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The impact of regulation on bank capital augmentations in Spain.

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THE IMPACT OF REGULATION ON BANK CAPITAL AUGMENTATIONS IN SPAIN

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LIST OF ACRONYMS

A = Assets
ALP = Activos Líquidos en manos del Público (Liquid Assets)
BIS = Bank for International Settlements
BV = Book Value
CAD = Capital Adequacy Directive
CAMEL = Capital - Assets - Management - Earnings - Liquidity
CC = Cost of Capital variable
CECA = Spanish Confederation of Savings Banks (Confederación Española de Cajas de Ahorro)
CLR = Classical Linear Regression model
CM = Capital Markets variable
D = Deposits
DI = Deposit Insurance variable
DGF =Deposit Guarantee Fund
EC = European Community
EPS = Earnings per Share
FCF = Free Cash Flow
g = internal capital generation rate
G-10 = Group of Ten.
GDP = Gross Domestic Product
I.O. = Industrial Economics
IOSCO = International Organization of Securities Commissions
K = Capital
KR = Capital Regulation variable
LED = Large Exposures Directive.
LLR = Lender-of-last-resort.
LQ = Liquidity variable
MV = Market Value
OECD = Organization for Economic Cooperation and Development
OLS = Ordinary Least Squares
PER = Price-to-Earnings Ratio
PF and PF^* = Profitability variables
PPT = Spanish Treasury Bills (Pagarés del Tesoro)
PR = Payout ratio
PK = Portfolio Risk
RAR = Risk-Adjusted Ratio
ROA = Return on Assets
ROC = Return on Capital
ROE = Return on Equity
RR = Retention Ratio
S-C-P = Structure - Conduct - Performance
SMVAM = Statistical Market Value Accounting Model
S.W. Funds = Social Works Funds (Fondo de la Obra Social)
TBTF = Too-Big-To-Fail

GENERAL NOTES

1) Footnotes can be found at the end of each chapter.

2) Totals given in the tables may not equal the sum of individual items due to rounding.

ABSTRACT

The increasing importance of bank prudential regulation in an era of financial liberalization and intense competition, together with the lack of empirical research on capital adequacy in the Spanish banking system, shape the motivation for this study.

This research examines the impact of the Spanish bank capital adequacy regulation on capital augmentations (changes in the total amount of the capital) of banking institutions operating in Spain. The period analyzed is 1987-90, during which deregulation and the 1985 risk-based capital requirements have been two major forces in the Spanish banking markets.

An empirical model of capital augmentations is developed for Spanish banks. The general model (employing regulatory and book-value capital) for both private and savings banks appears to explain better the capital augmentations of savings banks compared with those of private banks. One of the main findings in this general model is that capital adequacy regulation appears to be a stricter constraint for savings banks. Market-value capital is also employed in the model for the Spanish private banks quoted on the Spanish stock market, but the explanatory power of the model is not improved. When bank size is introduced into the analysis, the results appear to indicate that larger banks might have certain advantages in terms of capital ratios and in terms of capital augmentations.

The findings of this research have implications for the role of the market in regulating capital adequacy, for the deregulation - reregulation framework of banking, the economic desirability of 'functional' (*versus* institutional) supervisory regulation of banks, and for the competitive neutrality of bank legislation.

CHAPTER 1 : AIMS AND METHODOLOGY

In this first chapter, the purpose of the analysis and the methodological framework in which the research is organized are examined. An introduction of the relationship between bank capital requirements and bank capital augmentations, the central concern of this thesis, is also provided.

1.1.- CAPITAL ADEQUACY AND CAPITAL AUGMENTATIONS : AN INTRODUCTION.

Capital adequacy has always been a major issue in banking and has consolidated itself as an enduring banking problem in an era of financial deregulation and an increasingly competitive environment. There are many dimensions of capital adequacy. For example, bank pricing and competition are important aspects associated with the 'level playing fields' movement towards convergence in capital adequacy requirements and regulation. Another dimension, which is to be dealt with extensively in this thesis, is to what extent capital regulation affects the behaviour of the banking firm in terms of capital augmentations, increases in capital. There may also be different regulatory effects on capital augmentations across different types of credit institutions. Asymmetric capital requirements regulations may disadvantage those banks subject to comparatively stricter capital adequacy rules and/or those banks with lower legal possibilities to raise capital. This could have important policy and strategic implications for banking markets.

At a fundamental level, capital adequacy is related to a bank's corresponding risk exposure. *Ceteris paribus*, the higher a bank's risk exposure, the more capital should be required. However, the apparent exactitude of capital ratios has been largely illusory. Simple balance-sheet ratios (such as capital/deposits) may be irrelevant nowadays as capital regulation tools since financial innovations have altered the traditional bank business mix and the underlying economics of banking.

Banking theory seems to support the view that capital adequacy constraints may have significant effects on different aspects of banking behaviour and performance. For example, the imposition of different capital adequacy ratios may have a different impact on the overall riskiness of bank portfolios. Another aspect of banking behaviour is how capital may be increased in nominal and/or real terms. Capital augmentations can be defined as increases in nominal and/or real bank capital.

As far as the empirical evidence of the effects of capital regulation on bank conduct is concerned, there seems to be no general agreement. Several empirical studies have shown that regulators have not succeeded in imposing their capital standards upon the banks they presumably regulate. However, there are other studies that show strong evidence of regulation affecting bank's capital decisions. There is very little empirical research evidence on this issue for the different European banking systems.

1.2.-PURPOSE OF OUR STUDY.

The main purpose of this study emerges from two important factors that must be borne in mind. First, the need for further research on the issues related to the relationship between capital adequacy and capital augmentations. Second, the study is applied to one of the most peculiar European banking systems, the Spanish banking system, where very little research has been done on the issue, and this must be borne in mind. One of the main characteristics of the Spanish banking system is that the operational and legal differences across different types of banking institution have been reduced in recent years. However, there are still important differences across different depository institutions in terms of the possibilities of raising capital. The policy and strategic implications of this need to be evaluated within the terms of reference of this thesis.

The main purpose of this research is analysis of the impact of capital regulation on banks' capital augmentations for 1987-90, using (primarily) accounting data for all the private and savings banks in Spain. Although the focus will be on accounting data, the researcher will also employ market-value data for those private banks quoted on the Stock Exchange.

The main research questions addressed in this analysis are the following:

a) What is the impact of bank capital regulation on capital augmentations of banks operating in Spain during 1987-90 ? Is the impact different across different types of banking institution ?

b) What other economic variables influence capital augmentations ? Is the impact of these variables on capital augmentations greater than the effects of capital regulation ?

This research is organized as follows:

+ First, the most important institutional and structural features of the Spanish banking system and its bank regulation are identified. Then, an exploratory analysis of the main book-value, regulatory and market-value capital adequacy trends in the Spanish banking system is performed. This is necessary in order to understand the framework and environment in which our empirical work is to be undertaken.

+ A relevant theoretical background is developed for the main research questions of the thesis. We will explain and synthesize the capital adequacy literature which has studied the relationship between capital regulation and bank capital augmentations. A theoretical model of capital augmentation in banking and the theoretical analysis of the main managerial and regulatory determinants of bank capital augmentations will be studied. This survey will identify the main testable hypotheses, relevant to the main aim of this thesis that the literature suggests.

+ The main empirical models and methodologies which have tested the impact of capital regulation on banks' capital augmentations will be analyzed. Then, the models are redefined by including particular features of the Spanish banking system. These particular features will emerge from the chapters devoted to the exploratory analysis of the Spanish banking system and from the field survey carried out amongst several large Spanish banks.

+ The impact of capital regulation on different definitions of capital augmentations in the Spanish banking system during 1987-90 is examined and tested. The researcher also aims at appraising to what extent managerial variables affect bank capital augmentations. Tests will be undertaken for the different types of institutions so that one can evaluate if there are differences across different types of institutions in the ways they augment capital.

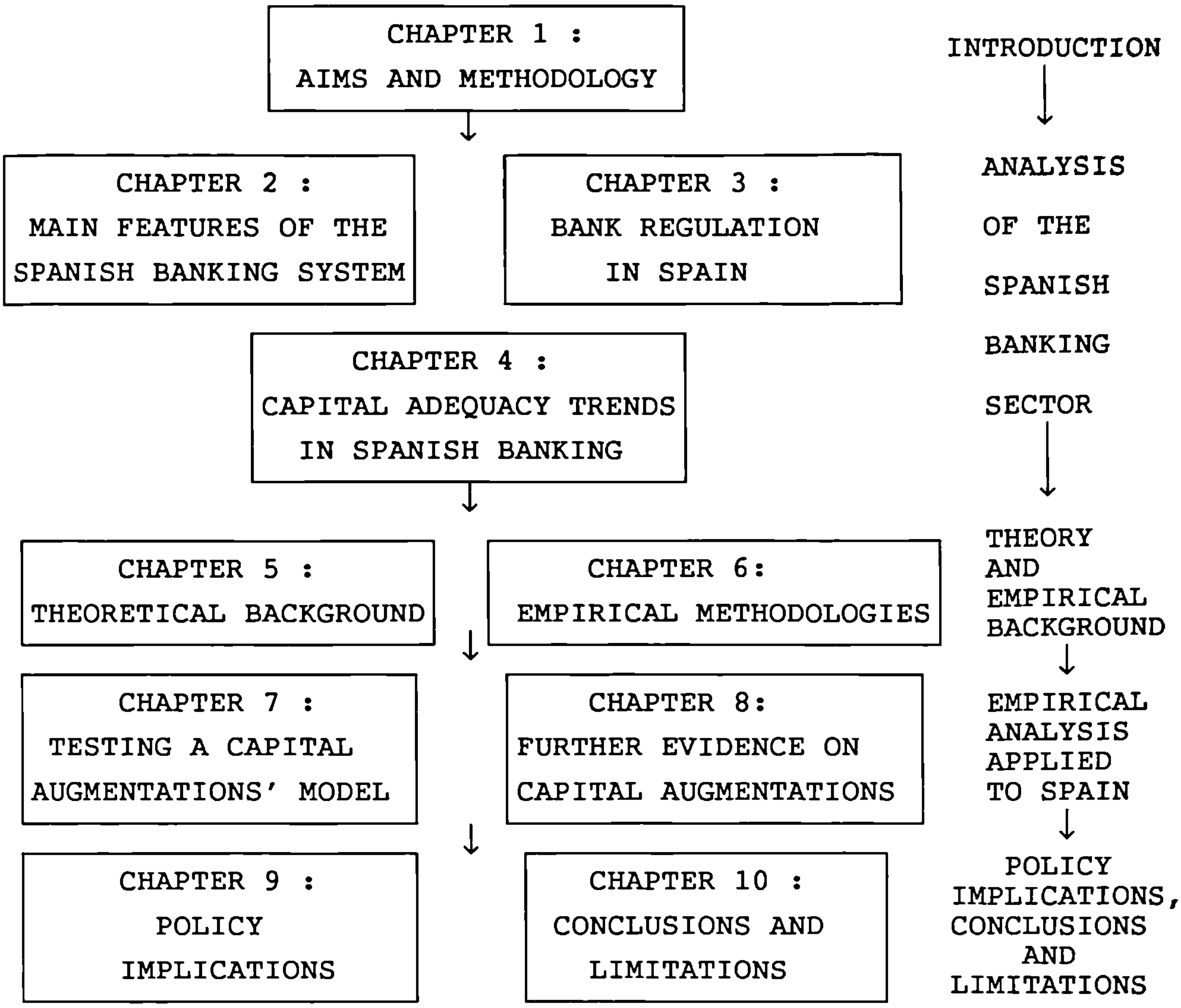
+ Finally, the implications of our findings are explored. We discuss what our results imply for the Spanish bank capital regulation and supervision in terms of competitive neutrality. Policy and strategic issues from the standpoint of banks and regulators will be also developed from this analysis.

1.3.-METHODOLOGICAL FRAMEWORK.

In order to attain the objectives of this research, our research is organized in the manner described below. Figure 1.1 displays a flow diagram of the structure of the thesis.

In Figure 1.1 it can be observed that following this introductory chapter, Chapter 2 deals with the main institutional and structural features of the Spanish banking system. Chapter 3 examines bank regulation in Spain, focusing particularly on bank capital adequacy requirements regulation. Chapter 4 provides an exploratory analysis of the main capital adequacy trends in the Spanish banking system. Chapter 5 provides a revision of the theoretical capital adequacy literature, which has focused on the relationship between capital adequacy and bank capital augmentations. Chapter 6 will identify the main empirical models and methodologies which have tested the influence of capital regulation on banks' capital augmentations. Chapter 7 provides the hypotheses, model, data and initial results of our empirical analysis on the effects of capital regulation on capital augmentations for the Spanish banking system. Chapter 8 undertakes follow-up tests which will complete the analysis of how banks operating in Spain augment capital. From these results, Chapter 9 will suggest policy implications for the Spanish banking system. Finally, the conclusions and limitations of our thesis will be put forward in Chapter 10.

Figure 1.1: Structure of the Research



CHAPTER 2 :THE SPANISH BANKING SYSTEM : INSTITUTIONAL AND STRUCTURAL FEATURES

2.1.- INTRODUCTION

Traditionally, the Spanish banking system has been described as a closed system: heavily regulated, protected from external competition, conservative in terms of innovations and controlled by the large banks, which own at the same time big portions of industry. However, since Spain joined the EC in 1986, the description presented above is no longer appropriate. The idea of a convergence towards a true Single European Market after 1992 has become an increasingly certain horizon for which banking firms and regulatory authorities have prepared for some time. Both firms and regulatory authorities are well aware of the importance of the changes that will be taking place, and they are already reacting to the new competitive environment that is expected to prevail after 1992.

The purpose of this chapter is to analyze the main features of the institutional, structural and overall competitive structure of the Spanish banking system. This is our 'laboratory', and an essential prelude to the rest of the thesis.

2.2.- IMPORTANCE AND EVOLUTION OF THE SPANISH BANKING SYSTEM.

2.2.1.- Importance and Evolution of the Financial Sector.

Table 2.1 summarizes three economic dimensions of the financial sectors for eight European countries; here the financial sector is defined as including credit and insurance institutions. The Spanish financial system appears to be of above the average (excluding outliers) economic dimensions for EC standards, and is only surpassed by Luxembourg and the U.K., which are international financial centres. One would believe that this could be either due to higher prices (because of inefficiencies and/or market power) or is an indication of extensive financial services provided to domestic and foreign clients. The latter seems not to be the case.

Table 2.1 provides some sample information on observed labour productivity. Column 1 divided by column 2 produces a ratio of labour productivity in the financial sector relative to the whole economy: this is 2.9 for Spain and 1.7 for the average of the rest of the EC (EUR 8). This overperformance of Spain could arise because the human and physical capital employed in the sector is above average or as a result of non-competitive pricing.

Column 3 divided by column 2 produces a ratio of remuneration per employee relative to the rest of the economy: this ratio is 2.4 for Spain and 1.67 for the rest of the EC (EUR 8): this suggests that the Spanish financial industry also enjoys an above average remuneration per employee relative to the rest of the economy. The ratio for Spain is close to that of a sophisticated financial sector like that of the U.K. (2.3 for the U.K.) which employs higher quality human capital and indicates the possibility of non-competitive wages in the industry in Spain, possibly appropriating some of the oligopolistic rents that could explain high observed productivity.

Table 2.1 : Economic Dimensions of the Financial Services Sector for Eight European Countries (1985).

	Gross value-added (% GDP)[a]	Employment (% total employment)[b]	Wage bill (% total for economy)
Belgium	5.7	3.8	6.3
W. Germany	5.4	3.0	4.4
Spain	6.4	2.8	6.7
France	4.3	2.8	3.8
Italy	4.9	1.8	5.6
Luxembourg[c]	14.9	5.7	12.2
Netherlands	5.2	3.7	4.9
U.K.	11.8	3.7	8.5
EUR 8 [d]	6.4	2.9	6.2

a.- Including net interest payment

b.- Employees in employment plus the self-employed

c.- Data for 1982

d.- This aggregate accounted for 95 % of Total EEC GDP in 1985

Source: Commission of the European Communities (1988)

Table 2.2 shows the participations of the three sectors of the economy (financial institutions, public sector and households and firms) in the total variation of assets and liabilities (financial flows) of the resident sectors for 1978, 1983 and

1986.The important participation of financial institutions in the financial flows is a logical consequence of their own role as intermediaries of resources. However, the relative loss in importance in the financial flows in recent years can be observed in Table 2.2; financial disintermediation appears to lie behind this decreasing trend. Disintermediation is the process whereby borrowers and financial investors by-pass banks and transact business directly. We will return later on to this phenomenon.

Table 2.2: Participations in the Total Variation of Assets and Liabilities of Resident Sectors (1978, 1983 and 1986)(%).

	1978		1983		1986	
	A	L	A	L	A	L
Finan. Institutions*	52.7	52.6	45.3	37.9	45.9	43.5
Public Sector	4.0	7.9	12.5	27.3	3.9	23.5
Households and firms	43.3	39.5	42.2	34.8	50.2	33.0

A = Assets L = Liabilities

(*) Consolidated, therefore the intrasector flows are excluded.

Source: Trujillo, Cuervo-Arango and Vargas (1988, p.40)

Table 2.3 : Participation of the Intrasector Flows in the Variation of Assets and Liabilities of the Sector (1978, 1983 and 1986) (%).

	1978		1983		1986	
	A	L	A	L	A	L
Finan. Institutions	5.3	5.5	38.5	38.7	6.3	7.1
Public Sector	--	--	13.0	6.0	0.1	--
Households and firms	1.4	1.6	5.0	5.7	14.5	23.6

Source: Trujillo, Cuervo-Arango and Vargas (1988, p.40)

In Table 2.2 one can also note the increasingly important role of the public sector in the creation of financial liabilities. This is a consequence of the increasing finance needs of the public sector as a result of its deficits.

Table 2.3 displays the percentages of intrasector financial flows. One can notice the relatively high percentage of intrasector operations for the financial firms group in 1983. This resulted from the financial relationship between the Treasury and the credit institutions, performed by the Bank of Spain, that reached its climax in the following manner: the Bank of Spain gave credit to the Treasury and placed its liabilities (in the form of monetary control certificates) in the credit institutions. From 1984 onwards, these certificates were replaced by Treasury bills.

The financial disintermediation can also be seen in Table 2.3. There is an increasing trend in the participation of the intrasector flows in the total financial flows of households and firms. Firms increasingly obtain funds directly from the financial markets. A major part of these funds are supplied by the households.

To sum up, two main conclusions can be drawn from this subsection:

- As for the economic importance of the financial sector in Spain, one can say that the sector appears to be of above average economic dimensions by EC standards. This could possibly be due to non-competitive pricing in the industry.

- As for the evolution of the sector, although the financial institutions still play the central role in the financial flows of the economy, the importance of the industry has been declining in recent years as a result of the direct participation of the public sector, households and firms in the financial markets (disintermediation).

2.2.2.- Financial Markets.

The stage of development of Spanish financial markets is very asymmetrical: highly developed markets with a degree of sophistication comparable to the most advanced European markets have been living alongside sleepy markets with some regulations and practices dating back to the nineteenth century. In the mid-1970s, the strict regulation and control of every financial activity by the Bank of Spain and/or the Ministry of Economy, together with the cosy *status quo* of the banking sector, led the financial sector to a level of underdevelopment that contrasted with other parts of the Spanish economy. Regulations began to be loosened up and reform was very different across markets. The chief explanation for this asymmetry in the evolution is probably that reforms were implemented only when they contributed towards solving some urgent needs of the public sector. These urgent needs reflected the necessity of creating flexible ways of deficit financing (in a scenario of runaway public sector deficits until 1985) and, also, the necessity of flexible monetary policy instruments that could provide the Bank of Spain with the required tools to bring two-digit inflation under control.

The previous explanations are corroborated by an examination of the situation of the Spanish financial markets at the time of the accession to the EC, and its evolution to the present. The most developed markets are the interbank market and the market for short and medium-term government debt. Their degree of sophistication contrasted with the situation of the other segments of the money and capital markets, such as the stock market and the markets for private debt instruments (long-term private bonds, mortgages and derivative instruments, etc.). The demands of a booming economy together with the spectre of the 1992 liberalization have led to a rapid development of many of these markets.

The government debt securities market has, apart from funding the public sector's cash deficits, two other missions of transcendental significance: the control of cash in the economic system (through open-market operations) and the setting of the reference interest rate for the whole credit system.

Table 2.4 presents the main stylized facts of Spain's money, bond and stock markets. Part A shows the growing importance of the interbank market, which is closely linked to the process of liquidity creation by the Bank of Spain. Nowadays, the market is sizeable, deep, and works very efficiently with a simple and direct clearing system. Part B shows that the development of the short-term bond market has been less gradual than in the interbank market. This, in turn, has been due to the changing needs of the Treasury regarding the financing of sizeable budget deficits, to the relative after-tax real unattractiveness of deposit interest rates in the late 1970s and early 1980s, and also to the increasing sophistication of monetary control. As may be observed, total market volume has grown quite spectacularly between 1982 and 1988, representing in this last year about 22 per cent of Spanish GDP.

Table 2.4: Spanish Money, Bond and Stock markets, (1982-88) (billion Spanish pesetas).

	1982	1985	1987	1988
A. Interbank market[a]				
Total daily flows	138	412	790	
Deposits outstanding	300	962	2695	
B. Short-term bond market				
Treasury bills (Pagares)				
Gross issue	131	4708	3314	2965
Outstanding stock	115	5100	5332	5051
Treasury notes (Letras)				
Gross issue	--	--	2538	3658
Outstanding stock	--	--	--	--
C. Long-term bond market				
Treasury bonds (Bonos)				
Gross issue	151	387	1038	1163
Outstanding stock	606	1100	3287	4267
Private fixed interest rate bonds				
Gross issue	574	1086	640	759[b]
Outstanding stock	2120	3655	4220	4350
D. Stock Exchange				
Volume	172	621	4766	3021
Net issue	141	207	456	495
Capitalization	1403	3007	7240	9640
Market index (1970 = 100)	69	122	358	397

a.- Daily averages
b.- Flows from January to November and stocks outstanding in November.

Source : Viñals (1990) in Bliss and Braga (1990, p.190)

Other short-term bond markets are the mortgage market and the commercial paper market. The first has not taken off yet, and the second enjoyed a large success before the appearance of Treasury notes. Nowadays, the commercial paper market is particularly ripe for development, given the recent strong growth of private investment and the relatively high transformation costs of the banking sector. Nevertheless, the market will not be consolidated until the unfavourable fiscal treatment - relative to Treasury bills- is eliminated, and until the archaic operating mechanics of the market are changed.

Part C of Table 2.4 summarizes the recent evolution of the Spanish long-term bond market. The main instruments traded are private fixed interest rate bonds ('obligaciones privadas') and Treasury bonds ('obligaciones' for maturities above 5 years, and 'bonos' for maturities below). The Treasury bond market started from a very low level and grew slowly until 1986, when the outstanding stock almost tripled as a result of the aggressive issuing policy of the Treasury in that year in an environment where the private sector held expectations of future lower interest rates and of the development of a sophisticated Treasury bond market. Since then, the delay in the introduction of the expected market reform and the restrictive monetary policy stance since 1987 have led to a Treasury bond supply and demand contraction which has slowed down market growth. Nevertheless, the future of the Treasury bond market looks bright if and when the current demand management problems leading to very high short-term interest rates are solved. Once this is achieved, the recent technical improvements in the market will make it deeper and more liquid, efficient and transparent; it is expected that the market will become a centrepiece of the Spanish financial system.

Where things look rather less encouraging is in the private long-term bond market. As shown in Table 2.4, while the relative size of this market was rather large in 1982, its growth since then has been much slower than in the public sector long-term bond market, even suffering a decline in gross issues since 1987. This recent setback was linked to the near-bankruptcy of one of the major utility companies in the country which prompted a very negative reaction in the market. This episode - which surprised most market participants- points out the problems caused by the absence of a reliable debt-rating service that could orientate investors.

Other negative factors in the market are the recent increase in interest rate volatility, the low degree of development of pension funds and other natural buyers of long-term bonds, and the lack of long-term public sector bond issues which leaves the private market without a point of reference. In any case, the lack of development of the long-term private bond market has fairly negative implications for the access of firms to badly-needed long term capital, as is the case with utilities and other capital-intensive industries. This makes firms resort to the Euromarket, to higher than desirable short-term financing, or to tapping the less reliable equity market. Still, for many small firms bank credit is the only option to finance long-term capital investment.

Moving on now to the stock market, there is a presumption -

both in public and private circles - that this is the segment of the financial markets that could be most negatively affected by the 1992 Single European Market. However, it should be pointed out that this vulnerability is also shared by most of the continental stock markets of the EC, including the French, Italian and German markets.

There are four organized markets in Spain for the public trading of securities: Madrid (founded in 1831), Barcelona (1915), Bilbao (1890) and Valencia (1980) Stock Exchanges. Madrid is the Spanish biggest stock market with 80 per cent of the total market in 1989. The so-called continuous market, which is a computer-assisted trading system, in which transactions can be carried out from any point in Spain, came into operation in April 1989, and is expected to handle eventually most of the transactions in Spain (between 80 per cent and 90 per cent of total Spanish trading). The recently created options and futures markets operate separately, and are managed by organizations other than the Official Stock Exchange.

Part D of Table 2.4 shows that the evolution of the stock market has been remarkable in recent years, especially during 1985-87. However, in order to complete the picture of the Spanish stock market, it is necessary to make additional remarks. First, the exceptional performance of the market from 1985 until October 1987 may have artificially increased Spanish capitalization above normal values. Second, the market is very narrow, with fewer than 400 quoted companies, out of which only about 60 have enough liquidity to be acceptable in the portfolios of large investors.

Moreover, banks and public utilities account for about 75 per cent of total assets traded, prices are still subject to the manipulations of large shareholders, and insider trading has not until now been regulated. Finally, until mid-1989 the compensation and liquidation process was archaic; the official intermediary agents ('agente de bolsa') charged a fixed fee (independent of volume) that discriminated against small investors, and there was a lack of self-regulatory power of the Exchanges. All these features have hindered the efficiency of the Spanish stock market until recently.

The fear that the Spanish stock market would be badly hurt by 1992 has led the authorities, starting in mid-1989, to issue legislation to overhaul the market and to get rid of most of the above mentioned problems. Given the important role that the stock market can play in helping Spanish firms adjust to increasing international competition derived from the "EC cum 1992" shock, it is critical that additional legal reforms take place soon and that incentives are provided to expand simultaneously market supply and demand.

2.2.3.- Importance and Evolution of the Banking Sector.

One can again undertake a comparative analysis with other EC countries in order to study the relative size of the Spanish banking sector. The economic dimension employed here as an indicator of banking sector size is bank loans outstanding as a percentage of GDP. Table 2.5 displays these values for eight EC countries for 1985. It may be noted that the figures for Luxembourg are somewhat distorted because of its financial centre status.

Table 2.5 : Bank Loans Outstanding as a Percentage of GDP for 8 EC Countries (1985).

Country	Bank loans as % of GDP
Belgium	142[a]
W. Germany	139
Spain	99
France	93[a]
Italy	96
Luxembourg	6916
Netherlands	130
U.K.	208
EUR 8[b]	142

a.- 1982 data
b.- Weighted average

Source:Commission of the European Communities (1988)

It can be seen from Table 2.5 that Spain has one of the lowest values of total bank loans as a percentage of GDP, and the Spanish percentage is well below the average of the other EC countries (EUR 8). The relative size of the banking sector in Spain appears smaller by EC standards. This seems to contrast with the earlier finding for the financial sector as a whole; earlier on, it was found that the financial sector in Spain seems to be of above average economic dimensions by EC standards. This might result from the use of two different measures (gross value-added and bank loans as a percentage of GDP). High relative gross value-added and low relative bank loans may be explained by the existence of high intermediation margins (non-competitive pricing).

One can also examine the evolution of the intermediation performed by the banking sector. There are different ways of measuring the level of intermediation of the banks. A simple and rather intuitive measure will be used: this is the ratio which measures the percentage that the liabilities of the financial institutions (excluding those that are assets of other financial institutions) represent in the total financial assets of the rest of sectors (public sector, non-financial firms, households and external sector). Table 2.6 displays the values of this ratio for financial institutions, private banks and savings banks for 1975 and 1981-87.

