staffing expenses, emoluments and discretionary investment expenditure);

3 Marris' (1964) growth model, which contends that the motivations of managers are realised by maximising the rate of growth of the firm.

More recent research into the relationship between executive income, corporate size and profitability, however, has cast doubt on the motivational validity of management objective functions. Although Meeks and Whittington (1975) confirmed previous research that executive income was more closely correlated with sales than with profit, they also found that changes in profitability will have more effect on income than changes in size. An even stronger defence of the role of profit was provided by Llewellyn and Huntsman (1970). They found executive income to be correlated with profit, but not with sales.

9.2.4 Pricing objectives in practice

Shipley's (1981) study of the pricing objectives of 728 British manufacturing firms found that although most firms had more than one pricing objective, two-thirds specified a target profit or return on capital as their principal objective. Similarly, in a study of twenty large US companies, Lanzillotti (1958) found profit, in the form of a target return on capital, to be the most popular objective. Other pricing objectives were, however, also cited, such as 'stable price and margin', 'target market share', and 'matching the competition'.

It should be emphasised that profit as a pricing objective is not the same as profit maximisation. Although nearly 50 per cent of Shipley's (1981) study claimed to be motivated by profit maximisation, just over 16 per cent were classified as 'true maximum profit motivated firms', in the sense that the maximisation of profit was taken to be of overriding importance. The strongest support for the maximisation of profit probably comes from Hague's (1971) study where five of the thirteen British firms studied attempted to maximise profits when taking the pricing decision.

Baumol's (1959) revenue-maximisation hypothesis gains even less support. In Shipley's (1981) study only one in twenty firms cited revenue as the principal goal with profit as the secondary target, while one in ten cited profit as the principal goal with revenue as the secondary target.

9.2.5 Profit maximisation reinstated

From this brief review of the empirical evidence of the pricing objectives of firms, the objective of profit maximisation gains most support. It should be emphasised that profit maximisation is a pricing objective not a strategy. A pricing strategy which is aimed at gaining market share in the short run may be compatible to long-run profit maximisation. As stated previously, profit maximisation implies a long-run pricing path or direction, not a specific price at any given point in time.

Although most of the literature surveyed in this section so far relates to studies of pricing objectives in manufacturing industry the principles can be equally applied to the banking industry. When examining pricing strategies with respect to the euronote market, we will do so on the assumption that in the long run underwriting banks will seek to maximise profits.

9.3 The Selection of a Pricing Strategy

According to Channon (1986, p 150), the selection of a bank pricing strategy is a function of three key determinants:

1 Demand

The level of demand will be a function of market segment size and service price elasticity. Price sensitivity tends to be more acute in corporate markets than in consumer markets.

2 Competitor prices

While demand and costs may establish a price ceiling and floor for a service respectively, competitor prices will help establish pricing range limits. It is, therefore, necessary to evaluate carefully the price and quality of competitor services.

3 Cost structure

The cost structure of a service will set the floor for pricing strategy unless for strategic reasons it is considered desirable or necessary to price to make a loss.

Based upon these three criteria (and their provisos) a number of operational pricing options are open to the bank. These alternatives include cost-plus pricing, breakeven and profit impact target pricing, skimming pricing, value in use pricing, market rate pricing, relationship pricing, and penetration pricing. These will be reviewed in turn with particular attention to their relevance to pricing in the euronote market.

9.3.1 Cost-plus pricing

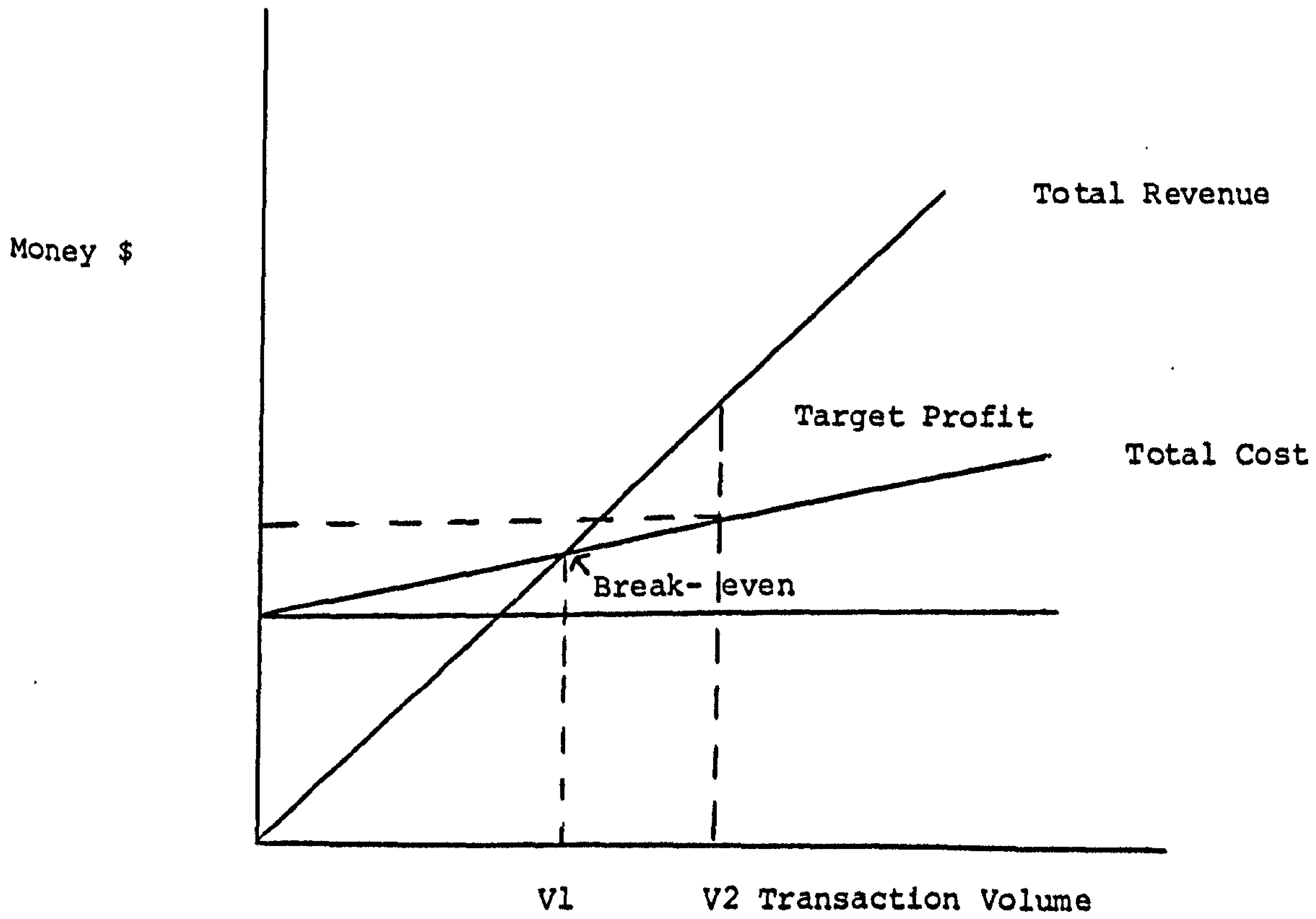
Cost-plus pricing is a relatively simple method of setting a price. The costs of a product or service are calculated and a standard mark-up is added. This method is widely employed in the retail trades. However, in banking it is not a common method of establishing price, due to a lack of cost knowledge in many cases. Indeed, it could be argued on a more general note that a pricing method which does not take into account customer price sensitivity and competitive prices does not often lead to the best strategic plan. In the euronote market with nearly 300 banks competing for US $90 billion of underwritten facilities it is doubtful whether cost-plus pricing could be accurately employed.

No evidence was found to support such a strategy in either the qualitative or quantitative data collected through the semi-structured interviews. The costs of providing an underwriting service in the euronote market are largely dependent on the level of capital that has to be employed to fund drawdown. As drawdown cannot be calculated prior to the event then cost-plus does not appear to be a feasible pricing strategy in this market.

9.3.2 Breakeven and profit impact target pricing

Profit impact target pricing is another cost-orientated pricing method. Under this system the bank decides on the required profitability of a given service and prices in accordance to meet that level of profitability. This method employs break-even analysis as illustrated in Figure 9.1.

Figure 9.1 Breakeven analysis



Source: Channon (1986, Figure 8.4, p 152)

The breakeven chart displays the total cost and total revenue expected at different levels of service transaction volume. Direct variable costs are added to fixed costs to show a total cost rising with service volume. The total revenue curve rises from zero in a linear form with increasing volume. The two curves meet at the break-even volume v_1, with the desired level of profit requiring a higher level of volume v_2.

It is essential to understand the market share position that a breakeven and profit impact target pricing strategy implies. If it is necessary for the bank to take a high market share to achieve its desired level of profitability, it is necessary to understand from where this market share gain will emanate. Unless the market is high growth, the bank will have to gain market share from its competitors. Established competitors may cut prices in an effort to maintain share. As Channon (1986, p 152) points out:

> 'This may substantially change breakeven and profit impact target volumes as revenues decline, and strategies that are very sensitive to competitor price reaction should be examined carefully to test whether the probable end is worth the effort.'

In the euronote market it may be that the probable end of such a pricing strategy would not be worth the effort. Although most market respondents stated that a minimum target of 0.5 per cent return was required in this market, the results of Chapter 8 show that this has not been achieved in practice. Comment was also made of the fact that it is rarely possible to charge what is believed to be 'a correct' return on many facilities for fear of losing the deal.

9.3.3 Value in use pricing

A number of banks and other financial institutions are following industrial companies and establishing price, not on cost but on perceived consumer value for a service (Channon, 1986, p 152). Under this system of pricing, management must estimate the volume of a service it expects to sell at a specific quality and price. Compared to competitive service offerings, the bank must assess relative service quality, reliability, together with other key variables, and estimate the value that customers would be willing to pay for these facilities. By adding these to the average competitive base price the bank is able to establish an overall 'value' price for the service. Actual offered prices usually represent a discount from this overall value price, but at the same time such prices are usually above the market average. Value in use pricing implies that the bank offering the service has either talents and skills which other banks may not possess or a product or service which is different to that offered by other banks in the market.

An underwriting commitment attached to a euronote facility is a fairly homogeneous service no matter which bank offers it. Borrowers may, however, be prepared to pay a premium on an underwriting commitment to a bank that has greater resources to meet the commitment than might other banks. This would imply that the largest banks in the euronote market (as measured by capital) might be able to charge a premium for their services in the form of value in use pricing. It is unlikely, however, that such a pricing strategy has ever been consistently used in the euronote market. Underwriting fees are mainly fixed by negotiation between the lead manager, the borrower and the arranger of the facility (where applicable). Each bank is then awarded, or requests, a certain portion of the facility at or below the agreed fees. Fieldwork did discover that banks able to take larger portions of the underwriting did win more lead manager mandates, but borrowers were generally not prepared to pay more for this: the reward being the mandate itself rather than an additional fee. The maximum price was already fixed.

9.3.4 Skimming pricing

A skimming pricing strategy applies when a bank seeks to price a service above the normal level of such an activity. As Channon (1986, p 155) emphasises:

> 'For a skimming strategy to be successful there should be a sufficiently large customer segment to justify adopting a skimming price; the costs of operating at lower volume should not be such as to cancel the revenue gain from charging a higher price; the high price should not stimulate the entry of competitors; and the concept of a higher price should add to the image of a superior product.'

Due to the homogeneity of the underwriting service and the very low prices in the euronote market, a skimming pricing strategy seems to be the least likely pricing strategy to be used in this market. Again, most evidence from our fieldwork research tends to negate the employment of such a strategy in this market: in particular, the ease with which competitors may enter this market.

This tends to suggest that the euronote market is contestable. Baumol, Panzar and Willig (1982) argue that a contestable market,

> 'is accessible to potential entrants and has the following two properties: first, the potential entrants can, without restriction, serve the same market demands and use the same productive techniques as those available to incumbent firms. Second, the potential entrants evaluate the profitability of entry at the incumbent firms pre-entry prices'.

Contestable market theory implies that only sunk costs, not fixed costs, are barriers to entry. However, it would be imprudent to argue that the euronote market is 'perfectly contestable' because, although transferability of liabilities is possible and has been practical in order to recover capital on leaving the market, on a large scale such recovery would not be possible until the underwriting commitment had matured. Although capital will be recovered on maturity (assuming no default) the fact that immediate exit may not be possible may prove to be a partial barrier to entry.

9.3.5 Market rate pricing

Under a market rate pricing system the bank cedes the initiative to key competitors to set price. Smaller banks 'follow the leader' in pricing services. This was, in fact, found to be one method of pricing employed in the euronote market. Smaller banks are effectively removed from the negotiation process whereby fees are set. When invited to participate in a facility they are invited to do so at a fixed price per level of commitment. Since the euronote market is an international financial market, the borrower may be unknown, or more importantly the creditworthiness of the borrower may be unknown to many of the potential underwriters. They were found to accept the price on the grounds that other larger banks were involved in the facility whom they perceived to have carried out the credit analysis of the borrower and determined the fees to be adequate in the light of that analysis. This is a form of market rate pricing.

9.3.6 Market penetration pricing

For new services in a price-sensitive market, it may be best to price low deliberately in order to build rapidly market share. Failure to use penetration pricing may encourage new market entries and provide a price umbrella for the higher cost competitors. Ultimately, such a pricing strategy usually results in a price war. This in turn usually leads to a market 'shake-out' when a number of competitors exit from the market. Market penetration pricing is a short-term pricing strategy to gain market share. If it is sustained in the long run it may lead to low rates of return, even losses. Essentially, then, if banks were employing market penetration pricing in the euronote market, one would expect to see an exit of competitors from the market and a rise in prices after a certain period of time. There is no evidence that either has occurred (yet) in the euronote market (see Figures 5.5 to 5.8).

Although market share gain may be a short-term pricing objective in the euronote market, relationship pricing may be a more viable explanation of current pricing trends than market penetration pricing given the results of our fieldwork research. The latter implies that the service itself must eventually provide adequate profit through an increase in prices. Relationship pricing, on the other hand, implies that the 'relationship' must eventually provide an adequate return to justify the low pricing of the particular service.

9.3.7 Relationship pricing

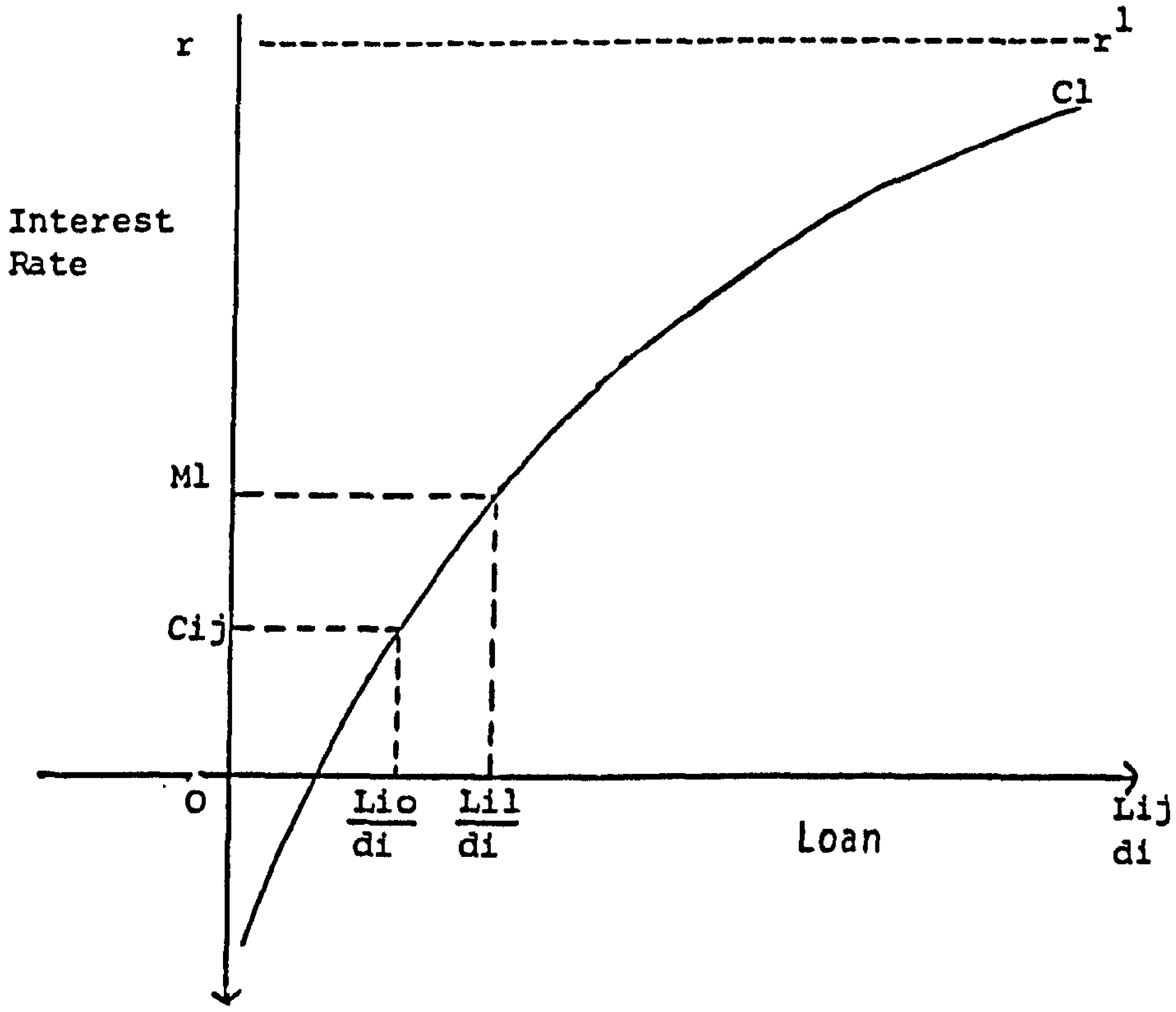
In 1972, the study Unbundling Full Service Banking (written by Bryan and Clark) had a significant effect on the US commercial banking industry. Its basic premise was the suggestion that bankers should price individual products to gain a better understanding of what their products cost them. This book caused many of the large banks to rethink their pricing of commercial services. However, the concept of bundling, which is the engine of relationship banking, and unbundling should not be misunderstood. Bundling is a tactic used for relationship pricing, and it can be used very effectively. When it is possible to improve the overall profit from a relationship by cross-selling high margin services, it may be worthwhile to provide relationship-building services in this manner. For instance, when a corporate customer provides a bank with its first piece of business from that customer, the bank usually prices the business below cost. If such business is correctly costed then this pricing can be accepted as a marketing cost provided future business from the relationship is expected to yield an adequate rate of return.