Table 2.6: Evolution of the Intermediation : Liabilities of Financial Intermediaries as a Percentage of Total Financial Assets of the Rest of Sectors (1975, 1981-87).

	1975	1981	1982	1983	1984	1985	1986	1987
Fin. institutions	88.0	83.7	79.4	76.2	74.9	73.7	72.5	72.9
Private banks	51.2	47.6	45.4	42.9	42.7	40.1	37.0	37.6
Savings banks	20.6	19.0	19.1	19.1	19.4	20.7	21.3	21.4

Source: Trujillo, Cuervo-Arango and Vargas (1988, p. 309)

Table 2.7 : Number of Financial Institutions in Spain

	1980	1983	1986	1989	Variation 1980-89
Banking institutions	371	380	364	341	- 30
Other financial institutions	412	508	419	411	- 1
Total	783	888	783	752	- 31

Source: Negueruela and Gomez (1990, p.171)

In Table 2.6, one can notice again the loss of importance of the financial institutions' intermediation, particularly after 1982, although in 1987 the disintermediation process appears to peter out. As one can observe in Table 2.6, the savings banks do not seem to be affected by this disintermediation process and the ratio appears approximately constant throughout the period. However, private banks have lost almost 14 points since 1975. When comparing between groups of institutions, one must take another variable into account. This is the relative market share which may explain partially the evolution of these ratios for the two types of banks.

The last variable to be analyzed here is the evolution of the number of the financial and banking institutions in the market during the period 1980-89: see Table 2.7. Under the heading of banking institutions are included private banks, savings banks, credit co-operatives and official credit institutions.

In Table 2.7 one can observe a decrease in the number of financial institutions during the period 1980-89, which is mainly explained by the decrease in the number of banks. The banking crisis that the Spanish banking system suffered in the 1980s seems to lie behind this decline in the number of banks.

The main conclusions one can draw from this subsection are:

- The Spanish banking sector appears to be of relatively smaller size by EC standards as measured by total bank loans as a percentage of GDP; this contrasts with the earlier finding of relatively high gross value-added as a percentage of GDP. This result may be explained by non-competitive pricing and/or the existence of an extensive network of financial services provided to domestic and foreign customers.

- The level of intermediation performed by the banking institutions in Spain has been declining during the 1980s, and the private banks are the institutions most badly affected.

2.3.- INSTITUTIONAL FEATURES OF THE SPANISH BANKING SYSTEM.

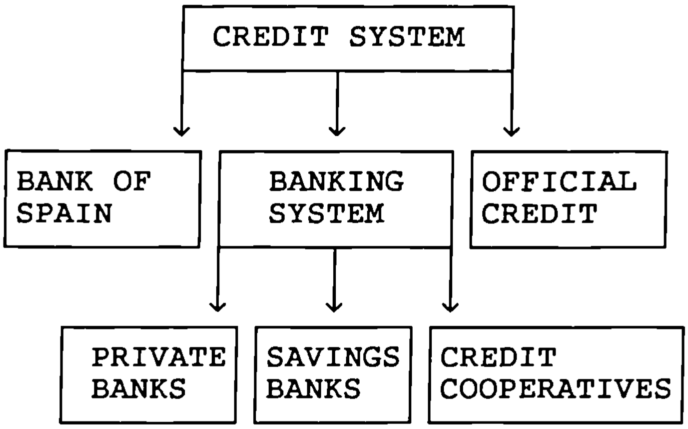
2.3.1.- Types of Bank Institution in Spain.

2.3.1.1.- *Introduction.*

Figure 2.1 illustrates the institutions of the credit system and the banking system in Spain. The credit system contains the Bank of Spain, the banking system and the Official Credit Institutions. There are three main types of banking institution in the Spanish banking system: private banks, savings banks and credit cooperatives. Nowadays, the main difference between them is their ownership structure. Otherwise, they have almost identical operational capabilities.

Private banks (except Banco Exterior) are privately owned banks. According to the regulatory differences that used to exist among domestic banks and the legislative differences that still exist between domestic and foreign banks, private banks can be classified into corporate banks, commercial banks, mixed banks and foreign banks.

Figure 2.1: Credit System and Banking System in Spain



Savings banks are non-for-profit institutions. Profits are allocated to charitable projects (Obra Social in Spanish) run by the savings banks. The boards of the savings banks are controlled by local and regional governments and are grouped in the Confederation of Spanish Savings Banks (Confederacion Española de Cajas de Ahorros = CECA), which unlike in the rest of the EC, has limited powers over the individual banks.

Credit cooperatives are constituted by members that can be individuals or other cooperatives. The rural savings banks (cajas rurales) are the most important and their operations are related to the agriculture, forestry and social conditions of the rural areas. Credit cooperatives will not be examined because of their small importance in the Spanish banking system as a whole.

2.3.1.2.- *Private and Savings Banks: Main Differences.*

Three main areas can be identified with regard to the most important differences between private and savings banks. These areas are: ownership, legal and regulatory framework and operational differences.

2.3.1.2.a.- *Ownership*

Nowadays, ownership is the main difference between private and savings banks. Table 2.8 shows the sector ownership for 1985-88.

Table 2.8: Banking Sector Ownership (1985-88)

Category	Total banking sector assets (%) 1985	1988	Change
Private	53.3	49.0	- 4.3
Public	7.9	2.3	- 5.6
Mutual	31.5	37.7	6.2
Foreign	7.3	11.0	3.7
Totals	100.0	100.0	

Source: Gardener and Molyneux (1990, p.270)

The Banco Exterior is one of the two institutions (the other is the Postal Savings Banks) that comprise the public-sector financial institutions and it operates as a commercial bank. Apart from this case, the ownership of the commercial banks is private or foreign. In Table 2.8, one can observe the decline in the relative total assets of the private-owned banks (basically domestic commercial banks) and the increase in the relative total assets of the branches of the foreign banks (basically they are commercial banks). Under the heading of mutual ownership structure, we find savings banks and credit cooperatives: it can be seen that the relative total assets of the mutual-owned banks have increased during this period.

2.3.1.2.b.- *Legal and Regulatory Framework.*

The regulations that have affected both types of institution have been complex and different. However, since 1974-75 a new trend towards an equal legal treatment for both types of institution has emerged. Many rules which used to discriminate between these firms are no longer in effect. The aim of this process was to eliminate discrimination and to encourage competition among financial intermediaries by allowing them to have access to the different markets under the same operating conditions, to determine prices, or in terms of the compulsory solvency ratios they have to bear. This area will be further examined in Chapter 3 when the researcher deals with bank regulation in Spain.

2.3.1.2.c.- *Operational Differences.*

As it will be seen when it comes to examining the competitive structure of the Spanish banking system in section 2.4, private banks (chiefly commercial banks) control the largest share of the market, but savings banks have been steadily gaining ground at the expense of private banks. In the 1980s, savings banks market share has increased while the share controlled by the private banks has gradually decreased. The main reasons for this trend are the disappearance of the web of regulations that prevented savings banks expansion (deregulation) and, as seen earlier, the faster pace of disintermediation process in the private banks traditional markets.

In order to identify the main operational differences between private and savings banks, their asset and liability structure can be analyzed. Tables 2.9 and 2.10 show respectively the asset and liability structures for private and savings banks.

On the asset structure side (Table 2.9), one can see that the structures for both types of institution have converged during the period 1982-87. The percentage of financial investment in loans decreased dramatically for private banks and moderately for savings banks. The securities portfolio of savings banks is relatively higher than the one for the private banks, even though savings banks have a lower level of industrial participations. Savings banks are more concentrated in fixed income securities. In the period considered, the portfolio of securities decreased substantially for savings banks but only slightly for private banks. Investment in the interbank market and in monetary assets increased for both. In the interbank market, private banks appear to have become more active than the savings banks. As for monetary assets, after 1984 investment in Treasury notes increased substantially, even above what was compulsory owing to the lack of investment opportunities; the disintermediation process was emerging. Private and savings banks are still concentrated in different market niches. Savings banks are mainly dedicated to middle and low income retail banking, devoting a sizeable part of their credit to households and mortgage loans, whereas private banks lean more to middle and high retail consumers and to wholesale banking.

Table 2.9: Asset Structure for Private and Savings Banks (1982-87) (%) (*)

	Bank of Spain and monetary assets	Interbank market	Loans	Securities
	Private Banks			
1982	7.2	5.1	74.7	12.9
1983	12.2	8.3	67.7	11.8
1984	16.4	13.2	57.4	13.0
1985	19.8	13.7	52.9	13.7
1986	20.4	13.6	52.9	13.1
1987	22.0	14.1	51.4	12.6
	Savings Banks			
1982	9.3	9.2	52.3	29.2
1983	15.4	9.2	51.2	24.2
1984	23.2	8.8	47.3	20.7
1985	27.1	11.6	42.3	19.2
1986	24.4	13.6	42.8	19.2
1987	25.4	11.3	46.2	17.1

(*) Some of the numbers do not add up to 100 because of rounding

Source: Trujillo, Cuervo-Arango and Vargas (1988, p. 301)

On the liability side (see Table 2.10), one can observe that savings banks obtain relatively more funds from cheap deposits (checking and savings accounts) than the private banks. One can, nevertheless, notice a decrease in the proportion of cheap deposits for both types of institution. Long-term deposits were almost stable for savings banks and decreased by 20 points for private banks during the period considered. During the period 1983-85 there was a movement towards negotiable securities, particularly in the case of private banks. In 1985-87 there was a movement towards endorsement of Treasury notes, again particularly in the case of the private banks which became very active in this area. Table 2.10 appears to indicate that changes were drastic for private banks and moderate for savings banks. These movements could be explained in terms of tax (in the case of the Treasury notes) and were also linked to the recovery in the demand for credit from 1985 onwards. Since then, banks, rather than financing the government (purchasing Treasury notes), have been financing the private sector and transferring the notes to their clients. On the liability side, it is not as clear as on the asset side that the structures for private and savings banks have converged.

Finally, as a conclusion, one can say that the operational characteristics in terms of asset structure have converged for private and savings banks but, this is unclear in terms of their corresponding liability structures.

Table 2.10: Liability Structure for Private and Savings Banks (1982-87) (%) (*)

	Checking and savings accounts	Term deposits and CDs	Negotiable liabilities	Asset endorsement	Other
			Private Banks		
1982	41.1	48.4	4.2	--	6.4
1983	38.2	41.1	14.9	--	5.7
1984	35.9	31.5	25.7	1.5	5.4
1985	36.8	29.8	18.9	8.6	5.8
1986	38.3	33.8	4.1	17.6	6.2
1987	37.5	28.9	5.5	23.3	4.8
			Savings Banks		
1982	57.6	40.6	0.1	--	1.7
1983	55.9	39.9	0.2	--	4.0
1984	50.7	37.2	4.4	2.0	5.8
1985	48.4	36.0	4.9	4.0	6.7
1986	49.2	39.2	0.3	3.4	7.9
1987	50.3	36.7	0.6	6.2	6.2

(*) Some of the numbers do not add up to 100 because of rounding.

Source: Trujillo, Cuervo-Arango and Vargas (1988, p.303)

2.3.1.3.- *Commercial and Investment Banking in Spain.*

Investment banks (industrial banks, or 'bancos industriales' in Spanish terms) were created in 1962 and had different regulations from those of the commercial banks. However, nowadays there is no difference in legal treatment between them. The Spanish banks have the characteristics of "universal banking" which makes the distinction between commercial and investment banks less relevant for the Spanish case since most commercial banks offer investment banking services.

2.3.1.3.a.- *The Spanish Model: Universal Banking.*

The relationship between the banking system and the industrial sector has been discussed extensively in the literature. There are two opposite models of banking system relationships with the industrial sector (Mañas, 1989 and Torrero 1988). The first model is the one adopted by Japan and Germany in which banks have important equity holdings in industrial firms, are represented at the company's boards and, hence, have a direct participation in their management. The opposite model, is best exemplified by the UK and the US where the banking systems do not have such strong and direct (equity) relationships with the industrial firms and thus, they are not involved directly in the management of the firms. The banks that follow the latter model have no strong role in financing industrial firms, and the main source of long-term, equity financing for the industrial firms is identified in the Stock Exchange market.

The Spanish banking system has the characteristics of 'universal banking' and hence it is more in line with the German or Japanese model rather than the model followed by the UK and US (Mañas, 1989 and Torrero, 1988). As a matter of fact, the Spanish industrialization process since the end of the 19th century could not be understood without a reference to the major role that commercial banks played in it (Kindleberger, 1984). As with the rest of the countries that follow the universal banking model, the

Spanish banking system has maintained important links with the non-financial sector of the economy. Although in recent history there are examples of regulatory efforts to encourage a movement by the Spanish banking system towards the Anglosaxon model (such as the 1962 Law which allowed the creation of investment banks), the Spanish banks still maintain strong and direct links with the industry. In the next subsection, the importance of these links are evaluated.

2.3.1.3.b.- *Importance of Industrial Participations.*

Spanish banks have often been important shareholders as well as lenders to industrial firms. While this feature may have economic advantages, like the reduction of information asymmetries between lenders and borrowers, it also has a major disadvantage in terms of excessive concentration of debt and equity risk in a bank's asset structure. Those risks materialized in the deep and severe banking crisis that occurred after 1978 - and which affected almost half of the banks existing in 1977 - as a result of the strong industrial crisis suffered by the Spanish economy. Although the crisis ended with a recomposition of banking groups and with the creation of public institutions in charge of closely monitoring the performance of banks in trouble, the close links between some of the major banks and industry still prevail.

It is difficult to obtain an accurate quantitative picture of the importance of the bank's industrial portfolio, since there are only aggregate data publicly available and these data may be biased downwards because of the joint effect of inflation and prudential accounting standards. Bearing these problems in mind, according to Viñals (1990),the Spanish banks held in 1988 almost 1 trillion pesetas in shares, of which 730 billions were held by the seven major banks. This figure is equivalent to about 10 per cent of the stock market capitalization at the end of 1988 and also equivalent to almost 50 per cent of total bank equity (capital plus reserves).

Table 2.11 displays the portfolio of non-financial firms' shares as a percentage of the total shares' portfolio held by banks for five countries. In Table 2.11 one can observe that leaving Japan out, where the shares' portfolio only contains industrial participations, Spain has the highest percentage of industrial participations by banks in the shares' portfolio. Although the different tax and accounting rules could affect the balance-sheet valuation of shares (see Foster, 1986 p.190), the active role of the Spanish banking system in industry appears clear in this table. As for the evolution of the industrial participation, the decline in the percentage of industrial participations in the period studied can be observed. The differences between Spain and the other countries in the table (leaving Japan out) seem to have been reduced. The relative decline in the percentage of industrial participations held by banks may be explained by the recomposition of the banking groups after the banking crisis. However, the future of important segments of the banking system cannot be detached from the future of the industry.

Table 2.11: Industrial Participations' Portfolio (as a Percentage of Total Shares' Portfolio) for Five National Banking Systems.

	1982	1983	1984	1985	1986	1987	1988
W. Germany	49.4	46.8	48.8	50.0	49.4	52.4	--
Spain	81.0	69.6	72.2	66.7	68.0	64.3	67.1
Japan	100.0	100.0	100.0	100.0	100.0	100.0	100.0
U.K.	16.9	14.6	17.5	15.5	22.0	22.0	--
Italy	7.3	11.0	16.3	--	17.5	19.3	--

Source: Chulia (1990, p.76)

There are several ways in which the potential effects of the 1992 single financial market for Europe could affect these strong relationships between banks and industries. One of these ways has to do with our topic of capital adequacy regulation. The harmonization of solvency requirements across the EC may entail a severe limitation in the size of bank industrial holdings with regard to bank's equity. If Spanish banks had to sell a substantial proportion of their industrial participations, there would be a revolution in Spanish industry since many big firms would have to undergo a fundamental change in their controlling shareholders.

2.3.1.4.- *Foreign Banks in Spain.*

2.3.1.4.a.- *Introduction.*

In 1978, after decades of prohibition, foreign banks were again allowed to set up in Spain. However, rather restrictive conditions were set out for foreign banks:

- Foreign banks could not open more than three offices and thus, they were prevented from expanding into retail banking.
- However, the most stringent restriction was the requirement of maximum financing with resort to the internal market (not including interbank loans) of 40 per cent of their total credits. Hence, they were forced to employ expensive credit sources (such as the interbank market).

Spain's entry into the EC brought about the elimination or softening of many of the discriminatory rules against foreign banks, although not all of these rules have disappeared as it will be seen later on in Chapter 3.

2.3.1.4.b.- *Importance and Evolution of the Foreign Banks in Spain.*

At the end of 1989 there were 54 foreign banks in Spain. We need to examine their importance in terms of market share for some products. Table 2.12 displays the evolution of the importance of the foreign banks in terms of market share of some products (credit and securities, total assets and interbank liabilities).

In Table 2.12, one can observe the increasing importance of the foreign banks in Spain. At the end of 1989, they accounted for 13 per cent of the credit given by all the banks in Spain. One can also note the active role of the foreign banks in the interbank markets. At the end of the 1989, they accounted for about one third of the interbank liabilities.

Table 2.12: Importance of the Foreign Banks in Spain (as a Percentage of total Spanish Banking) (1980-89)

	1980	1983	1986	1989
Credit + securities	5.2	9.5	12.6	13.0
Total Assets	5.8	10.4	12.1	13.7
Interbank liabilities	24.0	30.4	34.0	32.3

Source: Negueruela and Gomez (1990, p.173)

Table 2.13: Comparison of the Balance-sheet Structure of Foreign and Domestic Banks (1985-87).

	Foreign Banks			Domestic Banks		
	1985	1986	1987	1985	1986	1987
Assets						
1. Credit system	14.7	18.7	22.9	20.4	18.3	19.6
2. Other finan. inst.	0.7	1.8	4.0	0.4	0.6	0.9
3. Public sector	7.6	13.8	15.2	18.1	22.0	19.6
4. Private sector	51.6	46.2	43.5	42.4	43.4	43.3
5. Foreign sector	13.8	18.5	10.3	11.3	10.4	8.3
6. Real assets	0.5	0.5	0.5	2.3	2.1	1.0
7. Sundries	11.0	0.3	3.5	5.2	3.1	6.4
Total	100.0	100.0	100.0	100.0	100.0	100.0
Liabilities						
1. Credit system	55.3	60.5	59.7	18.7	19.2	16.2
2. Other finan. inst.	0.9	2.3	1.3	0.5	0.6	0.7
3. Public sector	0.2	0.4	0.3	1.7	2.6	2.6
4. Private sector	3.6	3.1	9.2	55.8	56.4	55.8
4.1 Deposits	(1.4)	(1.2)	(1.6)	(45.4)	(40.8)	(37.8)
4.2 Other	(1.5)	(1.0)	(6.1)	(7.3)	(12.4)	(14.4)
5. Foreign sector	23.6	27.4	19.4	10.4	10.1	9.8
6. Capital	5.2	6.1	6.0	8.5	9.4	9.3
7. Sundries	11.2	0.3	4.0	4.4	1.8	5.6
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Trujillo, Cuervo-Arango and Vargas (1988, p. 307)

In Table 2.13 it can be observed that in 1986-87 the foreign banks obtained around 60 per cent of their credit sources from the interbank market, which is an expensive credit source, and they obtained only 9.2 per cent of their credit sources from their clients in 1987 (this percentage was even smaller in 1985-86). This may be explained by the restrictions placed on foreign banks. This situation contrasts with the domestic banks who obtained 56 per cent of their credit sources from their clients and only 16 per cent from the interbank market in 1987.

As for the assets, credit to the private sector accounts for around 45 per cent of the total credit given by the foreign banks in 1986-87. Credit to the public sector as a percentage of total assets increased during the period as credit to the foreign sector as a percentage of total assets decreased. Credit to the private sector was chiefly given to large firms: in many cases in the form of syndicated loans (a financial innovation introduced by the foreign banks during that period). One can also observe that there seems to be a convergence between domestic and foreign banks in terms of asset structure. In 1987, the asset structures for both types of bank appear more similar than in 1985.

To sum up, the entry of foreign banks in the Spanish financial sector was a healthy shock. They brought in badly needed competition to the wholesale market: they introduced many financial innovations (such as the syndicated loan) and they had an important role in the development of money and capital markets, in particular in the interbank markets.

2.3.2.- The Framework of the Banking Activities in Spain during the 1980s.

2.3.2.1.- *Banking Crisis and the Current Health of the Spanish Banking System.*

It is no exaggeration to affirm that in the period 1978-85, the Spanish banking system went through one of the most serious banking crisis that has taken place in any OECD country during recent years. Initially, the crisis affected middle-sized and small banks but, at a later stage, a big bank group (Rumasa) was also affected. Some big banks, such as Banesto and Banco Hispano Americano were not allowed to pay out dividends until they restored adequate solvency standards.

Table 2.14 displays data related to the banks involved in the banking crisis. From 1977 to 1983, 51 banks were affected by the crisis which represents almost half of the banks existing in 1977. The amount of accounts, branches and staff affected by the crisis appears very important.

The deep recession of the period 1975-83 was the detonator of the banking crisis in Spain. The effects of the crisis were aggravated by the lack of an appropriate monitoring policy because of the absence of technical and legal resources in the hands of the Bank of Spain (stemming from a lack of foresight by the relevant policymakers).

After the major restructuring brought about by the crisis, the improvement of the economic conditions and the tough solvency and regulatory requirements imposed by the Bank of Spain have resulted in a generally sound banking system with strong balance sheets. Spanish banks have devoted a great deal of their large operational profits to cover fully their contingent liabilities (mainly remaining bad loans and employees' retirement plans). Moreover, Spanish banks have almost no exposure to country-risk. To sum up, one can say that Spanish banks faced the 1992 challenge with generally healthy balance-sheets.

Table 2.14: Spain's Banking Crisis (1978-83).

Year	Number of banks	Total liabilities (in million of pesetas)	Number of accounts (thousands)	Number of branches	Staff
1978	4	67998	185	120	1977
1979	2	46357	201	61	1026
1980	9	295063	775	371	6553
1981	4	144899	362	151	2143
1982	11	750223	1829	726	10761
1983	21	1145382	1946	1193	13204
Total	51	2449922	5298	2622	35664

Source: Trujillo, Cuervo-Arango and Vargas (1988, p. 241)

2.3.2.2.- *Main Trends and Changes in the Spanish Financial and Banking Systems.*

In the 1980s, there have been many changes in the environment where the Spanish banking firms engage in business which has affected the banking business itself. Negueruela and Gomez (1988) identify four major areas where important changes have taken place. These are the following:

a) The process of liberalization of the Spanish financial system which started in 1977 (two years after Franco's death). The following measures have been the most important in that sense:

-Total freedom for banking firms to determine interest rates and commissions in their operations.

-Reduction in the bank ratios to be held which monitor a part of the bank resources.

- Increase in the operational possibilities of the financial firms in terms of the activities they can engage in, and reduction in the differences established for commercial and savings banks.

- Reduction in the entry barriers to banking competition and an increase in the range of institutions which can engage in banking business.

- New perspectives in the regulation and supervision of banking activities which now focus more on the solvency aspects of the institutions and the protection of the consumers.

b) The economic environment in which firms perform their activities was no longer a generalized crisis environment after 1985. High economic growth was one of the features of the new environment which has made possible an important growth in the banking business, in the financial culture of the public and in the new financial products and markets. This can be illustrated with the growth rates of Spain' Gross Domestic Product in real terms during 1986-90, which are shown in Table 2.15.

Table 2.15 : Spain's Real GDP Growth Rates (1986-90) (%)

Year	Real GDP Growth Rate
1986	3.2
1987	5.6
1988	5.2
1989	4.8
1990	3.7

Source: Boletín Estadístico - Bank of Spain (1991)

Table 2.16: Spanish Government Net Financing (1987-90)

Year	Net Financing
1987	- 1596.6
1988	- 1299.3
1989	- 1126.9
1990	- 1387.0

Source: Boletín Estadístico - Bank of Spain (1991)

c) The growth in the financial needs of the public sector and the change in its finance policy which has resulted in the public sector becoming the major issuer of financial assets and a fundamental factor in determining the interest rates of the Spanish economy. This is illustrated in Table 2.16, where the Spanish Government Net Financing during 1987-90 is displayed. It can be noticed that throughout the period considered, there has been a Government deficit that needed to be financed through financial assets.

d) Spain's entry into the EC and the configuration of the European Single Market have been factors that have largely affected the regulatory changes and modified substantially the expectations about the future framework in which the banks will develop their activities in Spain.

As a consequence of all these changes, a dramatic transformation of the competition conditions of the Spanish banking industry has come about. This will be analyzed later on in the next section devoted to the competitive structure of the Spanish banking industry.

2.4.- STRUCTURAL FEATURES OF THE SPANISH BANKING INDUSTRY.

2.4.1.- Introduction.

As an introduction to this section, several economic measures of the Spanish banking system compared with other European countries, will be examined. Torrero (1988) undertook a comparative analysis in this area and he employs data from OECD Bank Profitability (1988) and from the Boletin Economico del Banco de España. Five countries are considered (Germany, Italy, France, Sweden and Spain) using 1986 data. Table 2.17 summarizes his findings and shows the different measures. The data shown are for private and savings banks pooled together.

The main features of these data are the following:

- The number of population per branch in Spain is the lowest in the table.
- The number of employees per branch is again the lowest of all the countries in the table.

- The volume of average assets per employee and per branch are the lowest in the table.

Table 2.17 : Comparative Analysis of Economic Measures for the Banking Systems of 5 European Countries (1986).

Country	Population per branch	Employees per branch	Volume of Average Assets per employee(*)	Volume of Av. Assets per branch(*)
Germany	1534	n.a.	n.a.	30.7
Italy	4189	22.5	2.04	45.9
France	2614	17.3	2.47	42.7
Sweden	2731	13.7	2.61	35.8
Spain	1185	7.4	1.24	9.2

(*) In U.S. $ million
n.a. = not available

Source: Torrero (1988, pp. 139-142)

From this one can say that it appears from these data that the Spanish commercial and savings banks prefer to open a large amount of branches with basic services. It is difficult to believe that with the low number of employees per branch the banks can offer a broad range of services in all the branches.

An issue related to these figures is that of "overbanking" in Spain, a topic very often discussed in the literature (see, for example, Torrero 1988). From Table 2.17 one can say that the Spanish banking system appears "overbanked" compared with the other four countries in the table. Torrero (1988) argues that the Spanish banking system seems to need restructuring in terms of number of branches, employees and management systems.

2.4.2.- Profitability and Efficiency.

Relative to their European counterparts, the performance of the Spanish banking sector is usually characterized by two distinctive features: high transformation costs and at the same time, high profitability. Spanish banks appear to have high intermediation margins that allow them to incur high operational costs, while maintaining good levels of profitability. The usual interpretation of these two facts that are accepted as conventional wisdom in the literature is that although Spanish banks appear to be inefficient in terms of costs, they are able to remain profitable because of the exercise of market power.

Table 2.18 shows a comparative analysis of private and savings banks in Spain in terms of profitability and transformation costs for 1981-87. In Table 2.18, one can observe that savings banks show consistently higher profits (both in terms of return on assets and return on equity) and higher net interest income even if they do not show the tendency of private banks to decrease their operating expenses (mostly labour) as a proportion of assets.

As the rates of inflation up to 1984 were of two digits (14.6 per cent in 1981 and 12.2 per cent in 1983 according to Bank of Spain's Boletín Estadístico (1985)), real returns for private banks adjusted for inflation were negative until 1984.

Table 2.18: Comparative Analysis of Private Banks and Savings Banks in Spain (1981-87).

Ratio (1) = Net interest income/ Assets
Ratio (2) = Operating expenses/ Assets
Ratio (3) = Profit before tax/ Assets
Ratio (4) = Staff costs/ Assets
Ratio (5) = Equity/ Assets (*)
Ratio (6) = Profit-before tax/ equity

Private Banks

	1981	1983	1985	1986	1987
Ratio (1)	4.15	3.95	3.57	3.73	3.89
Ratio (2)	3.42	3.09	2.80	3.00	3.04
Ratio (3)	0.75	0.65	0.72	0.81	1.00
Ratio (4)	2.31	2.08	1.88	2.10	2.12
Ratio (5)	6.48	5.94	5.52	5.68	--
Ratio (6)	11.54	10.94	13.04	14.36	16.69

Savings banks

	1981	1983	1985	1986	1987
Ratio (1)	4.73	5.28	4.28	4.68	4.87
Ratio (2)	3.55	3.61	3.39	3.83	3.51
Ratio (3)	1.03	1.06	1.04	0.91	1.22
Ratio (4)	2.36	2.35	2.20	2.65	--
Ratio (5)	6.04	5.82	5.51	5.38	--
Ratio (6)	17.10	18.19	18.92	16.89	22.27

(*) Equity equals capital plus reserves minus provisions (arithmetic average of years n-1 and n).