Relationship pricing implies that the bank knows, or is able to calculate, its cost structure and is willing to accept a low margin or loss in favour of optimising return on the total relationship.

Probably the first proponent of the importance and effect of the customer relationship as concerns bank loan-pricing was D R Hodgman (1963). Hodgman emphasised the importance of demand deposits as a principal source of the individual bank's capacity to lend and invest and so stressed the consequent importance to the bank of its relationship to loan customers who hold demand deposits with the bank. The effect of this relationship is emphasised in Figure 9.2. The formula for calculating the return on the customer relationship under Hodgman's analysis is presented and explained in Appendix 9.1.

In his analysis Hodgman distinguishes three loan rates of interest; the market rate, r (adjusted for risk), charged on a non-deposit borrower or available on open market securities; the preferential rate, C_{ij}, charged on the ith depositor-borrower for a loan in the jth size category (this rate is always below the comparable market rate); and the particular preferential rate known as the prime rate (in the United States), M. In Hodgman's analysis the notation L_{ij} indicates a loan in the jth size category to the ith borrower.

Figure 9.2 Minimum preferential rate on a bank loan to a depositor



If the deposit relation of a borrower is ignored it may be supposed that a bank would be willing to lend varying amounts to that particular borrower at the market rate, r. The appropriate value for r may be read by referring to the line rr' on Figure 9.2. Consideration of the customer relationship of the borrower makes it possible for the bank to charge a lesser preferential rate of interest, C_{ij} and still be compensated equally with a loan of the same size and risk to a non-depositor. When the revenue from the loan and the revenue gains from the investments which the borrower's deposit has funded is taken into account the bank will still break even as compared with the market rate, r. Hence as Hodgman says:

> 'The net advantage of the loan to the prime borrower over that to the nondepositor is measured by the difference between the actual prime rate, M_1, and the preferential rate, C_{io}, which the bank could charge because of the customer relationship and still break even as compared with the market rate'.

Therefore, although the bank may price the loan below prime rate (and may theoretically appear to be pricing below marginal cost) the revenue which may be acquired from the borrrower's deposit (all assuming it is greater than the cost of that deposit to the bank) must also be taken into account.

It should be clear, then, that the minimum preferential lending rate for a particular customer must increase with an increase in the size of a loan relative to the customer's deposit. As Hodgman points out, this is simply another way of noticing that the compensating balance of a borrower is a variable which enters into the determination of his profitability to the bank.

When a customer borrowers more than he needs and leaves a portion on deposit it may be correct to interpret the compensating balance requirement as merely a devious way to increase the effective rate of interest on the particular loan. However, if the compensating balance represents a new primary deposit as it does with a new depositor-borrower, it increases the bank's lending capacity and contributes more to bank earnings than in its absence. Furthermore, if the deposit simply represents the normal working balance of the new depositor then it does not raise the effective rate of interest to the deposit-borrower. Accordingly, the borrower is no better off and the bank is worse off without the compensating balance requirement in this instance. It is this circumstance which R E Emmery (1971) has in mind when he argues that:

> 'the ratio of cash to short-term funds borrowed from banks is so great for most firms that no compensating balance requirement within the limit that practical business procedure will permit banks to require can force them to hold idle funds. Consequently, an increase in the compensating balance requirement does not, in the usual case, increase the cost of money to borrowers'.

But he adds,

> 'A compensating balance requirement on loans to non-depositors increases the total volume of loans (a bank) can support, given its resources'.

This would seem to support Hodgman's challenge to the popular interpretation of the compensating balance as a device to raise the effective rate of interest on and during the life of a particular loan. In those cases where it has such an effect it is inferior to an overt increase in the contract rate. In cases involving new depositor-borrowers it is useful but has a different rationale, that of increasing the bank's lending base.

The primary rationale, then, for the compensating balance requirement is the part it plays in restricting price competition for demand deposits within the banking industry.

Although Hodgman was the first to recognise the importance of the customer relationship (1961 and 1963) his was a single-period individual customer model which did not take account of the dynamic aspects of the customer relationship for the bank portfolio problem. By concentrating on current information on loan customers, Hodgman ignored the present value of future customer relationships. In extending a technique first developed by White (1974), Cramer and Sterk (1981) introduced a specific loan pricing formula that uses the present value approach. The formula distinguishes between loan relationships with balances expected and 'rate only' loan relationships. It implies that,

> 'loan volumes should be increased until the marginal return on loans is equal to the return on investments less a differential amount which reflects the present value of future deposits and other business attributable to the previous investment in loans'.

It is important to emphasise, then, that the customer relationship includes income gained from future as well as present income streams. These present and future measures may come from areas not directly associated with the initial loan. As Mason (1979, p 304) states:

> 'customer profitability analysis as it is set up now in many banks includes all the relationships a customer has with the bank ... If a customer is going to be judged on the basis of all the services it receives from the bank, then the pricing relationship should also be based on these factors'.

All of the points mentioned so far on relationship pricing have direct significance for pricing in the euronote market. The need to maintain and acquire customer relationships appears, from the findings of our preliminary fieldwork research, to be a motivating factor behind pricing in the euronote market. One of the most significant findings of the semi-structured interviews was that, as far as most large and medium-sized banks were concerned, as much as 80 per cent of their underwriting business was gained from existing customers who were replacing traditional credit lines with euronote facilities. The fear of losing existing customer relationships, with various spin-off revenues, appears to be a factor which has led to the very low pricing experienced in this market.

Another finding from our period in the field was that most banks were not prepared to underwrite a facility unless placement business was also offered. Although no compensating balances, as such, are required in the euronote market, this placement business requirement could be seen to be analogous to Hodgman's compensating balances. The placement of a borrower's notes is a natural necessity with any euronote programme. As such, an underwriter requiring such business is not asking for business which increases the borrower's cost of funds as this placement business would have to be granted to another bank anyway. Accordingly, the borrower is not worse off and the bank has an extra income stream.

From our preliminary fieldwork results it would appear that underwriters in the euronote market are taking into account the customer relationship when pricing these facilities. The extent to which this dominates price will be examined in the following naturalistic research stage.

However, the fact that underwriters in this market may be prepared to price low in view of the customer relationship does not mean that systemic risk is unaffected by such a strategy. This will only be so if the return from the entire customer relationship is adequate to compensate for the portfolio of risks encompassed within it. This requires the establishment of detailed customer profitability systems within banks to determine whether sufficient compensation on the total package of services to the customer is being obtained. Again, the naturalistic research stage to follow will review this area.

A warning was provided in the early 1970s in the United States of the systemic risk potential of underpricing 'committed' facilities on a customer relationship basis. Many potential borrowers established 'insurance' lines of credit in the 1960s to ensure liquidity during periods of tight money. Usage rates were low and so the cost of obtaining these lines was also low. However, as the banks learned to their distress, the variance of demand on the part of the borrowers was extremely high. As Mason (1979, p 90 and 302) points out:

> '... the commitments of banks took on in the late 1960s and early 1970s caused the banks to assume more risk than they charged for, because the pricing mechanism they used did not compensate them for the potentially large loan demands they might have to face and in fact did face as events unfolded ... they had been providing a very valuable commodity, the ability to obtain funds at any time they were needed, but had underestimated the cost of providing it'.

As a result of this uncertainty of funding demand many banks were unable to meet loan demands and experienced a liquidity crisis. This risk may be heightened with euronote facilities in the sense that banks will be accepting risk at prices already refused by the market. It is vitally important, therefore, that pricing levels should allow for the adequate compilation of reserves. This lack of foresight on the part of US banks in the 1960s could be termed 'disaster myopia'. Disaster myopia may present an additional explanation of pricing in the euronote market and is discussed in the following section.

9.4 The Disaster Myopia Hypothesis and Researching its Reality

9.4.1 Introduction

It was stated previously that one reason why underwriting banks may be willing to accept such low returns in the euronote market may be their inability to estimate correctly random shock probabilities. This may be because they believe that they will only be called on to fund a small portion of their commitments for a short period of time (if they are called on to fund their commitments at all). In this sense, they may be underestimating long-term shock probabilities. It is this systematic tendency to underestimate (or ignore) shock probabilities that is known as disaster myopia.

The objective of this section of the chapter is to layout the basic conceptual framework and explain the conditions conducive to disaster myopia as well as its possible effects. Particular attention will be paid to exploring the possible applicability of the concept to the euronote market. Evidence will be drawn from our initial fieldwork research where appropriate.

9.4.2 The conceptual framework

The disaster myopia hypothesis was originally formulated by Guttentag and Herring (1984). They developed a framework to show why the financial system tends to become increasingly vulnerable to major shocks during long periods when no such shocks occur. They built on this framework in a latter essay (1986) to refine the hypothesis. Guttentag and Herring (1986, p 1) begin their formulation of the disaster myopia hypothesis by distinguishing risk from uncertainty. They argue that pure uncertainty describes the situation where we know nothing about the probability (p) that the ith event will occur (pi). Pure risk, for Guttentag and Herring, describes the situation where pi takes on a value between zero and one that is known with complete confidence (1986, p 1). They describe perfect certainty as the situation where pi is either zero or one. Although their usage differs from the one commonly employed in the modern literature on finance, where risk is the dispersion of possible outcomes around the expected outcome, it is similar to the definitions of risk and uncertainty employed by Luce and Raiffa (1958, p 15). Luce and Raiffa argue that risk obtains,

> 'If each action leads to one of a set of possible specific outcomes, each outcome occurring with a known probability'

and uncertainty obtains,

> 'If either action or both has as its consequence a set of possible specific outcomes, but where the probabilities of these outcomes are completely unknown or are not even meaningful'

In everyday life we do not know pi with certainty. Our knowledge lies somewhere between risk and uncertainty. In this sense, we do not know pi but we have some evidence that allows us to estimate it. The greater our confidence in that estimate, the closer we are to pure risk on Guttentag and Herring's criteria. The lower our confidence, the closer we are to pure uncertainty.

Guttentag and Herring (1986, p 2) argue that two major factors determine the extent to which our knowledge about an event is characterised by risk or uncertainty. The first is the frequency wih which the event occurs relative to the frequency of changes in the underlying causal structure. Their contention is that, if an event occurs many times but the structure is stable, we accumulate evidence that permits us to estimate probabilities with considerable confidence. For example (1986, p 2):

> '... if floods over a plain occur on average only once in every twenty-five years but basic topographic and climatic conditions are stable, an historical record over several hundred years may yield good estimates of flood probabilities. Despite the low probability of a flood in any short period, our knowledge about the probability of a flood is closer to pure risk than to uncertainty. In contrast, the causal structure underlying economic developments is unlikely to remain stable for long periods, so that it is very difficult to estimate the probability of low-frequency economic events with much confidence. Our knowledge about their probability is much closer to uncertainty'

The latter point seems *a priori* to be especially applicable to underwriting practices in the euronote market. There has been no default in this market so far and so probability cannot be judged on experience of the occurrence of past defaults.

The second factor that determines whether a situation is better characterised by risk or uncertainty, according to Guttentag and Herring, is our understanding of the underlying causal structure. They argue (1986, p 2) that the probability that the fair toss of a coin will generate heads is an example of pure risk, because our prior knowledge of the mechanism determining the result allows us to specify its exact probability, even without knowledge of the results of prior tosses. In contrast, as we understand far less about the causal structures underlying economic processes, our understanding is much more likely to be subject to uncertainty.

Uncertainty and imperfect knowledge of shock probabilities are both central tenets of the disaster myopia hypothesis. Shocks can be described quite simply as events that occur very infrequently and have very large potential effects. Our understanding of the causal structure underlying economic shocks is imperfect. The causal structure may also change between shocks. For these reasons, knowledge regarding economic shocks is closer to the case of pure uncertainty than pure risk.

Financial institutions are exposed to such shocks because of the variety of activities in which they engage and because of the turbulence that has characterised all banking and financial systems since the early 1970s (see, for example, Gardener, 1986). Credit shocks arise due to defaults by a major category of borrowers. Funding shocks arise either through runs by depositors or the calling of commitments at a time when funding markets are closed to the lending institution. An institution's insolvency exposure may become excessive if its exposure-management policies have been based on underestimates of shock probabilities.

Under uncertain conditions there is no reason why the subjective probabilities that market participants (in our case euronote underwriting banks) attach to the occurrence of a shock should equate to the actual probability of that shock occurring. There is little strength in the argument that market discipline will require decision makers to form correct expectations: the shock may occur so infrequently that institutions which disregard it completely may survive over long periods of time. Competition may, in fact, force prudent institutions out of the market. As Guttentag and Herring (1986, p 3) emphasise:

> 'An institution that attempts to charge an appropriate premium to develop a reserve against a low-probability shock is likely to lose business to competitors who are willing to disregard the shock'

It may be that certain banks in the euronote market realise that the premiums they are charging are insufficient, but are unable to charge higher premiums due to the fear of losing business to competitors who are willing to disregard the shock.

But how are the shock probabilities formulated? As Lucas (1977) observes, in situations of uncertainty the rational-expectations hypothesis and efficient-market axioms simply do not hold. Guttentag and Herring (1986, p 3) draw, instead, their hypothesis from work on cognitive psychology and the behavioural approach to decision making under uncertainty. They argue that two of the heuristics that have been found to characterise human behaviour with regard to low probability, high-loss hazards provide insights into the behaviour of international banks confronted with shocks of low but unknown probability. These are the 'availability heuristic' and the 'threshold heuristic'.

The availability heuristic characterises situations in which people assess the frequency of a class or the probability of an event by the ease with which instances or occurrences can be brought to mind (Tversky and Kahneman, 1982, p 11). The validity of the availability heuristic has been verified in both controlled laboratory experiments and fieldwork. For instance, Tversky and Kahneman (1982) conducted ten controlled experiments with 1,500 subjects. They argue that the results of these experiments demonstrated that even when probabilities could be objectively determined, people tended to employ the availability heuristic. Further, they argue that their results are also applicable to very infrequent events where probability judgements cannot be based on a tally of relative frequencies. Kunreuther et al (1978) conducted a field survey of 2,000 homeowners in flood-prone areas and 1,000 homeowners in earthquake-prone areas. They concluded that insurance decisions are subject to the availability bias.

Although frequent events are usually easier to recall than infrequent events, ease of recall may be affected by other factors that may have little or no relationship to probabilities. This gives rise to an availability bias. One such factor is the time elapsed since the last occurrence.

The threshold heuristic, as Guttentag and Herring point out, is an implicit rule by which decision makers allocate one of their scarcest resources, managerial attention. This heuristic may also contribute to bias. The rule is that when a probability reaches some critically low value it is equated to zero. The threshold heuristic is based on the work of Herbert Simon concerning procedural rationality. Slovic et al

(1977) used the threshold heuristic in order to explain why people may refuse to buy insurance against low probability hazards. The threshold heuristic is also supported by Kunreuther _et al_ (1978) in their field survey of the insurance decisions of 3,000 households.

The availability heuristic in combination with the threshold heuristic may lead to disaster myopia. Guttentag and Herring (1986, p 4) argue that the subjective probability of a shock becomes a negative function of the length of time since the last shock and at some point is treated as if it were zero. A similar situation may be arising in the euronote market. As Guttentag and Herring (1986, p 4) point out:

> 'Disaster myopia leads decision makers to allow the shock exposure of their firms to rise and the ability of their firms to withstand shocks to decline. In consequence, insolvency exposure grows as the period since the last shock lengthens. If this pattern is widespread among firms, the entire system becomes more vulnerable to shocks and to a possible financial crisis'

To the extent that pricing in the euronote market is based on disaster myopic practices, it is possible that the growth of the euronote market may indeed contribute to an increase in systemic risk.

The disaster myopia hypothesis is, however, only of limited use as an explanation of insolvency exposure. In a similar vein the availability and threshold heuristics are of only limited use as an explanation of disaster myopia itself. As Guttentag and Herring fully appreciate, it is impossible to demonstrate _ex ante_ excessive insolvency exposure to shocks of unknown probability. It is still impossible after the shock has occurred. If excessive insolvency exposure is non-demonstratable then so is disaster myopia. Even so, valid judgements (although inconclusive) can still be made on both topics. As Guttentag and Herring explain (1984, p 4):

> 'Many diseases have been known by their symptoms, and sometimes by the conditions associated with the symptoms, well before the pathogenic substance could be identified by a definitive diagnostic test. While a definite test for disaster myopia is probably impossible, we know many of its symptoms and the conditions that encourage it. For example, a lack of information about shock exposures is a good indication that no thought has been given to the probability that a shock will occur. From a policy standpoint, however, it is less important to recognise the symptoms of disaster myopia than to understand the conditions that encourage it'

As far are our own thesis is concerned, it may not be possible to identify conclusively the existence of disaster myopia in the euronote market, but we may be able to identify the symptoms, and understand the conditions that encourage it.

9.4.3 Conditions which may be conducive to disaster myopia

Disaster myopia is a perceptual bias that Guttentag and Herring associate with two heuristics commonly used to deal with uncertainty. This perceptual bias will contribute to an increase in insolvency exposure if the exposure toleration to potential shocks appears to be profitable. Under the disaster myopia hypothesis, the incentive to increase insolvency exposure rises as anticipated returns increase. It is argued (1986, p 5) that uncertainty may, at least to a certain degree, be converted into risk through investment in information. However, the conditions that encourage disaster myopia also discourage the accumulation of information required to convert uncertainty into risk. Some of these conditions are identified.

If decision makers believe they can reduce their exposures quickly should a shock arise, it is unlikely that they will commit substantial resources for investment in information. Where there is a certain amount of flexibility in exposure management, decision makers may not see the need for increased investment in information. Such 'flexibility' has traditionally been provided through the establishment of revocable commitments: the policy of keeping options open by taking positions that the bank believes can be reversed or shifted at short notice.

Unfortunately, attempts to deal with uncertainty by making revocable commitments usually fail, because they are subject to the fallacy of composition. Although short maturities may protect a single creditor that has superior information and can shift exposure to other banks before they perceive the danger, the strategy cannot protect all creditors. Exposure is merely shifted around the system, it is not reduced and does not leave the system. In this sense, systemic risk is not reduced.

A bank may commit insufficient resources for investment in information if it believes that it will receive government assistance should a shock arise, thereby insulating it from the full force of the shock. This is known as moral hazard. The existence of a lender of last resort (LLR) in fact, or belief, may actually lead banks to increase their exposures in the belief that in times of crisis they will be 'bailed out'. Banks may, therefore, be encouraged to disregard the probability of shocks. Guttentag and Herring (1986, p 6) argue that international banks may assume that:

> '... the chances of getting ... protection are better if they 'herd', keeping insolvency exposure, especially capital ratios and exposures to individual countries, roughly in line with those of their peers. Herding converts any major problem into a problem for the whole banking system, raising the spectre of a general financial crisis if the government fails to assist the banks'

The syndication process in the eurocredit market may be taken as signs of this herding instinct amongst international banks although no evidence was found in our initial fieldwork research to indicate that underwriters are assuming more risk for this reason.

Compensation systems for managers that emphasise short-term performance can also discourage investment in information as regards low-frequency shocks. There will be little incentive for decisionmakers to commit substantial resources for investment in information if such resources could be invested in short-run profit maximisation, for both the firm and the manager. Compensation systems may encourage decisionmakers to increase their own incomes by increasing the exposure of their firm to low frequency, high hazard shocks, while shielding themselves personally from the impact of the shock. The less frequent the shock and the higher the decisionmaker's job mobility, the greater will be the disparity between the exposure of the decisionmaker and the exposure of his firm. Even where shock probabilities are perceived without bias, the personal interests of decisionmakers may lead them to increase the insolvency exposure of their firms.

All these factors are part of the process by which Guttentag and Herring argue an institution becomes increasingly vulnerable to insolvency shocks.

9.4.4 Competition and the growth of liability management

Competition can increase tendencies towards disaster myopia in two related ways:

'First, competitive markets make it impossible for lenders that are not disaster myopic to price loans as if there were a finite probability of a major shock when banks that are disaster myopic price them as if that probability were zero ... Second, if international banks are apparently earning returns above the competitive level (disregarding the need for reserves against future shocks), they will encourage new entry by equally myopic banks, which will tend to erode those returns' (Guttentag and Herring, 1986, p 14).

By placing inadequate (or no) capital against potential losses in the market, international banks can increase their financial returns. Such practices can give a false impression of the profitability of the market. Indeed, because of the competitiveness of most international financial markets, with negligible barriers to entry, returns can only be maintained if lenders either allow their capital positions to decline (or their exposure to funding shocks to rise) or forego the collection of an uncertainty premium for bearing the hazards of exposure to a major shock. It is interesting to note here that respondents in the semi-structured interviews claimed it was not possible to price a facility to reflect value as the deal would almost certainly go to a competitor.

However, lest their analysis be viewed as 20-20 hindsight regarding shocks that have already occurred, Guttentag and Herring (1986, p 16) next turn their attention to a type of exposure that has not yet generated a crisis (a type of exposure which is particularly relevant to the euronote market): exposure to a funding shock. This risk was identified in the semi-structured interviews as being particularly hazardous for the euronote market. Where underwriters' liquidity is insufficient to meet a call for funds at a time of falling prices (i.e. where notes are unsellable in the market) a funding crisis could arise.

Since the early 1960s, major banks have become increasingly dependent on liability mangement rather than asset management to regulate their liquidity positions. They depend on their ability to borrow (as well as their ability to liquidate assets) to meet unexpected cash needs. This trend towards liability management has brought with it implications for funding shocks. As Guttentag and Herring (1986, p 20) reveal:

> 'The more a bank depends on liability management, the more vulnerable it is to a bank-specific funding shock associated with a decline in the market's confidence in that bank's solvency. Its survival rests on its ability to place new liabilities at least equal to the amount by which maturing liabilities exceed maturing and readily saleable assets'

If depositors are unwilling to roll-over existing claims then a bank may be forced to access the LLR (in the euronote market there is no lender of last resort, although domestic banking authorities may act as such in times of crisis). Substantial borrowings from the LLR may, however, provide an adverse signal to the market and other sources of finance may dry up.

To the extent that a bank practicing liability management depends on access to an LLR when other sources are no longer available, the bank's exposure to a funding shock will rise the more it has to borrow from the LLR. If borrowings from the LLR become excessive this may lead to an unacceptable level of social subsidisation for the bank. The LLR may, therefore, take complete control. A case in point here is the Continental Illinois episode (see Continental Illinois Corporation Prospectus, 24th August 1984 for a full exposition).

There is, to an extent, an economic rationale (if only a short term one) for banks to expose themselves to funding shocks through the practice of liability management. It is more economical for banks to issue their own liabilities to meet funding requirements than to hold liquid assets on their books. The margin of interest between liquid and illiquid assets is substantial. It is more expensive for banks to hold liquid assets on their books for long periods of time to be used when needed than it is to issue their own liabilities as and when the need arises. Naturally, this requires the existence of a well-developed market for the bank's own liabilities.

Guttentag and Herring (1986, p 26) admit that they cannot demonstrate that the probability of a contagious liquidity shock exceeds some uncomfortable level, let alone that such a shock will occur. They do contend, however, that:

> '... exposure to such shocks has increased markedly over the last two decades. This reflects the increasing dependence of banks on markets in which they can sell their liabilities to meet their liquidity needs ... We also know that this increase in exposure to liquidity shocks has occurred under conditions conducive to diaster myopia' (1986, p 26).

In the euronote market, the use of liability management to fund commitments of anything from three to fifteen years may prove to be a particularly hazardous policy in times of financial crisis.

9.4.5 Disaster myopia and the euronote market

The main message of the Guttentag and Herring thesis is their contention that banks tend to underestimate or ignore low probability shocks that could have major adverse effects. They attribute this to a general human tendency to be myopic about low-probability shocks, as well as to accounting systems that encourage short planning horizons, competitive markets that force banks to ignore such shocks in pricing credit, the belief in the existence of government support in times of crisis that encourages moral hazard, and other factors such as liability management. All of these factors are relevant to the euronote market.

In the euronote market, underwriters have to fix a price for the facility. It may be that they employ an ROA methodology to calculate the returns under different funding scenarios. If this is so then underwriters may perceive that they are making adequate returns, at least under certain scenarios. The euronote underwriter may perceive the probability of ever having to fund the facility completely (or to a great extent) as so small that the potential shock of having to do so is underestimated or even ignored. Returns may, therefore, be calculated under low (and possibly zero) funding scenarios. Under such scenarios, using an ROA methodology, returns may be artificially inflated.

Even if an ROA methodology is not employed by some banks in the market, they may be forced to forego the collection of an appropriate uncertainty premium for fear of losing business to other disaster myopic competitors.

The fact that disaster myopia is associated with states of uncertainty provides us with a methodological dilemma. As Guttentag and Herring (1986, p 27) emphasise:

> '... when shock probabilities are governed by uncertainty, there is no objective way, even in principle, to determine ex ante that a bank is excessively exposed'

As far as the euronote market is concerned, all we can do is to try to determine whether or not the conditions under which underwriters are fixing the prices of the facilities are conducive to disaster myopia. It should be stated at this juncture that the disaster myopia hypothesis may be reconcilable with our other (mutually independent) hypothesis for current pricing in the euronote market (relationship pricing). The fact that underwriters may be pricing to gain returns from other parts of the relationship does not mean that they are not disaster myopic. The latter will be determined by the conditions under which the pricing strategies are implemented: that is whether an ROA or ROX methodology (or some other form of return calculation is used); whether internal exposure limits are fixed; whether customer profitability systems exist; whether reserves are compiled against exposures and whether funding sources are diversified etc.

9.5 Summary and Conclusions

In this chapter we have reviewed financial and bank pricing literature in order to establish hypotheses to explain the low pricing of euronote facilities identified in Chapters 7 and 8. In reviewing the pricing literature the qualitative and quantitative data obtained through the semi-structured interviews have been used to eliminate improbable pricing strategies and to add support for more feasible hypotheses. In particular, the existing literature relating to 'disaster myopia' has been reviewed. Disaster myopia provides one feasible explanation for the existence of a systemic gap in the euronote market.

Two hypotheses to explain pricing in the market have thus been identified. They can be stated as follows:

1 that current pricing in the euronote market is determined by customer relationship factors

2 that current pricing in the euronote market is determined by disaster myopia on the part of euronote underwriters.

It should be stressed that these two hypotheses are perfectly compatible. It may be that both the customer relationship and disaster myopia combine to influence prices in the euronote market. To test these hypotheses it will be necessary to move into a more naturalistic research mode. The only way to determine whether conditions conducive to disaster myopia exist in the euronote market is to spend some time as an observer in the market. Similarly if we are to judge whether the return on the customer relationship provides justification for such low returns in this market it will be necessary to observe how customer profitability systems operate within the banks. Such objectives can be achieved through open observation and for this reason the author spent some time as a participant observer in two banks in the market. The results of this period of observation and its implications for our hypotheses are discussed in the following chapter.

Appendix 9.1

Return on the customer relationship

$$Pi = rdi\,[(1-R)] + CijLij - pdi + [Si(di) - Fi(di)]$$

where Pi = net earnings on the customer relationship,
- r = the market rate of interest (adjusted for risk and net of costs) on loans and investments which do not involve a deposit relationship,
- di = deposit of ith customer, net of loan proceeds,
- R = ratio of the bank's cash and legal reserves to its demand deposits,
- (1-R) = proportion of deposits which can be used to acquire earning assets
- Lij = a jth size loan to the ith customer,
- Cij = contract rate of interest charged on the jth size loan to the ith customer,
- p = the rate of interest paid on demand deposits,
- Si(di) = charges to the customer for services, routine and otherwise,
- Fi(di) = cost to the bank for services, routine and otherwise, rendered to the customer,
- i = subscript denoting the ith customer
- j = subscript denoting the size of loan to the ith customer.

If $\left(\frac{Pi}{Lij}\right) = r$, the return on the customer relationship is equal to that on loans and investments made at the market rate, r, to non-customers.

CHAPTER 10

THE PARTICIPANT OBSERVATION PERIOD - A TEST OF THE HYPOTHESES

10.1 Introduction

The purpose of this chapter is to gather data as a participant observer in the field in order to help support or reject the hypotheses identified in the previous chapter. If disaster myopia is identified as the main force behind pricing in the euronote market then it may be that the systemic gap which has emerged in this market will continue to widen. In this sense the widening gap may be akin to Van Horne's financial bubble which continues to expand until the bubble finally bursts initiating a financial crisis. If this is found to be so, it will be necessary to suggest methods for closing or at least reducing the systemic gap, possibly through the imposition of stringent regulatory controls.

If relationship pricing is identified as the main force behind pricing levels in the euronote market it will be necessary to determine the ability of the banks to employ such a strategy effectively. To do so banks must be able to judge the level of return from the customer portfolio against the level of risk inherent in that portfolio. This requires the establishment of sophisticated customer profitability systems as well as a first hand knowledge of the necessity of providing certain products at very low prices in order to maintain relationships. Both points are important if a relationship pricing strategy is to be employed effectively. Without sophisticated customer profitability systems any relationship pricing strategy will be based on guesstimates and uncertainty. Without a knowledge of the importance of providing certain products at low prices for the maintenance of the customer relationship, banks may be providing unprofitable services which may generally be viewed as transactional items by customers and, as such, relatively unimportant for the maintenance of the relationship.

To investigate these issues time was spent as a participant observer in two banks in London. It was decided that our research would be most rewarded by spending time in a bank that was a large player in the euronote market and a bank that was a small player in the market. It was between these two categories of banks that the greatest division of opinion was found regarding price strategies and measures of return in the earlier semi-structured interviews.

By referring to a bank as a large player in the market no assumption is made about the actual size of the bank as measured by capital or assets. Rather, size refers here to the amount of underwriting facilities that the bank has signed. A large player is defined as any bank that has signed over US $500 million of facilities. A small player is defined as any bank that has signed under US $200 million of facilities.

10.2 The Sample

The choice of which banks to observe could not be made randomly. As indicated in Chapter 6 most banks in the euronote market are suspicious of outsiders and are reluctant to give interviews. To allow an outsider to observe the actions and practices of their euronote team on a day-to-day basis was, understandably, not an option that many were prepared to consider.

Because of the author's working relationship with National Westminster Bank plc, County NatWest, one of the largest players in the euronote market, was willing to meet our request to observe the actions and habits of its euronote team and to examine the systems in place throughout the bank to analyse customer revenues and, as such, County NatWest was used as a case study representing one of the large players in the market.

Unfortunately, all of the smaller players approached declined our request to observe their euronote underwriters over a number of days. Most thought the exercise to be futile given their only minor presence in the market. Indeed, none of the smaller players who were approached actually had a euronote team in the same way that the larger players did. Any underwriting or trading was conducted from the floating rate asset desk. Dean Witter Capital Markets did, however, allow us to observe their operations over a few non-consecutive days.

Before discussing our period of observation in these two banks it is important to understand first some of the facets and pitfalls of using a participant observation methodology.

10.3 Participant Observation as a Data Collection Tool

Any attempt to obtain an insider's view presents the researcher with the first of his problems - that of gaining entry into the group. The researcher needs to enter the group or setting in such a way as to disturb as little as possible the lives of those being studied. The way in which the researcher decides to enter the group will depend on the characteristics of the people under study, and it will vary from field situation to field situation.

There are basically four roles open to the participant observer: complete participant; participant as observer; observer as participant; and complete observer. The choice of participant role requires a cautious anticipation of the nature of the group, its accessibility and openness, research exigencies such as time and other resources, as well as the personal qualities of the researcher. In the role of participant as observer, both researcher and subjects are aware of the fact that theirs is a fieldwork relationship. The role of complete participant, on the other hand, involves complete pretence and so incurs the greatest risk. Gold (1958) states:

> 'The complete participant ... must bind the mask of pretence to himself or stand the risk of exposure or failure.'

However, because of the very competitive nature of most business organisations (especially investment banks) it would be on rare occasions only that a researcher would be permitted to adopt such a role. Indeed, the author found some initial distrust of his motives for conducting his research, even under the role of participant as observer. There was undoubtedly an early fear that the author may be a spy, or use the information gained for commercial profit. It is thus essential that the researcher is able to command the trust of those he is observing. Hughes (1960, p xi) observed:

> 'The unending dialectic between the role of members (participant) and stranger (observer and reporter) is essential to the very concept of fieldwork, and this all participant observers have in common: they must develop a dialectic relationship between being researchers and being participants.'

Ironically, it is this very role of participant which may inevitably affect the role of observer. By taking a role the researcher may well affect the structure of the interactions being studied. Indeed the researcher too may be affected by his participation in the group. There is no one precaution he can take against this occurrence. The only safeguard lies in the ability of the researcher to keep in mind the objectives of his research while at the same time being able to assess his own effect upon it.

10.4 Gaining Entry

As noted, it is important to gain entrance to the group with as little disruption as possible. To do this it was necessary to contact the head of the euronote team (or head of the relevant division). This was to be the only person who had complete knowledge of our intentions. Such a person is often referred to as the 'gatekeeper' (as explained in Chapter 6). As contact had already been made with the respective gatekeepers in the initial fieldwork stage, contact was made this time by phone. A time and date was fixed to begin the period of observation. With both banks, employees were told simply that the author was a research student trying to gain information on the operations of the euronote market.

10.5 Presenting the Data

Qualitative data and analytic procedures, in contrast to quantitative ones, are difficult to present adequately. Statistical data can be summarised in tables, and descriptive measures of various kinds and the methods by which they are handled can often be accurately reported in the space required to print a formula. However, with participant observation, the data do not lend themselves to such straightforward presentation. As Becker (1979, p 322) points out:

> 'The data of participant observation ... frequently consists of many different kinds of observations which cannot be simply categorised and counted without losing some of their value as evidence.'

In an attempt to tackle these problems Becker (1979) argues that participant observers should provide a description of the 'natural history' of their conclusions, presenting the evidence as it comes to their attention. The term 'natural history' implies not the presentation of every datum, but only the characteristic forms data assumed at every stage of the research. This involves description of the form that data took and exceptions to that form in presenting the various statements of findings and the inferences and conclusions drawn from them. As Becker (1979, p 322) states:

> 'The reader would be able, if this method were used, to follow the details of the analysis and to see how and on what basis any conclusion was reached. This would give the reader, as do present models of statistical presentation, opportunity to make his own judgement as to the adequacy of the proof and the degree of confidence to be assigned the conclusion.'

In this study the results of our period as participant observer in the euronote market are presented on a natural historical basis. This approach allows for a steady compilation of the results, whilst allowing the reader to compare the similarities and differences between the two banks studied.

A word is in order regarding the use of quotations from field notes. These quotations serve several purposes. As previously noted, they allow the reader to see how the field operations were conducted. In addition they provide a basis on which the reader may consider alternative formulations to the ones presented.

Before presenting the results of this section of our research, it is first necessary to describe briefly the two research environments.

10.6 County NatWest

The structure of County NatWest's euronote operations has changed since our study began. Prior to December 1986 County NatWest's euronote team was separate from its other money/capital markets teams. Since December 1986 the team has been restructured and expanded to take account of FRNs and euro-CDs, as well as euronotes and euro-CP. The entire team now consists of over twenty people, comprising an originations group, a trading group and a sales group. County NatWest is a member of many tender panels but will only bid for paper at levels at which firm investor demand has been identified. As such, little paper is won through tender panels as other banks take up paper at lower levels. Most paper is won through dealerships.

Initial client contact is made mainly through existing commercial banking relationships (nearly 80 per cent by this method), and the rest mainly by direct marketing by the originations group of the euronote team (direct approach to issuers with existing euro-CP programmes), although a few syndications are accepted. If the result of initial client contact by the commercial banker is favourable, the client is referred to the originations group of the euronote team, who will fix a time convenient for the client to meet with the team. If the resultant meeting proves positive (i.e. if the client wishes to issue paper) a date is fixed for the issuance of the paper and, where the dealership method of placement is to be used, a price is also fixed. If the tender panel method of placement is to be employed then County NatWest will act as tender panel agents, advising the client on which banks (or investment houses) might be preferable to provide the distribution channels that the client wishes to establish. The final decision on which banks to invite into the tender panel lies with the client.

County NatWest will also arrange to underwrite any commitment which the client may wish to have. While a proportion of the underwriting business is placed with the parent bank (National Westminster Bank plc), County NatWest will attempt to sell down (syndicate) as much of the commitment as possible. Although they have in the past accepted underwriting business without the possibility of placing paper, underwriting business is usually no longer accepted unless the opportunity to place paper is guaranteed.

County NatWest will only guarantee not to sell paper to professional traders if it has obtained that paper through a dealership. In such cases it will always make a market in its client's paper. This means that if end investors wish to liquidate their paper before maturity, County NatWest will always bid for it, or if investors wish to purchase more paper, County NatWest will always offer it (if it is carrying paper on its books) or ask the issuer to issuer more.

Once the paper 'hits' the market (is issued) it is County NatWest's policy never to 'short' a deal (sell paper before it has bought it) and will only rarely go 'long' on a deal (buy paper without ready investor demand for that paper).