Source: Dermine (1990, p. 273)

Table 2.19 displays a comparative analysis of banking systems (1986) in terms of profitability and transformation costs. It will help us to determine whether the Spanish banking system has relatively higher profitability and transformation costs for EC and OECD standards.

According to Table 2.19, in 1986 Spanish banking institutions (private and savings banks) compare favourably with

OECD countries in terms of return on assets. In return on equity terms they do not fare so well. This may be due to the higher provisions of Spanish institutions, which is manifested as a lower leverage; Table 2.19 illustrates this position. Spain has tough equity requirements (a minimum equity-to-assets ratio of 5 per cent in 1987).

Table 2.19 : Comparative Analysis of Banking Systems[a], 1986.

	Private Banks			Savings Banks		
	Spain	EEC Average[b]	OECD Average[c]	Spain	4-country Average[d]	8-country Average[e]
Ratio (1)	3.73	2.56	2.40	4.68	3.42	3.23
Ratio (2)	3.00	2.23	2.22	3.83	2.62	2.87
Ratio (3)	0.81	0.65	0.68	0.91	0.83	0.84
Ratio (4)	2.10	1.44	1.28	2.65	1.65	1.52
Ratio (5)	17.61	25.02	26.63	18.59	23.78	29.18
Ratio (6)	14.36	15.36	18.03	16.89	19.97	19.44

a.- Table 2.16 for ratios (1)-(6)
b.- It includes all EEC countries except Denmark, Greece and Ireland.
c.- It contains all OECD countries except Denmark, Greece, Ireland, Austria, Iceland, Turkey, Australia and N. Zealand.
d.- Spain, West Germany, Belgium and Italy.
e.- The four above plus Finland,Norway, Sweden and Switzerland.

Source: Dermine (1990, p. 284).

Spanish banking institutions have very high intermediation margins by EC and OECD standards as measured by the ratio of net interest income to assets. They have also higher operating expenses and labour costs ratios. This can be interpreted as evidence of inefficiencies derived from the regulated and protected environment, but it may also indicate a retail-oriented banking system.

The market power of the banks, which will be examined in section 2.4.4, might be shaping the high intermediation spreads. Banks may be able to charge higher intermediation mark-ups because of their market power. However, there are two other factors that could lie behind bank's high margins of intermediation in Spain. These are the following:

+ High taxes of financial intermediation: sometimes the literature overlooks the fact that financial intermediation is more heavily taxed in Spain than elsewhere in Europe. Wide interest differentials may just mean a high tax wedge between lending and borrowing rates.

+ Different consumer tastes : some surveys have found that when asked about the main factors affecting their bank choice, the consumers have listed vicinity and service quality far above interest rates (Mañas, 1989).

The interpretation of international comparisons must be treated with care. For example, the relative inefficiency of the Spanish system may have different interpretations. It may imply that the same levels and qualities of outputs and services are produced at a higher cost. It may also reflect the fact the Spanish banking is more retail-oriented and that clients receive higher quality in terms of convenience (as seen in the introduction of this section with the relatively high number of branches), in which the output composition is not the same and costs should be higher.

Finally, one must comment on one of the latest developments in the Spanish banking system which is the accounts' war or 'guerra del pasivo' whereby many institutions of the Spanish banking market began to offer high interest rates on current accounts since 1989-90. Private banks were mainly the institutions involved in the accounts war whose main objective was to attract deposits. As can be noted in Table 2.20, the impact of this accounts war on the interest rates paid on current accounts and total financial costs in 1990 appears higher for private banks than for savings banks. Both interest rates on current accounts and financial costs have increased considerably for private banks in 1990. The implications of the accounts war for the Spanish banks are still difficult to tell, but the impact of it on the cost of deposits and costs of funds appear clear in Table 2.20.

Table 2.20: Average Interest Rates (r) on Current Accounts and Aggregate Financial Costs for Spanish Banks (1987-90).

	Private Banks		Savings Banks	
Year	r (%)	Financial Costs	r (%)	Financial Costs
1987	7.51	2053129	6.49	789504
1988	7.15	2060071	6.79	935997
1989	8.05	2716654	6.81	1229787
1990	10.15	3424651	7.25	1383339

Source: Consejo Superior Bancario and CECA (1987, 1988,1989 and 1990).

2.4.3.- Concentration and Market Share.

Given the apparent coexistence of high intermediation costs and significant profitability in the Spanish banking system, one might conclude that Spanish banks exercise some kind of monopoly power. This issue of the exercise by Spanish banks of some degree of monopoly power must be examined. In this subsection, the researcher looks at market concentration which under the traditional industrial organization (I.O.) paradigm of 'market structure - conduct - performance' (S-C-P) is the most relevant structural dimension for the study of possession of monopoly power[1].

First, we study the market shares of the different institutions (private banks, savings banks and credit cooperatives). Table 2.21 displays the market shares of these institutions in the Spanish banking system for 1976-89.

The general picture in Table 2.21 is the dominance of the private institutions, which account for more than 60 per cent of Total Assets of the banking institutions. However, over the years the savings banks have tended to gain market share at the expense of the private banks. Thus, the only institutions that provide direct competition in many different markets are the savings banks. This has been made possible by allowing the savings banks to have almost the same powers as the private banks.

Table 2.21 : Market Shares of Institutions in the Spanish Banking System (1976-89).

	Percentage of Total Assets							
	1976	1980	1984	1985	1986	1987	1988	1989
Private banks	71.6	70.2	68.1	67.0	65.0	64.3	62.2	61.1
Savings banks	25.9	26.7	29.0	29.9	31.8	32.5	34.8	36.1
Credit cooperativ.	2.5	3.1	2.9	3.1	3.2	3.2	3.0	2.8

<u>Source</u> :Banco de España. Boletin Estadistico.

Table 2.22 contains two alternative indices of concentration for the period 1980-88. Part A shows the total market share in total deposits by the biggest 5, 10, 20 and 50 banks according to varying institutional criteria. It can be observed that during the 1980s there seems to be a process which tended to reduce the market share of the 5 largest commercial banks. This process was reversed in 1988, with the merger of two of the big seven banks into BBV (formerly Banco de Bilbao and Banco de Vizcaya).

The existence of a trend towards lower concentration is not so clear, however, when one looks at bank groups. This implies that the relative size of the group with respect to the parent company increased, which may be either a consequence of the process of absorption of smaller banks after the banking crisis or, rather, a deliberate strategic choice. Again, the mergers break the stability of the market share of the big five banks, which suddenly jumps to 66 per cent in 1988.

When one looks at private and savings banks together, a process towards lower concentration between 1980 and 1988 is also detected. This may be due to the faster pace of expansion of savings banks during the period - as some of the regulatory constraints imposed on them were partially relaxed - together with their smaller size relative to the major private banks. However, the merger previously discussed breaks the trend towards lower concentration, as also happened in the other cases examined.

Table 2.22: Indices of Concentration in the Spanish Banking Sector (1980-88).

	Individual Banks			Bank Groups		
	1980	1988	1988[a]	1980	1988	1988[b]
A. Number of banks						
5	50	46	52	58	58	66
10	68	66	68	84	83	86
20	80	80	81	--	--	--
50	93	95	96	--	--	--
B. Herfindahl index	0.062	0.056	0.066	--	0.090	0.109

	Private and Savings Banks			
	1980	1988	1988[a]	1988[b]
A. Number of banks				
5	33	28	31	39
10	49	45	47	57
20	62	59	60	71
50	80	79	80	89
B. Herfindahl index	0.031	0.026	0.030	0.045

a.- Consolidated data for BBV used.
b.- Data corresponds to private bank groups (after mergers) and savings banks.

Source: Viñals (1990) in Bliss and Braga (1990, p.187)

In part B of Table 2.22 the Herfindahl index is displayed, which is defined as the sum of squares of market shares of firms in a particular market or industry. This index ranges from near zero (pure competition) to 1 (pure monopoly), and its reverse gives the equivalent number of firms of identical size that generate the same market concentration. This index is attractive because it does not have the disadvantages of the absolute concentration index (dependence on the number of firms and not accounting for differences in size)[2]. The computed values of H in Table 2.22 seem to corroborate quite precisely the trend towards lower concentration observed in the 1980s until it was sharply reversed by the recent mergers.

In order to better understand these figures of concentration ratios, an international comparative analysis of concentration ratios is analyzed[3]. We will employ Molyneux's results (1990) which are displayed in Table 2.23. In this table, concentration concentration measures are computed for the banking systems of the EC countries. In Table 2.23 it is interesting to note that out of the largest five banking sectors (Germany, U.K., France, Italy and Spain), France and Italy appear far more concentrated than the other three. The Spanish banking sector appears one of the least concentrated in the EC.

Table 2.23: Market Concentration and Size of Banking Sectors in the EC, 1986.

Number of banks in the market	Country	Concentration % Assets 5 firm	Concentration % Assets 3 firm	Concentration % Deposits 5 firm	Concentration % Deposits 3 firm
4465	Germany	31.2	21.2	30.5	19.1
661	U.K.	32.6	26.5	30.3	21.6
367	France	63.0	42.3	65.2	45.5
980	Italy	55.1	35.2	68.5	41.6
349	Spain	34.7	21.9	38.8	24.3
81	Netherlands	---	71.3	---	83.9
86	Belgium	84.7	57.1	87.5	59.0
120	Luxembourg	22.4	16.7	---	16.5
216	Denmark	50.9	36.7	58.9	45.3
n.a.	Greece	---	---	---	49.7
40	Portugal	---	49.7	---	49.6
43	Ireland	---	71.0	---	---

Source: Molyneux (1990, p. 169)

The main conclusion in this subsection is that from 1980 to 1988 there was a trend towards lower concentration in the Spanish banking industry which was sharply reversed by the recent mergers. The mergers represent a reversal of the previous long-term trend towards lower concentration.

2.4.4.- Market Power.

The data presented in previous subsections, in particular the international comparisons, are not inconsistent with a relatively high degree of market power in the Spanish banking sector. In this section the researcher will examine if there is any initial evidence that Spanish banks enjoy market power.

The measure of market power employed here is Tobin's q ratio, which is the ratio of the market value of the firm to the replacement value of its assets[4]. Table 2.24 contains the q ratios for banking sectors of several major countries.

The q ratio for the seven Spanish largest private banks in the period 1978-1985 has been slightly above one only in 1978 and 1981, which appears to result from the effects of the severe banking crisis during the period. The data for 1978 and 1981 seem to indicate that in those years, banks had undervalued assets or 'hidden value' in their balance-sheets.

International comparisons of averages over the period 1974-82 show Spain, with a ratio of 1.62, above France, West Germany and the U.K. as can be noted in Table 2.24. The evidence shown here appears to support the hypothesis that the Spanish banks seem to enjoy some kind of market power.

Table 2.24: q-ratios

Countries	Market price/book value (average 1974-82)	Market price/book value (1978)
France	0.89	0.94
Switzerland	1.65	1.61
West Germany	1.34	1.43
U.K.	0.59	0.68
Japan	1.92	1.62
U.S.A.	0.90	0.87
Spain	1.62	1.10

Source: Dermine (1990, p.292)

The evidence provided by the stock market prices must be treated with some caution, given that, as described in section 2.2.2, the stock market is underdeveloped in Spain and generally controlled by the large banks. In particular the price of the stock of a bank is typically manipulated by the same institution buying or selling in the market[5].

2.5.- SYNTHESIS.

In this chapter the researcher has reviewed the main broad institutional and structural characteristics of the Spanish banking system. This exploratory analysis of the Spanish banking sector is necessary in order to understand the framework and environment in which banks operate in Spain.

Until very recently the Spanish banking system has been described as a rather static, sheltered, over-regulated, relatively inefficient sector and controlled by the large banks, which at the same time own big portions of the industry. However, since Spain's entry into the EC in 1986, this description is no longer appropriate. Both banking firms and regulatory authorities are well aware of the importance of the changes that will be taking place after 1992 and are already reacting to the new competitive environment.

Many important changes have taken place in the Spanish financial sector during the 1980s: liberalization, new perspectives in the regulation and supervision of banks, the good economic environment, Spain's entry into the EC and the large growth of the financial needs of the public sector. As a result of these changes, a dramatic transformation of the competitive conditions of the Spanish banking industry has come about.

Several indicators of profitability, efficiency, concentration and market power have also been analyzed in order to obtain a general picture of the setting of the Spanish banking industry. The Spanish banks seem to have high transformation costs and at the same time high profitability by EC standards. The usual interpretation of these two facts is that Spanish banks are inefficient and profitable at the same time because they are able to exercise some kind of market power. The market power evidence shown here appears to support this hypothesis.

There was a trend towards lower concentration in the Spanish banking sector from 1980 to 1988, which was sharply reversed by the recent mergers.

The implications for competition of the integration of the European financial markets after 1992 must be borne in mind since this is a factor that points towards even higher competition in the Spanish banking sector.

NOTES:

1.- See for example, Ferguson (1988) for a review of the S-C-P paradigm.

2.- See for example, Ferguson (1988) for the features of the Herfindhal index.

3.- A word of caution about using traditional measures of concentration is needed, such as the market share held by a specified number of the largest banks for international comparisons. Honohan and Kinsella (1982) argue that cross-country comparisons of traditional measures of concentration are of limited use for answering normative questions such as: is the banking system too concentrated in our country?. They emphasize that the traditional concentration measures are mainly sensitive to the degree to which market share is held by the largest banks. These measures are intuitively acceptable in measuring the degree to which market power is concentrated in a small number of firms and empirical evidence confirms that they are correlated with descriptive characteristics of non-competitive behaviour such as profits. One must bear these considerations in mind for international comparisons.

4.- Dermine (1990) argues that this replacement value is in practice approximated by the book value. A ratio close to one implies competitive behaviour, while larger ratios are deemed as evidence of market power, since according to the valuation of the market, the firm is expected to earn supranormal returns. The q ratio has the advantage of incorporating and adjustment for risk, but it is not free from accounting measurement problems when using approximations and relies heavily on the efficiency of the stock market as pricing mechanism.

5.- Econometric evidence of major aspects of pricing in the Spanish equity market is given by Rubio (1986) and Alonso and Rubio (1988).

CHAPTER 3 : BANK REGULATION AND CAPITAL ADEQUACY IN SPAIN

3.1.- INTRODUCTION.

As with most countries, the Spanish financial system and in particular the banking sector is one of the most regulated industries in the economy. Several justifications have been suggested for the wide range of regulations that are imposed on the banks (Trujillo, Cuervo-Arango and Vargas, 1988):

+ The protection of depositors: hence, solvency regulation of the institutions.

+ The protection of the banking consumer: regulation on the relationships between banking firms and consumers.

+ Monetary control: regulation on bank liquidity requirements.

+ Limiting competition among banks to secure solvency: regulation on interest rates or on geographical expansion.

+ Allocation of bank credit to industries considered to have priority in the economy: regulatory facilities for credit to key industries of the economy.

+ Attempts to encourage certain banking models: regulation on commercial and/or investment banking.

Although the comparative importance of some of the regulatory objectives have changed over time, they have brought about specific regulations that have affected the structure and type of business developed by the different groups of banking institution.

In this chapter, the researcher examines the bank regulation in Spain[1], focusing in particular on capital adequacy regulation. In the opening section, the regulatory bodies and framework are examined. Before examining the present bank regulation in Spain, the philosophy and evolution of bank regulation will be studied. In the next two sections the bank solvency regulation is analyzed, together with the present capital requirements in Spain. Finally, a relevant synthesis of the chapter is provided.

3.2 .- REGULATORY AND SUPERVISORY BODIES AND FRAMEWORK: THE BANK OF SPAIN.

3.2.1.- The Bank of Spain's Monetary Policy Role: Targets and Instruments.

The Bank of Spain has been the only issuing bank since 1874 and is also the bank of the State and of the banking system. It acts for the government in implementing monetary policy, exchange controls and in supervising deposit-taking institutions. Probably the most important function of any central bank is to undertake monetary control operations. Monetary control operations aim to control a monetary variable chosen as a target (such as the amount of money supply, the level of interest rates or exchange rates) which is assumed to be linked to the evolution of a macroeconomic variable or variables (for example GDP growth or rate of inflation) which comprise the goal that the government attempts to achieve with its overall macroeconomic policies.

The Bank of Spain employed the control of M_3 (which is the monetary aggregate that includes notes and coin in circulation with the non-bank private sector, non-bank private sector sight bank deposits, non-bank private sector savings bank deposits and non-bank private sector time bank deposits and certificates of deposits) as the intermediate monetary target up to 1984. From 1984 onwards, the so-called ALP (whose meaning is liquid assets) or M_4 that contains M_3 and other liquid liabilities of the credit system, money-market institutions and Government with the non-bank private sector has been employed.

Once the intermediate target variable has been selected, and as the Bank of Spain cannot have a direct influence on the target variable, the Bank selects a variable under its control that affects the evolution of the intermediate target variable. This variable is the currently Banking System Liquid Assets (ACSB in Spanish) in Spain. This is a variable that the Bank of Spain can influence mainly through the following instruments and operational methods:

a) Open market operations: where the Bank operates in the market and buys or sells government debt (from 1984 to 1987 Treasury bills mainly, and from 1987 onwards mainly with Treasury notes) to the non-bank private sector. In general, if the Bank sells government debt, the money supply decreases *ceteris paribus* and *vice versa*. Since 1987 when Treasury notes replaced Treasury bills as the main form of government debt in the open market operations, these operations are organized in the form of auction. These auctions are held regularly every fortnight.

b) Lender-of-last-resort (LLR) operations: the Bank of Spain has acted as a LLR for the banking system since 1977. The Bank of Spain stands ready to supply funds to the banking system if liquidity (or much worse) solvency problems arise. The current system generally operates on a daily basis. The market operates in the form of auction through the Money Market Telephone Service; the maturity of the loans is usually one day. The Bank does not disclose the amount of funds it is willing to supply. This important market occasionally reaches a total volume of 1 trillion of pesetas.

c) Reserve requirements (Coeficiente legal de caja): minimum cash, liquid assets or deposits at the Bank of Spain ratios that banks are required to hold.

3.2.2.- The Bank of Spain's Regulatory and Supervisory Role.

The Bank of Spain is responsible for the regulations and inspections of all private banks, savings banks, co-operative banks and intermediary money-market houses that operate within the banking system in Spain. The powers and duties of the Bank of Spain as well as its role in the monetary policy process are outlined in the Nationalization and Reorganization of the Bank of Spain Decree of 1962. The application of sanctions is still governed by the Banking Law of 1946, which did not provide the necessary structures to deal with a bank crisis of the size of the

Spanish one during the early 1980s. More authority in relation to the conduct of the Government's monetary policy was given to the Bank of Spain through a 1980 Law.

The Bank of Spain provides information to the rest of the credit system through the Central de Riesgos Bancarios (Centralized Banking Risk Department) in which all the information relating to bank customers is centralized, and through the Central de Balances (Centralized Balance-sheets Department), which compiles the information voluntarily sent to the Bank by nonfinancial firms, who seek interfirm comparison information.

Under the 1962 Decree, the Bank carries out periodic, ordinary inspections of banks, as well as extraordinary inspections. If any violation is noticed, the Bank of Spain proposes to the Ministry of Economy that sanctions should be applied. The sanctions can range from simply bringing it to banks' attention; public or private warnings; a fine of a specified amount; suspension of the privileges deriving from its relationship with the Bank of Spain; suspension of directors; striking banks and bankers off the register; and dissolving the firms. The gaps and shortcomings which were seen to exist during the crisis resulted in an increase in legislation, and there has been a growth in the number of inspectors so as to cope more quickly with crises.

In 1982 there was another development as a consequence of the crisis. The information that banking institutions provided to the Bank of Spain lacked uniformity, but from that year all institutions began to produce accounts using the same conventions of valuation and classification. Yet the most important effects of the 1982 law were those which dictated norms for modern and stringent accounting standards, tightened up the regulations for the reporting of balance sheet and profit and loss accounts, and established that each institution submit confidential reports which break down in detail each account of the financial statement. Such regulation was necessary in order for the Bank to exercise its supervisory function. In an attempt to achieve the best modern accounting standards, these requirements, which caused concern among bankers in 1982, were tightened up in 1985.

For some time the Bank of Spain has given strong encouragement to the banks to adopt external auditing. Until fairly recently, the auditors appointed were directors or even employees of the bank, but now in 1986 external auditors have been introduced, although many banks adopted external audits in 1985 for the first time. The Bank of Spain understands that the external auditors are important allies because they perform an activity complementary to its inspecting task. As in some European banking systems, external auditors have a legal duty to report to the authorities any infraction of the regulations; for instance, the Rumasa group crisis in 1983 was triggered off by an external auditing report.

Until 1979, supervision of the Spanish banking system concentrated on monitoring the fulfillment of the compulsory ratios, but the banking crisis demonstrated the inadequacy of these methods. In 1980 the supervisory process changed from a general view of the banking system to a bank-by-bank analysis, based on a continuous assessment of the standards of banking decisions and practices, and accompanied by an increase in the number of inspections, as can be seen in Table 3.1. Nowadays, the Bank of Spain is proud of using the international standard system called CAMEL to judge the 'quality of a bank'. The CAMEL method derives its name from the initials of Capital (the level of capital),the quality of Assets, the quality of Management, Earnings (level and composition of profits) and analysis of the current and prospective Liquidity position.

Table 3.1: Bank of Spain Inspections, 1979-84

	Number of Inspections											
	Ordinary						Extraordinary					
	1979	80	81	82	83	84	79	80	81	82	83	84
Private banks	21	25	30	37	26	24	17	9	38	4	22	--
Savings banks	7	15	11	20	15	22	--	1	5	--	--	--
Co-operatives	10	23	18	32	31	30	--	--	--	--	--	--
Total	38	63	59	89	72	76	17	10	43	4	22	--

Source: Bank of Spain, Memoria de Actividades (1979-85)

Therefore, the Bank of Spain is intensifying its inspection in an effort to prevent banks from getting into difficulties, and to penalize bad banking practices. This is the only way one can explain the measures adopted with two of the large seven bank groups (before the BBV merger). In 1984 Banco Hispano Americano had difficulty in turning round Banco-Urquijo-Union (one of its subsidiaries), and as recommended by the Bank of Spain, it had to pass its dividend. The Bank of Spain was not satisfied with the bank's management; Hispano had a new chairman and vice-chairman. The outcome of the inspections at Banco Central and Banesto was similar, and the Bank of Spain appointed a director to the board of Banco Central. These measures adopted against two of the three largest banking institutions give an idea of the present power of the Bank of Spain, which contrasts with the situation in 1978 when it was unable to adopt similar measures of any kind.

3.3.- BANK REGULATION IN SPAIN : EVOLUTION AND PHILOSOPHY.

The Spanish banking industry has traditionally been heavily regulated in terms of interest rates, entry, branching, and investment and reserve requirements. Furthermore, these regulations have placed different constraints on different institutions, such as banks and savings banks, for example. A major change in philosophy took place and liberalization advanced significantly during the 1970s; this has accelerated recently, transforming banking into a free-market business.

3.3.1.- Bank Regulation up to 1985: from Complete Regulation to Liberalization.

In 1962, the 'Ley de Ordenacion Bancaria' (Regulation of Banking and Credit Law) allowed the establishment of new banks and tried to separate commercial from so-called 'industrial' banks.

Nevertheless, banks tended to follow the tradition of universal banks. During the 1960s, regulations operated on deposit and loan rates, and the investments of financial institutions through investment requirements. Spanish banks have been required to provide loans to specific priority sectors (traditionally, agriculture, housing, export-oriented activities, etc.) or to hold public debt at below-market rates. The philosophy shaping bank regulation (and regulation generally) was assisting the Government's efforts towards enhancing the economic development of the country's basic industries.

In 1969 the process of liberalization of the financial system began with a change of philosophy towards more free-market positions. The discount rate of the Bank of Spain became the reference rate to fix deposit and credit rates according to certain margins, with the exception of deposits of more than two-year maturity in industrial banks, loans of more than three-year maturity, deposits in foreign currency, interbank transactions and checking accounts. Reserve requirements for the purposes of monetary control were introduced for private and savings banks.

In 1974, the liberalization process received a major impulse with the authorization of new banks and free branching (backed by enough capital), making the operations that industrial, commercial and savings banks were allowed to perform more homogeneous, reducing the investment coefficients and completely liberalizing interest rates for operations of more than two-year maturity. Monetary control was rationalized using reserve requirements, credits from the Bank of Spain to the banking system and open-market operations as instruments of monetary policy.

In 1977, interest rates of more than one-year maturity were freed and the process of putting all banking institutions on the same footing continued, which tended to equalize investment (down) and reserve coefficients across institutions and allowed savings banks to perform increasingly the same operations as others, including participation in the Bank of Spain's auctions. Nevertheless, until very recently savings banks have been restricted to investing mostly in their own geographic region, thereby cutting down the possibilities of diversification.

Savings banks have traditionally suffered stricter regulations in terms of geographical limits to their operations, higher investment coefficients and distribution of profits. It is only since 1973 that they have been able to operate in the market for time deposits of more than two years; since 1975 they have been allowed to expand their number of branches, but only within their own geographic region.

Foreign bank entry was regulated in 1978 with a view to restricting its participation in the retail market. Foreign banks were subjected to various restrictions, which remained in place until 1986.

In 1981, several interest rates were liberalized, including loan rates of all maturities and deposit rates of more than six months' maturity for more than a million pesetas. Bank dividends were also liberalized. In 1985 freedom of branching was complete, except for foreign banks and for the geographical limits imposed on savings banks which have recently been removed.

3.3.2.- Bank Regulation since 1985: the Effects of Spain's Entry into the EC.

In 1986 Spain joined the EC which resulted *inter alia* in a major change in the philosophy or viewpoint of the legislations in general since no regulation from that year onwards could deviate from the EC norm. There are many bank regulatory consequences of Spain's entry into the EC. The Spanish bank legislation had to be adapted to be in line with the EC one. Basically, three aspects of the Spanish bank regulation were changed:

- First, the principle of non-discrimination against institutions of other EC members. This means that all the rules that prevent banking firms from other EC countries from establishing in Spain and from providing services under the same conditions as the domestic bank institutions must be abolished. This process will last up to 1992 and the different discriminatory rules will be abolished gradually.

- The second basic aspect has to do with the First Banking Co-ordination Directive (in effect since 1977), which laid down the minimum conditions to be observed before authorizing the creation of a new credit institution. This means that from 1992 onwards, the Spanish authorities must accept the creation of any EC bank which complies with the conditions laid down. As it will be seen later on, this eliminates the criteria called 'market economic needs' when studying the applications submitted to open a bank. Related to this issue, one must make reference to the EC First and Second Banking Co-ordination Directives. The ultimate goal of these two Directives is to set out a system whereby a credit institution whose head office is in any EC country may open branches in any other EC country. The Commission's approach towards attaining an EC single banking market hinges upon two main principles: 'home country control' and 'mutual recognition'. 'Home country control' stipulates that institutions operating across national boundaries should be supervised mainly by the regulatory authority of the country in which their head office is located. The Commission views this as acceptable provided there is 'mutual recognition' that each country's supervisory system are equivalent. These Directives mentioned embody these two principles which will allow any bank authorized by its home regulators to provide a universal range of banking services anywhere in the EC.

- The third aspect is related to the limitation of risk concentration. The (1987/062) Large Exposures Directive (LED) led to a change in the control system of those risk concentrations in Spain.

The continuing developments towards a free-market system in the banking industry in Spain must also be studied. In 1987, all interest rates and service charges were liberalized; hence, the process of liberalization was completed and the free-market philosophy reached its highest point to date.

The process of liberalization (also called market structural deregulation) has been accompanied by a corresponding trend towards supervisory re-regulation. To some extent this reflects an underlying conflict between competition and regulation. Structural deregulation has been stimulated by the political adoption of a general regulatory philosophy that emphasizes the advantages of the 'free-hand' of the market in resource allocation. The practical experiences of the market, however, have suggested that structural deregulation may have associated with it significant costs in the form of periodic high risk-taking by certain 'pockets' of financial institution. As a result, supervisory re-regulation appears to be necessary in order to match the increased risk potentials for financial institutions that may be associated with structural deregulation. In 1985, this supervisory re-regulation was manifested in the reform of the capital adequacy requirements in Spain.