If County NatWest wishes to obtain paper from an issuer with whom it has no dealer relationship, its traders will bid the issuer (determine the level at which the issuer is prepared to sell a certain quantity of paper). The traders will then inform the salesmen of the guaranteed rate at which paper may be obtained. Salesmen will notify potential investors to purchase paper once firm investor demand has been identified.

In some cases, however, investors may approach the salesmen for paper of a particular quality and maturity. In this scenario the traders will be told to bid for such paper. In return for flexibility on maturity the issuer will often be more rigid on price.

10.7 Dean Witter Capital Markets

Dean Witter has a far smaller presence in the euronote market than County NatWest. It has no defined euronote team. Rather, the 'team' consists of six to seven people who also manage the floating rate note (FRN) desk. Unlike County NatWest who relies mainly on its parent's relationships with customers for business, Dean Witter, as a securities house, has no commercial banking relationship with clients.

Because of its far smaller capital base, Dean Witter cannot commit large amounts of funds to underwriting business. It thus takes most of its euronote business from syndications rather than from winning mandates from existing customers. Although it prefers to participate in deals where placement business is available, it will participate in syndications where placement business is not on offer.

Dean Witter sees itself as an innovator rather than a market leader. It accepts euronote business to keep its syndications lines open and to keep its name in the market.

10.8 The Participant Observation Period

10.8.1 Format

As the time spent observing the actions of those engaged in euronote operations in Dean Witter was short compared with the time spent observing the actions and operations of County NatWest's euronote team, the results of our period at Dean Witter are not presented separately. Rather, the results of our period of observation at County NatWest are documented and comparisons are made with Dean Witter where applicable. Where individual names are used these have been changed to ensure anonymity.

10.8.2 Getting to know the team

Although the Group Director of County NatWest's euronote team was aware of my links with the parent bank and, in general, the purpose of the observation period, I was introduced to the members of the team simply as a university researcher studying the operational aspects of the euronote market. It was felt that such an introduction would prevent any feelings of parental overseeing of their operations.

After a short 'settling in' period I seemed to be accepted as just another face around the office. It was important to identify each member's role and responsibilities within the team. The first stage of the observation period was spent simply doing this and getting to know the team members. The fact that I appeared to have the boss's approval undoubtedly helped as far as acceptance into the team was concerned and, as such, little resistance was encountered. I was allowed to move freely amongst the team, observing their actions and taking notes. Again it was decided that a tape recorder should not be used but that simple note taking would probably allow for more open conversation.

By contrast, my movements were restricted at Dean Witter, with the observation period thus being more akin to unstructured interviews than observation of actions and participation within the team. My presence was tolerated but never totally accepted.

10.8.3 Business sources

In evidence of the data gathered in the semi-structured interview stage, the source of most underwriting business was found to be the parent bank in the case of County NatWest. The overall group's relationship with a customer is briefly recorded on what are referred to as 'relationship sheets'. Reference to County NatWest's relationship sheets revealed that almost 80 per cent of the investment bank's underwriting customers already had established relationships with one or more other sections within the National Westminster Banking Group. The source of such business invariably came from one of these other sections within the group with which the customer had an established relationship. Interestingly, hardly any customers with which the parent bank had a relationship actually approached County NatWest directly.

Reference to County NatWest's success sheets (referred to by members of the team as the 'hit lists') showed a high 90 per cent success rate, judged on the percentage of inter-group introductions which actually resulted in the establishment of a euronote programme. Of the programmes established through such inter-group introductions, nearly 90 per cent were established as dealer-led programmes as opposed to tender panel programmes.

Of the 20 per cent (approximately) of County NatWest's euronote business which emanated from outside the group as little as five per cent originated through participation in other bank-led programmes (all tender panel). The remaining 15 per cent came from direct approaches by potential customers, again almost all of which was tender panel based. 'Hit lists' showed a far lower success rate in this category (only 30 per cent) than where existing bank customers were referred by other bank departments (90 per cent success rate).

By contrast, almost 100 per cent of Dean Witter's euronote business came from participation in other bank-led syndications.

These statistics are presented in Table 10.1.

One of the most striking statistics from Table 10.1 is that of success rates; 90 per cent of all inter-group introductions were successful compared to only 30 per cent of direct approaches and as little as 10 per cent of all syndication offers as far as County NatWest is concerned.

Table 10.1 Sources of euronote business and success rates

Per cent

	Inter-group	Direct approach	Syndication
County NatWest			
Source of introduction	80	15	5
Existing relationships	98	2	Nil
Success rate	90	30	10
Dealer-led	90-	5-	Nil
Tender panel	10+	95+	100
Dean Witter			
Source of introduction	Nil	Nil	100
Existing relationships	na	na	5
Success rate	na	na	80
Dealer-led	na	na	Nil
Tender panel	na	na	100

Notes: 1 The figures for Dean Witter are estimates obtained through the observation period but have not been validated through observation of customer records

2 The statistics for tender panels relate to where the bank was asked to underwrite and not just bid for notes on an uncommitted basis

Evidence was sought to explain the statistics of Table 10.1. As far as the high rate of success of inter-group introduction was concerned, the overriding factor seemed to be the desire to meet customers' requirements in order to secure the maintenance of the relationship. A comment by one of the members of County NatWest's underwriting team (Mr X) was revealing in this respect:

> 'We're not like a Shearson or a Merrill where most of the business is on the nose [transactional] we also have the bank's [National Westminster Bank plc] relationships to think about when deciding whether to do a deal or not. It's better to cut a deal [underprice] than to see the relationship go elsewhere.'

The philosophy of relationship pricing appeared to have a major bearing on deciding whether to accept underwriting business or not, but as Mr X went on to say:

> 'Don't get me wrong, we won't underwrite at all costs. We look at the relationship and if it's worth it we'll do it, if not then we won't, unless of course the bank gives us a hold harmless letter.'

It was this latter point which was found to be significant from our point of view. Although the risk/return characteristics of underwriting a deal were viewed on a bank-wide customer relationship basis, County NatWest were still prepared to underwrite euronotes where they believed the customer relationship did not justify this action, given that a 'hold-harmless letter' was provided by National Westminster Bank plc. A hold-harmless letter basically states that in the event of default the provider of the letter will accept the risk of the deal to which the letter relates. It is provided to ensure inter-departmental co-operation as far as customer relationships are concerned. Such letters are provided reluctantly as the risk remains with the provider of the letter while the return is gained by the acceptor of the letter. It was discovered during the observation period that as much as 10 per cent of County NatWest's inter-group introduced euronote business is conducted against hold-harmless letters.

Reasons were sought for the use of hold-harmless letters. It appeared at first illogical that if the customer relationship did not justify the deal that the parent bank should wish to provide hold-harmless letters in the first place. Mr X explained:

> 'Sometimes the customer relationship does justify the deal on a group wide basis, but not for us. If underwriting fees are the only income we're getting from a customer then the deal is usually not worth it by itself. The bank takes all the milk and honey and then expects us to chew the crud just to keep the goodies flowing. Sure, we'll put the deal together but unless there's profitable spinoffs from the deal we feel that the bank should take the risks, not just the profits. This way we're happy, the customer's happy and the bank's happy.'

It became apparent that despite assurances given during the semi-structured interview stage, underwriting business was occasionally accepted without placement business against a hold-harmless letter where the overall customer relationship justified it.

The importance of the customer relationship in deciding whether or not to underwrite a deal is also borne out by other figures in Table 10.1. Of the direct customer approaches that County NatWest receive to underwrite euronotes only 30 per cent actually result in a deal being struck. Even more striking is the fact that of all the offers received to syndicate a deal as little as 10 per cent are accepted. The main reason given to explain these figures was that without an established customer relationship, underwriting euronotes was usually not worth it when viewed on a transactional basis. Direct customer approaches, while often offering placement business, are usually tender-panel based. Even with the opportunity to place paper, profits from this source were seen to be insufficient usually to boost fees to acceptable levels. As far as syndication offers were concerned, placement opportunities were usually unavailable and with no customer relationship underwriting fees alone did not usually justify the risks incurred.

In sharp contrast to County NatWest, Dean Witter gains all of its euronote business from syndications, of which approximately only 5 per cent includes existing relationships. Again, in sharp contrast to County NatWest, the majority of syndicate offers are accepted (approximately 80 per cent). Two reasons were found to explain this: firstly, returns on underwriting business are calculated on a straight ROA basis; secondly, there is a fear that if euronote underwriting business is refused, other more profitable syndication business may not be offered. The reasons for the diversity of underwriting practices between County NatWest and Dean Witter became more apparent as the arrangement of a major deal by County NatWest was observed.

10.8.4 Arranging the facility

During the period of observation the opportunity arose to witness the structuring and syndication of a major deal. County NatWest had been approached by their parent bank on behalf of an existing customer, to structure a revolving underwriting facility for £100 million. County NatWest were to be lead managers, with sole responsibility for placing the paper with investors. The situation was explained by Mr Y, another member of the originations team:

> 'On the face of it, it's a good deal. We're to be sole placing agents as well as lead managers - that's good. It's a strong name across the group: some lending, some leasing, some foreign and all the transmission, but it's the first time we've seen anything and it's the first time they've been to the market. The paper isn't going to be easy to place straight off: we'll probably have to tap the first tranche. The parent has indicated that they don't want more than 15 per cent so that means syndication and without placement that's not going to be easy, we can forget the big guns'.

Remuneratively the deal appeared to be lucrative: all the arrangement fees; some of the front-end fees and all the placement profits; the facility fees would go to the underwriters. From a syndication point of view it was going to be difficult. The name was relatively unknown to the market which meant that paper could be left with the underwriters, hence Mr Y's suggestion that the first tranche may have to be tapped into the market bit by bit rather than all at one go. Perhaps more importantly, however, the potential underwriters would have no opportunity to boost returns by placement profits unless County NatWest was prepared to conceed some placement business to the underwriters. The consensus of opinion amongst the originations team was that, on this basis, the larger players in the market would not be interested in joining the syndication. Marketing efforts were, therefore, to be aimed at the smaller players in the market.

A meeting was arranged with customers at Drapers Gardens (head office of County NatWest) to discuss requirements. Customers were keen that confidentiality should be maintained at this stage and so our only information from the meeting had to be obtained second hand from members of the originations team once the meeting had been concluded.

It transpired that the RUF was to be used for acquisition purposes. Customers wished to ensure that should a major acquisition be identified in the next few years that sufficient funds would be immediately available at the cheapest possible price. Their balance sheet could not possibly carry such funds in current liabilities as this would result in a negative net current assets position which would in turn severely affect their cash flow. As such, the amount sought could not be carried in overdrafts. Another alternative was a medium-term loan (MTL) but this would be expensive and unless funds were drawn immediately the non-utilisation fees would be prohibitive. The only feasible route was a standby commitment linked to market funding. This could be carried in creditors over one year on the balance sheet so unaffecting the company's working capital, but funding could also be taken when required at the market rate.

As the RUF was to be primarily a standby facility, pricing was structured to provide a low undrawn return and a higher drawn return. This met customer's requirements as there was always the possibility that the RUF would never be drawn if a suitable acquisition was not identified. The next step was to apply a pricing structure to the facility and return to customers with the official offer document.

10.8.4.1 Pricing the deal

The procedure for pricing a RUF was documented in Chapter 2; the procedure observed at County NatWest was not dissimilar. There are two components to a RUF: the notes and the underwriting facility. Both have to be priced separately but with an understanding of how the pricing of one will impact on the other. If the notes are priced too high then the market will not buy them and they will be left with the underwriters. If the notes are priced too low they will be purchased by the market but the customer will complain that his funds are too expensive. Conversely if the strike offer yield (the price at which underwriters will purchase paper) is too low then underwriters will not join the syndication.

It became apparent that once County NatWest had agreed to do the deal, the most important factor as far as pricing was concerned, was the market.

The customer relationship dictated the decision to underwrite but the market invariably dictated the pricing of the deal. It went without saying, as far as the team at County NatWest was concerned, that pricing would at least have to better the cheapest form of finance the customer was already obtaining. In this case that meant bettering the rate the customer could obtain on acceptance credits. This rate turned out to be a flat yield of ½ per cent over the Eligible Bill Rate. If this rate could not be bettered then the deal would almost certainly be lost and the customer would look elsewhere. It was emphasised by the team leader that this was something that could not be allowed to happen given the strong relationship which this customer had with the Group.

It became apparent, as expected, that there was no established procedure or formula for fixing the pricing levels of the separate components of a RUF. Much of the assessment is based on the euronote team's 'feel' for the present state of the market. From a financial point of view the important customer features appeared to be the sales turnover, pre-tax profit record and net tangible assets. It was on this criteria that (in the absence of a credit rating) the company's creditworthiness was generally assessed.

Market records were then scanned, by accessing a market database, for prices at which similar sized companies had come to the market for similar amounts in the last few months.

Finally, and perhaps most revealing of all, a value was sought for the customer relationship. Mr Y explained why and how this was done:

> 'We already know that we, as a Group, do a lot for this name, it's a good customer, but we need to know whether its profitable or not. You'd be surprised by the number of good customers we have who we make Zilch out of. I can recall one occasion where we were approached to syndicate US $200 million for a 'good customer' yet when we costed it out we

> were losing money. That alone pushed up the fees considerably ... but we still kept the deal ... How do we cost a relationship? Well each part of the Group keeps its own records and these are brought together quarterly for each major name under what we call the Mucky Corp exercise [major UK corporate exercise]: that's all put onto a database in the tower but we can access it from here. It's only been going for about six months but it sure opens your eyes.'

Unfortunately, at this stage we were refused access to further information relating to the major UK corporate exercise. What was now apparent was that a major Group-wide profitability system had recently been established throughout the National Westminster Bank plc Group since mid-1987. As such it appeared that County NatWest at least had some idea of the value of the relationship when pricing the deal. Access to this information was made available at a later stage of our research and is documented in Chapter Eleven.

With all these factors taken into account the pricing structure for the RUF was agreed upon and the structure of the facility was documented in an 'offer document' which was subsequently sent to the customer, simply setting out the terms and conditions of the facility.

In this case customers accepted the terms and conditions of the facility as set out in the offer document. The next step was to syndicate (or in market jargon to 'sell down') the deal.

10.8.4.2 Selling down the deal

Once the pricing structure of the facility had been agreed, the next step would normally have been to draw up an information memorandum to circulate to potential investors and underwriters. The information memorandum normally includes information relating to the creditworthiness of the borrower, any relevant legal clauses and a description of the borrower's business. In this case, however, where difficulties were forseen in syndicating the deal without the opportunity to gain placement profits, members of the euronote team rang around potential underwriters in an initial attempt to raise interest in the forthcoming deal.

The potential underwriters contacted were invariably the smaller players in the market. The strategy employed to raise interest in the deal on each occasion observed, was that of high returns to the underwriters despite the lack of placement business. Potential underwriters were informed of the forthcoming deal and emphasis was placed on the fact that the deal was primarily designed as a standby facility. It became apparent that members of the euronote team were using ROA as a marketing tool to these smaller players in the market. Following this initial marketing exercise, the strategy of marketing a deal though the use of ROA was questioned.

All members of the euronote team accepted that ROA did not provide a true calculation of return to an underwriter as it did not take into account the underwriter's actual exposure, only his return on assets actually funded. However, the consensus of opinion was that it was still a viable marketing tool. As Mr Y stated:

> 'If it's a standby facility then you're probably going to be faced with a lengthy period of time where no funds are required. Now that boosts your return if you do have to fund. That's our argument for using ROA. It's up to the market whether it accepts it.'

To the extent that ROA provides a misleading measure of an underwriter's true return, as in practice a standby facility can be called at any time, the practice of marketing a facility on this basis could be seen as a feature of disaster myopia in the euronote market.

Following from this, members of the euronote team were asked whether such low returns would enable underwriters to accumulate sufficient capital to guard against an unforseen shock to the system. The response, generally, was that such a shock was highly unlikely especially given the stability of the market to date. Since no default had ever occurred in the euronote market members of the team found it difficult to envisage a major default occurring let alone a major shock to the entire system. To a certain extent this seeming unwillingness to account for the possibility of a shock to the system in the pricing of euronote facilities might be attributable to Tversky and Kahneman's (1982) availability and threshold heuristics discussed in Chapter 9.

However, although members of the euronote team seemed prepared to market facilities on a ROA basis, facilities were only accepted at such low prices where the value of the customer relationship justified such low returns. This tends to contradict one facet of the disaster myopia hypothesis that banks will forgo the collection of an appropriate premium before losing business to other disaster myopic competitors. County NatWest were found to be prepared to lose such business if the value of the customer relationship did not justify the decision to do the deal. This is undoubtedly the result of profitability systems recently established throughout the Group. No such systems were found to exist in Dean Witter (although that is not to say categorically that they do not exist).

Following the initial marketing exercise an information memorandum was compiled and distributed to potential investors and underwriters. This was followed by an invitation telex to potential underwriters, formally inviting them to participate in the facility. Appendix 10.1

contains summaries of a typical information memorandum and invitation telex along with a specimen timetable for the establishment of a RUF.

10.8.4.3 Exposure management systems

Although County NatWest would price a deal low for customer relationship purposes, the group's exposure to that customer was managed. The exposure systems in place were found to be customer, industry and country based, i.e. a RUF would not be provided if gearing for a particular customer was seen to be excessively high or if the group's exposure to a highly geared corporation was seen to be too high. In other words, individual customer exposure systems existed along the normal credit analysis lines. Industry and country exposure limits were also found to exist. However, there was no system in place to monitor the group's exposure to the euronote market itself. In a systemic crisis all sectors of the market would be affected.

10.8.5 Presentation of results

Since the author had been introduced as merely a researcher documenting the operations of the euronote market, it was not feasible to present the results to date to the euronote team. Rather, results were presented only to the head of department who was already aware of the total research effort. It was agreed that elements of disaster myopic practices were evident in the market, not least through the use of ROA as a marketing tool to syndicate facilities. The influence of the customer relationship was agreed to be a significant, indeed the major factor on the decision to underwrite a deal. However, in order to analyse the data used to determine the value of the customer relationship it would be necessary to investigate the extent and structure of the profitability systems in existence throughout the bank.

As for the existence of a systemic gap, it was stated that prior to the establishment of the major UK corporate exercise, pricing of euronote facilities paid little regard to the value of customer relationships. The overriding factor was the need to maintain existing relationships at all costs. During this period it was accepted that a systemic gap may well have developed within the euronote market even given other returns from the customer relationship. Many relationships were actually unprofitable even prior to the time at which the borrower entered the euronote market, but such relationships were virtually impossible to segregate from the profitable ones. Basically, the bank did not know the value of its relationships.

Following the establishment of the major UK corporate exercise, it was now possible to segregate unprofitable relationships. In this sense the systemic gap may be more akin to Van Horne's financial balloon which will eventually deflate as prices increase for unprofitable relationships or as unprofitable deals are declined.

10.9 Summary and Conclusions

This chapter has served to outline how the period as participant observer in the euronote market was conducted and has gathered evidence with which to test our two hypotheses, namely:

1 that current pricing in the euronote market is determined by customer relationship factors

2 that current pricing in the euronote market is determined by disaster myopia on the part of euronote underwriters

Evidence was gathered to support both of these hypotheses. Although the decision to underwrite, as far as County NatWest was concerned, appeared to be determined by customer relationship factors, the ability to syndicate deals at such low prices (once the decision to provide the facility has been taken) appeared to be at least partially attributable to disaster myopic factors.

By marketing underwriting facilities though the use of ROA, County NatWest were able to justify the very low pricing levels attached to these facilities. Subsequently, underwriters participating in the syndicate were able to justify their participation on the same basis.

Another influential factor as regards participation in syndicates appeared to be the smaller players' fear of retribution by their larger competitors if they refused to participate. The main concern here was that refusal to participate in a RUF may lead the larger banks to deny them participation in more lucrative facilities.

If deals continue to be sold down on a ROA basis the potential for widening the systemic gap increases. Although the pricing of an individual deal may be justifiable for an individual bank on a customer relationship basis, if that deal is syndicated in the market it is important that pricing can be justified to the market on an exposure basis. Until profitability systems are established throughout the market then the potential for systemic risk to increase through disaster myopic practices remains.

The lack of a market exposure system could also leave banks vulnerable to the effects of a market crisis if facilities are agreed without regard to the group's exposure to the market itself as opposed to individual customers or segments of that market.

Despite the fact that our survey covered only two market participants, we would argue that these are typical of the two main classes of market participant: the large commercial bank-owned investment bank and the smaller independent securities house. As Appendix 6.5 showed, the market is dominated by the large commercial banks or their investment banking subsidiaries with the financial muscle to underwrite major deals, with the peripheral securities houses left to join in sub-participations.

The findings of our period of observation in both County NatWest and Dean Witter are supportive of, and serve to explain many of the findings of our semi-structured interviews, e.g. why the large market players priced on a ROX basis, whereas the smaller players tended to price on a ROA basis. In this sense, although our period of observation was spent in only two institutions, it builds on and serves to support information gathered in sixteen semi-structured interviews (excluding the Bank of England).

Whilst each individual bank will have its own particular characteristics, the commercial banks in the capital/securities markets have generally entered to provide a full banking package to their customers and hence relationships play an important part in pricing policy. As such, the development of adequate profitability systems with which to price the overall relationship has relevance to each bank.

However, even though profitability systems may exist they must be sufficiently sophisticated to be able to capture value from the entire customer relationship. The following chapter uses a case study approach to analyse the profitability systems in place throughout the National Westminster Bank plc Group and attempts to determine whether these systems are sufficiently sophisticated to be able to perform this required objective: that of placing a quantitative value on specific customer relationships. If the profitability systems are found to be able to perform this task then it might be argued that, as far as National Westminster Bank plc Group is concerned, their involvement in low priced deals is fuelled by an awareness of their affect on the overall customer portfolio, and justified on this basis. Whilst the development of each profitability system will depend on the requirements/structure of each institution, this could provide a lead to the rest of the market and hopefully a means of checking any further increase in systemic risk from this source.

Appendix 10.1 Arranging the Facility

The information memorandum

Once the pricing structure of the facility has been agreed, the lawyers of the issuer and those of the arrangers and underwriters meet to draw up the relevant documentation. An information memorandum may be drawn up to circulate to potential investors. This will include such information as, for example, the financial condition of the borrower, any relevant legal clauses, and a description of the type of business in which the issuer is involved.

The invitation telex

This telex to potential underwriters is vital to the success of the facility because it must provide a clear and complete outline of the issuer if it is to tempt potential underwriters to make an initial enquiry. The telex will include such things as:

- currency of denomination of notes
- size of facility
- type of placement method
- maturity period of notes (e.g. three or six months)
- type of facility (i.e. to be drawn or used as stand-by)
- maturity of facility (e.g. 6 years)
- size of tranche
- length of selling period
- pricing components and fees
- ratings (where relevant)
- time of notice if necessary before cancellation of facility
- list of documents to be prepared, e.g.
  - (a) RUF contract with issuer, arranger(s) and underwriters
  - (b) agency agreement between issuing and paying agency for custodianship
  - (c) governing law (e.g. English Law)
  - (d) status of notes (usually unsecured, unsubordinated liabilities of the issuer, with senior debt status, although they may be subordinated)

It will take 30 or more business days to set up a RUF, before notes may actually be issued under that facility, with the information memorandum and invitation telex usually being issued on the second or third day. A detailed specimen RUF timetable is given in the next section.

Once the facility has been agreed upon, it must be decided whether the facility is needed as a back-up or on a fully-drawn basis. If it is to be drawn, the method of placement must be decided upon.

Specimen timetable for a note issuance facility (RUF, NIF, etc.)

Business days

Day 1 The issuer delivers signed mandate letters to lead manager of the facility; appointment of lawyers

Day 2 The issuer, lead manager and lawyers begin arranging meetings to agree the following documents:

1 information memorandum
2 facility agreement
3 issue and placing agency agreement
4 tender panel agreement (if applicable)
5 invitation telex to underwriters
6 invitation telex to tender panel members (if applicable)
7 form of note
8 form of purchase request notice
9 draft legal opinions
10 letter to reference banks

Day 12
1 Decisions have to be taken regarding:
(a) reference banks
(b) composition of management group
(c) composition of tender panel (if applicable)
(d) advertising
2 Arrangements made about subscription account
3 Appoint printers and security printers

Day 14	Prospective underwriters (and tender panel members, if applicable) invited by telephone/telex	
Day 21	1	Telexed acceptances required from underwriters (and tender panel members, if applicable) by 12 noon London time
	2	Letter to underwriters (and tender panel members, if applicable) enclosing drafts of the underwriters' facility agreement
	3	Letter to tender panel members enclosing draft of tender panel agreement (if applicable)
	4	Prospective reference banks invited by telephone and confirmed in writing
Day 23	Decisions to have been taken about representation at signing ceremony, if any	
Day 30	1	Drafts of tombstone prepared and sent to underwriters for approval
	2	Deadline for underwriting and tender panel members (if applicable) to comment on facility agreement
	3	Deadline for tender panel members to comment on tender panel agreement (if applicable)
	4	Final versions of facility agreement, issue and placing agency agreement, tender panel agreement (if applicable), and form of note to be prepared
	5	Security printer to have been given text of notes
	6	Telex to underwriting (and tender panel members, if applicable) giving details of signing ceremony, including representation and form of authority
Day 32	Deadline for receipt of form of authority for signing from underwriting (and tender panel members, if applicable) and approval of draft tombstone	
Day 35	1	Following documents to be executed at the signing ceremony: (a) facility agreement (b) issuing and placing agency agreement (c) tender panel agreement (if applicable)
	2	Legal opinions to be produced
	3	Press announcements made, if any
	4	Printers instructed to print notes
	5	Deliver final version of tombstone, if any, to Public Relations of the lead manager

CHAPTER 11

THE ESTABLISHMENT OF A CUSTOMER RELATIONSHIP PROFITABILITY SYSTEM

11.1 Introduction

It was stated in the previous chapter that if banks are to price services and products on a relationship basis then it is important that systems exist within these banks to identfy the profitability of the whole customer relationship and different segments of the relationship. Without such profitability systems any attempt at relationship pricing will be, at best, guided by an incomplete picture of the worth of the relationship, and at worst misdirected.

Where profitability systems are absent, the systemic gap identified in the euronote market may indeed prove to be real rather than just apparent. In this case, relationship pricing is guided by an uninformed desire to keep the relationship rather than an understanding of its worth.

If it could be shown that adequate profitability systems do exist within those banks underwriting euronote facilities, then it could be argued that there is a sound basis on which to practice the relationship pricing strategy found to be dominant in the market. In this case the systemic gap identified in Chapter 8 may prove to be more akin to Van Horne's financial balloon which will eventually deflate as unprofitable deals (on a relationship basis) are declined. In the long-term the gap may thus prove to be more apparent than real. We may then contend, in response to our original question, that although the growth of the euronote market may have increased systemic risk in the short-term, in the long-term a relationship pricing strategy, supported by adequate profitability systems, may reduce this risk.

However, the fact that our field study of profitability systems will be confined to a case study examination of the systems in place (and being developed) in just one bank (the National Westminster Bank), means that our conclusions must be qualified. Whilst the final form of any profitability system will be dependent upon particular organisational requirements, in practice it is likely that the National Westminster Bank is not untypical of the large market players. If the systems within the National Westminster Bank are concluded to be adequate for relationship pricing purposes then this could at least provide other banks with a guide to producing their own systems (if they have not already done so). In this sense, although the systemic gap may be more than just apparent, the market will at least be provided with a means by which the gap may be closed. We believe that this would be a valuable contribution towards the safety of the system.

The following sections are not meant to provide a guideline for how a profitability system should be developed, but rather how one has and therefore could be developed by a large commercial bank. The actual format of any profitability system will, as previously mentioned, be determined by _inter alia_ management objectives and organisational requirements.

11.2 The Organisational Structure of the National Westminster Bank plc Group

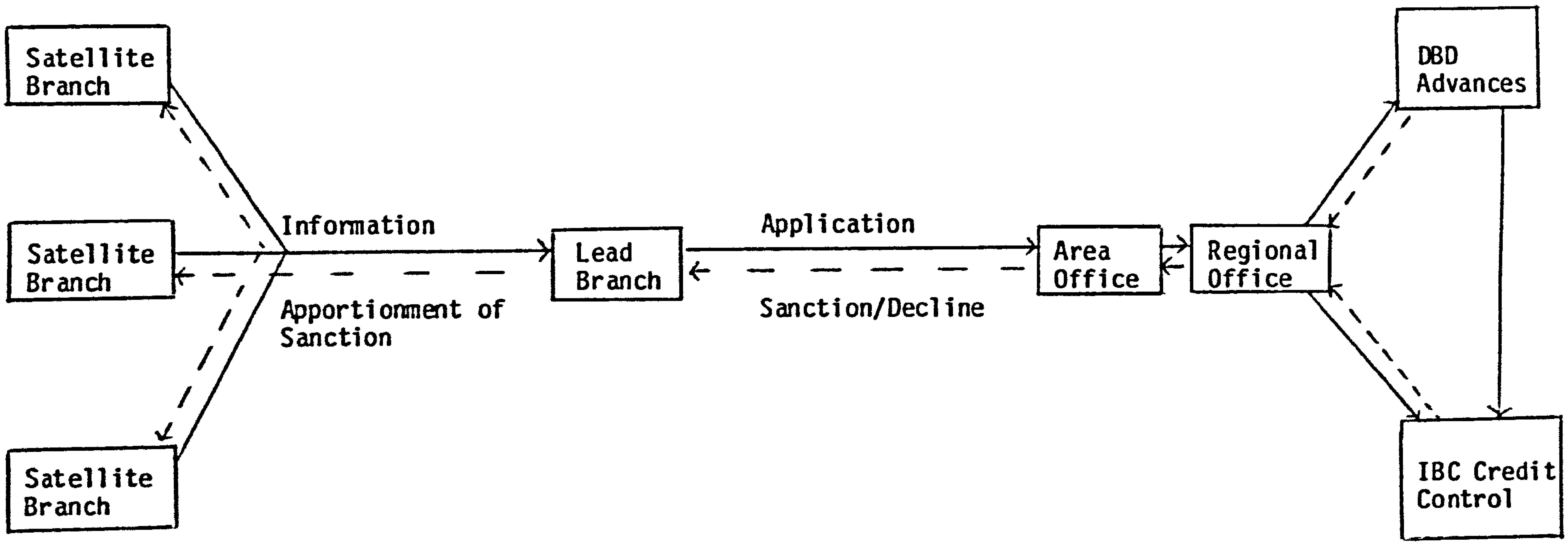
Before describing the profitability systems presently being established throughout the National Westminster Bank plc Group it is first necessary to gain an understanding of the structure and reporting systems of the group. One fact which will become apparent is the need to adapt the structure of the organisation to meet the requirements of the profitability system. This is the vital first step in the establishment of any such system.

In the National Westminster Bank each lending manager is given his own discretionary power (DP) up to which he can sanction facilities on his own authority. Any facilities sought in excess of his DP have to be referred to a higher sanctioning authority for approval or decline. Historically, an application for any facilities sought in excess of £1 million but less than £10 million had first to be sent to Area Office where a covering letter (setting out the main points of the application) would then have had to be sent with the application to Regional Office for approval or decline. However any facilities sought in excess of £10 million had to be approved by Domestic Banking Division (DBD) Group Advances in London, again via Area Office and Regional Office. Furthermore, if the application for facilities in excess of £10 million included international facilities then DBD Advances had to refer this to International Banking Division (IBD) Credit Control.

This intricate web of reporting lines was further complicated by the fact that the branch initiating the application was invariably a 'lead branch' with the main responsibility for that particular customer. However, that customer's banking accounts would be probably at many branches around the country: these branches were known as satellite branches. They provided the information necessary for the lead bank to compile the report. Figure 11.1 depicts this web of reporting lines historically in place throughout the bank.

To attempt to develop a profitability and management information system along the existing reporting lines would have been cumbersome, time consuming and probably grossly inefficient. The entire reporting structure of the bank had to change to make any sort of profitability

Figure 11.1 Historic reporting lines throughout the Group



system a viable undertaking. From the beginning of 1986 to mid-1988 change was initiated by two major developments within the bank: the development of Business Centres, and the establishment of the major UK Corporate Exercise. These will be discussed in turn.

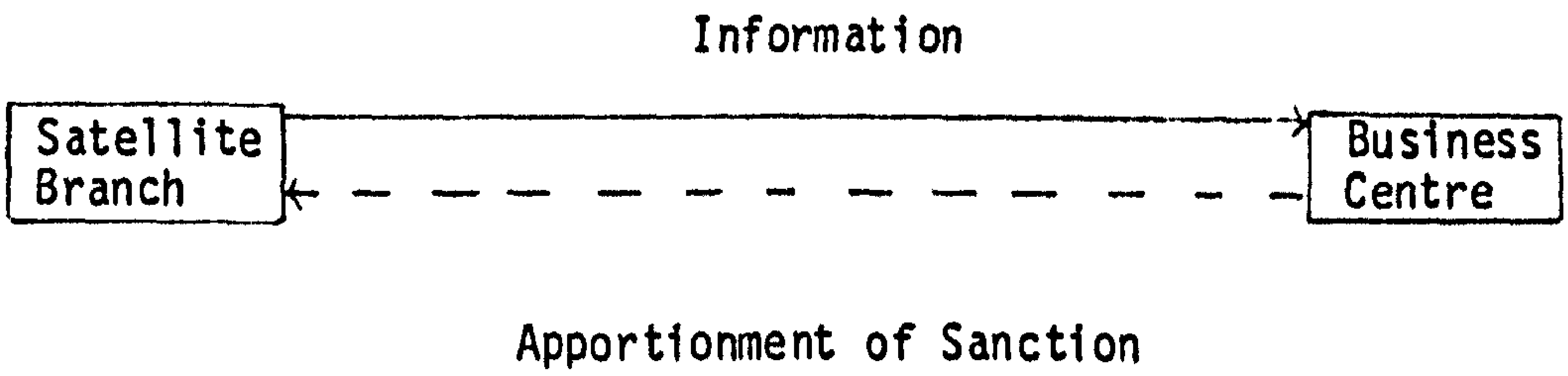
Towards the end of 1986 the bank began to rethink its policy for meeting the requirements of its corporate customers. The existing structure dictated that most corporate customers banked at the local branch. This meant that, in many cases, the local branch manager could be discussing personal loans or mortgages in the morning and interest rate hedging techniques for a large corporate customer in the afternoon. Many branch managers had neither the expertise nor the time to devote towards meeting the needs of these large corporate customers.

Furthermore, corporate customers usually had relationships with many branches. Often the lead branch, whose responsibility it was to co-ordinate the relationship, had very little contact with the customer.

The decision was taken that large corporate customers should be enticed to have one major relationship with the lead bank, using satellite branches mainly for cash drawing and paying in purposes. This centralises large corporate relationships. However, it was not sufficient simply to attempt to relocate relationships. Corporate customers had to be shown that there were benefits to them in this move. It was decided that centres of corporate excellence should be established across the country, staffed by employees with substantial corporate experience and devoted solely to meeting the requirements of large corporate customers. These 'centres of excellence' became known as Business Centres. By April 1988 there were over 100 such centres across the bank.

Not only did these business centres centralise corporate relationships, but they also rationalised the satellite branching structure of the bank. The establishment of Business Centres meant that large corporates had relationships with fewer satellite branches. The collection of information on corporate relationships was thus made easier and more efficient. This was an important development as it made the construction of a customer profitability system more practical by rationalising the first link in the reporting chain. This rationalisation process whereby the number of satellite branches reporting to the Business Centre (old lead branch) was reduced is depicted in Figure 11.2

Figure 11.2 The establishment of Business Centres and the rationalisation of satellite branching



The establishment of Business Centres was an important first step in meeting the needs of large corporate customers and rationalising reporting lines. However, for corporate customers that required large banking facilities the reporting lines within the bank still remained an anathema: time-consuming and inefficient. It was for the purpose of improving the delivery of services to these UK corporates that the major

UK Corporate Group (MUKCG) was established in the National Westminster Bank Tower in London.