In this section the researcher has outlined the evolution of bank regulation in Spain and the change in philosophy or perspective that has taken place from 1962 onwards. Up to the 1970s, the banking sector was heavily regulated and different institutions experienced different constraints. The efforts to develop the Spanish economy seemed to shape that heavily regulated environment. The process of liberalization and a change towards a more free-market positions in the banking sector started in 1969 and continued gradually up to 1987 when all interest rates and charges were freed. Supervisory re-regulation (especially reform of the capital adequacy requirements) also came into effect to match the increased risk potential for financial institutions that may be associated with the process of liberalization or structural deregulation. Spain's entry into the EC simultaneously resulted in changes of philosophy or in the viewpoint of the legislator since legislation had to be adapted to be in line with EC legislation.

3.4.- THE PRESENT BANK REGULATION IN SPAIN.

3.4.1.- Entry and Expansion Regulation.

The requirement whereby a previous authorization is necessary to engage in banking activities, as well as the regulation on the geographical expansion of the institutions, affect the structure of the banking system. There are two major considerations when it comes to examining the authorization requirement : the solvency of the new credit institution and the degree of competition in the banking system.

These two considerations need to be reconciled since it appears contradictory that it is necessary for new entrants to secure solvency when new competition reduces margins and, thus, solvency. Financial regulatory authorities generally aim at reaching an equilibrium between the market determination of the degree of competition and the need to impose barriers of entry in terms *inter alia* of solvency requirements.

The requirements for new banks to comply with can be objective or discretionary. When the requirements are objective, the new banks only have to comply with the rules laid down in order to obtain the authorization. Alternatively, when they are discretionary, the authority keeps the right to interpret whether certain requirements are fulfilled. The most typical example of discretionary requirement for the Spanish banking case is the 'market economic need' (necesidad economica de mercado). This requirement means that only the institution which shows that there exists a economic need for its creation (in terms of population, economic characteristics, existence of other institutions in the area, etc.) where they wish to set up a new institution will obtain the authorization. The EC legislations prohibit the use of this principle in particular and the existence of a discretionary procedure of authorization in general.

As for the regulation on geographical expansion, solvency and competition considerations are also important. Solvency is taken into consideration as follows : the authorities try to make sure that an institution is able to absorb the creation of new branches without negative effects on its operational characteristics. The authorities try to prevent these institutions from becoming too large in terms of numbers of branches compared with their basic financial magnitudes. Very often, equity is thought to be a measure of expansion capacity.

Competition considerations are also relevant. In the past, when the interest rates were regulated, the firms could not compete in terms of prices. They used to compete by opening more branches and then providing the services closer to the customer.

As for the actual Spanish regulation on entry and expansion of banking institutions, the main points are the following :

a) As far as the creation of new banking institutions, for the Spanish and EC banks the criteria of "market economic need" is held up to 1992 but in an objective way as laid down in the First Directive. However, for the non-EC banks, this criteria will continue to be applied after 1992: thus the authorization for these banks will be discretionary.

b) As far as the expansion of banking institutions is concerned, up to 1985 the regulation was based upon the existence of sufficient equity. Since 1985, the system changed completely, although the possibilities of expansion are still related to bank equity. However, the way they are now linked is less direct and more flexible. The role of capital, then, is also important in this regulation.

3.4.2.- Banking Ratio Requirements.

Nowadays, the commercial and savings banks and the credit cooperatives in Spain are subject to the following three ratio requirements :

1) Cash ratio (coeficiente de caja): this requirement obliges banks to hold a certain percentage (previously fixed) of their liabilities in the form of deposits in the Bank of Spain and in cash. These requirements are essentially instruments of monetary policy.

2) Investment ratio (coeficiente de inversion): the main aim of this requirement is to allocate financial resources of the banks to sectors considered to have priority; the maximum level of

the ratio is 35 %. In addition, up to 1986 there were two maximums for the two types of assets where the resources should be invested : 15 % for the short-term and medium-term debt issued by the Government (this ratio was called PPT ratio whose translation would be Treasury Bills ratio) and 25 % for other sectors (support for the exports industry, employment, social needs etc). The latter was also called the investment ratio; nowadays, there is only an unified investment ratio.

3) Own funds ratio (coeficiente de recursos propios): this requirement aims at securing the solvency of the banks by obliging them to hold a minimum level of equity as a function of the risk of the institution.

In Table 3.2, the broad evolution of the investment (PPT and investment ratios) and cash ratios for 1981-90 is displayed. Up to 1985, the investment ratio shown as private banks corresponds to the commercial banks: the industrial banks ratio was slightly lower. One can observe that up to 1985, the savings banks had to comply with higher ratios than the private banks.

From 1986 onwards, it can be noted that there is no distinction between private and savings banks in terms of ratios to be held. One can also notice the decreasing trend in the ratios through time. The process of deregulation seems to be shaping this trend. From 1987 onwards there is no distinction between Investment and PPT ratios. There exists just one unified investment ratio nowadays. At the end of 1992, the investment ratio disappears, in order to comply with the EC legislation.

Table 3.2 : Investment Ratios (PPT and Investment ratios) and Cash Ratios : Evolution in the Period 1981-90.

Private Banks

	Investment ratio	PPT ratio	Cash ratio	Total
December				
1981	21.0	--	8.75	29.75
1982	21.0	--	9.75	30.75
1983	21.5	--	11.75	33.25
1984	21.5	12.0	18.00	51.50
1985	16.5	10.0	18.00	41.00
1986	13.0	10.0	18.00	41.00
	Unified			
1987	11.0		18.50	29.50
1988	11.0		16.50	27.50
1989	9.5		17.00	26.50
1990	7.0		5.00	12.00

Savings Banks

	Investment ratio	PPT ratio	Cash ratio	Total
December				
1981	45.0	--	8.75	53.75
1982	39.0	--	9.75	48.75
1983	35.25	--	11.75	47.00
1984	35.25	12.0	18.00	65.25
1985	26.50	10.0	18.00	54.50
1986	13.0	10.0	18.00	41.00
	Unified			
1987	11.00		18.50	29.50
1988	11.00		16.50	27.50
1989	9.50		17.00	26.50
1990	7.00		5.00	12.00

Source: Trujillo, Cuervo-Arango and Vargas (1988, p. 227); and Parejo, Rodriguez and Cuervo (1992, pp 176-189).

The decreasing trend in the liquidity ratios can also be observed in Table 3.2. By 1990 the required cash ratio was lowered to 5 per cent. The reduction in the ratio appears to have enhanced banking competition in Spain, since banks engaged in an accounts war in order to capture deposits that, from 1990 only required 5 per cent of cash ratio.

3.4.3.- Regulation on Interest Rates.

The regulation of bank interest rates is basically the imposition of a legal ceiling on the rates paid to depositors and charged in banks' assets. When this regulation came into effect, the major justification for it was to secure solvency of the institutions by trying to prevent excessive competition between banks. However, nowadays this regulation is no longer in effect. The current features of financial markets, instruments and intermediaries and the process of deregulation have effectively rendered this regulation no longer valid in practice.

In Spain, the process of deregulation of interest rates has been gradual in order not to affect negatively the markets. The process began in 1969 by liberalizing the interest rates on operations with long-term maturities. The process of deregulation of interest rates in Spain was brought to an end in 1987 when all the interest rates are deregulated (except those included in the investment ratios). In 1987, the commissions charged by banks were also liberalized.

3.5.- BANK SOLVENCY REGULATION IN SPAIN.

3.5.1.- Introduction.

In this section, one needs to examine the bank solvency regulation in Spain before dealing with the capital adequacy regulation which is a key part of the broader concept of solvency regulation.

Why regulate bank solvency ? The problem is complex: a bank with financial problems could be viewed as a sign that the banking system is not doing well or is 'fragile'. This might affect the rest of the institutions in the market because of the interrelationships among depository institutions. Depositors might feel that problems in one bank could affect other banks through the interrelationships among banks. This is called 'contagion-risk', and the actions taken to secure solvency are then, important for the system as a whole.

Solvency may be defined broadly and simply as the degree of viability of a firm in the long run. This viability depends upon two factors. The first is its capability of obtaining profits. The second one is its capability of avoiding or absorbing losses. Given the characteristics of the banking business, the latter is vital for banking. The quality of bank assets is a central factor when it comes to avoiding losses. In addition, the larger the equity and provision funds of a bank, the higher its capability to absorb losses and thus, the greater is its solvency. In this context, Maisel (1981, p.20), building on an earlier study by

Sharpe (1978) defined adequate bank capital as follows:

"Capital is adequate either when it reduces the chances of future insolvency of an institution to some predetermined minimum level or, alternatively, when the premium paid by the bank to the insurer is 'fair'; that is, when it fully covers the risks borne by the insurer. Such risks, in turn, depend upon the risk in the portfolio selected by the bank, on its capital, and on terms of the insurance with respect to when insolvency will be determined and what losses will be paid"

At this stage, it will be as well to make clear the differences between equity and provisions. Provisions are to cover probable losses or commitments by the firm, whereas equity represents shareholders (owners) funds available to absorb unexpected losses.

In the following subsections, the evolution of the solvency regulation in Spain, and the present bank solvency regulation are examined.

3.5.2.- Evolution and Philosophy of the Solvency Regulation in Spain up to 1985.

The 1962 Law mentioned above embodies an enhancement in the process of regulation of and intervention in the banking system by the Government. The main goal of the 1962 Law is the solvency of the banking system. The guarantee ratio (coeficiente de garantia) which linked equity with the deposits of a bank (it was the inverse of the gearing ratio) began to play a major role in the system as well as the liquidity ratio. The objective was to secure the solvency and liquidity of the banking firms. The obligations of creating legal reserves and having a minimum level of equity were also laid down in the Law.

The philosophy lying behind the 1962 Law (and stated in the Law) as to the solvency ratios is double. As said earlier, the protection of depositors by securing solvency is the first concern of the Law. The solvency of the banks was the main goal of the Law in the heavily regulated and interventionist (by the Government) environment of the 1960s. However, the solvency ratio began to play a role in the monetary policy from that moment onwards. Thus, the philosophy shaping the 1962 Law as to the solvency ratio was both the solvency of the banks and the use of the ratio as an instrument of monetary policy.

The solvency ratio was first only imposed on the industrial banks in 1962 (originally a level of 15 per cent and in 1968 a 10 per cent). In 1974 the application of the solvency ratio is extended to the commercial and mixed banks (a level of 8 per cent) and in 1979 and 1980 to the savings banks and credit cooperatives, respectively. Thus, this solvency ratio regulation used to discriminate between institutions as a function of their specific characteristics: there were differences between commercial and industrial banks. Yet the savings banks were the most discriminated against since the only way for them to increase their equity was through reserves which limited the amount of profits devoted to Social Works Funds as a function of the solvency ratio held.

The guarantee ratio aimed at protecting depositors by attempting to secure a sufficient level of equity that would serve as a guarantee for depositors in the case of the bank getting into financial difficulties. In addition, there used to be several restrictions and limitations placed upon the opening of branches, fixed assets, industrial participations portfolio, firm risk, business volume in foreign currency and risk concentration. All the restrictions depended on the level of equity.

This guarantee ratio had many disadvantages since it did not capture the risk financed with funds other than deposits and, hence, it did not link equity with the true dimension and composition of the bank business.

In 1977, the Deposit Guarantee Fund (Fondo de Garantía de Depósitos) was set up in Spain. In 1981, apart from continuing the liberalization process, the legislation enhanced the solvency control mechanisms through Bank of Spain's regulation in terms of accounting standards and provision for loan losses.

3.5.3.- Solvency Regulation since 1985: the Role of the Capital Adequacy Regulation.

The main change in solvency regulation took place in 1985 when the solvency ratio regulation was changed. The solvency ratio as computed according to the 1962 Law (Capital / Deposits) had several technical and practical problems. First, deposits do not capture a bank's risk exposure adequately and hence computing the solvency ratio in terms of deposits is inappropriate. It did not link equity with the true dimension and composition of the bank business which made the ratio irrelevant. Secondly, the supervisory authority had very little leeway to carry out a correct policy of assessment and classification of assets according to the risk they bear. Thirdly, the different rules on the solvency ratio were too complex and different for each type of banking institution, which resulted in a lack of effectiveness and in important infractions and circumvention of the regulation.

Being aware of all these difficulties and problems, the regulatory authorities considered that a reform of the solvency or capital adequacy ratio regulation was necessary. In 1985 the reform took place, and in the draft of the reform the objectives of the new regulation were stated. They were the following:

+ Technical improvements in the concept and mechanism of application of the solvency ratio.

+ Enhancement of own funds of the banking institutions so as to face the higher risk of banking activities.

+ Development of the ways of increasing the own funds not only through reserves but also through the use of subordinated debt and restructuring assets by reducing relatively the assets with higher risk.

+ Simplification of the regulation by eliminating partial rules as the limits of concentration risks.

+ Two ratios (a general one and a selective one) are established as a function of the risk. The higher ratio of both must be fulfilled.

+ General application of the new legislation to all the banking institutions except in the case of the unavoidable differences of savings banks and credit cooperatives.

The solvency of the depository institutions must be based fundamentally upon an adequate level of capital and a good portfolio-risk diversification as well as a good provisions policy (Trujillo, Cuervo-Arango and Vargas, 1988). The new Spanish capital requirements for banks aims to achieve an adequate level of capital and adequate portfolio-risk diversification.

The current Spanish capital-adequacy requirements model is in line with the 1988 BIS Recommendations and the 1989 EC Directives on the issue. Spain did not take part directly in the BIS Agreement but adhered later to the BIS Recommendations.

The 1985 solvency ratio regulation with all its improvements is the most important part of banks solvency regulation nowadays, and it will be described in section 3.6. The philosophy and role of this solvency or capital adequacy ratio regulation needs a further comment. As suggested in section 3.3.2, there has been a clear movement in recent years towards greater detail and codification of supervision, whose best example is the new solvency ratio regulation. This seems to reflect the underlying conflict between competition and regulation since market structural deregulation (which encouraged the intensifying competition) and supervisory re-regulation (like capital adequacy regulation) have come about together.

The practical experiences of the market (as happened during the banking crisis in Spain), have suggested that structural deregulation (and also a lack of adequate supervisory and monitoring bodies and instruments up to the early 1980s) may have associated with it important costs in the form of high risk-taking by some credit institutions. As a consequence of this, supervisory re-regulation (such as solvency ratio regulation) appears to be needed in order to match the increased risk potentials for banks that may be associated with structural deregulation. The new capital adequacy regulation aims at achieving a 'safe playing field' for the banking market once the 'level playing field' has been accomplished through the process of liberalization and deregulation.

3.5.4.- The Present Bank Solvency Regulation in Spain.

Apart from the bank capital-adequacy regulation (which will be considered in the next section), there are three pieces of regulatory action other than capital adequacy requirements that aim at securing bank solvency. These are the following:

- Deposit Guarantee Fund (Fondo de Garantía de Depósitos).
- Provision for loan losses.
- Country-risk provisions.

The Deposit Guarantee Fund for private banks was created in 1977, and the Deposit Guarantee Fund for savings banks was created in 1982. Their ultimate goals are not only to guarantee deposits, but also to get involved in actions related to the solvency of the institutions such as intervening to save banks in crisis. In the period 1978-82, the Fund intervened to save 26 private banks in Spain (see Trujillo, Cuervo-Arango and Vargas, 1988). The Fund was first created for private banks since the banking crisis affected private banks more negatively.

Although the membership in the Fund is, in theory, voluntary, it is obligatory in practice since non-member banks cannot obtain financial resources from the Bank of Spain. The Fund guarantees up to 1.5 million pesetas per depositor. 50 per cent of the resources of the Fund are provided by the Bank of Spain and the other 50 per cent by the banks' contributions. Private and savings banks had to contribute with a percentage of their deposits. These percentages have changed over time: when the Fund was created, the percentage was 0.1 per cent of total deposits for both private and savings banks; in 1985 it was set at 0.12 per cent for private and savings banks; the contribution was lowered to 0.03 per cent for savings banks in 1988 as a consequence of the increasing reserves of the Fund since no action had been needed so far to save a savings bank; in the case of the private banks, in 1989 the percentage was increased to 0.2 per cent, and to 0.25 in 1990 per cent; recently, in January 1993 the percentage has been lowered to 0.15 per cent for private banks.

The provision for loan losses is very important in banking since one of the major risks in banking activities is the credit default-risk, the probability of experiencing losses on a loan.

The Spanish regulation on the provision for loan losses can be divided into two parts:

- First, the legislation lays down rules to classify assets (there are rules to know when an assets becomes a possible loss).

- Secondly, the legislation also establishes the minimum amounts to be held for the doubtful assets: there are 4 ratios (25, 50, 75 and 100 %) according to the category of the assets.

The country-risk provisions have been a major issue in international banking and have become the focus of risk management in international banking. Whenever a financial institution transacts across a national border or in foreign currency, exposure to transfer or convertibility risk, known jointly as "country risk", exists. This matter became central in the international debt crisis in August 1982. The Spanish regulation classifies the countries according to risk. There are five types of countries which have different ratios to be held:

* Group 1 (OECD countries): no provision is obligatory.
* Group 2 (no classified countries) : 1.5 %
* Group 3 (temporary difficulties) : 15 %
* Group 4 (doubtful countries) :
    - 20 %, the first year when it is classified in this category.
    - 35 %, from the 2nd year onwards.

* Group 5 (very doubtful countries):
    - 50 %, the first year.
    - 75 %, the 2nd year.
    - 90 %, the 3rd year onwards.

Generic provision (for Groups 3 to 5) = 35 %

The provisions for Groups 3 to 5 can not be lower than 35 % (generic provision).

3.6.-THE PRESENT BANK CAPITAL ADEQUACY REQUIREMENTS IN SPAIN.

3.6.1.- Introduction.

Capital adequacy enters into the operation of banking institutions in two ways. First, there is an absolute amount of initial capital required for the establishment of banks; this is a clear barrier to entry to banking markets. The second way in which capital adequacy enters into the operations of the banks is through the imposition under prudential regulations of minimum capital ratios which all banks must attain or exceed. This second are is the main concern of this thesis.

The Spanish capital requirements for banks aim to achieve an adequate level of capital and an adequate portfolio diversification. The current capital ratio requirements model is in line with the BIS Agreement (July 1988) and the respective EC Directives. We first need to study both the BIS and the EC Standards to learn the sources from where the Spanish contemporary capital regulation has developed. Then, the Spanish capital regulation will be analyzed.

3.6.2.- The BIS Proposals.

3.6.2.1.- *The Risk Assets Ratio.*

The BIS proposals for convergence of capital adequacy are based upon a Risk Assets Ratio approach (RAR). The Basle Committee considers (1988, para 9):

" a weighted risk ratio in which capital is related to different categories of asset or off-balance-sheet exposure, weighted according to broad categories of relative riskiness is the preferred method for assessing the capital adequacy of banks."

Thus, the RAR model is the core appraisal and monitoring system which the contemporary convergence movement has centered upon. Conceptually, it is a comparatively simple model. Total bank assets (A) are divided into a number (n) of 'equivalent risk classes', a_i (where A is the summatory of a_i). Separate 'risk weights' are assigned to each of these equivalent risk classes of asset (risk weights = r_i). These risks are not absolute measures: they reflect the relative riskiness of the respective asset category (a_i). 'Weighted assets' is then computed as follows:

$$W = \sum a_i * r_i \qquad (3.1)$$

Let (supervisory-measured) bank capital be C and a bank's computed RAR be R_a(= C/W).The latter is compared with the minimum specified supervisory RAR level, R_s. A bank is presumed to have adequate capital if $R_a \geq R_s$. Condition $R_a < R_s$ is indicative *a priori* of inadequate capital.

The risk weights assigned to each of the equivalent risk classes are designed to reflect (largely) the relative credit risk. This means *inter alia* that the model is not an accurate risk appraisal tool since it does not recognize the wide differences that may exist in the riskiness of assets within a single risk class. As it will be seen below, this is particularly important in the case of credits to the private sector.

The framework of risk weights has been kept as simple as possible. Only five risk weights are employed: 0, 10, 20, 50 and 100 per cent. Assets are allocated into categories of relative riskiness according to their deemed credit-exposure. The scheme focuses on credit risk and country transfer risk as a further aspect of credit risk. The weighting structure of the convergence RAR scheme is set out in Annexes 2 and 3 of the Basle paper (1988). In this thesis, the researcher is only interested in the study of on-balance sheet items and the researcher will not consider off-balance sheet operations. Table 3.3 displays the BIS risk weights by category of on-balance-sheet assets.

Table 3.3: Risk weights by category of on-balance-sheet asset (Basle Agreement).

Assets	Weight
Group 1: Cash, Balances at and claims on domestic central bank; loans to domestic central governments; securities issued by domestic central governments; loans and other assets collateralised by cash or domestic central government securities or fully guaranteed by domestic central governments.	0 %
Group 2: Claims on domestic non-central public sector entities and loans guaranteed by such entities (at national discretion).	0, 10, 20 or 50 %.
Group 3: Claims on domestic and foreign banks with an original maturity of under 1 year; claims on domestic banks with an original maturity of 1 year and over and loans guaranteed by domestic banks; claims on foreign central governments in local currency financed by local currency liabilities; cash items in process of collection.	20 %
Group 4: Loans to owner-occupiers for residential house purchase fully secured by mortgage.	50 %
Group 5: Claims on the private sector; cross-border claims on foreign banks with an original maturity of 1 year and over; fixed assets; real estate and other investments; capital instruments issued by other banks (unless deducted from capital); all other assets.	100 %

Source : Committee on Banking Regulations and Supervisory Practice (1988, Annex 2)

The Basle Committee is continuing work on several issues related to bank risk. The existing capital convergence framework essentially addresses only credit risk. However, banks are exposed to a range of other forms of risk such as interest rate risk, foreign exchange risk, position risk, and settlement and operational risks. Since the Basle Accord was promulgated, both the Basle Committee and the European Commission have been pursuing intensively the ways in which other types of risk might most appropriately be incorporated within the regulatory arrangements. In the course of pursuing this work, there has been increasing contact between banking regulators and the authorities responsible for the regulation of securities business, particularly the International Organization of Securities Commissions (IOSCO). All three groupings are now coordinating very closely to develop a common approach to trading and interest rate risk in particular. These developments are beyond the scope of this research, since we are only concerned with commercial bank capital adequacy.

3.6.2.2.- *BIS Capital Definition.*

Let us now examine the numerator of the capital adequacy ratio (R_a), that is, the capital. How can we define capital ? Wide differences still exist between countries on how capital should be defined. Pecchioli (1987, p. 108) provides a comparative view of the basic components of capital for solvency (supervisory) purposes in a wide range of European and other countries. Although considerable differences in detail exist between countries, there seems to be a general agreement on the functions of core capital for capital adequacy purposes. Pecchioli (1987, p.107) summarizes this as follows :

+ They must be permanently available to absorb losses.

+ They must impose no contractual charges against earnings.

+ They must not be redeemable at owner's request.

The Basle Agreement for capital adequacy purposes suggests two Tiers of capital. Tier 1 capital (core capital) comprises equity capital, published reserves, minority interests in equity of subsidiaries less than wholly owned, and current year profits (at national discretion). Equity capital consists of issued and fully paid-up ordinary shares/common stock, non-cumulative and perpetual preferred stock. Goodwill must be deducted from Tier 1.

Tier 2 capital includes undisclosed reserves, asset revaluation reserves, general provisions/ general loan loss reserves, hybrid (debt/equity) capital instruments and subordinated term debt. Tier 2 capital may be included by supervisors up to a maximum of 100 % Tier 1 capital. Subordinated debt is limited to a maximum of 50 % of Tier 1. There are also limits on general provisions/general loan loss reserves and asset revaluation reserves (as unrealized reserves).

The deductions from Total Capital (Tier 1 + Tier 2 - Deductions) are investments in unconsolidated banking and financial subsidiaries and investments in capital of other banks and financial institutions.

As far as the minimum target RAR (see equation 3.1) established in the Basle Agreement is concerned, a minimum target of RAR of 8 % was agreed for the end of 1992. The transitional arrangements can be found in Committee on Banking Regulation and

Supervisory Practices (1988, Annex 4). As our analysis focuses on 1987-90 for the Spanish banking system, it is interesting to note in those transitional arrangements that by the end of 1990, a minimum ratio of 7.25 per cent should be observed.

The Basle Committee is continuing work on the capital adequacy framework by monitoring national implementation and taking account of the effects of accounting standards and fiscal policy on this implementations. In February 1991, the Basle Committee published proposals aimed at achieving a more uniform definition of the treatment of provisions in the capital definition.

There have been recent debates internationally with regard to the creation of novel forms of Tier 1 and Tier 2 capital. Many banks have attempted to create new forms of Tier 1 and Tier 2 capital in order to circumvent the current capital regulation. These financial innovations have included variable rates notes, perpetual preferred stock and repackaged perpetual debt. There has been a debate on whether revaluation surpluses may be upgraded to Tier 1 capital. These important issues have a crucial bearing on capital augmentation strategies since they exemplify banks' attempt to have a wider range of financial instruments to augment capital.

Regulators have been forced to abandon a sole reliance on general principles and to adopt a case-by-case approach to all these kinds of proposals. The Group of Ten (G-10) supervisors have created a subcommittee - the Capital Liaison Group - to monitor capital definitions on a continuing basis. The Basle forum appears to have been strengthened under the pressures it has experienced since 1988 to modify and adjust its original proposals.

3.6.3.- The EC Directives.

3.6.3.1.- *Evolution and Characteristics.*

Work at Brussels on the development and testing of capital adequacy ratios for banks and other credit institutions began in the late 1970s. The work at Brussels and Basle overlapped to some extent, but there were important differences. The work on capital adequacy at Brussels was designed to cover banks and all credit institutions within the EC, and to be legally binding in all EC members. At Brussels, the focus was more on domestic activities rather than on international banking. Work at Basle was geared towards international banks, and their proposals do not have the force of law. There are also other definitional differences between Brussels and Basle that are reviewed below.

During the 1980s a consensus emerged within Europe that convergence of capital adequacy was a desirable requirement. Before the Second Banking Directives's provisions for mutual recognition and home country control can take effect, a harmonized approach towards capital adequacy is necessary. European legislation will need to be in place for defining own funds and prescribing at least the general framework of a harmonized solvency ratio.

One of the legislative aspects the EC has considered necessary to harmonize in order to establish a Single European Market for banking services is the solvency ratio. This has been considered in two Directives. The first one, the Own Funds Directive (89/299) harmonizes the definition of capital of credit institutions. It defines the funds of unconsolidated capital to be employed and the numerator (or capital adequacy base) for solvency ratios. These definitions are very similar to those of the BIS Committee. The second one, the Solvency Ratio Directive (89/647), harmonizes solvency ratios for credit institutions. Its objective was to harmonize solvency ratios for credit institutions within the EC.

The EC solvency ratio seems to reflect closely the Basle proposals. The Directive proposals are minimum standards: they lay down the minimum rules that home member states should observe. Individual members may establish stricter though not looser rules for their own institutions than those suggested by the Directives. The benefit of a common approach and philosophy, therefore, may be weakened by the competitive possibilities of this requirements. As Gardener (1989b) argues, it still leaves open the opportunity of some 'competition in laxity' to develop between major financial centers.

3.6.3.2.- *Related Regulatory Areas.*

There are related regulatory areas in the EC legislation that although they do not directly affect commercial bank capital adequacy, the main concern in this thesis, they are relevant in this context.

The Capital Adequacy Directive (CAD) (90/141) aims mainly at securities houses. The CAD establishes minimum capital requirements for the investment firms. These requirements are lower than those laid down for credit institutions in the Second Banking Co-ordination Directive. The CAD imposes additional capital requirements on banks when they deal in securities. CAD uses a method of establishing solvency that takes account of a wide range of different risks: these include position risk, settlement risk, interest rate risk, exchange rate risk, etc.

German banks objected particularly strongly because as universal banks they make no distinction between their banking and securities activities and consequently they are subject to both Directives at once. This appears to be less of a problem for banks in countries like the UK where banks conduct business through separately regulated subsidiaries.

CAD has raised many important issues, and these seem unlikely to be resolved in the foreseeable future. One question is whether banks and securities houses should be treated the same. Although many believe not, the institutional convergence between investment and commercial banking may reduce the case for complete regulatory separation. The compromise proposal in CAD is that banks (at national supervisors discretion) should be allowed to separate their securities trading activities.

Another of the features of the EC Directives on the issue which has most affected the new solvency ratio in Spain is the requirement to analyze the depository institutions on a consolidated basis (Consolidated Supervision Directive, (83/350) and the modifications introduced in the Directive 90/605)). The solvency ratio for the banks is monitored according to the consolidated balance-sheet by the authorities of the country in which their head office is located.

Finally, one needs to mention the Large Exposures Directive (87/062) which harmonizes credit exposure limits for banks and the Deposit Guarantee Directive (87/063) that sets out to ensure that EC depositors are covered by suitable deposit-insurance compensation schemes.

3.6.3.3.- *Main Differences between BIS and EC Solvency Ratios.*

The main definitional differences in terms of regulatory capital that the EC Directives have with respect to the Basle framework are:

1) Tier 1: in the EC Directives, current year profits are included if verified by auditors. In addition, funds for general banking risks are included as a separate category but they are not included when a limit on Tier 2 is fixed.

2) Tier 2: latent revaluation reserves are not allowed in the EC Directives. The commitments of co-operative members must be specified as included and they are included in subordinated debt limit. Finally, excess provisions of up to 4 % of specified assets are permitted, at national discretion.

3) Deductions:

* From Tier 1:

  - Goodwill and other intangibles.

  - Own shares held at book value.

  - Current year losses.

* From Total:

  - Investments in capital of other banks and financial institutions:

    (a) only where they exceed 10 % of investee institution's capital whole amount and

    (b) such investments where these total are more than 10 % of reporting institution's own funds before deduction of investments in (a) (excess amount).

4) Floors/ceilings: no limit is set on general provisions included in Tier 2.

The minimum ratio specified by the EC Directives is 8 % and must be implemented by end of 1992 (equal to Basle). There are slight differences in risk weights and in other features between Basle and the EC Directives[2].

3.6.4.- The Current Spanish Solvency Ratio.

3.6.4.1.- *Introduction.*

A risk-based capital adequacy requirement has been in place since 1985, but the EC Directives have yet to be implemented. The existing system applies to all credit institutions on a consolidated basis.

The Spanish capital adequacy ratio is a mixed one in which two main elements co-exist simultaneously:

- A RAR in line with the Basle Agreements and EC Directives. This needs further explanation below.

- For deposit-takers there is also a global or non-selective ratio computed on a non-weighted balance-sheet. The minimum non-selective capital ratio must be a 5 % of the total investments net of provisions and depreciation.

The latter means a limit placed on the possibilities of transforming assets to comply with the RAR. If the portfolio of a bank is moved towards investments with lower risk and, thus, less equity is needed according to RAR, the equity needs will decrease till falling below the equity requirements set by the non-selective ratio, which at that moment, will be the one to comply with.

3.6.4.2.- *Risk-Weighting in the Spanish Solvency Ratio.*

The Spanish risk-based ratio specifies capital requirements rather than weights. In other words, in Spain the weightings and the level of the minimum ratio (8%) are applied to each asset category simultaneously. For example, instead of applying first the weightings (0, 10, 20, 50 and 100 %) to each assets category and then requiring defined capital equal to 8 % on the weighted assets (like in the Basle RAR), in Spain both weighting and minimum ratio are applied together and simultaneously to each assets category. Thus, the ratios applied in Spain would be: 0 %, 1.6 % (which is a 20 % of 8 %), 4 % (a 50 % of 8 %) and 8 % (100 % of 8 %). The actual ratios in Spain are not exactly these figures, but the general philosophy is as summarized here.

In order to examine the similarity of both systems, the following mathematical equation will be used:

Let us consider

$a_1......a_n$ the different risk asset categories laid down in BIS.

$r_1......r_n$ the weightings applied to each risk asset category.

$R_s........$ the minimum specified supervisory ratio level.

$b_1......b_n$ the selective ratio or own funds needs for each asset category in the Spanish solvency ratio.

C .... capital

The Basle Agreement model would be :

$$C\ /\ (a_1 * r_1 + ... + a_n * r_n) \geq R_s \qquad (3.2)$$

which would be equivalent to the Spanish one which is :

$$C \geq (a_1 * b_1 + ... + a_n * b_n) \qquad (3.3)$$

$$\text{where } b_i = r_i * R_s \qquad (3.4)$$

The actual ratios applied in Spain are displayed in Table 3.4. It is important to note that the ratio (R_s) applied in Spain is 7.5 % instead of 8 % (minimum BIS ratio for 1992). Another difference between both models is that there are more asset categories in the Spanish capital ratio.

Table 3.4 : Selective (RAR) Solvency Ratios in Spain (Weighting and Minimum Ratio together).

Risk assets categories	Selective (RAR) ratio	Variation margin delegated to the Bank of Spain
Group a:Credit riskless assets: Cash; deposits in Bank of Spain; loans to public sector; loans fully collaterised by cash; currency forwards contracts.	0.25	0 to 0.75
Group b:Assets with minimum risk: Credit institutions securities.	1.25	0.50 to 1.50
Group c: Guaranteed Assets: Loans fully secured by mortgage; credits fully secured by credit institutions; loans with other guarantees; loans to state-owned firms.	3.75	2 to 4
Group d: Normal risks: Non-guaranteed loans; all other loans; long or short positions in foreign currency.	7.50	5 to 8
Group e: risk capital; industrial participations other than in banks.	16.00	5 to 16
Group f:Fixed assets and others:fixed assets; participations in other banks; subordinated debt with other credit institutions.	35.00	10 to 35
(**Group g:**Intangible assets not deducted from equity.	100.00	--)

Source: Trujillo, Cuervo-Arango and Vargas (1988, p.256)

In the Spanish risk weighting in balance sheet, there are also distinctions between OECD and non-OECD countries and between the public and private sectors, but no distinction is made within the public sector. Another difference is that in Spain, the treatment does not differ according to maturity.

According to a Price Waterhouse Survey (1991) on the implementation of capital adequacy convergence proposals, it may emerge on the implementation of the EC than in certain areas the Spanish requirements are more demanding than the Basle minima: eg. higher weightings being applied to capital investments in corporates; a low weighting being applied to OECD government debt.

3.6.4.3.-*Capital Definition in the Spanish Solvency Ratio.*

In the Spanish capital adequacy regulation, there is no Tier 1 / Tier 2 split. In general a more restrictive definition applies than in the BIS Proposals. In the Spanish legislation, the capital definition for private banks, includes share equity, disclosed reserves, general provisions, and the subordinated debt. The capital definition for savings banks includes foundation funds, disclosed reserves, general provisions, Social Works funds and the subordinated debt. We will return to these definitions in section 4.2.2.

The differences in terms of capital definition between the Spanish regulation and the BIS are that in Spain:

- Undisclosed reserves and hybrid instruments are excluded.
- General Provisions exclude a specific 1 % provision for "insolvencies"

- Current year losses are deducted.
- Subordinated debt is limited to 20 % of the calculated capital requirements and to 30 % of total own funds.
- However, no limit is applied to general provisions and investments in other banks are not deducted but carry a 35 % capital requirement.

3.6.4.4.- *The Cases of Risk Concentration and Foreign Branches.*

Finally, there are two important questions that are associated with the solvency ratio. These are the following:

* Regulation on Risk Concentration: the solvency ratio appraised above is not sufficient alone to monitor the risk concentration of a bank. In order to limit the risk concentration, without having to use prohibition, a factor was included in the solvency ratio to dissuade banking institutions out of risk concentrations. This has been implemented by imposing penalties, in terms of larger own funds needs, for operations entailing risk concentration. The Spanish legislation on the issue closely follows the (1987/062) EC Large Exposures Directive whose main points are as follows:

a) A definition: the risk of a consolidated credit institution with a client or group of clients related becomes a large exposure ('gran riesgo') when the value of the risk is equal to or higher than 15 % of the own funds of the consolidated institution. If this percentage (15 %) is exceeded, then double the solvency ratio on these assets must be maintained. If it is higher than 30 %, a triple multiple will be applied.

b) A first limit: the highest risk of a credit institution with one client may not be higher than 40 % of the own funds of the consolidated credit institution.

c) A second limit: the total sum of the 'large exposures' (as defined in a)) borne by a consolidated credit institution may not exceed 800 % of the own funds of the institution.

* Solvency Ratio regulation on the Branches of Foreign Banks: this is a major issue in the EC because the EC legislation will lay down after 1992 that the solvency ratio will be demanded in the country of origin of the bank, which means that the different regulation on the branches of foreign banks will no longer be applicable after 1992. The philosophy shaping the different capital regulation for foreign banks is the creation of barriers of entry to competition rather than the solvency of the institution. However, after 1992 it will no longer be applied.

3.7.- SYNTHESIS.

In this chapter the bank regulation in Spain has been examined, focusing particularly upon the solvency regulation. Capital adequacy requirements in Spain have been analyzed in more detail.

The Spanish banking sector is one of the most regulated industries in the economy. Several justifications for this have been suggested: protection of depositors and banking consumers, monetary control, limiting competition, allocation of bank credit to priority sectors and attempts to encourage certain banking models. Before the process of liberalization that took place from the late 1960s to the 1980s, banking regulation in Spain was shaped by the philosophy that prioritized the economic development of the country (through allocation of bank credit to priority sectors), limiting competition and the solvency of the system. Once the liberalization process began, limiting competition and government intervention lost ground as philosophy of regulation, but then the solvency of the system became the central issue as to philosophy of regulation.

Legislation in terms of entry and expansion of banking institutions have been made equal for almost all kinds of institution (deregulation). Supervisory re-regulation (such as the reform of the solvency ratio requirements) came also into effect to match the increased risk potential for financial institutions that may be associated with the process of liberalization and as a consequence of it, with the process of intensifying competition.

The reform of the bank capital adequacy requirements in Spain in 1985 is the best example of the supervisory re-regulation. The present Spanish capital adequacy model is strongly influenced by the Basle RAR model and the EC Directives.

NOTES:

1.- All the banking regulation in Spain can be found in Bank of Spain (1988), **Legislacion de Entidades de Deposito y Otros Intermediarios Financieros. Normativa General.**

2.- See Price Waterhouse (1991) for a review of the main differences between Basle framework and EC Directives.

CHAPTER 4 : EXPLORATORY ANALYSIS OF CAPITAL ADEQUACY TRENDS IN THE SPANISH BANKING SYSTEM.

4.1.- INTRODUCTION.

This chapter is a preliminary analysis of capital adequacy trends in the Spanish banking system. This is necessary before any theoretical and more rigorous empirical work is undertaken in order to delineate the framework, our 'laboratory', where capital adequacy regulation takes place.

Before undertaking any analysis of capital adequacy trends, the researcher needs to define first what is the relevant capital definition. According to Sinkey (1992, p.713), there are at least three possible definitions of bank capital:

a) Book-value capital: is valued according to accepted accounting procedures standards. Banking books are kept on a book value or historical cost basis. If one wishes to measure book-value bank capital or accounting net worth, one simply subtracts the book value of liabilities from the book value of assets (Net Worth = Assets - Liabilities). Sinkey argues that this procedure is economically correct so long as the book and market values do not diverge too widely.

b) Regulatory capital: is what bank regulators consider as capital. Section 3.6 of Chapter 3 provided the different capital definitions and minimum standards of the BIS proposals, the EC Directives and the Spanish capital regulation[1]. A practical problem is that these values are not normally revealed to the market.

c) Market-value capital: is the value of bank equity according to the market. Specifically it equals the product of the price per share and the number of shares outstanding. Sinkey argues that unlike book-value capital and regulatory capital, market-value capital reflects the real worth of the relative cushion available for absorbing the realized risks of banking and, hence, the only real determinant of adequacy is the aggregate consensus of the market. He also maintains that although market values are more volatile than book values, there is no reason to prefer a measure that is less volatile, if the resulting number is misleading or based on old information. A practical issue here is whether the market has sufficient information to evaluate fully a bank's risk and return position and, correspondingly, value net worth. In recent years and in many developed financial systems, banks and analysts have paid increasing attention to market-based measures. In the case of Spain, a practical problem emerges as a result of the very reduced sample of private banks listed on the Stock Exchange and, hence, a very reduced sample of market-value capital data is available.

In this chapter, the researcher examines the capital adequacy trends in the Spanish banking system according to the three definitions above. At the end of each section, international comparisons of those capital trends with the major European banking systems, are made.

4.2.- TRENDS IN BOOK VALUE BANK CAPITAL IN THE SPANISH BANKING SYSTEM.

4.2.1.- Introduction.

This section analyzes the main trends in book-value bank capital adequacy in the Spanish banking system. First, the researcher examines the book-value capital base. Then, several capital ratios will be computed and appraised. Finally, the internal capital generation rate will be analyzed. This exercise will be undertaken with the public accounting or book-value data that we will employ later in our empirical work.

4.2.2.- Capital Base of Spanish Banks.

An exploratory analysis on the data to be employed later on in our empirical analysis will be performed. Data for 123 private banks and 76 savings banks (except in 1990 with only 64 savings banks after several mergers in the sector) will be used. We examine the evolution of the capital adequacy trends in the period 1987-1990. Due to the important differences in methods of raising capital for the Spanish private banks and savings banks, both both cases will be considered separately.

Capital is not an unambiguous or homogeneous concept and, hence, there is no single, universal definition of bank capital.

In the Spanish banking system, the concept of what is book-value bank capital differs between private and savings banks. The four main components of book-value private banks' capital base are share capital, disclosed reserves, general provisions and subordinated debt[2].

Disclosed reserves must be differentiated from other types of reserves. Disclosed reserves are usually created or increased by appropriations of retained earnings, share premiums or other surplus (Llewellyn, 1989). However, there also are other types of reserves that are undisclosed or arising from the revaluation of tangible fixed assets. The latter reserves are not included in the capital definition.

General and specific provisions must also be differentiated. General provisions are held against possible or latent loss, but these losses have not as yet been identified. Specific provisions are held specifically against lower valuations of particular claims, and are charged to the profit & loss account.

Due to the different legal possibilities for savings banks to raise capital, the main concepts of book-value savings banks capital base are the following:

- Foundation Funds (F. Funds): this concept is the equivalent to share equity in private banks but since the Spanish savings banks have no share equity by law, this concept is rather unimportant. The values which appear here correspond to foundation funds provided generally by local and/or regional authorities where the savings bank operate.

- Reserves.

- Social Works funds (Fondos de la Obra Social): instead of paying out dividends, since there is no share equity, the Spanish Savings banks have to allocate a part of their profits into Social Works funds. From now onwards these funds will be denominated S.W. funds.

- General provisions for bad debt.

- Subordinated debt.

Table 4.1 and Table 4.2 display the evolution of the different components of the aggregate capital structure in absolute terms and as a percentage of the capital base, respectively, of the Spanish private banks during the period 1987-90. Tables 4.3 and 4.4 show the evolution for the Spanish savings banks.

In Tables 4.1 and 4.3, it can be seen that the capital base has been increasing for both private and savings banks during the period 1987-90. All the components of the bank capital base have also been increasing during the period.

Table 4.1 : Aggregate Capital Structure of the Spanish Private Banks (in Spanish pesetas million).(*)

		1987	1988	1989	1990
	Share Capital	566625	731582	831010	903708
plus	Reserves	1069582	1476899	1472254	1671714
Equals	Equity	1636207	2208481	2303264	2575422
plus	Subord. Debt	41882	117222	209942	326632
plus	Bad debt Prov.	550311	553480	528598	540402
Equals	CAPITAL BASE	2228400	2879183	3041804	3442456

(*) The aggregate contains 123 private banks.

Source: Consejo Superior Bancario (1987-90); Own Results.

The increasing share of subordinated debt in the capital structure for both private and savings banks during the period 1987-90 may also be observed in Figure 4.1. One can also notice that the share of traditional components of the capital base, such as share capital and reserves for private banks and reserves and Social Works funds for savings banks, remain very similar.

Table 4.2 : Aggregate Capital Structure of the Spanish Private Banks (% share of each component).(*)

		1987	1988	1989	1990
	Share Capital	25.5	25.4	27.3	26.2
plus	Reserves	48.0	51.3	48.4	48.6
Equals	Equity	73.5	76.7	75.7	74.8
plus	Subord. Debt	1.9	4.1	7.0	9.5
plus	Bad debt Prov.	24.6	19.2	17.3	15.7
Equals	CAPITAL BASE	100.0	100.0	100.0	100.0

(*) The aggregate contains 123 private banks.

Source: Consejo Superior Bancario (1987-90); Own Results.

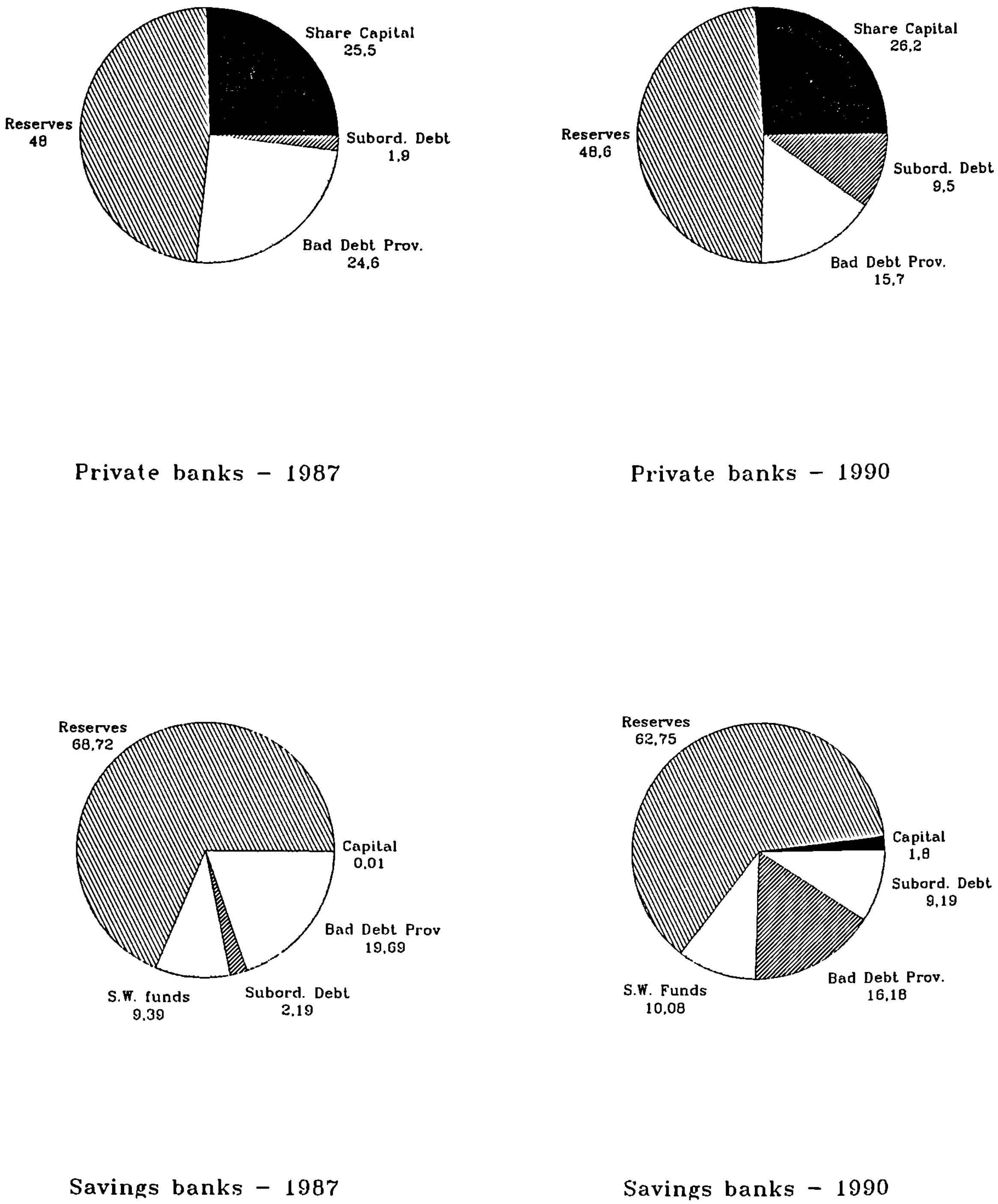
Table 4.3 : Aggregate Capital Structure of the Spanish Savings Banks (in Spanish pesetas million).(*)

		1987	1988	1989	1990
	F. Funds	974	974	974	31473
plus	Reserves	662608	814500	900390	1112465
plus	S.W. Funds	90272	106136	123447	178635
plus	Subord. Debt	21059	125115	144374	162842
plus	Bad debt Prov.	189780	218137	246205	287281
Equals	CAPITAL BASE	964693	1264862	1415390	1772696

(*) The aggregate contains 76 savings banks during 1987-89 and 64 banks in 1990.

Source: CECA (1987-90); Own Results.

Figure 4.1: Capital Base Structure (1987, 1990)



Tables 4.2 and 4.4 show the increasing relative importance of subordinated debt in the capital base for both private and savings banks. The relative importance of the rest of the components of the capital base for private banks remains, apparently, very similar in the period, except for the provisions for bad loans which decrease continually. On the savings banks side, the rest of the components appear to maintain a similar share of the capital base in the period. In Table 4.3, one can observe that the foundation fund increases dramatically in the savings banks in 1990. This seems to have been caused by the existence of an outlier, which is a savings bank involved in a merger process.

Table 4.4.- Aggregate Capital Structure of the Spanish Savings Banks (% share of each component).(*)

		1987	1988	1989	1990
	F. Funds	0.01	0.01	0.01	1.80
plus	Reserves	68.72	64.39	63.61	62.75
plus	S.W. funds	9.39	8.40	8.72	10.08
plus	Subord. Debt	2.19	9.90	10.21	9.19
plus	Bad debt Prov.	19.69	17.30	17.45	16.18
Equals	CAPITAL BASE	100.00	100.00	100.00	100.00

(*) The aggregate contains 76 savings banks during 1987-89 and 64 banks in 1990.

Source: CECA (1987-90); Own Results.

The contribution of the various components of the increase in the capital base in the period is analyzed in Tables 4.5. and 4.6 for the Spanish private and savings banks, respectively.

From Tables 4.5 and 4.6, reserves appear to account for 50-60 per cent (except in 1989 for private banks) of the total year-by-year rise in capital for both private and savings banks.

In 1987, this percentage is even higher for savings banks (72.95 per cent). 1989 is the only exception for private banks since reserves decreased in that year, and the private banks as a whole augmented their capital accounts through external sources of capital. In 1989, private banks apparently augmented their capital by issuing new equity and subordinated debt. Except for private banks in 1989, the internal capital generation represents the largest source of increase in capital. This would seem particularly true for the Spanish savings banks which cannot issue share capital. The internal capital generation for savings banks (Reserves + Social Works funds + Bad debt Provisions) as a percentage of the total capital augmentations represents approximately 95 per cent in 1987, 65 per cent in 1988, 85 per cent in 1989, and 90 per cent in 1990.

The increasing importance of subordinated debt can also be observed from its contribution to the rise in bank capital in Tables 4.5 and 4.6. This is possible because the Bank of Spain allowed the inclusion of this instrument in the bank capital adequacy regulation created in 1985. Although the contribution of subordinated debt to the rise in bank capital seems to increase dramatically until 1988 for savings banks and until 1989 for private banks, the Bank of Spain's limit placed on the subordinated debt ratio (subordinated debt as a proportion of the total capital base could not exceed 50 per cent) appears to restrict clearly the possibilities of the use of this instrument to augment capital. It can be observed that the use of this instrument has decreased for savings banks in 1989-90 and for private banks in 1990.

Table 4.5 : Contributions to Rise in Spanish Private Banks Capital (1987-90) (in %).

	1987	1988	1989	1990
Share Capital	13.12	25.35	61.15	18.15
Reserves	59.21	62.58	- 2.87	49.78
Subordinated Debt	9.11	11.58	57.02	29.12
Bad debt Provision	18.56	0.49	-15.30	2.95
CAPITAL BASE	100.00	100.00	100.00	100.00
Δ CAPITAL BASE	311812	650783	162621	400652

Source: Consejo Superior Bancario (1987-90); Own Results.

Table 4.6 : Contributions to Rise in Spanish Savings Banks Capital in 1987-90 (in Spanish pesetas million and % share).

	1987	1988	1989	1990
Foundation Funds	0.00	0.00	0.00	8.53
Reserves	72.95	50.60	57.06	59.36
Social Works funds	- 1.71	5.28	11.50	15.44
Subordinated Debt	3.75	34.67	12.80	5.17
Bad debt Provision	25.01	9.45	18.64	11.50
CAPITAL BASE	100.00	100.00	100.00	100.00
Δ CAPITAL BASE	102313	300169	150528	357305

Source: CECA (1987-90); Own Results.

In 1988, the participation capital (cuotas participativas) was introduced in Spain[3]. It is a financial instrument meant to help savings banks augment capital and according to CECA (1991), it has the following main characteristics:

- It is primary capital in terms of supervision.
- It lacks voting rights or any other political right.
- Its maturity is indefinite.
- It can be employed to absorb losses.

- Its remuneration is subject to the existence of surplus and to the limits set by the government.

No Spanish savings bank had issued participation capital up to 1991. Therefore, its importance as a means of augmenting capital is still very limited.

4.2.3.- Book-Value Capital Ratios of Spanish banks.

The evolution of basic book-value capital ratios in the Spanish banking system during the period 1987-90 needs to be examined at this stage to compare the evolution of the capital accounts with the evolution of assets. The main trends in different book-value capital ratios are displayed in Tables 4.7 and 4.8 for Spanish private banks and Spanish savings banks respectively (this view is completed in Figure 4.2).

Table 4.7 : Aggregate Capital Ratios of Spanish Private Banks (%).

	1987	1988	1989	1990
Capital-assets ratio[a]	7.4	8.7	7.8	8.2
Equity-assets ratio[b]	5.4	6.7	5.9	6.1
Free capital ratio[c]	5.6	6.2	5.9	6.2
Free equity ratio[d]	3.6	4.2	4.0	4.1
Subord. debt ratio[e]	2.5	5.0	8.4	11.3

a.- Capital base to total assets.
b.- Equity to total assets.
c.- Capital base less fixed assets to total assets.
d.- Equity less fixed assets to total assets.
e.- Subordinated debt to equity plus subordinated debt.

Source: Consejo Superior Bancario (1987-90); Own Results.

First of all, in Tables 4.7 and 4.8 one can observe that the capital-assets ratio, the equity-assets ratio, the free capital ratio and the free equity ratio appear to show no clear tendency during the period and they remain approximately around the same values for private and savings banks, respectively. However, all 1990 values are higher than 1987 values for those ratios. Seemingly, this indicates that the aggregate capital base, the equity, the free capital and the free equity value have increased at a higher rate than the assets from 1987 to 1990. Another characteristic one can notice is that these four capital ratios seem to move together over time. The time-series comovement of capital ratios could be expected in this type of analysis[4].

Secondly, it can be observed that the capital-assets and equity-assets ratios seem to be just slightly higher for the Spanish private banks than for the savings banks during the period

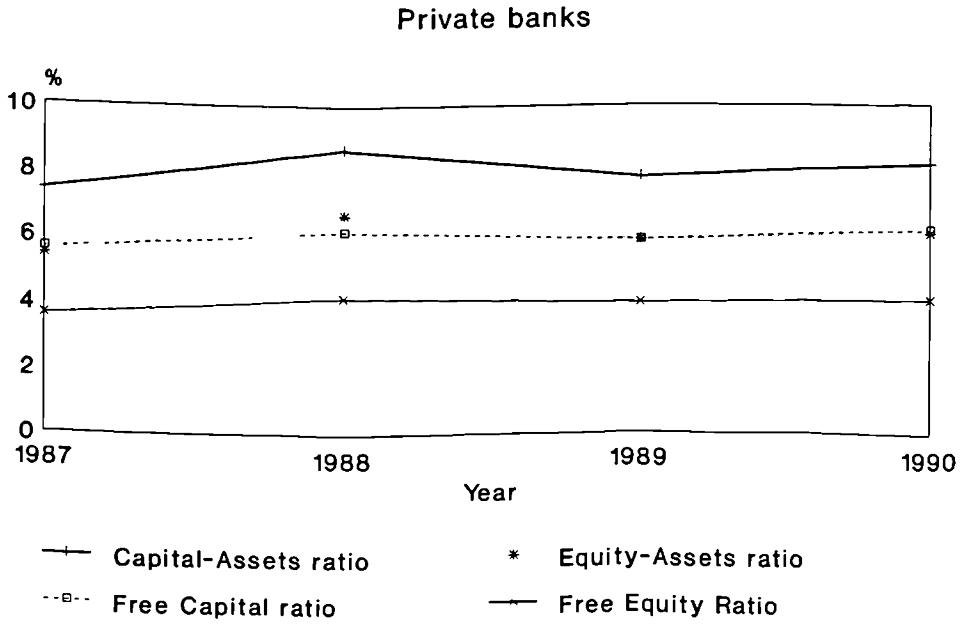
Table 4.8 : Aggregate Capital Ratios of Spanish Savings Banks (%) (*).