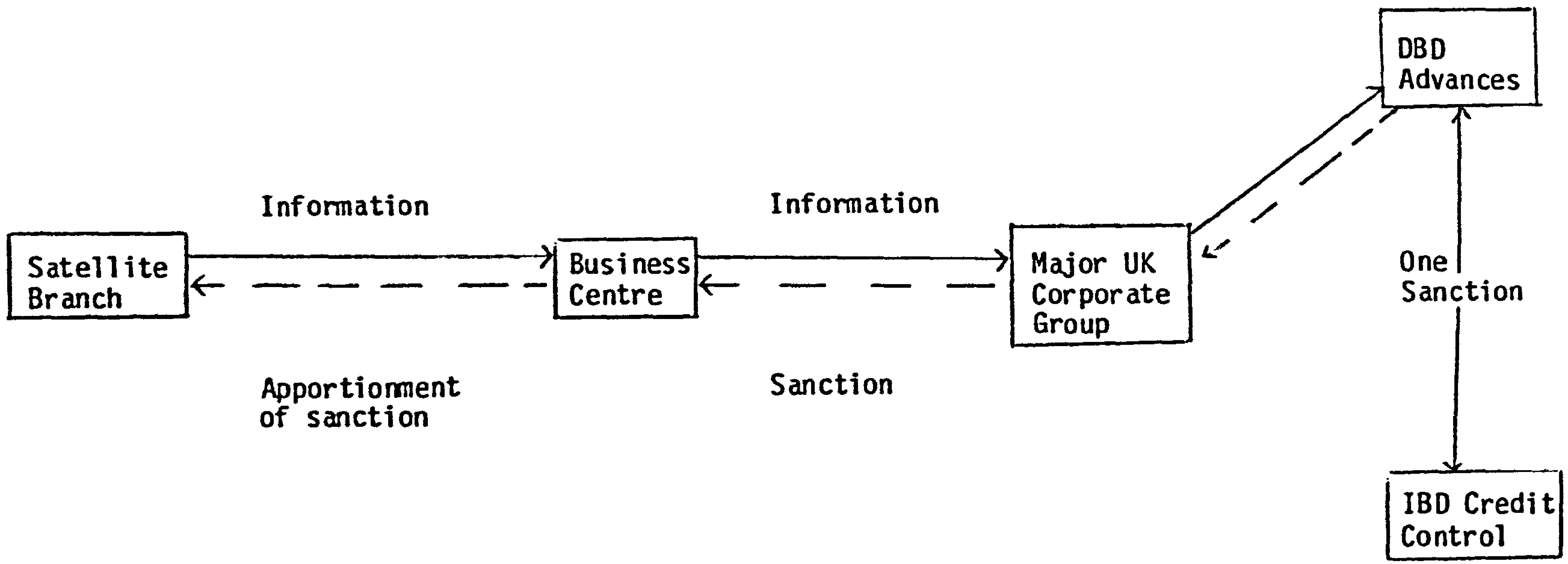
MUKCG was given responsibility for managing all corporate relationships with sales turnover in excess of £130 million. This is not a rigid figure but rather a guideline. Some corporates with turnover below £130 million, but with complicated financial requirements, may also be looked after by MUKCG.

In order to rationalise reporting lines still further and to improve the delivery of financial services to these major corporations MUKCG was allowed direct access to DBD Advances and IBD Credit Control: the major sanctioning bodies of DBD and IBD respectively. Although it was still necessary for MUKCG to approach the Business Centres for information on the operational aspects of a relationship, the reporting lines via Area Offices and Regional Offices were severed. The new reporting structure for major UK corporates is depicted in Figure 11.3. The establishment of Business Centres and MUKCG has not only rationalised reporting lines within the bank but has also reduced the number of sanctioning bodies which need to see the application.

With the rationalisation of reporting lines it became apparent that the establishment of a customer profitability system stretching across the group was now feasible. A specialised systems group was set up within MUKCG to explore ways of establishing a customer profitability system. Their initial findings are discussed below.

The first task of the systems group was to discover where the major corporate relationships were situated, not just throughout DBD but throughout IBD as well. Within DBD the task was relatively simple because of the rationalisation and centralisation programmes which had directed most major UK corporate relationships to MUKCG. Within IBD the

Figure 11.3 Rationalisation of reporting lines for major UK corporates



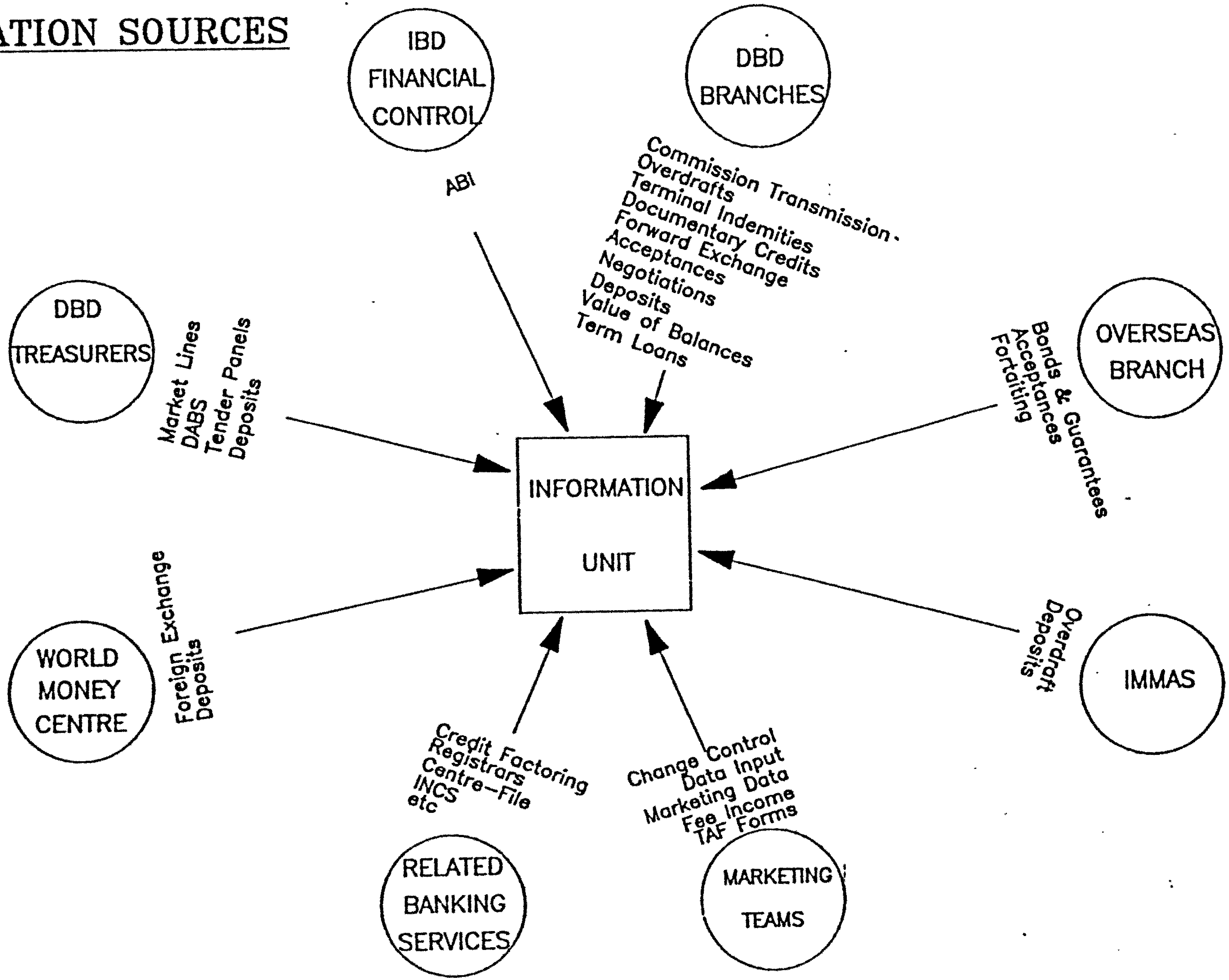
task was made more difficult by the fact that many customers were multinational organisations with relationships with the National Westminster Group across the world. However, most relationships were found to be co-ordinated by two departments within IBD: UK Finance and Marketing which caters for the needs of multinationals with mainly UK financial requirements, and Corporate Financial Services which caters for the needs of multinationals with predominantly international financial requirements. If a profitability system for major relationships was to reach throughout the bank then it would have to encompass relationships within all three major relationship departments as well as related banking services such as leasing through Lombard North Central etc.

The original plan was to modify existing computer systems to allow branches and departments within IBD to enter their information directly on to a central information collating system, in a similar manner to that depicted in Figure 11.4.

It transpired that existing systems were virtually unmodifiable but that engineers were working on two new systems (one for DBD and one for IBD) which would allow information to be entered at branch and department level. These systems are known as ISS (Information Systems Strategy) in DBD and CIS (Central Information Systems) in IBD. Unfortunately these systems will not be operational until 1993. This meant that any new system established in the interim period would, almost certainly, have to collate information manually. However, as Ernst and Whinney (1987, p.179) point out:

Keeping in mind the limitations imposed by time frame and by e 11.4

ORMATION SOURCES



resources, the organisation may have to settle for second best, especially at the outset.

A manual system can still be extremely useful and can provide a base for automation at a later date.

11.3 Operationalising the System

The new system sought to compile a central database of over 400 identified major UK corporates. For operational convenience, MUKCG, UK Finance and Marketing and Corporate Financial Services were situated alongside each other within the NatWest Tower.

It was decided that, despite the present lack of computerised information systems, the original plan to gather information in the manner set out in Figure 11.4 should still be followed. This would enable revenue information on the majority of products provided by the group to be collated periodically. To analyse the data forms sent to every information arm (depicted in Figure 11.4) would be time consuming and largely repetitive. It will be sufficient for our purposes to examine how the system works in relation to DBD branches - the major information arm in the MUKCG exercise.

In Spring 1987, letters were sent to all lead branches (mainly Business Centres) where major UK corporates had accounts. The purpose of the letter was primarily to establish a uniform and workable practice of recording particular information on a quarterly basis. Appendix 11.1 sets out the type of information required for a particular relationship and the objective and the procedure to be followed for recording that information. Appendix 11.2 provides an example of how that information is actually recorded. The services/products on which information is required are the major services/products provided by that particular arm of the group.

One of the main advantages of the system is that it not only provides a means by which a central co-ordinating unit can determine the main revenue areas within a relationship but also the split between risk income and non-risk income. The greater the proportion of non-risk income to risk income within the customer portfolio the lower is the exposure of the bank to the failure of that relationship. Types of non-risk income include, for instance: large credit balances held within the group; related banking services such as registers; non-underwritten securities placement business; and commission transmission income. The latter is, perhaps the most significant of all.

Commission transmission income relates to the revenues earned through acting as a company's 'clearing bank'. Appendix 11.3 presents a typical transmission activity form. Each item on the form is costed.

Each per item tariff has been arrived at by allocating general overheads and direct costs to that item on an average cost basis, and then adding an 'adequate' undisclosed profit margin. A 100 per cent recovery of objective thus implies a full cost recovery plus an adequate profit margin. Anything above a 100 per cent recovery of objective thus implies that supernormal profits are being made from transmission services - profits that could be transferred to supplement other lower recovery areas within the relationship. The lynch pin to an effective profitability system thus becomes an established method of cost allocation. Without a means of allocating costs to various services the 'profitability' systems established within banks can best be viewed as 'revenue identification systems'.

It is probably fair to say that, with the exception of transmission services, where a major cost allocation exercise was undertaken within the last five years, the major UK corporate system is primarily a revenue identification system at present. However, a major project is underway to establish a system whereby costs can be allocated within the customer relationship. This new system will be based on previous 'floor level costing studies' which sought to discover the extent of the cost savings through the loss of particular relationships.

The floor level costing studies were lapsed in 1986 because of the difficulty and expense inherent in obtaining information via the old reporting structure. Given the new reporting lines within the bank and the establishment of the major UK corporate exercise, a floor level costing exercise is to be re-established with the objective of establishing a true 'profitability' system throughout the bank based on the identification of revenues and costs within the customer portfolio. Only at that time can a true relationship pricing strategy be employed to its full effect. Only then can bank supervisors and researchers be content that the banks are actually aware of the profitability of a customer relationship and whether that relationship justifies the inclusion of one or more underpriced assets within the portfolio. Although a revenue identification system provides at least some information on which to base this decision, it portrays an incomplete picture. In this sense systemic risk may still arise where bank underwriters equate revenue to profit. The following section examines the process by which a cost allocation system is being established within the National Westminster Bank plc Group.

11.4 Establishing a Cost Allocation System

By identifying revenues and allocating costs to various services within the customer relationship a profitability system can be established incorporating a cost allocation system. One way of establishing a cost allocation system is to identify the net cost savings that could be expected to accrue if a particular customer's business were to be lost. This objective can be achieved by calculating the overall contribution of the connection on a full absorption cost basis as the system being developed within the National Westminster Bank attempts to do.

Absorption costing is based on the premise that the normal costs of running a firm should be charged to the individual cost units in order to ascertain the total cost of each unit. By such an exercise the cost units absorb the total costs. The product units are thus charged not only with direct costs, but also with a fair share of the overhead cost (Armand, 1984).

Absorption costing is different to marginal costing which states that each cost unit should be charged only with those costs which it exclusively caused to be incurred. Marginal costing is also known as direct costing.

The rationale for absorbing overhead costs to products is to recover accounting profits, but care should be exercised when employing the absorption costing method as overhead absorption rates must be predetermined. This task will always involve an element of estimation. We will return to this point at the end of the following costing example.

11.4.1 Costing the relationship

In order to cost a customer relationship a team must first identify all the bank services used by that particular customer and the volume used. Costs can then be allocated on an estimated full absorption cost basis. For the example we are about to work through, transmission business accounted for nearly all of the customer revenue and, hence, a considerable proportion of the costs.

The services which this particular customer (henceforth referred to as customer A) was found to use can be divided into three categories: lending and other liability services, transmission services, and other group services. These wil be addressed in turn in order to show how each was costed.

11.4.1.1 Lending services

Customer A does not have a legal power to borrow. However, in order to facilitate administration of the various departments under its control, an overdraft facility of £35 million gross/£ nil net was sanctioned. A gross position relates to the total of all debit balances across that customer's accounts. A net balance refers to the total of all debit balances plus credit balances.

Given the fact that the cost of debits and credits would be included in the section on transmission costs and that no facility letters were required to be compiled, no costs were allocated to this particular part of the relationship.

11.4.1.2 Lombard Group

The customer was found to operate eight leasing agreements through Lombard North Central (NatWest's wholly-owned subsidiary) on which limits of £80,000 were fully utilised during the year. A contribution for the service was not calculated by Lombard as this would have entailed reviews of each lease with appropriate adjustments for grossing-up leasing valuations.

11.4.1.3 Transmission services

The total cost of operating customer A's basic transmission service on a full absorption costing basis for the year ended 198X was £306,495 as detailed in the top section of Table 11.1. The bottom section of Table 11.1 shows total income for the same period of £465,244, which produced a surplus of £158,749: a 152 per cent recovery of costs.

The average free cleared credit balances shown in Table 11.1 are valued at average 3 month LIBOR.

Table 11.1 can be broken down to show how the individual cost figures are arrived at. Table 11.2 provides a detailed analysis of the entries passing through this customer's account (the top two rows in the cost column of Table 11.1).

The detailed breakdown facilitates the application of specific unit costs to each transaction rather than applying average cost rates as is the case with the transmission activity form referred to earlier. Table 11.2 identifies a total cost of entries of £174,663 which is comprised of £146,507 debit entry costs and £28,156 credit entry costs.

Section 1 cheques are those cheques paid through the clearing system whereas section 2 cheques are those cheques returned unpaid for whatever reason. Cheques issued by customer A account for 90 per cent of the debit entries and attract some 99 per cent of the debit entry costs.

Table 11.1

TRANSMISSION ACTIVITY ON FULL ABSORPTION COST BASIS

YEAR TO SEPTEMBER 198

COSTS

ACTIVITY		Department 1	Department 2	Department 3	TOTAL VOLUME	UNIT COST p	COST £
		VOLUME					
Entries	- Debits	147,289	677,214	1,724	826,227	) See	146,507
	- Credits	37,796	1,680	217	39,693	) Table 4	28,156
Cash In		6,926,947	22,180	1,066	6,950,193	Ave 27.1p%	18,813
Cash Out	- Branches	10,335,048	5,917,348	491,218	16,743,614	Ave 17.3p%	29,036
	- Securicor Bulk Withdrawal	10,174,808	-	-	10,174,808	1.2p%	1,221
	- Bullion Bulk Withdrawal	6,888,883	-	-	6,888,883	2.1p%	1,447
Cash Exchanged		19,801	-	-	19,801	155p%	307
Dispersal Credits	- Via Clearing	195	-	-	195	38.22	75
	- In House	13,364	-	-	13,364	13.10	1,751
BACS Credits Distributed		1,571,519	75,715	-	1,647,234	3.10	51,064
Items Collected		128,607	1,230	99	129,936	7.87	10,226
Statements Despatched		10,107	23,353	101	33,561	21.00	7,048
SUB TOTAL							295,651
Other Bank Claims							10,844
TOTAL COST							306,495

INCOME

		Department 1	Department 2	Department 3	TOTAL VOLUME	UNIT COST p	COST £
Commission Income		223,612	92,199	2,846	-	-	318,657
Other Bank Claims (Paid by Customers)		9,479	1,365	-	-	-	10,844
Average Free Cleared Credit Balances							
Current Account	- Group (after set off)	-	693,117	-	693,117	)	82,481
	- PPA's	-	-	3,941	3,941	) 11.90%	469
	- Endowment Trusts	86,480	1,982	-	88,462	)	10,527
Deposit Account	- Endowment Trusts	830,816	20,644	-	851,460	) 3.17%	26,991
	- Patients Monies	481,862	-	-	481,862	)	15,275
TOTAL INCOME							465,244
Surplus							158,749
Recovery Ratio							152%

Table 11.2

ANALYSIS OF ENTRIES

TYPE OF ENTRY		NO OF ENTRIES Department 1	Department 2	Department 3	TOTAL ENTRIES	UNIT COST p	COST £
Debit Entries							
Cheques Cashed	- Home Branch	5,256		1,638	6,894	37.23	2,567
			143		143	39.08	56
	- Agency Branches	3,322			3,322	67.81	2,253
			58,121		58,121	69.66	40,487
Section 1		130,465		86	130,551	11.42	14,909
			599,934		599,934	13.27	79,611
Section 2		3,817		-	3,817	23.35	891
			17,152		17,152	25.20	4,322
Bank Raised	- Home Branch	735	289	-	1,024	13.08	134
Standing Orders	- Computer Generated	117	-	-	117	8.87	10
Direct Debits		1,226	162	-	1,388	5.77	80
Overseas Branch	- Automated	333	-	-	333	5.77	19
House Cheques		1,493	-	-	1,493	16.37	244
Transfers	- Automated	139	-	-	139	5.77	8
	- Manual	146	1,309	-	1,455	59.75	869
	- CHAPS		104	-	104	5.77	6
	- Truncated	240	-	-	240	17.09	41
TOTAL		147,289	677,214	1,724	826,227	Ave 17.73	146,507
Credit Entries							
Home Branch	- Cash Credits	12,897	9	127	13,033	68.32	8,904
	- Non Cash Credits	1,941	147	66	2,154	33.99	732
Agencies	- Cash Credits	15,467	226	-	15,693	106.64	16,735
	- Non Cash Credits	203	46	-	249	72.31	180
Other Bank's Claimed Credits	- Cash	1,012	176	-	1,188	24.75	294
Traders Credits		1,472	-	-	1,472	20.20	297
Bank Raised	- Home	1,453	153	-	1,606	13.10	210
Automated Credits		1,706	443	24	2,173	5.77	125
Overseas Branch	- Automated	63	-	-	63	5.77	4
Transfers	- Manual	401	380	-	781	59.75	467
	- CHAPS	-	100	-	100	5.77	6
	- Truncated	1,181	-	-	1,181	17.10	202
TOTAL		37,796	1,680	217	39,693	Ave 70.93	28,156
TOTAL COST OF ENTRIES							174,663

As far as credit entries are concerned Table 11.2 reveals that cash credits at home and agency branches attract over 90 per cent of the credit entry costs.

Immediately below the cost figures for debit and credit entries in Table 11.1 is the cost figure for cash in (i.e. cash paid into bank branches for the accounts of customer A). This figure of £18,813 is broken down in Table 11.3. Table 11.3 analyses by tranches the volumes and costs of cash received based upon a one month sample undertaken for each department.

Over 20,000 credits per annum, some 70 per cent of the total, contained less than £100 of cash with an average cash content of only £25.

The majority of the credits seen in the higher volume tranches are paid in by the larger operating units. The cost of cash handling per £100 reduces as the volume per credit increases and this aspect is reflected in the unit costs used.

The other items in Table 11.1 are costed on exactly the same basis as the above and a detailed breakdown of each of the other cost figures is, therefore, unnecessary.

11.4.1.4 Other group services

Other group services utilised by customer A show a net shortfall for the year of £2,053 on a full absorption cost basis. This is arrived at by calculating the revenues and costs from the following:

1 Other branch services

2 Foreign business

3 Sterling money market office

4 Statement details on magnetic tape service

Table 11.3

ANALYSIS OF CASH IN

TRANCHE	NUMBER OF CASH CREDITS	VOLUME £ Department 1	VOLUME £ Department 2	VOLUME £ Department 3	TOTAL VOLUME £	UNIT COST P%	COST £
£1-£100	20,370	491,317	12,335	1,066	504,718	98.0	4,946
£101-£500	4,263	936,051	9,845	-	945,896	37.4	3,538
£501-£1000	1,832	1,213,566	-	-	1,213,566	26.2	3,180
£1001-£2000	1,330	1,939,506	-	-	1,939,506	19.8	3,840
£2001-£5000	931	2,346,507	-	-	2,346,507	14.1	3,309
Total Cash In Volume and Cost	28,726	6,926,947	22,180	1,066	6,950,193	Ave 27.1	18,813

5 Other divisions' services (not costed)

These will be addressed in order.

<u>11.4.1.5 Other branch services</u>

Table 11.4 identifies the annual activity levels, costs and income in respect of other branch services revealing a shortfall of £6,997. The annual volumes have been ascertained by sampling the records at the account-holding branches and grossed where necessary to reflect a full 12 months activity.

The main contributors to the shortfall are stopped cheques and BACS recalls.

Table 11.4 OTHER BRANCH SERVICES - ACTIVITY COST AND INCOME

SERVICE		VOLUME	UNIT COST £	ANNUAL COST £	INCOME £
Returned Cheques	- Inwards	388	1.83	710	695
Credits Opened	- Outwards	55	4.29	236	106
Direct Remittances	- Inwards	12	1.68	20	-
	- Outwards	15	4.24	64	34
Stopped Cheques		834	7.29	6,080	272
Audit Letters		20	13.90	278	-
BACS Recalls		1,474	3.75	5,527	2,184
CHAPS without Cypher	- Inwards	100	5.31	531	-
	- Outwards	104	5.31	552	4,144
Night Safes Bank Opened	- Rental	27	-	-	158
	- Usage	207	0.78	161	101
Status Enquiries	- Inwards	12	4.97	60	-
	- Outwards	415	3.05	1,266	829
	- Outwards Direct	29	1.53	44	-
Safe Custody Lines	- Inwards	42	2.06	87	-
	- Outwards	45	3.86	174	-
Boxes and Parcels	- Inwards	11	4.31	47	-
	- Outwards	12	5.03	60	-
	- Inspections	48	5.48	263	-
Boxes and Parcels	- Number charged (per annum)	89	-	-	463
Envelopes	- Number charged (per annum)	49	-	-	327
Bankers Drafts		-	-	-	166
Sundry Payments Cheques		24	3.68	88	-
Coin Bags		-	-	780	552
Total Other Branch Services				17,028	10,031
Shortfall					6,997
				17,028	17,028

11.4.1.6 Foreign business

Table 11.5 details the annual activity levels, costs and income of foreign business which reveals a shortfall of £1,288 mainly in respect of foreign currency drafts issued. Standard bank tariffs were applied to all services.

Table 11.5 Foreign business - activity cost and income

Service	Volume	Unit cost	Annual cost	Income
Foreign drafts Overseas issued - currency	351	7.42	2,604	1,417
Foreign bills sold with recourse Clean - currency	28	7.69	215	147
Travel cheques Branch issued - sterling	190	0.92	175	142
Total foreign business Shortfall			2,994	1,706 1,288
			2,994	2,994

11.4.1.7 Sterling money market office (SMMO)

The total average deposit balance held with SMMO for the year amounted to £1,326,862. Applying an average ROA margin of 0.5 per cent to this total provides income of £6,634. Branch end costs were found to amount to £2,221 resulting in an overall net contribution of £4,413.

11.4.1.8 Statement details on magnetic tape

Tapes are provided to three of customer A's operating units, incorporating details of statement entries to simplify the updating of their book-keeping records.

The operating units are invoiced direct for these tapes at 0.5p per entry plus transport costs and a surplus is revealed along the following lines:

Income	(696,246 items)	£3,689
Cost		£1,870
		£1,819

11.4.1.9 Other divisions' services

It was discovered that customer A was also using the services of Lombard North Central and County NatWest (Investment Services). No details regarding costs and income were provided for these services given their low usage and the costs inherent in obtaining this information.

The contribution from other group services is thus -£2,053. This figure is arrived at as follows:

Service	Contribution
Other branch services	-£6,997
Foreign business	-£1,288
SMMO	£4,413
Magnetic tape service	£1,819
	-£2,053

11.4.2 'Floor level' cost recovery and income summary

The 'floor level' costs of operating customer A's accounts can be defined as the costs which the bank would save if the relationship was lost.

In this particular example it was concluded that the loss of customer A's business would have little effect across the bank's network even though there are 21 account-holding branches and some 150 branches used on an agency basis.

Staff resources available for redeployment and the reduction in BACS charges were found to account for 89 per cent of the cost saving area and the following summarises the overall annual figure that was found to be achievable.

Account holding branches	£
Staff available for redeployment	43,262
Stationery and telephones etc	13,900
BACS charges	51,064
	108,226
Agency branches	
Staff available for redeployment	22,108
Floor level cost	130,334

Staff available for redeployment make up 50 per cent of the floor level cost of operating the business. It must be borne in mind, however, that this result has been calculated by identifying the direct staff and pension costs for the sum total of the different grades of staff at the account holding and agency branches processing customer A's business.

Should the business be lost it is, of course, impossible to tell how quickly these particular cost savings would be realised in individual locations by the introduction of replacement business or the redeployment of staff resources.

The total floor level cost does not take into account any capacity that would be created within branch premises by the reduction in staff at the account-holding and agency branches.

Nor does the floor level cost take into account the costs which may be saved by closing various sub-branches through the loss of the relationship. This was estimated at approximately £100,000 per annum.

11.4.3 Staff cost savings on a full absorption cost basis

Included within the unit costs allocated to each transmission service is an element of staff costs.

Table 11.6 shows the staff costs, on a full absorption basis, of undertaking customer A's business to be £194,783. These costs are allocated across each transmission service on a per item basis.

Staff levels were calculated by identifying the total volume of work undertaken for customer A at the main account holding branch and the twenty other account holding branches. The following were then calculated (drawing on findings of a previous average staff costing study conducted on a sample of 200 branches in the bank):

1 the average unit time for each category of work undertaken

2 the grades of staff involved in the work

Table 11.6 TOTAL COSTS ATTRIBUTABLE TO THE BUSINESS AT MANCHESTER CITY OFFICE AND 20 OTHER ACCOUNT-HOLDING BRANCHES (INCLUDING SUPPORT)

LEVEL OF STAFF	(MANCHESTER CITY OFFICE)		(OTHER BRANCHES)		TOTAL STAFF INVOLVED	TOTAL COST £
	STAFF INVOLVED	COST £	STAFF INVOLVED	COST £		
Managerial	0.01	553	0.01	361	0.02	914
Appointed	0.19	4,615	0.22	5,343	0.41	9,958
Grade 4	-	-	0.02	376	0.02	376
Grade 3	0.03	460	0.15	2,299	0.18	2,759
Grade 2	0.95	12,627	1.61	21,400	2.56	34,027
Grade 1	1.07	12,056	0.68	7,662	1.75	19,718
Secretarial	0.01	150	0.04	601	0.05	751
	2.26		2.73		4.99	
Sub Total (Direct Branch Costs)		30,461		38,042		68,503
Other Costs						
Area/Regional Support		3,540		4,429		7,969
Departmental Support		7,103		7,929		15,032
Computer Support		38,973		2,966		41,939
Bullion Support		223		5,358		5,581
Clearing Support		49		4,646		4,695
BACS		2,347		48,717		51,064
TOTAL COSTS		82,696		112,087		194,783

The individual volumes were then multiplied by the average unit times to produce the total prime activity hours worked by function and grade of staff.

These hours were then converted into staff numbers, indicating that a total of 4.99 staff were involved in undertaking customer A's business.

11.4.3.1 Sources of costs

A brief explanation of the sources used to identify and calculate the costs of customer A's business, indicated in Table 11.6, is provided below.

Direct branch costs	The annualised attributable average costs per grade of staff multiplied by the staff identified
Area/Regional support	The average cost per hour per prime activity category applied to the relative activity hours identified for customer A's business
Departmental support	As per Area/Regional support plus central bank and group overheads in respect of the staff involved
Computer support	The year's projected central accounting charge per entry applied to the actual number of entries processed for customer A plus an appropriate share of general ledger entries

Bullion support	The year's projected rate applied to the cash turnover of customer A.
Clearing support	The year's projected unit cost applied to the number of debit and credit out clearing items processed for customer A.
BACs	The annual number of BACS credit items processed for customer A multiplied by the per entry charge levied on the bank.

11.4.4 Overall contribution on a group relationship basis

The overall contribution on a group relationship basis for customer A is shown in Table 11.7. From Table 11.7 it is clear that transmission business accounts for the vast majority of revenue and costs from this relationship, revealing a net contribution of £159,000 for the year.

Obviously, the development of an adequate cost allocation system is vital to the establishment of an adequate profitability system. Unfortunately, the costing exercise just described has not yet been employed on a group wide basis but rather for selected relationships. Its deployment on a group basis is, however, iminent.

In this sense we might argue that a profitability system will soon be in place throughout the group with which to identify the profitability of customer relationships and different segments of those relationships. The adequacy of these systems does depend also on the costing methodology employed.

Table 11.7

GROUP RELATIONSHIP SUMMARY
(Amounts expressed in £000's)

Date: December 198
Period: October 198 - September 198

CUSTOMER:	BUSINESS:	GROUP RELATIONSHIP EXECUTIVE:
	- Strategic planning of services and co-ordination of Operational management	-

SUMMARY

Services	LIMITS 12/85	NET CONTRIBUTION 12/85
Lending	35080 G 80 N	-1
Other Liabs.	40000	-
Transmission		159
Other Gp.Svces.		-2
Total	75080 G 40080 N	156

SERVICES FOR WHICH CONTRIBUTION NOT CALCULATED

SMMO - Sterling Money Market Office Costs.

LOMBARD - Sterling Deposits for 2 DHA Endowment Trusts.

County Bank - Investment Services for 2 DHA Endowment Trusts.

LENDING

Unit	Type/ Curr.	Current Limit	Average Util.	Rate (%)	Margin (%)	Fee	Admn Costs	Contr/b	Expiry (date)	Notes
DBD										
Manchester City Office and 20 Others	O/D £	35000 G - N	11381 G 4 N	BR + 1.00	0.88	-	1	-1	1/86	Full S/O. SCC reduces normal utilisation from £9 N to £4 N. Loss of interest at Branch £0. Loss of contribution on GRS basis £0.
RBS										
LOMBARD	LE £	80	80	Agreed Rates	*	*	*	*	*	Eight leasing Agreements.
Total		35080 G 80 N	11461 G 84 N			-	1	-1		

OTHER LIABILITIES

Unit	Type	Limit	Income	Cost	Contr/b	Expiry Date
DBD						
Various branches	FBSR	-	0	0	-	-
BACS	Salaries and Trade Payments	40,000	Costed under transmission			1/86
Total		40,000	0	0	-	

OTHER GROUP SERVICES

Service	Notes	Income	Cost	Contr/b
DBD				
Other Branch Services	Various	10	17	-7
Foreign Business	Drafts and Travel Facilities	2	3	-1
SMMO	Ave Bal £1,327 @ 0.5%	6	2	4
Transmission Service	Statement details on magnetic tape	4	2	2
Total		22	24	-2

TRANSMISSION

Terms and key information:

Date last review: April 198	Special Terms agreed bi-annually	
Date next review: April 198	Commission claimed September.	in March/

CONTRIBUTION

Income		
Commission	318	
Value of free credit balances (C/A £786 D/A £1,333 See Table 3)	136	
Inter Bank Agency claims charged (Where debited direct to customers)	11	465
Costs		
Costs	295	
Inter Bank Agency claims paid	11	306
Recovery ratio (%) 152	Net	159

SUNDRY KEY INFORMATION

Average Cleared Credit Balances (Current, Deposit and SMMO)

M = plus mandatory liquid asset costs
* = not available
( ) = facility within overall facilities above

The systems being developed within the National Westminster Bank employ an absorption costing methodology as opposed to a marginal or direct costing methodology. Matz and Usry (1976, p 681) have argued:

> 'Absorption costing obscures the true relationship beween prices, costs, and volume due to the behaviour of fixed costs when calculated on a unit cost basis. Direct unit costs remain constant for various volumes of production and sales as does contribution margin per unit.'

Despite this criticism, absorption costing remains the accepted method of external reporting. In criticism of the marginal costing school the American Institute of Certified Public Accountants (AICPA) state:

> 'the exclusion of all overheads from inventory costs does not constitute an accepted accounting procedure' (Accounting Reseach Bulletin, no 43).

The AICPA is probably correct in this statement, but it is also fair to say that not 'all' overheads need to be allocated to 'all' products as is the case with absorption costing. The main failure of the absorption costing methodology is that it only identifies costs at a particular point on the demand scale. It does not take into account the fact that costs per unit may fall as output increases.

The main rationale for the use of absorption costing in certain banking markets may, however, be that of uncertainty about the future and hence the future shape of the demand curve. Solomons (1968, p 140) supports this contention, saying:

> 'Another reason for the use of full cost [absorption cost], particularly in pricing decisions, is the absence of adequate data on the level and shape of the demand curve facing the firm. Whether this is due to the oligopolistic nature of the market, which makes for indeterminancy, or to difficulties in quanitifying a determinate relationship, the result is the

same - the price maker falls back on full cost, which assumes not a demand curve but a given point on a demand curve.'

In markets where uncertainty about the future makes the plotting of a demand curve difficult then absorption costing does at least allow some basis for the development of a cost allocation system, even if this does take into account only present unit costs.

In balance, each cost allocation methodology can provide reasonably accurate and relevant information in the appropriate environment. However, as Ernst and Whinney (1987, p.224) point out:

> 'The concerns of line management should be considered carefully in selecting cost accounting methodologies. It is imperative that these managers understand, accept, and ultimately support the process ... Managers will not rely on information if they do not clearly understand or accept the process used to develop it ... For this reason alone, many institutions choose simple but comprehensible methodologies.'

Basically, there is no right or wrong methodology, although in reality the simplicity of absorption costing can be a strong incentive. When deciding which allocation methodology to use it is necessary to consider the intended use of the information and the availability of resources as well as the complexity of the organisational structure and its ability to adapt to information needs. As Ernst and Whinney (1987, p.225) conclude:

> 'Compromises [are necessary] to implement a profitability measurement system and to ensure its acceptance and smooth operation. It also is important to bear in mind that the information generated by such a system can be worthwhile even if it is less than 100 per cent accurate. Such information still can present a rational approach to matching expenses with revenues, and benefits with their associated costs.'

Essentially, then, the solutions lie in the characteristics of the institution and in how it intends to use cost and profitability information.

11.5 The Importance of RUFs for the Maintenance of the Customer Relationship

An adequate profitability system will provide a bank with information on the quantitative worth of the relationship and products within the relationship. It will not, however, provide any information on the worth which the customer attaches to various products for the maintenance of the relationship.

If RUFs are to be priced on a relationship basis then it is important to establish profitability systems. It is equally important, however, to understand whether or not customers see RUFs as a relationship or transactional product. If RUFs are viewed by customers as a transactional product then banks may be providing RUFs at unnecessarily low prices for the maintenance of the relationship.

Unfortunately, a study conducted within the National Westminster Bank in early 1988 was rather inconclusive on whether RUFs are seen as an important product for the maintenance of the relationship. Out of 200 major corporates surveyed 36 per cent had used RUFs (or MOFs) in the past year but only 20 per cent of these said that they mattered for the maintenance of the relationship (see Appendix 11.4 for data). Although this would only add up to fifteen banks out of the 72 using RUFs or MOFs it still indicates that a significant proportion (if somewhat less than anticipated) see RUFs and MOFs as relationship products.

This type of survey does, at least, provide the banks with some knowledge as to whether it is worth underpricing various products in order to maintain the relationship. On this basis alone, such a study should complement a relationship pricing strategy.

11.6 Summary and Conclusions

In this chapter we have examined the development of a profitability system within the National Westminster Bank. It has become apparent that certain developments are necessary before such a system can be established. The bank's organisational structure must adapt to allow the collation of required information in an efficient manner: a cost allocation system must be developed alongside the system designed to gather information on revenue generated from the relationship, and, preferably, some study should be undertaken to ascertain the importance of various services to the maintenance of the relationship.

We would argue that the system presently being developed within the National Westminster Bank will provide an adequate information base on which to promote a relationship pricing strategy. The bank should, thus, be able to price euronote facilities on a relationship basis with an understanding of the quantitative value of the relationship.