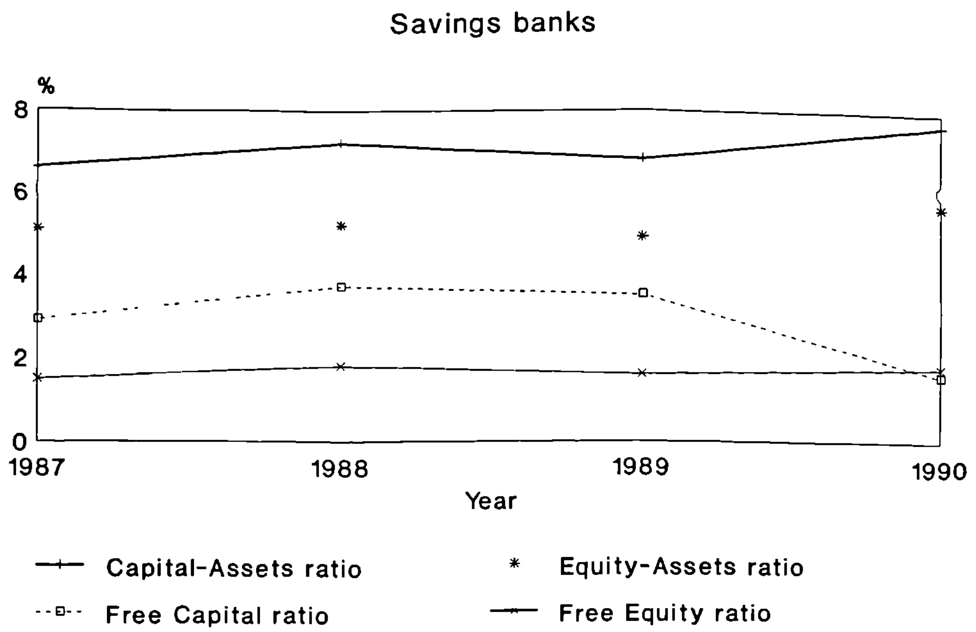
	1987	1988	1989	1990
Capital-assets ratio	6.6	7.2	6.8	7.7
Equity-assets ratio	5.1	5.2	4.9	5.7
Free capital ratio	2.9	3.7	3.5	3.7
Free equity ratio	1.5	1.8	1.6	1.8
Subord. debt ratio	2.7	11.9	12.3	11.0

(*) The different ratios have been computed as in Table 4.7 but for the savings banks equity is assumed to consist of foundation funds plus reserves plus Social Works funds.

<u>Source</u>: CECA (1987-90); Own Results.

Figure 4.2: Capital Ratios for Spanish Banks (1987-90)





studied. The different possibilities for private and savings banks to raise capital might cause this difference in these two ratios. However, there appear to be larger differences in free capital and free equity ratios between private and savings banks. Spanish savings banks seem to have much lower free capital and free equity ratios than private banks. Thus, savings banks seem to have a greater portion of fixed assets in their balance-sheet than the private banks.

Finally, the subordinated debt ratios for both Spanish private and savings banks show the relative, increasing importance of subordinated debt, which seems to gain ground on the equity instruments. In 1987, 1988 and 1989, savings banks have apparently employed more subordinated debt in relative terms than the private banks. However, by 1990 private banks seem to have caught up with savings banks in terms of relative use of subordinated debt.

4.2.4.- The Internal Capital Generation in the Spanish Banking System.

A very important variable with regard to bank capital adequacy is the banks' internal capital generation rate. Banks facing the need for additional capital very often tend to turn to the retention of earnings. It is a key issue to examine banks' internal capital generation rate since it appears the main source for additional capital as found in Tables 4.5 and 4.6.

The internal capital generation rate is influenced by the profitability and the dividend policy of the firm. In this context, Sinkey (1992, p. 764) defines the internal capital generation rate (g) as follows[5]:

$$g = ROE \times RR \tag{4.1}$$

where ROE is Return on Equity (the relevant measure of profitability for stockholders) and the RR is the retention ratio. If after-tax earnings are used, RR is equal to (1-PR) where PR is the dividend payout ratio. If before-tax returns are employed, RR is equal to (1-t-PR) where t is the taxes to earnings ratio and before-tax ROE must be employed. As the researcher has before-tax values, the latter will be used.

The issue of the internal capital generation in the Spanish banking system is relevant for both savings and private banks. Internal capital generation is a key issue for the Spanish savings banks since until recent years the only way savings banks could augment capital was through retained earnings. This is so because Spanish savings banks were not allowed to have share equity. This situation may change in the future if savings banks make use of the participation capital, a capital instrument introduced in 1988 in Spain, which (as explained in the previous section) does not give any voting right in the bank but entitles holders to receive a percentage of the earnings. However, this instrument had not been issued by any savings bank by the end of 1990. Thus, in the period considered (1987-90), savings banks needed to rely upon their profitability to augment capital standards.

As the Spanish savings banks do not pay out dividends, and, hence their retention ratio (RR) is 100 per cent, the researcher will examine the profitability of the savings banks during the period, which due to these operational features of these institutions, represents their internal capital generation rate (g). In Table 4.9, the values of aggregate before-tax earnings during 1987-90 for the private and savings banks are displayed.

The figures in Table 4.9 for the savings banks represent their internal possibilities to increase capital. Table 4.9 shows no clear tendency of the savings banks' earnings during the period. 1988 seemed a bad year in terms of before-tax earnings for Spanish savings banks. However, 1989 seemed a very good year. If the average of the last three years (1988, 1989 and 1990) is calculated, the figure is approximately the same as the 1987 value (pesetas million 177534 is the average whereas the 1987 value is pesetas million 178847), which appears to indicate that there is no upwards trend in the aggregate net earnings. Therefore, savings banks' main capital source, that is, profitability, seems to have remained constant during the period, which in turn seems to set limits on the possibilities to increase capital in the savings banks.

As far as private banks in Spain are concerned, Table 4.9 indicates that there has been an upward trend in the before-tax earnings for those banks during 1987-90. The increase in earnings in 1988 and 1989 appear higher than in 1990 when earnings seem to have grown at a slower rate. This apparently reflects the impact of the accounts war, in which the private banks engaged in 1990, on profitability. The impact of the accounts war on financial costs and interest rates paid on current accounts was illustrated in Table 2.20 in Chapter 2.

Table 4.9: Aggregate Before Tax Earnings for Private and Savings Banks. (1987 - 90) (in Spanish pesetas million).

Year	Private Banks	Savings Banks
1987	305006	180997
1988	449650	135530
1989	579240	211661
1990	626700	194402

Source: Consejo Superior Bancario (1987-90); CECA (1987-90).

As far as Spanish private banks are concerned, retained earnings and new share equity issues play the critical role in augmenting capital. Spanish private banks have a choice when needing additional capital: the internal capital generation and the issue of new equity. It is also interesting to note that private banks' managers face a problem that Spanish savings banks' managers do not: earnings distribution between dividend pay-out and retained earnings.

Let us compute the internal capital generation rate (g) as described in Formula (4.1) for the private banks operating in Spain. First of all, the aggregate earnings distribution for the private banks operating in Spain during 1986-89 is displayed in Table 4.10. The tax-earnings ratio, the dividend pay-out ratio and the retention ratio are given by the values of Corporate Tax, Dividends and Retained Earnings as a percentage of before-tax earnings for every year. We have distinguished between Spanish banks and foreign banks. If the Total Banks column is examined, it seems that earnings have been increasing throughout the period, which appears to have allowed the private banks to accommodate dividends increases and retained earnings increases. The absolute dividend pay-out actually tripled and the retained earnings increased by 90 per cent during 1986-89. The tax-to-earnings ratio has steadily increased in the period except for the foreign banks.

Table 4.10: Private banks: Aggregate Before Tax Earnings Distribution. (1986-89) (in Spanish pesetas million and %).

	Spanish Private Banks		Foreign Banks		Total Banks	
	Amount	%	Amount	%	Amount	%
1986						
Corporate Tax	54423	24.0	5943	32.7	60366	25.2
Dividends	67368	29.7	91	0.5	67459	28.1
Retained Earnings	105258	46.3	12136	66.8	112006	46.7
TOTAL	227049	100.0	18170	100.0	239831	100.0
1987						
Corporate Tax	78167	26.5	4696	32.1	82863	26.8
Dividends	90142	30.6	5	0.1	90147	29.1
Retained Earnings	126688	42.9	9921	67.8	136609	44.1
TOTAL	294997	100.0	14622	100.0	309619	100.0
1988						
Corporate Tax	125811	29.2	6634	29.2	132445	29.2
Dividends	142301	33.0	393	1.7	142694	31.4
Retained Earnings	163062	37.8	15658	69.1	178720	39.4
TOTAL	431174	100.0	22685	100.0	453859	100.0
1989						
Corporate Tax	181972	32.5	7370	34.2	189342	32.6
Dividends	185508	33.2	548	2.5	186056	32.1
Retained Earnings	191960	34.3	13636	63.3	205596	35.3
TOTAL	559440	100.0	21554	100.0	580994	100.0

Source: Consejo Superior Bancario (1987-90); Own Results.

However, the cases of Spanish private banks and of foreign banks appear dramatically different. The dividend pay-out ratio for Spanish banks has remained between 30 and 35 per cent during the period. However, foreign banks had a dividend pay-out ratio between 0.1 and 2.5 per cent during the period. Seemingly, foreign banks have hardly paid out dividends during the period. Foreign banks' retention ratio is 65-70 per cent in the period, whereas Spanish banks retention ratio is approximately 35-45 per cent during the period. The retention ratio seems to have a downwards trend during 1986-89 for Spanish private banks and also for all the private banks together. However, it has remained stable for foreign private banks.

One also needs ROE values during 1986-89 to calculate the internal capital generation rate. The aggregate ROE estimations for the private banks operating in Spain can be found in Table 4.11.

It can be observed in Table 4.11 that ROE appears to have an upwards trend during 1986-89 when all the private banks are considered. These ROE values for all the banks seem to be strongly influenced by the ROE values for the Spanish private banks which account for the largest part of the private banks. However, the ROE values for the foreign banks operating in Spain appear much more erratic in 1986-89 and, except for 1986, lower than those for the Spanish private banks.

Once the retention ratios and ROE values have been examined, one can compute the internal capital generation rates (g) for the private banks operating in Spain. Formula (4.1) is employed and the results are reported in Table 4.12.

Table 4.11: Aggregate Before Tax ROE for Private Banks in Spain. (1986-89) (%).

	Return on Equity (%)		
YEAR	Spanish Private Banks	Foreign Banks	Total Banks
1986	16.20	26.11	16.76
1987	20.15	17.11	20.02
1988	23.31	20.68	23.12
1989	26.04	16.07	25.46

Source: Consejo Superior Bancario (1986-89); Own Results.

Table 4.12: Aggregate Internal Capital Generation Rates (g) for Private Banks (1986-89). (%).

	Internal Capital Generation Rate (g)		
YEAR	Spanish Private Banks	Foreign Banks	Total Banks
1986	7.5	17.4	7.8
1987	8.6	11.6	8.8
1988	8.8	14.2	9.1
1989	8.9	10.1	9.0

Source: Consejo Superior Bancario (1986-89); Own Results.

The internal capital generation rate for total banks (i.e. Spanish private and foreign banks in Spain) have been increasing during 1986-89. This seems to have been caused mainly by the ROE increases in the period, as found in Table 4.9. Foreign banks have had a higher internal capital generation rate than the Spanish private banks. Apparently, the comparatively higher retention ratios seem to lie behind this result. However, foreign banks' internal capital generation rate has been decreasing during the period. In Table 4.11 it was noted that foreign banks' profitability in terms of ROE has been deteriorating from 1987 to 1989. This seems the likely explanation for the decrease in "g" values.

The contrary appears to have happened to the internal capital generation rates of the Spanish private banks since they have been improving during the period considered as a consequence of the increases in profitability. Although the retention ratio has deteriorated during the period for the Spanish private banks, the high ROE values have allowed these banks to have higher "g" values.

4.2.5.- Equity Issues in the Spanish Banking System.

The external sources of capital also need to be explored for the Spanish banks. The external sources of capital seem only relevant for the private banks in Spain, since savings banks are not allowed to issue equity.

Table 4.13 shows the new equity issues (in pesetas) for the private banks operating in Spain during 1987-90. One may note that 1988 was the year in which private banks issued the largest amount of new equity, and 1989 was also a year in which private banks were very active in terms of new equity issues.

Another feature that one can observe in Table 4.13 is that several banks were involved in more than one new equity issue during 1987-90. The number of banks involved in new equity issues is lower than the number of new equity issues, which indicates that several banks issued new equity more than once during a certain year. In fact, several banks, particularly very large banks, issued new equity three times during a certain year. Thus, some banks appear to be able to tap the external sources of capital more often than others.

Table 4.13 : Bank Equity Issues in Spain (1987-90)

	Number of New Issues	Number of Banks	Total Amount (in pesetas million)
1987	39	30	49190
1988	76	51	175301
1989	55	42	103050
1990	47	36	90910

Source: Consejo Superior Bancario (1987-90); Own Results.

A very important factor associated with the issues of new equity is the potential ownership dilution that may occur. The theoretical implications of ownership dilution are investigated in Chapter 5. In this section, our concern is focused on some empirical data on the number of stockholders for the Spanish private banks. Table 4.14 displays the number of shareholders in the Spanish private banks. Shareholders are divided into small shareholders (less than 100 shares), medium-sized shareholders (between 100 and 500 shares) and large shareholders (more than 500 shares).

Table 4.14 : Number of Bank Shareholders in Spain (1987-90)

	Less than 100 shares	Between 100 and 500 shares	More than 500 shares	TOTAL
1987	1423815	486358	160632	2070805
1988	1425426	569160	191476	2186062
1989	1357246	571803	206392	2135441
1990	1260932	573810	250378	2085210

Source : Consejo Superior Bancario (1987-1990)

One may note that the number of large and medium-sized shareholders seems to have increased significantly during 1987-90, and the number of small shareholders seems to have decreased during the same period. Thus, there seems to have been a concentration process in terms of private banks' stock holdings in Spain during 1987-90. In other words, the evidence provided in Table 4.14 does not appear to support that there have been dilution ownership effects associated with bank equity issues in Spain during 1987-90.

4.2.6.- International Comparisons of Book-Value Capital Trends.

One also needs to compare the book-value capital trends of the Spanish banking system with the book-value capital trends of the banking systems of several European major countries. There are data available on the comparison of the values of the equity/assets ratio and the comparison of internal capital generation rates.

Morgan Stanley regularly estimates several key performance measures and ratios for selected banks in different countries. The selected banks are usually the largest banks in these countries. One of the ratios Morgan Stanley computes is the equity/assets ratio. In Morgan Stanley estimates, the sample of Spanish banks appear to maintain relatively high equity ratios compared with other European countries. This can be seen in Table 4.15, where average equity/assets ratios for selected banks of five major European countries at the end of 1988 and 1990 are displayed.

At the end of 1988, the average equity/assets ratio of the Spanish selected banks seemed the highest compared with the other four countries. However, there appears to be a decline in this ratio by the end of 1990. Only U.K. banks in the sample seem to maintain similar average values of the equity/assets ratio to the Spanish banks. French and German banks appear to have higher leverage than the other countries since their ratios are comparatively lower.

There is also information available on international comparisons of the internal capital generation rates for selected banks. Salomon Brothers (1992, Figure 8, p.23) have computed those rates for some of the largest banks of several countries. From these figures the researcher has calculated the average of those internal capital generation rates for those selected banks of the five European banks considered in Table 4.15. Those average values during 1987-90 are shown in Table 4.16.

Table 4.15: Average Equity / Assets Ratios for Selected Banks of Five Major European Countries (1988, 1990). (%)

Country	Number of Banks	1988	1990
France	5	2.96	3.16
Germany	5	3.16	3.28
Italy	11[a]	5.30	5.21
Spain	9[b]	6.35	5.97
U.K.	9	6.12	5.34

a.- In 1988, only seven Italian banks were selected.
b.- In 1990, only eight Spanish banks were selected.

Source: Morgan Stanley (1990a, 1991c)

According to Table 4.16, the Spanish banks seem to have enjoyed the highest internal capital generation rates (g) of the five countries considered. Those Spanish selected banks appear to have g values well above the rest of the countries considered. The U.K. banks seem to be a special case with extreme observations since the capital generation rates values change dramatically during the period covered.

Table 4.16: Average Internal Capital Generation Rates (g) of Selected Banks for Five European Countries (1987-90). (%)

Country	Number of Banks	1987	1988	1989	1990
France	8	8.16	8.87	10.62	7.92
Germany	3	3.48	5.30	5.02	4.30
Italy	4	6.43	6.59	4.68	6.81
Spain	6	10.30	12.83	11.81	9.82
U.K.	4	- 7.06	13.92	- 9.23	2.68

Source: Salomon Brothers (1992, figure 8, p.23)

Apparently, the best year in terms of g values for the European banks seemed to be 1988 when the maximum values throughout 1987-90 were obtained in the five countries. Since then, there has been a decline in g values. This result was also found in Table 4.12 for the aggregate private banks operating in Spain.

4.3.- TRENDS IN REGULATORY BANK CAPITAL IN THE SPANISH BANKING SYSTEM.

4.3.1.- Introduction.

In this section the main features of banks operating in Spain in terms of regulatory bank capital are analyzed. Specifically, the researcher is concerned with the extent to which those banks appear to have fulfilled the minimum regulatory capital standards.

Unfortunately, the information related to the fulfillment of the regulatory standards by banks operating in Spain is limited; an economic justification for this limitation is given by Revell (1989). Revell argues that in the present era of narrowing margins, the raising of minimum capital ratios by the authorities and a need for extra capital in order to expand and to initiate new services, the performance by a credit institution on the capital coefficient is probably the most important single indicator of its soundness, more important even than the figure of profit or net surplus that it earned during the previous year. Given this importance, it is surely strange that in no country do the authorities publish statistics of the fulfillment of capital coefficients by banks, either in the aggregate or by individual institutions.

Using the limited information available, first the fulfillment of the Spanish regulatory capital standards is studied. Then, the position of the largest private banks in terms of the BIS proposals is analyzed. Finally, the position of the Spanish banks in terms of the EC regulatory capital standards is evaluated.

4.3.2.- The Fulfillment of Spanish Regulatory Capital Standards.

As an introduction to this subsection, one needs to report Price Waterhouse survey results (1991) among the Spanish banks. According to the survey, all but a few very small banks had reached the equivalent of the BIS (1988) 8 per cent level by the end of 1990. None of the banks surveyed had so far needed to raise capital specifically to meet the standards but future action may be necessary in one case. Likewise changes to the asset portfolio had not yet been necessary.

Let us analyze the evolution of the old capital regulatory standards, employing the ratios Capital / Assets and Capital / Deposits. The latter was the ratio employed before the reform of 1985. Before 1985, the regulatory capital standards contained only equity and disclosed reserves. The upper part of Table 4.17 shows the aggregate evolution of those two ratios for private and savings banks during 1980-89.

Table 4.17: Aggregate Regulatory Capital Ratios for Private Banks and Savings Banks (1980-89)

	Private Banks				Savings Banks			
	1980	1983	1986	1989	1980	1983	1986	1989
Capital 1 / Total Assets	5.98	4.71	5.10	6.02	5.11	4.23	4.47	4.25
Capital 1 / Deposits	8.99	7.37	10.03	10.26	5.98	5.09	5.41	5.30
Capital 2/ Assets	5.98	4.71	6.10	7.88	5.11	6.13	6.39	8.14
Capital 1 / Investment	10.41	9.08	11.51	13.11	12.28	9.13	12.1	9.88
Capital 2 / Investment	10.41	9.08	13.72	17.15	12.28	13.2	17.3	19.1

Notes:

Capital 1 = Equity capital + published reserves
Capital 2 = Capital 1 + subordinated debt + Other capital instruments
Investment = Credit investment.

Source : Negueruela and Gomez (1990 p. 178)

In the upper part of Table 4.17 it can be noticed that private banks seemed to show an upwards trends in both ratios. Savings banks appear to show a downwards trend in both ratios during the period and they are also much lower than those for private banks. This result might be caused by the non-existence of share equity in savings banks.

The lower part of Table 4.17 contains, the recent evolution of the aggregate generic ratio (Capital 2 / Assets) which currently is being applied in Spain. It can be observed that after 1985 both private and savings were well above the minimum required (5 per cent). Both groups of banks seem to have upwards trends in their aggregate generic ratios. Seemingly, savings banks have slightly higher aggregate generic ratios than the private banks throughout the period.

If one now focuses on the other two ratios, whose denominator is credit investment, it can be noticed that as banks were not allowed to issue subordinated debt before 1985, some values of the ratios Capital 1 / Investment and Capital 2 / Investment are the same in 1980 and 1983. One can also observe that the Capital 1 / Investment ratio has been increasing for the private banks in the period, whereas it has been decreasing for the savings banks. The aggregate values of that ratio appear higher for private banks than for savings banks. However, the Capital 2 / Investment ratios appear higher for the savings banks than for the private banks. Savings banks seem very active in terms of subordinated debt issues and other capital instruments issues.

The only available information on the fulfillment of capital ratios by Spanish banks is referred to the savings banks. Table 4.18 shows the levels of both generic and specific ratios for Spanish savings banks at the end of 1988 and 1990.

In Table 4.18, it can be observed that the position of the savings banks in terms of fulfillment of the capital standards imposed by the Spanish bank regulators has improved from 1988 to 1990. In 1988, eleven savings banks failed to meet the generic or global capital ratio and fourteen failed to fulfill the specific or selective capital ratio (nine failed to fulfill both ratios). However, at the end of 1990, only three savings banks failed to meet the specific ratio and all the banks reached the minimum generic ratio.

Table 4.18: Fulfillment of Spanish Regulatory Capital Standards by Savings Banks. (End of 1988 and 1990).

	1988	1990	
		Number	% of Aggregate Assets
Global coefficient			
Less than 5 %	11	0	0
5 - 6 %	30	19	15.52
6 - 7 %	18	18	22.68
Over 7 %	18	26	61.80
TOTAL	77	63	100.00
Specific coefficient (actual / required ratio)			
Less than 1	14	3	0.80
1 - 1.5	51	43	68.49
1.5 - 2	10	16	29.82
Over 2	2	1	0.89

Source: CECA (1989, 1991)

The three savings banks which failed to meet the regulatory standards at the end of 1990 account for less than 1 per cent of aggregate assets of the Spanish savings banks. Consequently, those three banks appear to be of small size. The position of the Spanish savings banks as a whole in terms of Spanish regulatory capital definitions seem robust at the end of 1990.

4.3.3.- The Position of Spanish Banks in terms of BIS Regulatory Standards.

One can also analyze the position of the Spanish banks in terms of BIS capital ratios. Unfortunately again, we only have information about a limited sample of banks operating in Spain. The sample contains the nine biggest Spanish private banks. Table 4.19 shows the BIS capital ratios for these banks during 1988-89.

Table 4.19: BIS Capital Ratios for the nine Largest Spanish Private Banks (1988-90).

	BIS capital ratio (%)		
Bank	1988	1989	1990
BBV	10.4	9.7	11.7
Banco Central	11.0	11.7	12.0
Banco Exterior	8.8	9.9	10.7
Hispano Americano	9.0	10.0	9.7
Banco Popular	12.3	11.9	12.6
Banco Santander	10.6	10.6	13.6
Banco Zaragozano	9.0	10.0	n.a.
Banesto	7.6	10.6	10.2
Bankinter	11.0	12.0	11.7

n.a = not available

Source: Morgan Stanley (1990a, 1991b)

In Table 4.19 it may be noticed that the nine biggest Spanish private banks appear well-capitalized in terms of BIS ratios from 1988 to 1990. Only one bank did not reach the BIS minimum ratio in 1988, but in 1989 and 1990 all the banks were well above 8 per cent. It can also be observed that those banks tended to have in 1990 higher BIS ratios than in 1988. Although they had reached the BIS minimum ratio in 1988, they had further improved their position by the end of 1990.

From this small sample of Spanish banks, one can observe that in principle, the BIS proposals do not appear to be more demanding than the Spanish capital regulation. The banks in the sample maintain ratios well above the BIS minimum ratio.

4.3.4.- The Position of Spanish Banks in terms of the EC Capital Adequacy Ratios.

Spanish bank capital adequacy legislation will have to be adapted in the future to comply with the 1989 EC Solvency Ratio Directive. Therefore, it is interesting to analyze the position of the Spanish banks in terms of the EC capital standards.

The researcher only has the position of the Spanish savings banks in terms of the EC solvency ratio by the end of 1990. These EC ratios for the Spanish savings banks are shown in Table 4.20.

In Table 4.20, it seems that all the Spanish savings banks would have complied with the EC minimum Solvency Ratio (8 %) by the end of 1990. All the savings banks are well above 8 % and many of them even doubled that percentage. The average ratio is 14.71%, which is practically almost double the EC requirement. Therefore, they seem very well-capitalized in terms of the EC regulation.

From this evidence it would seem that the EC regulatory capital requirements are less demanding than the requirements currently applied in Spain. Consequently, when the EC Solvency Ratio comes into effect, the banks operating in Spain appear to be well-prepared for the challenge.

Table 4.20: Fulfillment of EC Regulatory Standards by Spanish Savings Banks (End of 1990).

EEC Solvency Ratio	Number of Banks	% of Aggregate Assets
8 - 11 %	14	11.60
11 - 14 %	24	32.40
14 - 17 %	16	30.13
17 - 20 %	4	17.42
Over 20 %	5	8.45
TOTAL	63	100.00

Source: CECA (1991)

4.3.5.- International Comparisons of Fulfillment of Capital Adequacy Standards.

In order to establish international comparisons of regulatory capital standards, BIS regulatory capital definitions will be used. Since 1988, Morgan Stanley provides estimates of the BIS capital ratios held by selected banks of several European countries.

When an international comparison with the largest banks of other EC countries is established, the position of the Spanish selected largest banks in terms of BIS ratios appears to be higher at the end of 1990. This can be observed in Table 4.21 where the average BIS capital ratios for selected banks of five European countries are displayed.

The average values of the BIS ratios for the five selected EC countries appear well above the BIS minimum (8 %) both at the end of 1988 and of 1990. The U.K. banks in the sample seemed to have the highest BIS ratios at the end of 1988, but the Spanish banks appear to have the highest ratios at the end of 1990. German and French banks have lower BIS capital ratios, but they still maintain ratios which are higher than the BIS minimum.

Table 4.21 : Average BIS Capital Ratios for Selected banks of Five European Countries (End of 1988,1989 and 1990). (%)

Country	Number of banks	1988	1990
France	5	> 8.40	> 8.72
Germany	5	> 9.60	> 9.80 E
Italy	11[a]	> 9.86	10.02 E
Spain	9[b]	9.97	11.51
U.K.	9	10.65	10.53

a.- In 1988, only seven Italian banks were selected.
b.- In 1990, only eight Spanish banks were selected.

E = estimation undertaken by Morgan Stanley

Source: Morgan Stanley (1990a, 1991c)

All things considered, the main conclusion one can draw is that the Spanish banks appear well-capitalized in terms of regulatory capital standards and they appear to be well above the BIS regulatory minimum and above the values of banks in other major European countries.

4.4.- TRENDS IN MARKET-VALUE BANK CAPITAL IN THE SPANISH BANKING SYSTEM.

4.4.1.- Introduction.

This section is devoted to the analysis of market valuation of Spanish private banks. The researcher will employ Madrid Stock Exchange data for the private banks quoted in that market. As displayed in Table 4.22, out of the 123 private banks operating in Spain, only 30 private banks during 1988-90 and 29 banks in 1987 were quoted on the Madrid Stock Exchange[6].

Table 4.22: Number of Private Banks Quoted on Madrid Stock Exchange (1987-90).

Year	Number
1987	29
1988	30
1989	30
1990	30

Source: Consejo Superior Bancario (1987-1990)

In this section, three indicators of market valuation of bank capital are evaluated for those private banks quoted on the Madrid Stock Exchange. The three indicators are the index of stock price of bank shares relative to the all share index, the market price to book value equity ratio and the price-to-earnings ratio.

4.4.2.- Bank Shares Stock Price Index in Spain.

The first indicator is the index of the stock market-price of bank shares relative to all share index. This is a measure of the performance of bank stock prices relative to all others and which abstracts from movements in the absolute level of both sets of prices (Llewellyn, 1989).

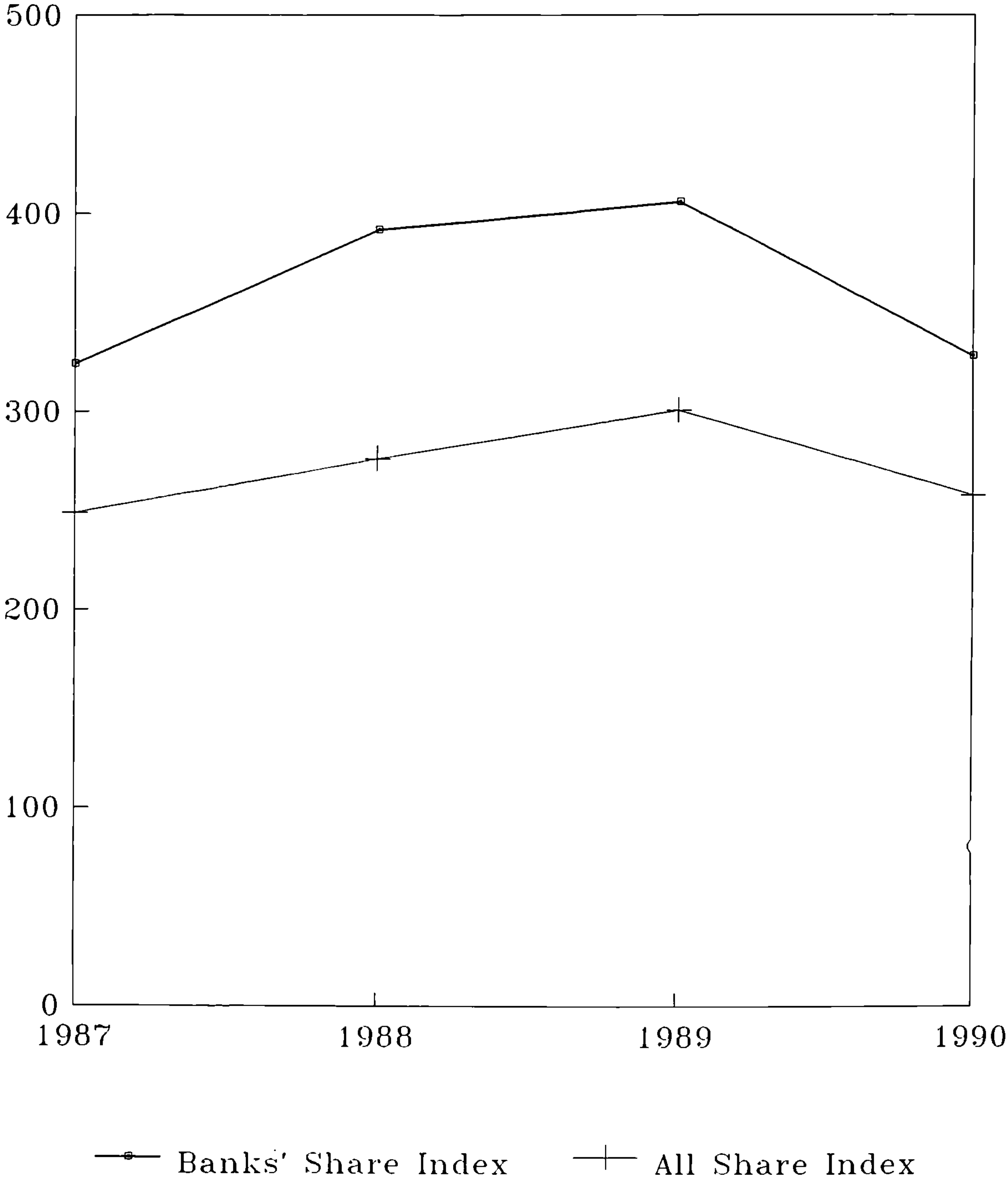
As it can be noticed in Table 4.23 and Figure 4.3, the banks index has been higher than the all-share index, in annual average terms during 1987-90. The maximum value of the banks index relative to the all-share index was that of 1988 and then it decreased in 1989 and 1990. In Table 4.23, it can also be observed that both banks index and all share index have moved in the same direction during the period considered. They both reached their maximum value in 1989 and both had a dramatic fall in 1990.

Table 4.23: Banks Index Relative to All Share Index for Private Banks in Spain (1987-90). (annual average)

Year	Banks Index (1)	All Share Index (2)	(1) / (2)
1987	324.79	249.96	1.30
1988	392.76	277.15	1.42
1989	406.11	301.10	1.35
1990	328.06	258.81	1.27

Source: Boletin Estadístico - Bank of Spain (1991)

Figure 4.3: Spanish Banks' Share Index (1987-90)



During 1987-89, the marketplace seemed to increase its confidence in the banking sector shares performance since bank share prices rose. However, in 1990 the banks share prices fell and the market seemed to have lost confidence in the performance of banks equity shares.

The fact that the banks share index is higher than the all-share index appears to show that the marketplace gives a relative premium to the shares of the banking sector. The marketplace seems to value the private banks sector relatively higher than the average sector. Hence, the market appears to have confidence in the prospects of a relatively higher performance of the private banks equity share.

4.4.3.- Market Price to Book Value Capital Ratio of the Spanish Banks.

The market price to book value ratio of a firm indicates to what extent the market valuation of this firm's equity diverges from the book-value of equity. According to Sinkey (1992, p.264), the divergence between the market and the book values of equity is called "hidden capital" or "hidden value". He emphasizes that there exists hidden value in the banking firm for two reasons:

(a) Accountant's misvaluations of the credit and interest-rate risks incorporated in items on bank's balance sheets.

(b) Accountant's neglect of the contingent claims or values associated with off-balance sheet activities and government guarantees that are not formally booked under accounting procedures.

The market price to book value ratio (P/BV) for the nine largest Spanish commercial banks appear well above 100 % at the end of 1988, 1989 and 1990. This can be observed in Table 4.24 where the P/BV ratios for the nine Spanish largest commercial banks are displayed. Hence, the market values of bank appear to diverge from the book-values of bank equity for the nine largest Spanish banks during 1988-90. Some of the banks in the sample have market values of equity which double or even triple the book-value of equity. This seems particularly true in 1988 where the highest P/BV values take place. This result is likely to imply high "hidden value" in the balance-sheet of these banks.

Gardener and Molyneux (1992) argue that unlocking the hidden value is one possible component of a bank's capital augmentation strategy. This strategy can benefit from a merger process since mergers require the revaluation of assets and incidental liabilities; since in Spain such a revaluation is not taxable, these large banks would have benefited from a merger process in terms of capital augmentations without paying taxes on the hidden value which is allocated in the capital augmentation.

Morgan Stanley (1990a, p.6) maintains that in Spain it is possible to unlock hidden values in investments and property through mergers. This has already happened on several occasions in the banking industry, the most notable being BBV.

However, since 1989, there seems to be a downwards trend in the P/BV values for those banks. It was found in Table 4.24, that after reaching a peak value in 1989, the banks shares index fell. This might be one of the causes shaping the downwards trend in P/BV.

Table 4.24: P/BV Values for the Nine Largest Commercial Banks in Spain (1988-90). (%) (*)

Bank	1988	1989	1990
BBV	204	169	142
Banesto	302	171	166
Banco Central	262	223	191
Banco Exterior	n.a.	164	162
Banco Hispano Americano	209	164	139
Banco Popular Español	222	209	201
Banco de Santander	324	208	203
Bankinter	184	162	134
Banco Zaragozano	126	221	n.a.

(*) All figures as of the end of each year
n.a.= not available.

Source: Morgan Stanley (1990b, 1991b)

One also needs to examine how those P/BV ratios compare with other European countries. Morgan Stanley (1990a, Table 3, p.5) elaborated international comparisons of the P/BV ratios and a Hidden Value Index that Morgan Stanley computed. Those results are displayed in Table 4.25.

In Table 4.25, one can notice that Spanish banks appear to have comparatively high price/book value ratios. Germany, Italy and Switzerland also appear to have comparatively high P/BV ratios. These differences between the market value and the book value reflect *inter alia* "hidden value" in the balance sheet of these banks.

Against the P/BV, the highest numbers being the most expensive shares, Morgan Stanley has placed their own index number as to how they perceive the elements of hidden value in the accounts. This is based on U.K. = 100 and there is some understandable correlation between the P/BV and the index. The principal hidden values are found in Germany, Italy, Spain and Switzerland as it might be expected from the P/BV ratio values for these countries.

Table 4.25: P/BV and Hidden Value Index. (%) (*)

Country	P/BV	Hidden Value Index
Belgium	90	100
Denmark	77	95
Finland	112	120
France	101	110
Germany	138	150
Ireland	167	100
Italy	214	160
Netherlands	79	110
Norway	94	90
Spain	196	150
Switzerland	188	180
U.K.	98	100

(*) 1988 P/BV.

Source: Morgan Stanley (1990a, Table 3, p.5).

To sum up, one can draw the conclusion that Spain appears one of the European countries with higher P/BV values, which in turn, means that there seems to be high hidden value in the balance-sheets of Spanish banks.

4.4.4.- Price-to-Earnings Ratio of the Spanish Banks.

The price-earnings ratio (PER) of a share is the ratio of market price of a share to earnings per share or EPS. Sinkey (1992) defines it as the benchmark measure of the relative value of a firm's earnings in the marketplace. Llewellyn (1989) defines it as an indicator of what investors are prepared to pay for the earnings of a share.

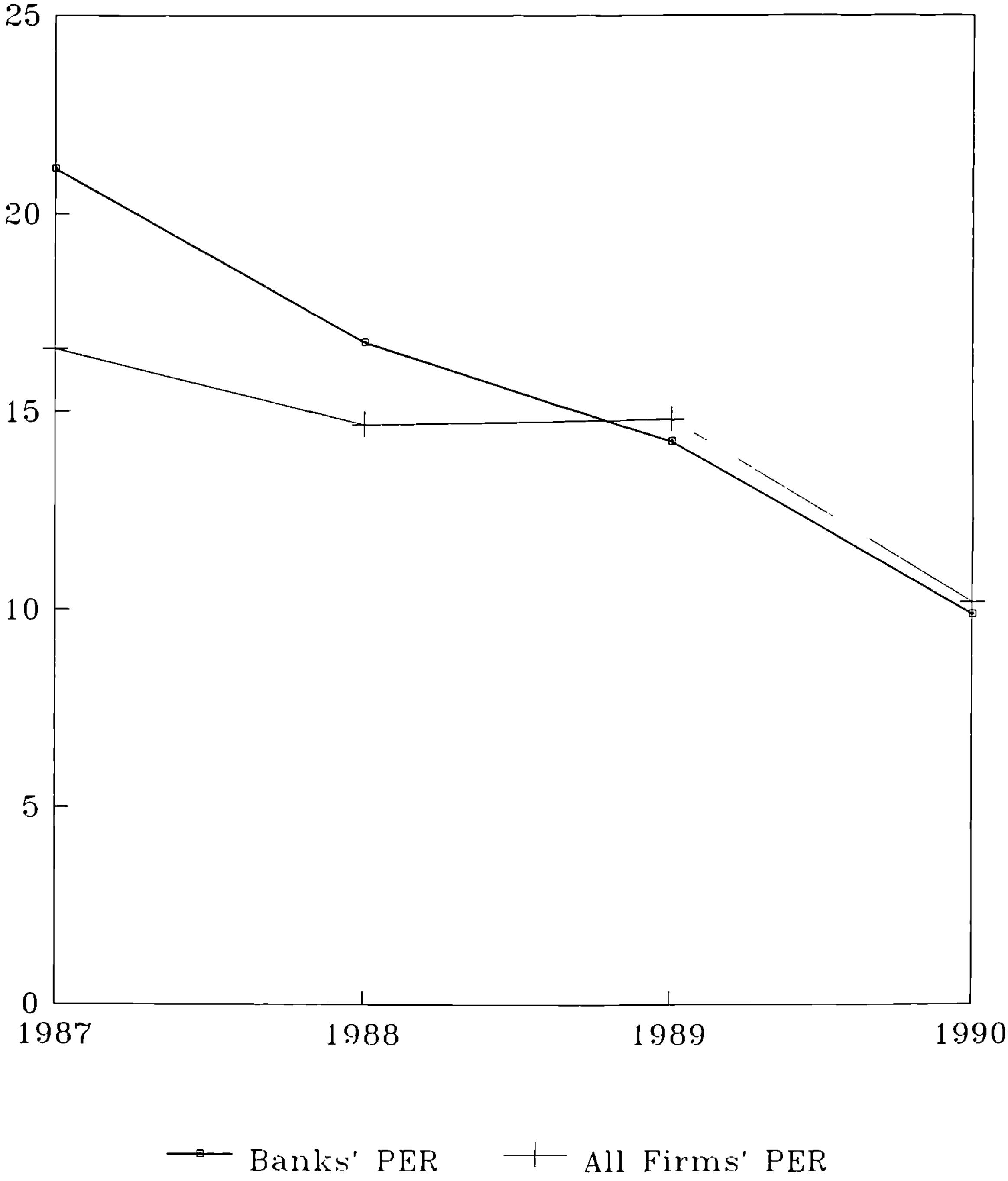
Llewellyn (1989) emphasizes that the PER will be high when *ceteris paribus*, (i) investors believe that future earnings will be rising relative to current earnings, (ii) when the perceived risk attached to those expected earnings is low, or (iii) when the attractiveness of alternative investments is low. The ratio will also rise when there are speculative purchases of equities independently of expectations and future earnings. Table 4.26 and Figure 4.4 show the aggregate PER for the banking sector and for the total firms in Madrid Stock Exchange.

Table 4.26: Aggregate Price-Earnings Ratios for the Banking Sector and for Total Firms (1987-90).

Year	Banks	Total Firms
1987	21.14	16.59
1988	16.75	14.68
1989	14.24	14.80
1990	9.87	10.17

Source: Boletin Estadístico - Bank of Spain (1991)

Figure 4.4: Spanish Banks' PER (1987-90).



The aggregate PER for the banking sector has been falling from 1987 to 1990 (Table 4.26 and Figure 4.4). The decrease in the aggregate PER for the banking sector might be caused by either the fact that future expectations of earnings in the sector are falling relative to current prices or by the fact that the perceived risk attached to those expected earnings of the sector is higher than the current earnings' risk.

The decrease in the aggregate PER for the banking sector from 1987 to 1990 does not appear to have been caused by a far higher attractiveness of alternative investments since the price-earnings ratio for the total of firms in the Stock market, which could be considered as a proxy of the attractiveness of alternative investments, also fell during 1987-90. However, the decrease in PER appears more dramatic for the banking sector than for the total firms. Actually, after 1988 when the PER for the banking sector was well above the PER for the total firms, the PER for the banking sector fell even lower than the PER for the total firms.

4.5.- BANK CAPITAL ADEQUACY TRENDS IN SPAIN: SYNTHESIS.

The main capital adequacy trends in terms of book-value capital, supervisory capital and market-value capital have been explored for the Spanish banking system during 1987-90. The main conclusions one can draw are the following:

1) As far as book-value capital adequacy trends, Spanish private banks and savings banks have different possibilities of raising capital. Spanish savings banks are not allowed to issue share capital and, thus, they rely on their profitability almost completely to raise capital. Since 1985, Spanish banking institutions can issue subordinated debt and this seems to have helped particularly the savings banks augment capital. Private banks also have issued a considerable amount of subordinated debt. The different possibilities to raise capital might lie behind the fact that private banks maintain higher accounting capital ratios than savings banks.

The Spanish banks seem to maintain higher equity/assets ratios by European banking standards. In the case of the Spanish private banks, they seem to have higher internal capital generation rates than banks in other major European banking systems.

2) As for regulatory or supervisory standards, Spanish appear well-capitalized. Only a very few banks have not reached the Spanish minimum regulatory standards. Spanish banks appear to be in an even higher position in terms of both BIS and EC Directive capital standards. Apparently, this appears that the current Spanish capital adequacy regulation is more demanding than the BIS and the EC regulation.

3) Finally, the market-value capital adequacy trends were explored. We found that the market-value of equity of Spanish banks is well above the book-value capital and the P/BV ratio for Spanish banks appears one of the highest among the major European

countries. Seemingly, this implies the existence of a great deal of hidden value in the balance-sheets of Spanish banks.

NOTES:

1- See Section 3.6 in Chapter 3 for regulatory definitions of capital according to the 1988 BIS Agreement, the 1989 EC Directive and the Spanish capital regulation.

2.- This is an application of Llewellyn's classification of capital base (1989).

3.- See Revell (1989) for an explanation of the characteristics of participation capital in Spain and elsewhere.

4.- See Foster (1986, p. 115-116) and Barnes (1987) for an analysis of time-series comovement of financial ratios.

5.- Equation (4.1) is an approximation of the internal capital generation rate that understates the true rate. To be more accurate, g is equal to (ROE - RR)/(1 - ROE - RR). However, Sinkey (1992, p.764) considers the approximation of g as "accurate enough".

6.- A few banks not quoted in Madrid were quoted in the other Spanish Stock Exchanges: in 1987, two banks were quoted in Bilbao and one in Valencia; in 1988, two in Bilbao and one in Barcelona; in 1989, two in Bilbao and one in Barcelona; in 1990, one in Barcelona.

CHAPTER 5 : THE IMPACT OF CAPITAL ADEQUACY REGULATION ON BANK CAPITAL AUGMENTATIONS : THEORETICAL BACKGROUND.

5.1.- INTRODUCTION.

Our main concern in this thesis is the analysis of the effects of bank capital adequacy regulation on bank capital augmentations in the Spanish banking system. With this primary objective in mind we need to analyze the determinants of bank capital augmentations and particularly, to appraise the role of bank capital regulation as a determinant of bank capital raising.

The researcher defines capital augmentation as capital growth; in other words, the amount that bank capital increases in a certain period. Capital augmentations may be nominal and/or real. A nominal capital augmentation implies an increase in book-value capital. A real capital augmentation is generated by an increase in market-value capital.

Capital adequacy augmentations must be differentiated from capital augmentations. At a fundamental level, capital adequacy is related to a bank's corresponding risk exposure. *Ceteris paribus,* the higher a bank's risk exposure, the more capital is required. Thus, a capital adequacy augmentation implies that the relationship measured by the ratio capital / bank risk has been increased. These augmentations may be nominal and/or real. A nominal capital adequacy augmentation takes place in the book-value and regulatory relationship capital / bank risk. However, a real capital adequacy augmentation is generated by an increase in the relationship capital / bank risk as measured by the market.

According to Gardener (1992), capital augmentation is a component of the bank's overall funding planning and co-ordination. The starting point in determining the amount of capital needed, that is to say, how much capital the bank needs to raise, is the bank's financial plan. One needs to appraise what factors influence capital augmentations, some of which are outside of management control. As emphasized by Gardener (1992), a good example of the latter would be the supervisory regime.

Following the three types of bank capital defined in Chapter 4 (book-value, supervisory and market-value capital), one can also define capital augmentations according to those types of capital: book-value capital augmentations, supervisory capital augmentations and market-value capital augmentations. Increases or decreases in each of these measures bay be mutually exclusive of any changes in the other two. For example, market-value capital can increase without having any corresponding effect on book-value or supervisory capital augmentation.

There is a vast theoretical literature that has examined the bank capital investment decision. One needs to review the theoretical studies which have appraised the determinants of bank capital augmentation and the impact of bank capital adequacy regulation on bank capital augmentations. This chapter is devoted to the analysis of those theoretical determinants and models and the study of the effects of capital regulation in this context.

The chapter is organized as follows. In the next section, the theoretical objectives of capital adequacy regulation are reviewed. Next, the researcher studies the main banking theoretical literature which has examined the capital structure issue in the banking firm. In the next section, we move on to our specific concern of the theoretical effects of capital adequacy on bank capital augmentations. This will be undertaken in a more general framework in which all the determinants of bank capital augmentations will be considered. Finally, the synthesis and testable hypotheses which the theoretical models imply will be provided.

5.2.- THE OBJECTIVES OF CAPITAL ADEQUACY REGULATION.

The banking industry is one of the most highly regulated industries in the economy and bank capital regulation plays a basic role in bank regulation. In few other industries is the capital capital investment decision so subjected to supervision and regulation.

Government bank capital regulation occurs most directly in the process of bank examination by the bank supervisory agencies. The primary, stated goal of all of the varied forms of government regulation of banking is the maintenance of a safe and sound banking system and to protect depositors. In Spain's 1962

Regulation of Banking and Law (Ley de Ordenación Bancaria), this concern is clearly stated[1]. The severe external consequences of the collapse of the financial system have focused public concern on safety.

Historically, this regulation has entailed attempts to compel greater solvency and liquidity on the part of individual banks than they would adopt voluntarily. This is the basis of bank portfolio regulation in general and capital regulation in particular. Edmister (1986, p. 413) emphasizes that regulation changes the alternative actions available to financial institution management and, therefore, becomes a factor in management decision making. As depicted in Figure 5.1, government regulations cause changes in the portfolios, security issues and operations of financial firms. Regulations aim to influence the derivative actions of the value/profit maximizing financial firms so that the public policy objectives of financial stability and other macroeconomic goals can be accomplished.

In implementing this legislative intent, bank examiners devote the greater part of their efforts simultaneously to a determination of the "riskiness" of a bank's assets and the adequacy of its capital. In this context, the primary function of bank capital is to act as a kind of internal insurance fund in order to protect a bank against uncertainties (Gardener, 1985). Regulators seek to gauge the probable extent of any decline in bank asset values and the ability of a bank's capital to absorb such declines without depositors incurring losses.

If, simultaneously, the asset portfolio is regarded as too risky and, therefore, capital inadequate, the relevant supervisory agency will attempt to compel a change in the bank's balance sheet: more capital and/or fewer risk assets (Peltzman, 1970). Therefore it would seem that more adequate capital and a less risky asset portfolio are substitutes in the eyes of the supervisors.

Figure 5.1 : Objectives of Government Bank Regulation.

Regulation ⟶	**Financial firm** ⟶	**Public policy objectives**
Regulations	Portfolios	Financial stability
Supervision	Security issues	Other macroeconomic goals
Insurance	Operations	

Source: Edmister (1986, p. 413)

Before a RAR was generally established, regulators tended to dedicate their greatest 'capital-adequacy analysis' efforts towards analyzing banks capital rather than the examination of the details of the corresponding asset portfolio. Peltzman (1970) argues that it was difficult for a bank regulator to estimate accurately the riskiness of the different asset elements in a bank's portfolio because, *inter alia*, they reflect a great variety of local market conditions, bank management and other circumstances. However, after RARs had been generally established, bank supervisors attempted both to examine banks' capital and to appraise banks' portfolios. Indeed, this was the objective of using a RAR approach.

Santomero (1984) supports the idea that regulation, if it is to be effective, must be combined with adequate understanding of the behavioral response of the banking institutions. Bank regulators must understand how banking firms would respond to regulation in order to avoid banks circumventing regulation, which might result in the regulation not achieving the desired results.

While the degree to which regulators succeed in having their notions of adequate capital implemented by the banks can only be determined empirically, Peltzman believes that these notions have more than the force of suggestion behind them. For example, the American banking law specifically requires that the federal supervisory agencies certify the capital adequacy of banking firms and they also have legal powers to compel individual banks to increase capital. Institutions with inadequate capital can, at any time, be penalized by expulsion from membership in the Federal Reserve system (U.S. Code, Title 12, 1964). The Spanish banking law lays down sanctions against banking firms which do not have adequate capital. In addition, these banks cannot obtain finance from the Bank of Spain (Trujillo, Cuervo-Arango, Vargas, 1988).

Contrarily, Mayne (1972) argues that in fact bank supervisors must rely upon persuasion, harassment, or possibly public citation to convince bank management to increase capital funds. This would result in the amount of bank capital being primarily determined by bank management. According to Mayne, it would seem more appropriate for the supervisors to focus their efforts upon the quality of bank management rather than on elaborating tests of bank capital adequacy.

The role of deposit insurance must also be considered in this context. In a compulsory deposit insurance system, central banks or monetary authorities guarantee, partially or totally, the coverage of potential banks' deposits losses. Thus, in the case of bank bankruptcy, these institutions will repay, partially or totally, bank depositors' losses. In return each insured bank pays an annual premium as a percentage of the total deposit balance.

The legislative interest in the creation of a deposit insurance system is, compensating depositors and ensuring a safe haven for depositor's funds[2]. However, Lewis and Davis (1987) maintain that the economic rationale for the existence of deposit insurance systems relies fundamentally on the necessity of building or maintaining confidence in the credit institutions and in the financial system as a whole rather than recompensing people after the loss of deposits. Therefore, this approach suggests reducing the external diseconomies arising from frequent bank's failures.

5.3.- BANK CAPITAL ADEQUACY AND CAPITAL STRUCTURE.

5.3.1.- Capital Adequacy and Modelling the Banking Firm.

A bank is the prototypical financial firm. There are considerable outward differences between the wealth invested by owners of financial institutions and that of other industries. The capital of a financial firm consists largely of financial assets and only to a small degree of the physical plant and equipment generally associated with capital in other industries[3]. Furthermore, these physical differences are associated with important functional differences. A financial institution, like any other firm, combines the inputs which it purchases to produce the output which it sells. The primary business of banking is one of collecting funds from the community and extending credit to economic units for useful and profitable purposes. Banking institutions are also involved in nonbanking financial services such as brokerage services, accounting and information services. In this production process, bank capital serves two basic functions: first, it is an input into the production process, as in any other business. Second, bank capital is used to attract deposit funds, which are also a necessary input into the production process (Peltzman, 1970; Mingo, 1975). Dietrich and James (1983) also consider the role of bank capital as a residual capable of absorbing losses.

Before considering how banking theory has appraised the capital structure decision in the banking firm, one first needs to examine a complete model of the banking firm to understand more fully the framework in which the capital decision is made. Sinkey (1992, p.96) distinguishes between partial and complete model of the banking firm. Partial models focus on either asset selection or liability management. In other words, they analyze only part of the banking firm's behaviour. However, a complete model of the banking firm, explains the bank's asset and liability decision (and their interaction if any) and the size of the firm. Baltensperger (1980), in a review of the alternative approaches to the theory of the banking firm, provides a complete model of the banking firm. In his model, a simultaneous determination of asset structure, liability structure, and size is demonstrated. His model considers real resource costs, liquidity costs, and insolvency costs. His balance-sheet constraint can be stated as:

$$R + E = D + K = A, \qquad (5.1)$$

where R = reserves, E = earnings assets, D = deposits, K = capital and A = assets. There are three choice variables in this model: (1) A, which determines the portfolio size of the bank, (2) the ratio E/A, which determines the asset structure of the bank, and (3) the ratio D/A, which determines the liability structure of the bank. Bank managers are assumed to choose three variables so as to maximize expected profit, $E(\pi)$.

The profit function of of Baltensperger's model can be explained as follows:

1.- There is a spread management component defined as:

$$[ra - cd - (1 - d)k]A \qquad (5.2)$$

where a = E/A, d = D/A, r = expected return on assets, c = interest cost of deposits and k = opportunity cost of equity capital.