The applicability of the National Westminster Bank system to other market players will, as outlined previously, depend on the particular characteristics of these institutions and their information objectives. In practice, though, as detailed in Chapter 10 (and at the beginning of this chapter), the National Westminster Bank is probably not untypical of the other large players in the euronote market.

Specifically, however, any increase in systemic risk which the underpricing of euronote facilities by National Westminster Bank may have contributed to in the early stages of the market, should now be checked by the development of a group-wide profitability system.

Although it is acknowledged that a relationship pricing strategy was employed before the development of a profitability system, this must, by implication, have been largely subjective and possibly misguided. To this extent, systemic risk may still have been increased despite the fact that the banks were not pricing euronote facilities on a transactional basis.

There is still considerable debate as to whether cost should be calculated on an absorption or marginal cost basis. There are arguments for and against both. The debate should not be allowed to obstruct the development of cost systems within the banks. A system based on absorption costing is still better than none at all and does at least reflect a sufficiently clear picture of cost at that particular point on the demand scale. In banking markets where uncertainty obscures the future shape of the demand curve, this may be the best that the banks can hope for at the present time.

If other banks in the euronote market can develop their own profitability systems, possibly along the lines depicted here, then the systemic gap which the underpricing of euronote facilities appears to have caused, may indeed prove bridgeable. Until these systems can be developed a relationship pricing strategy cannot be effectively employed in the euronote market. Any additional attempts to employ such a strategy without the development of adequate profitability systems will only serve to continue to reduce fee levels in the market and possibly further increase the systemic gap.

Appendix 11.1 Checklist for recording of major UK corporate information

1 Current accounts with reduced clearance cycles (22244)

Objective

To record and forward on a quarterly basis - average cleared credit/debit balances, on a group and individual account basis.

Procedure

Daily manual record and quarterly calculation. Extraction of this data should prove straightforward using existing branch manual or PC based system.

2 Acceptance credits/discounts

Objective

To record and forward on a quarterly basis:
(a) commission charged
(b) max/min exposure figures

Procedure

Records to be maintained in accordance with established procedures, i.e. adaptation of NWB 1765 Documentary Credit Summary Sheet. Commission charged to be totalled quarterly.

3 SMMO accounts

Objective

To record and forward on a quarterly basis:
(a) market lines - average utilisation and max/min exposure figures
(b) term loans - average utilisation, max/min exposure figures, fees charged and interest formula applying
(c) deposits - average balances

Procedure

Data available from existing computer/manual records.

4 Terminable indemnities

Objective

To record and forward on a quarterly basis:
(a) commission charged
(b) max/min exposure figures
(c) number of engagements

Procedure

BOI A17H to be followed, utilising NWB 1932. Max/min figures would normally be maintained only where teminable indemnities sanction forms part of a gross facility. Commission charged to be totalled quarterly, along with number of engagements.

5 Documentary credits inwards

Objective

To record and forward on a quarterly basis:
(a) overseas branch commission charged
(b) max/min exposure figures

Procedure

BOI F9F5 to be followed utilising NWB 1765. Please note that overseas branch commission debited to customer must be recorded in an extra column on NWB 1765 - this represents a minor amendment to existing practice - and total commission debited totalled on a quarterly basis.

6 Bills negotiated

Objective

To record and forward on a quarterly basis:
(a) sterling equivalent turnover
(b) max/min exposure figures

Procedure

BOI F7Q6 to be followed utilising NWB 1767. Calculate quarterly turnover by totalling the 'ON' column.

7 Forward exchange

Objective

To record and forward on a quarterly basis:
(a) sterling equivalent turnover
(b) max/min exposure figures
(c) number of deals

NB Where option facilities exist (eg 'O/D and/or Currency O/D and/or Documentary Credits and/or Acceptance Credits') ideally composite max/min profiles should be forwarded in addition to extracts for the individual constituent facilities. If not currently maintained, branches should consider the creation of 'position books'.

Appendix 11.2 Illustrated response

Information required by:	(date)
MUKCG/IBD Contract:	(name and region)
Branch/Office:	(name)
Branch/Office contact:	(name and ext)

East Cheshire Electrical Supplies plc Group

1 **Composite max/min for March/June Quarter 1987**

Composite-group account overdraft, acceptance credit and market line line no D2	Max Dr/Min Cr	Min Dr/Max Cr
March 1987	15,000,000 DR	1,250,000 DR
April 1987	14,750,000 DR	1,000,000 DR
May 1987	15,500,000 DR	1,250,000 DR
June 1987	15,000,000 DR	1,000,000 DR

2 **Average cleared credit/debit balances for March/June Quarter 1987**

		Average cleared debit balance	Average cleared credit balance
(a)	Current accounts Group - 11-65432101	9,000,000	500,000
	Line no D2 part of option facility		
	12345678	2,500,000	...
	34567890	500,000	200,000
	45678901	1,000,000	...
	56789012	1,000,000	...
	67890123	1,000,000	...
	78901234	50,000	200,000
	89012345	100,000	100,000
	90123456	350,000	...
	01234567	2,000,000	...
	98765432	500,000	...
	2 Imprest accounts	...	27,600
(b)	Deposit a/c 01-12346789 (Jan/June 1987)	...	30,000
(c)	Loan a/c 03-87654321	50,000	...

3 **Acceptance credit/discounts for March/June Quarter 1987 line no D2 part of option facility**

Commission charged	£1,250
Max DR	£3,000,000
Min DR	£2,000,000

4 **SMMD accounts for March/June quarter 1987**

(a)	Deposits N/O Howard England Ltd	Average balances	£8,000,000
(b)	Market lines Line no D2 Part of option facility	Average utilisation Max DR Min DR	£2,000,000 £2,500,000 Nil
(c)	Term loan Line no D1	Average utilisation Max DR Min DR Interest formula Actual fees charged	£4,500,000 £5,000,000 £4,000,000 43.75 basis points+LIBOR +MLAs £2,500

5 **Terminable indemnies for March/June Quarter 1987 Line no D3**

Commission charged	£2,200
Max DR	Not monitored
Min DR	Not monitored
Number of engagements generating commission during quarter	12

6 **Documentary credits inwards for March/June Quarter 1987 line no D4**

Overseas branch commission charged	£15,000
Max DR	£2,000,000
Min DR	Nil

7 **Foreign bills negotiated for March/June Quarter 1987 Line no D5**

Turnover (sterling equivalent)	£3,500,000
Max DR	£500,000
Min DR	£50,000

8 **Forward Exchange for March/June Quarter 1987 Line no D6**

Turnover (sterling equivalent)	£2,000,000
Max DR	£750,000
Min DR	Nil
Number of deals	36

Appendix 11.3

Transmission Activity Form For Year Ended ______ 19 ______

NB Managers should ensure that staff involved in the preparation and examination of Transmission Activity Forms are fully conversant with Book 'G' Chapters 16, 21 and 22, and Appendix 27.

Account ______ Turnover £ ______

Business/Occupation ______ SIC ______

Branch ______ Area ______ Region ______

Borrowing Limit £ ______ Date of next revisal ______

Account is ultimately controlled by: Group/Region/Area/Branch (Delete as appropriate)

W/M Tally Recorded Initial	

Description	Annual Level of Activity	At	£ only
Debit Entries		37p*	
Credit Entries — Manual		55p	
— Automated (ie computer generated)		13p	
— HO Coll A/c (paper)		40p	
Consumer Credits (paper) — HO Coll A/c		10p	
— Branch A/c		13p	
Cash In — Branches	£	42p%*	
— Direct to Bullion (presealed)	£	8p%	
Cash Out — Branches	£	40p%*	
— Direct from Bullion	£	15p%	
Cash Exchanged	£	150p%	
Items Collected		16.5p*	
Night Safe Lodgement (only if not debited direct)		80p per deposit	
Dispersal Credits — Bank Giro Outwards		40p	
— Autopay		18p	
BACS Entries — customer originated		12p*	
Account Maintenance — No of C/A's		£36 per C/A	
Other Services not charged — specify overleaf		£ (as overleaf)	

(* Shading for volume may apply Book T, App 1)

Value of Account Gross Commission including Account Maintenance Charge (B)	£	Remuneration Objective (A)	
Less Notional Allowance where applicable	£		
Commission Charged (as calculated overleaf)	£		
Average Cleared Credit Balances after any interest set-off arrangement C/A £ @ % pa	£		
Total Value of Account (C)	£	Surplus on Account	
Loss on Account	£		
	£		

Percentage Recovery of Objective without Credit Balances $\frac{B \times 100}{A}$ = %

Actual Percentage Recovery of Objective $\frac{C \times 100}{A}$ = %

Not for Branch Use

Reply to: Branch/Area/Region /Account Executive

Date Received ______ Date Replied ______

Copy to: Area/Region/Advances/ABS

Remuneration Increase £

Diary

NWB1396 Rev Nov 87-1

Appendix 11.4 PRODUCT USAGE AND TRENDS

	Services used in past year %	Matter most to relationship %	Expect to start using/use more actively %
Treasury			
Foreign exchange	94	52	16
Swaps	46	16	24
FRA's	50	15	13
Options	37	7	20
Corporate deposits	79	30	11
Financial futures	9	2	2
Electronically delivered CMS	59	21	22
Lending			
Traditional loans/ facilities/overdrafts	93	65	14
MOFs	36	20	20
Acquisition finance	31	12	9
Trade-related			
Documentary credits	55	13	3
Forfaiting	9	1	2
ECGD-backed loans/lines	26	7	2
Indemnities/bonds/guarantees	68	17	7
Factoring/invoice discounting	6	1	1
Investment banking			
£/Euro-CP programmes	29	12	27
Portfolio management	12	4	3
Eurobond issuing	15	6	7
Equity-related products	12	4	3
Corporate finance advice	41	13	7
Other			
Leasing	47	13	6
Project finance	26	8	7

Source: 'Relationship management in the UK', Internal Study by National Westminster Bank

CHAPTER 12

CONCLUSIONS AND LIMITATIONS

The central aim of this study was to determine whether the growth of euronote facilities contributed to an increase in systemic risk. Two types of systemic risk have been identified: that which is analogous to Van Horne's financial bubble, which eventually bursts leading to a financial crisis, and that which is analogous to Van Horne's financial balloon, which eventually deflates so closing the systemic gap.

We would conclude that the growth of the euronote market has contributed to an increase in the type of systemic risk analogous to Ván Horne's financial balloon. A strategy of relationship pricing may have been employed by banks in the euronote market without an adequate foundation on which to build such a strategy, at least in many cases. The lack of adequate internal profitability systems, evidenced in a more general sense by Hislop (1987), makes the employment of a relationship pricing strategy difficult. Euronote facilities may well have been contracted for on a misguided view of the worth of particular relationships. A relationship pricing strategy can only be effectively employed if supernormal profits from certain parts of the relationship justify the inclusion of assets in other parts of the relationship which generate abnormal returns. Only the establishment of profitability systems can provide such information on which to base underwriting decisions. The fact that many banks in the market may not yet have developed adequate profitability systems means that the underpricing of euronote facilities may not be justified on a relationship basis. To this extent systemic risk may have been increased.

To the extent, however, that certain banks may already be developing profitability systems (notably the National Westminster Bank) then euronote facilities which are unjustified on a relationship pricing basis will be either declined or priced on a transactional basis - this was found to be already happening in County NatWest. As this practice develops, the systemic gap created by the underpricing of euronote facilities will be reduced. It is on this basis that we argue that the growth of the euronote market has led to an increase in the 'balloon' type of systemic risk.

If, however, the banks do not apply themselves to developing profitability systems with which to employ a relationship pricing strategy, and if they continue to attempt to employ such a strategy in the absence of these systems then systemic risk may well increase still further. In this scenario the bubble may eventually burst leading to a financial crisis.

The supervisors also have a part to play here. In February 1988 the Governor of the Bank of England, speaking at the Economist conference in London, stated that:

> 'While it is the central bank's responsibility to safeguard the financial system, the concern is with systemic risk rather than individual components.'

The problem, however, has always been one of identification and control. How can an increase in systemic risk be identified and how can it be controlled? We have shown that systemic risk materialises in underpricing as banks try to employ relationship pricing strategies in the market. In Chapter 5 we showed how the application of asset-specific risk ratios to underwriting commitments does not appear to have materialised in higher fee levels. If banks are pricing risk and return on a portfolio basis then capital should also be applied on this basis. Risks and returns are inter-dependent throughout the portfolio. Any attempt by supervisors to control systemic risk must acknowledge this portfolio aspect. It is therefore important that systemic risk is identified and then controlled on a portfolio basis. Once again, however, if supervisors are to apply capital to a bank's portfolio of assets they must first satisfy themselves that banks have the capability to price assets on this basis, which in turn requires the establishment of profitability systems within the banks.

Although relationship pricing appears to be the main reason for such low prices in the euronote market, certain disaster myopic practices appear to play their part in the syndication of some low priced deals. The fact that some of the larger players in the market are able to market various facilities on a ROA basis to certain smaller players carries systemic risk potentialities. We would argue that ROX is a more conservative measure of an underwriter's return, as shown in Chapter 8. Supervisors should seek to ensure that syndicate returns are calculated on an exposure basis. At the very least, a discussion paper on the dangers inherent in applying a strict ROA methodology to underwriting facilities should be circulated. This would serve to educate the market to the drawbacks of employing this methodology.

There are indications (see, for example, Economist June 1988) that certain banks are examining the possibility of calculating returns on a RAROC (Risk Adjusted Return on Capital) basis. RAROC is a costing methodology that allocates risk weightings to certain products/markets and accordingly calculates a required return on a transactional basis. However, as it is based on asset funding/drawdown as opposed to exposure, it still falls prey to the problems of ROA as far as undrawn commitments are concerned. Perhaps a more appropriate methodology for the debt underwriting markets, in particular the euronote market, would be a conglomeration of both RAROC and ROX, i.e. RAROX (Risk Adjusted Return on Exposure). Whilst this would incorporate the ROX methodology preferred in this thesis, it would also apply equity capital to products/markets according to their perceived riskiness and would thus stipulate a required return. As far as the euronote market is concerned, RAROX would almost certainly serve to highlight even more the inadequacy of returns on a transactional basis in this market as a capital cost would also be included in the equation. The level of required return would, however, be for the individual institution to decide and again would necessarily be, to a large extent, subjective. It would require an analysis not only of the market but also of the individual institution's exposure to the market in relation to its other assets. Nevertheless, RAROX would at least focus management's mind on the inadequacies of ROA and the need to apply capital to undrawn commitments. For these reasons alone this may prove to be an area worthy of future research and development.

Although these may be seen as the main steps which could be taken to control systemic risk, the euronote market can also take other measures to reduce the likelihood of a systemic failure.

In Chapter 4 it was shown how the tender panel method of placing notes may do so at perceived insufficient yields whereas notes placed through dealerships traded at more steady spreads. The competitive nature of the tender panel again appeared to be forcing banks to forgo the charging of risk premia. The market is now moving more towards the dealership method of placing notes and this should be encouraged.

Although credit ratings were shown to make little difference to the price at which an issuer's paper trades, ratings do provide an issuer with a far wider investor base. By diversifying their investor base issuers are more likely to be able to withstand a financial crisis. For this reason, credit ratings are also advisable.

By employing all of these measures, we believe that the systemic gap which has been created through the underpricing of euronote facilities can be reduced, and eventually possibly closed completely. The banks must work with the supervisors towards this goal. This does not mean that systemic risk can be eliminated, merely that the increase in systemic risk, brought about by underwriting practices in the euronote market, can be reduced.

In this thesis we have developed what we refer to as the theory of the systemic gap. It is a theory of how systemic risk develops, the factors that can cause it and how it materialises as a gap between required market returns and actual market returns. We have also provided suggestions as to how systemic risk might be controlled.

Although this thesis has studied the euronote market specifically, it has implications for all new financial markets. If financial instruments are underpriced, systemic risk may arise. It is often not sufficient, however, to judge underpricing merely on a direct transactional basis. Where banks are employing relationship pricing strategies, returns must be calculated from the total relationship. It will only be possible to do this effectively where adequate profitability systems exist. Where such systems do exist, risk must also be controlled on a portfolio basis.

The thesis has been structured to show how, when faced with non-probabilistic information, different research methodologies can be used to collect and disseminate data. The first five chapters served as exploratory data chapters which sought to identify areas of the euronote market that may impact on systemic risk. The main area of concern, as far as systemic risk is concerned, was identified as the underwriting of euronote facilities rather than the placing of the underlying notes. Significantly, in this respect the euronote market appears to have provided a haven for 'panic money' during the stock market crash which began in October 1987. By doing so, funds were kept within the financial system so maintaining borrowers' ability to raise marketable debt. It could be argued, therefore, that as far as the existence of euronotes themselves are concerned, the market actually contributed to the stability of the system in times of capital market crisis, possibly reducing the likelihood of a systemic failure.

Having identified the underwriting of euronotes as the main area of concern as far as systemic risk is concerned, the second part of the thesis examined this area specifically. A combination of scientific and naturalistic research methodologies were employed to collect and test data, formulate hypotheses and subsequently test those hypotheses. By employing a diversity of research methodologies we believe that a richer information base can and has been gathered. The research methodologies of the natural and social sciences are not irreconcilable. As shown in this thesis, they can be employed alongside each other, both providing their own contributions to the formulation of hypotheses and the development of theory.

There are undoubtedly limitations in a study of this kind. The theory of the systemic gap, for instance, should be seen for what it is, a theoretical concept (albeit mapped with market data) rather than a mathematical doctrine. There are limitations also with the use of ROX:

ROX is not a measure of risk, it is a measure of return under a particular exposure scenario. It makes no attempt to quantify the possibility of default. By using ROX an underwriting bank is able to plot its return under different funding scenarios. The possibility of default, however, remains uncertain.

Similarly, the chosen funding scenarios in Chapters 7 and 8 although evidencing an effective range of funding possibilities, are not all encompassing. Futhermore, our standards of adequacy in relation to underwriting returns are also to a certain extent subjective, being based largely on market perception rather than objective risk criteria, which are lacking in this market.

We are also limited in that we were only able to study the profitability systems being developed in one bank. Our contribution, therefore, is to light the path. The banks must tred the path themselves. Hopefully this thesis will provide direction. At the same time bank supervisors should open the gate to those banks that are able to develop adequate profitability systems with which to employ relationship pricing strategies, by applying capital on the same portfolio basis. The onus is now on the banks to develop these systems. Those that fail will find their strategic marketing and pricing decisions constrained not only by lack of information but also by regulatory shackles which merely serve to restrict portfolio growth rather than control systemic risk.

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