Substituting the ratios for their values, one can rewrite equation (5.2) as

$$[rE - cD - kK] \qquad (5.3)$$

2.- The second component focuses on real resources costs or "overhead" (O), and is a function of the size and composition of the bank's balance-sheet:

$$O(A,a,d) \tag{5.4}$$

3.- The third component measures liquidity costs (Q) are a function of a bank's balance-sheet characteristics and is expressed as

$$Q(A,a,d) \tag{5.5}$$

4.- The fourth component focuses on solvency costs (S), They are a function of a bank's size, asset structure, and capital structure:

$$S(A,a,d) \tag{5.6}$$

Combining equations (5.2) and (5.4) to (5.6), expected profits becomes

$$\begin{aligned} E(\pi) = {} & [ra - cd - (1 - d)k]A - O(A,a,d) \\ & - Q(A,a,d) - S(A,a,d) \end{aligned} \tag{5.7}$$

Substituting equations (5.3) for equation (5.2) and deleting the functional form notation on the cost expressions O, Q, and S, equation (5.7) can be rewritten as

$$E(\pi) = rE - cD - kK - O - Q - S \tag{5.8}$$

Equation (5.7) reflects the heart of the optimization process in this framework. To maximize expected profit, the bank must determine the optimal values of A, a, and d as an interdependent set (i.e. $[A^*, a^*, d^*]$) in terms of the parameters of the underlying return and cost functions[4].

Baltensperger's model determines the optimal structure of the bank's asset and liability portfolio as well as its optimal scale. He shows that all of these decisions will be made in an interdependent way. Therefore, the capital decision of the banking firm will be made in an interdependent way with the rest of the decisions; one cannot separate the capital decision from the rest of the decisions of the banking firm.

Once a complete model of the banking firm has been examined, one can consider how the capital structure aspects have been dealt with in banking theory. The capital decision of the banking firm has been largely appraised by the economic literature. The capital decision of the banking firm is a complex issue since the optimal choice of size and leverage is determined by the assumed financial environment and the *raison d'être* of the bank (Santomero, 1984). An optimal capital structure is one that maximizes the value of the firm.

In unregulated competitive markets, with no bankruptcy costs, corporate income taxation or other market imperfections, Modigliani and Miller (1958) showed that there is no optimal capital structure. Thus, in order to derive an optimal capital structure, one must specify, first, the role played by the banking institution and second, the extent to which one wishes to deviate from the perfect market paradigm in explaining its operation.

Restoring one or more of those excluded conditions can produce an optimal debt/equity ratio, that is, an optimal capital structure. For example, Modigliani and Miller (1958) show that allowing interest on debt to be tax-deductible provides an incentive for firms to substitute debt for equity in their financial structure. However, when there exists bankruptcy costs, increasing leverage provides a growing offset to the incentives to expand debt. Under these two conditions (taxes and bankruptcy costs), a value-maximizing firm may reach an internal optimum, with positive equity in its financial structure (Kraus and Litzenberg, 1973 and Turnbull, 1979).

Sealey (1983), in a discussion of the applicability of capital structure theory to depository intermediaries, argues that the theory of corporate finance remains largely inapplicable without qualifications and modifications to the banking firm. There are two main reasons for this lack of applicability to banks. First, liquidity considerations are usually excluded from models employed to develop rules for corporate financial decisions. This is an important omission for banks since a significant part of their economic output is in the form of liquidity services. The second reason is that finance theory has not integrated production and financial decision making in a way that is applicable to depository financial institutions.

Sealey (1983) developed a theory of capital structure decisions of financial intermediaries based upon market equilibrium. His one-period model showed that the valuation equation of a financial intermediary differs from that of a non-financial firm by a liquidity premium paid by the public for liquidity services. These results are different from those obtained by Fama (1980): 'Fama's results' basically support the argument that when banking is competitive, the portfolio management activities of banks fall, in principle, under the

Modigliani and Miller theorem (1958) on the irrelevance of pure financing decisions. Sealey disagrees with Fama, because he assumed a different environment for banks.

In his comprehensive survey of the literature on the capital decision, Santomero (1984) suggested that the corporate finance literature needed to develop further in order to help in the search for a private determination of optimal capital.

The main recent theoretical studies[5] that have appraised the relationship between the value of the banking firm and capital adequacy, are summarized in Table 5.1.

Table 5.1: Capital Adequacy and Value of the Banking Firm: Recent Theoretical Studies.

Author	Year	Source	Comment
Pyle	1972	JFQA	Descriptive theories of financial institutions under uncertainty.
Pringle	1974	JMCB	An imperfect-markets and risk-aversion models on bank capital decisions.
Mingo and Wolkowitz	1977	JOF	A profit-maximization model subject to regulator's soundness requirement.
Talmor	1980	JFQA	A normative approach to bank capital adequacy and its determinants.
Buser, Chen and Kane	1980	JOF	Finacial theory employed to explain deposit insurance, capital regulation and optimal bank capital.
⋮	⋮	⋮	⋮

Fama	1980	JME	A general equilibrium look at banking in the finance theory.
Baltensperger	1980	JME	A survey of alternative approaches to banking firm theory.
Sealey	1983	JOF	Focus on value of the banking firm and capital structure.
O'Hara	1983	JOF	A dynamic theory of the banking firm.
Santomero	1984	JMCB	Survey on models of the banking firm, including the capital decision.
Crouhy and Galai	1986	JBF	Study of optimal capital structure and capital adequacy under different regultory environments.
Sealey	1987	CFD	Description of present state of financial intermediation.
Osterberg	1990	FRBC	A review of the literature on bank capital requirements and leverage.

Key to Abbreviations:

CFD = Chicago Federal Conference
FRBC = Federal Reserve Bank Cleveland Economic Review
JBF = Journal of Banking and Finance
JFQA = Journal of Financial and Quantitative Analysis
JMCB = Journal of Money, Credit and Banking
JME = Journal of Monetary Economics
JOF = Journal of Finance

5.3.2.- Market-determined Bank Capital Structures and Regulation-determined Bank Capital Structures.

Bank capital structure traditionally has been viewed primarily in terms of depositors' interests. This view is mainly concerned with the adequacy of bank capital: that is to say, with the role of capital in bearing risk and protecting depositors against loss.

Another perspective to view the capital position is in terms of optimality from the standpoint of shareholder interests. Since banks are generally private economic units, it is reasonable to assume that shareholder interests will influence, if not control, capital decisions. Taking the viewpoint of shareholders, Pringle (1974) maintains that capital is an important managerial decision variable and that it plays a key role in the financial management of the banking firm. He argues that in addition to the traditional function of risk-bearing, capital is important in adjusting the maturity structure of liabilities. In this context, Pringle argues that practicing bankers sometimes characterize the function of capital in terms of "underwriting" or "providing a base" for deposit and asset expansion. Thus, from the standpoint of shareholder interests, capital is important for two reasons: as a risk-bearing and as a managerial decision variable.

When bank capital is unregulated, its level reflects only the shareholders' optimality. However, there is no *a priori* reason to assume that this level is optimal also from the standpoint of society (Santomero and Watson, 1977; Talmor, 1980).

The shareholders preference for market-based bank capital positions or regulation-determined bank capital positions has been discussed in the literature. Pringle (1974) analyzes bank capital in terms of optimality from the standpoint of the shareholder rather than adequacy from the standpoint of depositors. He shows that, viewed from the perspective of shareholder interest, there is in principle an optimal capital position. In contrast, from the perspective of depositor interests, he finds it difficult to believe that an optimum exists. His paper indicates that where shareholder interests are controlling, the key determinants of optimal capital policies are future-oriented, market-based variables (i.e. expectations regarding future loan demand, deposits levels and financing costs) and the regulatory approach has little relevance to shareholder interests.

Pringle's main conclusion is that market-determined capital structures are preferable to those imposed by regulators and supervisors. However, Taggart and Greenbaum (1978) believe that the market-determined capital positions may vary widely according to the regulatory setting.

Sealey (1983) also develops a model which provides a more fundamental explanation of leverage in terms of shareholder utility based upon technological conditions that govern the intermediary services production. If substantial cost economies exist in the production of deposit services, then Sealey indicates that high leverage decisions by intermediary managers may be justified as maximizing shareholder utility.

Crouhy and Galai (1986) emphasize that the imposition of certain regulatory measures may allow a simple optimal capital structure to arise. They consider three different regulatory environments. In unregulated markets, there is no optimal capital structure and hence equity-holders are indifferent to the level of capital imposed by regulators. With an interest rate ceiling, capital regulation is still irrelevant and there exists an optimal capital structure. With deposit insurance they find that capital regulation is relevant for insurers and shareholders, and there is also an optimal capital position.

5.4.- THE DETERMINANTS OF BANK CAPITAL AUGMENTATIONS: MANAGERIAL DETERMINANTS AND THE ROLE OF REGULATION.

5.4.1.- Introduction.

This section is devoted to the analysis of the theoretical models which have been employed in the literature to analyze capital augmentations in banking. Basically, these models provide the determinants of bank capital augmentations: that is, which variables affect the way credit institutions decide on capital augmentations.

The determinants of bank capital augmentations can be divided into two classes: managerial determinants and regulatory-based determinants. The research considers both classes of determinants, but we will lay particular emphasis on the way capital adequacy regulation affects bank capital augmentations. The latter is the main research question driving this thesis.

This section starts by reviewing the main theoretical models of capital augmentation. Then, the managerial determinants of capital augmentations are examined. Finally, the impact of regulation on capital augmentations is examined.

5.4.2.- Modelling Bank Capital Augmentation.

In order to undertake the analysis of the impact of Spanish capital adequacy regulation on bank's capital augmentation, one needs ideally to have a theoretical model from which one can build our empirical model to test that impact. For a number of reasons, the researcher has chosen Peltzman's model (1965 and 1970) of bank capital augmentation. The general relevance of this model to the Spanish banking system is discussed in sub-section 5.4.2.3. Yet, one needs first to explore the theoretical model of capital augmentations in banking.

5.4.2.1.- *The Capital Augmentation Model with no Regulation.*

One first requires a model of the flow of new capital into banking which delineates and predicts bank conduct in the absence of regulation and then specifies the separate effects of regulation. In Peltzman's model (1970) - a 'classic paper' in the banking literature - the flow of capital into banking is considered as a response to a discrepancy between the desired or long-term equilibrium stock (C^*)[6] and the currently existing stock (C). This may be written mathematically as follows:

$$(dC/dt)^* = f(C^* - C) \tag{5.8}$$

We hypothesize that one of the determinants of C^* is the expected rate of return on capital in banking (π). This may be written:

$$C^* = g(\pi, \ldots) \tag{5.9}$$

The ellipsis represents other determinants of C^* which we will not analyze at present. Combining equations (5.8) and (5.9), one can obtain:

$$(dC/dt)^* = h(\pi, C, \ldots) \tag{5.10}$$

and

$$h_\pi > 0, \; h_c < 0$$

At this stage, Peltzman treats size effects separately and recalls that the major purpose of bank capital is to protect depositors against a decline in the value of bank assets. Thus, C^* will be larger the larger a bank's deposits, and it will grow secularly with deposits. Let us approximate this size effect by setting C^* equal to some desired fraction (k^*) of expected deposits (D^*), or

$$C^* = k^* D^* \tag{5.11}$$

which, in natural logarithms, is $\ln C^* = \ln k^* + \ln D^*$. Then, equation (5.8) is modified by writing

$$(d \ln C / dt) = f (\ln k^* - \ln k) + f (\ln D^* - \ln D) \qquad (5.12)$$

This clearly divides the intended capital investment rate into two adjustment processes - adjustment to a discrepancy between expected and actual deposits and adjustment to a discrepancy between the desired and actual capital-deposits ratio. Peltzman argues that since there is typically a pronounced secular trend in deposits, it will be useful to assume continuously complete adjustment of capital to expected deposit changes[7]. Therefore, one can specify

$$f = (d \ln D / dt)^* . \qquad (5.13)$$

In other words, since deposits are trend dominated, expected deposit growth is constant or changes very slowly over time. This stability lowers the costs of continuously complete adaptation of capital to deposit growth, and one can assume that such adaptation takes place. Peltzman then applies the capital investment model to those changes in capital not motivated by deposit changes: that is, changes in the capital to deposits ratio. Hence, one can write

$$\ln k^* = G(\pi, \ldots) \qquad (5.14)$$

and combine this with the first term on the right-hand side of the equation (5.10) in :

$$f = H(\pi, \ln k, \ldots). \qquad (5.15)$$

Finally, Peltzman converts equation (5.12) into an operational one by making the assumption of equality of intended and actual investment, and rewrites it as

$$(d \ln C/ dt) = H + (d \ln D /dt)^{*}. \qquad (5.16)$$

Two other determinants of the desired stock of capital should be considered. Firstly, the rate of return on alternative uses for bank capital. For any given expected rate of return on bank capital, investment in banking should vary inversely with the rate of return on alternative employments for bank capital. Secondly, a measure of portfolio risk should also be included. Peltzman employs the ratio of U.S. government bonds to deposits as a measure of portfolio risk.

The cost of capital as such is a variable which is not considered in Peltzman's model. The expected rate of return on capital which is a explanatory variable in his model might be considered as a proxy for cost of capital. This is discussed further in section 5.4.3.1.

5.4.2.2.- *The Inclusion of Bank Capital Regulation on the Capital Augmentation Model.*

Peltzman (1970) also includes the impact of bank regulation on bank capital investment. The regulation effects are determined by a set of variables such as capital adequacy ratios or deposit insurance. Thus, Peltzman's capital investment model can be summarized as follows:

$$(d \ln C/dt) = H(\pi, \ln k, \pi^0, g, R) + (d \ln D/dt)^* \qquad (5.17)$$

where π^0 represents the rate of return on investments alternative to banking, g stands for the ratio of government bonds to deposits as a measure of the default risk of bank portfolios and R represents the set of variables which measure the impact of bank regulation.

5.4.2.3.- *Relevance of Peltzman's Model to the Spanish Banking System.*

The researcher has selected Peltzman's theoretical model of capital augmentation in the banking firm since it is a very good theoretical approximation to the way Spanish banks decide on capital augmentation. In a field survey that the researcher undertook among the largest Spanish private and savings banks, it was found that the key variables that the Spanish bankers suggested were basically those specified in Peltzman's model. The main results of the field survey can be found in Appendix A.

Fundamentally, the main variables that the interviewed Spanish bankers, suggested as determinants of the capital augmentations they undertake are the following:

1) Spanish capital adequacy regulation: according to the bankers interviewed, this was the most important variable when deciding on capital augmentations. Regulation is a key variable

in Peltzman's model, and the way it works in his model in terms of portfolio risk and capital is very similar to the way Spanish bankers suggested. This is discussed next.

2) Regulatory capital and bank portfolio risk: Spanish bankers suggested that if their regulatory capital is found inadequate, they tend to augment capital, rather than change bank portfolio mix and growth. In other words, they tend to adjust capital to portfolio mix; they rarely alter portfolio composition and risk. This means that in Spain, the relationship between capital augmentation and portfolio risk appears to be rather one-directional. In Peltzman's model, the relationship is also one-directional: capital augmentation is the dependent variable and is influenced by two variables coming from bank's portfolio (deposits and portfolio risk). Therefore, rather than as a regulatory determinant from the standpoint of the individual banks, portfolio risk is considered as a managerial determinant, and the only regulatory determinant from their perspective is capital. This appears clearly not to fit in with RAR philosophy, but it certainly tends to be Spanish bankers' preference to accomplish regulatory standards.

3) Profitability: in the field survey, Spanish bankers stated that the main managerial variable affecting capital augmentation was profitability. Profitability is also a key variable in Peltzman's theoretical model, although his model does not consider related issues like retained earnings or dividend pay-out.

All things considered, according to the field survey carried out, it seems that Peltzman's model is highly consistent with the way Spanish bankers augment capital. Peltzman's model, therefore, will provide a theoretical background to our empirical work on the Spanish banking system.

5.4.3.- Managerial Determinants of Bank Capital Augmentation.

Once our theoretical model of capital augmentation and its relevance to the Spanish case have been analyzed, one needs to examine in detail the different variables which affect banks' capital augmentation.

The economic literature on bank capital augmentation has defined the following variables as main managerial determinants of bank capital raising: the cost of capital, with the related issues of profitability, retained earnings, dividend policy and access to external sources of funds (Derry, 1982; Zimmer and McCauley, 1991; Gardener, 1992), portfolio risk and liquidity (Peltzman, 1970; Mayne, 1972; Mingo, 1975; Dietrich and James, 1983; Yeager and Seitz, 1985). These determinants must be analyzed in order to understand the way they affect capital augmentations in banking.

5.4.3.1.- *The Cost of Capital: Profitability, Retained Earnings, Dividend Policy and External Sources of Capital.*

A) *Introduction to Cost of Funds and Cost of Capital.*

A major issue when depository institutions make decisions on capital investment is the study of the costs of the different methods to augment capital. This issue of cost of capital must be first examined in the more general framework of the cost of funds to depository institutions.

Central to the analysis of the cost of funds is the fact that the average cost of funds is influenced by the mix of funds employed by the bank. One major objective of financial structure management in a profit-maximizing firm is the minimization of the cost of funds. Profitability may be increased by lowering the cost of funds, since this increases the spread between cost of funds and return on assets, *ceteris paribus*.

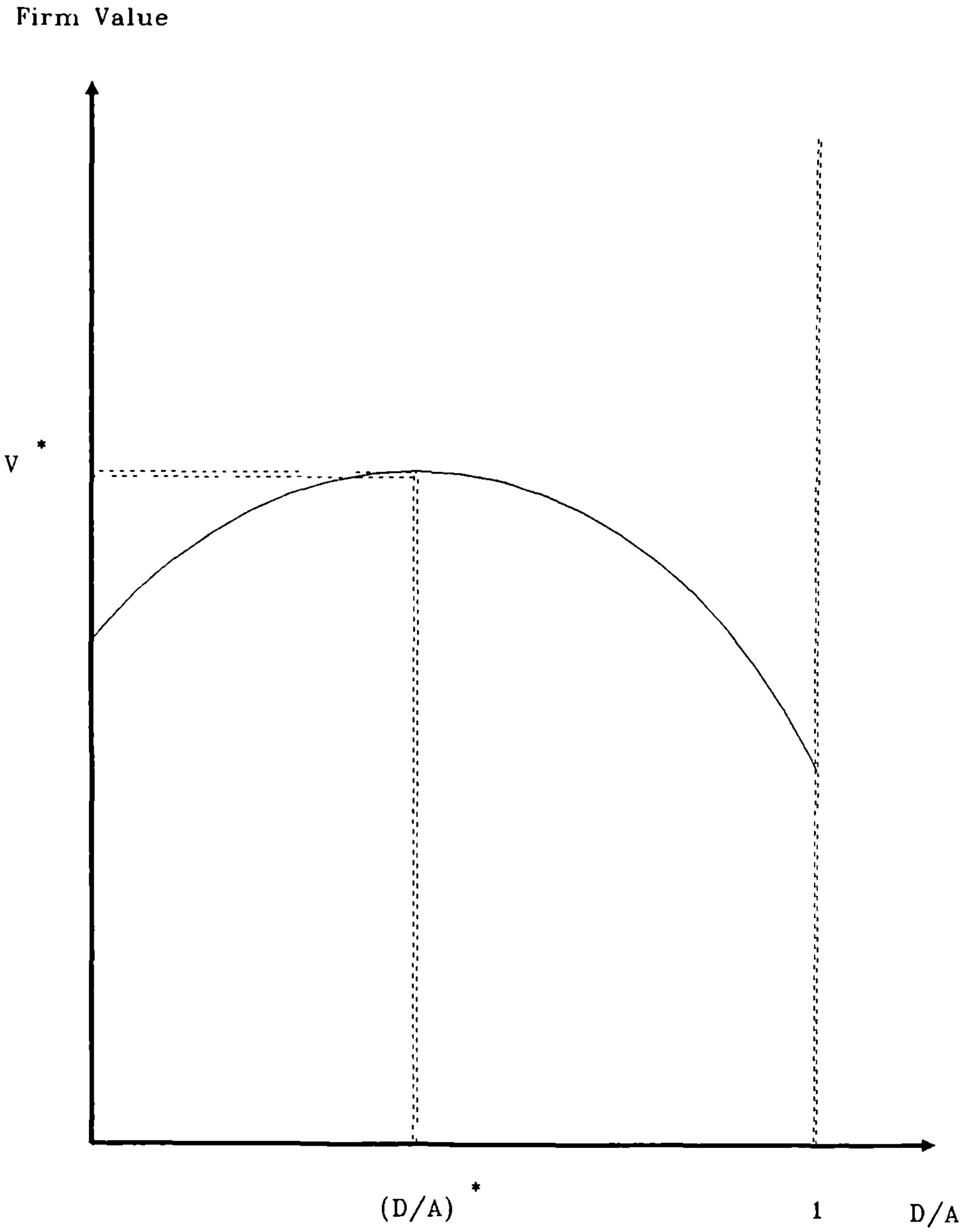
Fixed liabilities, such as debt and deposit liabilities, normally tend to cost much less than equity or other non-specific claims (Yeager and Seitz, 1985, p.101). Basically, Yeager and Seitz (1985) suggest two main reasons for that difference in cost. Firstly, investors as a group appear to invest in more risky equity and non-specific claims only when they anticipate a return from such claims that exceeds those available from debt and deposit claims. Secondly, interest payments to fixed claims are tax-deductible expenses, while dividends to shareholders must be paid from after-tax income.

Since debt liabilities generally have a lower after-tax cost than equity funds, one would expect the average cost of funds to decrease when the debt-to-assets ratio increases. Indeed, this will occur over some range. However, as the debt-to-assets ratio continues to increase, the bank's debt becomes an increasingly risky investment and the return required to attract such funds rises (Yeager and Seitz, 1985). Furthermore, continual addition of debt increases the risk to equity investors, driving up the required return on equity. Therefore, there are limits beyond which the addition of fixed obligations increases, rather than decreases, the average cost of funds.

This can also be examined by considering the relationship between the debt-to-assets ratios and the value of the banking firm. Sinkey (1992, p.729) demonstrates that combining costly bankruptcy with the tax-deducibility of interest expenses, produces a situation in which bankruptcy costs provide a disincentive that offsets the tax-shield incentive to expand debt. In other words, as a firm increases its use of debt, its risk of not being able to cover its fixed interest expenses increases. As Figure 5.2 shows, under these dual conditions, an optimal capital structure (D/A^*) exists in which the value of the banking firm (V^*) is maximized.

Fundamentally, there are two main ways for a firm to augment capital: first, the internal capital generation or retained earnings (where profitability and dividend policy are important issues), and, second, having access to external sources of capital

Figure 5.2: Financial Structure and Firm Value



(issuing different equity instruments). Both methods to increase capital and the cost involved in both are to be examined next.

B) *The Internal Capital Generation: Profitability, Retained Earnings and Dividend Policy.*

A bank's major source of capital is its earnings stream, a fact especially true for banks without easy access to capital markets. In Tables 4.5 and 4.6 in Chapter 4, we found empirical evidence that the main source of capital for both private and savings banks operating in Spain was their earnings stream and, more specifically, their retained earnings. This was especially true for the Spanish savings banks since they cannot issue share equity. Therefore, the first response of bankers facing the need for additional capital is probably, retained earnings. However, bankers must appraise their capital costs, especially, the costs to their shareholders. It seems generally accepted that increasing capital through the retention of earnings is the least painful and most desirable method available (Derry, 1982; Sinkey,1992). However, this method is not without costs.

According to Mingo and Wolkowitz (1977), the cost of capital of retained earnings is the opportunity cost of funds to the shareholders. Such opportunity costs will be increasing if the shareholders face imperfect markets for their investable funds. For the smaller, regional banks in the U.S., they argue that the shareholders are usually local businessmen who face a downward-sloped marginal efficiency of investment function in their various local business activities. For the larger national banks in the U.S., the opportunity costs of retained earnings are often the returns to imperfectly competitive nonbanking activities by the parent holding company that could be funded by the subsidiary bank's dividends.

In Chapter 4 the internal capital generation rate was defined. The formula is given by (4.1):

$$g = ROE \times RR \tag{4.1}$$

where ROE is Return on Equity and RR is the retention ratio. This can also be expressed as follows (Sinkey, 1992, p. 764):

$$g = PM \times AU \times EM \times RR \tag{5.18}$$

where PM is profit margin (= net income/operating income), AU is asset utilization (= operating income/average assets) and EM is equity multiplier (= average asset/average equity). Gardener (1992) emphasizes that from a managerial perspective, the four key elements on the right of equation (5.18) are essential determinants of a bank's rate of internal capital generation.

The link between capital adequacy (or net worth) and earnings is well-established. Revell (1975, p.116), for example, employed a very simple formula that expresses the dynamic relationship between earnings and net worth:

$$S = r + \frac{ra}{100 + a} \tag{5.19}$$

where S is surplus (retained earnings or profit), r is the change in the solvency ratio and a is the rate of change of total assets.

This model can be simulated under different growth of total assets in order to show the rates of earnings required to maintain various solvency ratios. This kind of model is very simple, but it illustrates the importance of internal capital generation within a bank's overall capital augmentation and the corresponding expansion of a bank's business mix and balance-sheet.

As suggested in Chapter 4, a bank's dividend policy bears a direct relationship to its rate of internal capital generation. The dividend payout ratio (PR) is equal to (1-RR). Then equation (4.1) can be re-expressed as follows:

$$g = ROE\ (1 - PR) \qquad (5.20)$$

In addition to this obvious relationship to the internal capital generation rate, a bank's dividend policy has an important bearing on bank market-value capital. In this context, a reduction of dividends is likely to have a dramatic negative effect on the market value of the stock (Derry, 1982). To a lesser degree, the failure of dividends to keep pace with increased earnings and expectations seems to have the same result. Foster (1986, p.387) provides U.S. empirical evidence (for 1983-84) of the effects of a change in the dividend policy on the behaviour of security prices of different samples of industrial companies. He found that firms that increase dividends, announce special or extra dividends, or initiate dividend payments for the first time experience positive abnormal returns. However, he also finds that firms that decrease or omit dividend payments experience significant negative abnormal returns.

A perceived drop in value of the shares by the market not only affects current equity holders but also may limit the bank's ability to raise capital in the future. Thus, the trade-off between retained earnings and dividend payout might affect both internal capital generation and external capital generation.

C) *External Sources of Capital.*

When market or regulatory forces require a depository institution to augment its capital beyond its internal capital generation rate and the institution does not reduce balance sheet growth and/or does not change balance-sheet business mix, the institution must turn to external sources of capital. Although both equity and debt capital are available for such purposes, under the new international and EC capital guidelines established for 1992, common equity has been assigned a more critical role. Accordingly, preferred stock and subordinated debt will count less in the eyes of the regulators in terms of meeting capital requirements. Healthy banks need to have access to external sources of capital to permit growth opportunities to be accomplished without unduly extending the bank's capital cushion or unduly increasing the internal retained earnings. Problem banks need to have access to external sources of capital to replenish the erosion of their capital account due to asset losses.

In principle, a banking firm has a choice between common stock, subordinated debt and preferred stock (Derry, 1982; Sinkey, 1992). The advantages and disadvantages of each must be weighed carefully. The sale of common stock in a public offering has one important advantage. It solves the capital adequacy question at once and, at least in the short-term, completely. Equity capital is also desirable because all of it counts in measuring the supervisory bank's capital adequacy, it is permanent and because the dividend payments are not a fixed, legal expense. However, the disadvantages become apparent when costs are considered. An important disadvantage is the high cost of an equity issue relative to debt. The high cost of equity relates to the bankruptcy-cost potential created by the use of less expensive debt (Sinkey, 1992). *Ceteris paribus*, an equity issue reduces the bankruptcy potential whereas a debt issue increases the bankruptcy potential. Hence, the equity issue is more expensive due to the advantages that involves. Another disadvantage is the ownership dilution. In the absence of preemptive rights, the current shareholders lose an element of control. The degree of concern over ownership dilution varies from bank to bank depending upon individual circumstances, but it cannot be ignored.

Subordinated debt is desirable for holders for the reason that the interest payments associated with the debt are a tax-deductible expense. In addition, it has no potentially diluting effects on earnings and control of a common stock issue. One disadvantage (to issuers) of a debt issue is its fixed interest rates. In other words, no matter how well the bank is performing, the interest payments have to be made. Another disadvantage is what Sinkey (1992) denominates "its lack of permanency". This means that there is uncertainty about whether or not the debt can be rolled over at maturity. A shortcoming of subordinated debt in terms of supervisory capital is the fact that only a portion of it may actually count in measuring a bank's capital adequacy.

In Chapter 4, it was shown that Spanish banks have been issuing important amounts of subordinated notes since 1985 when this financial instruments was introduced in Spain. Spanish savings banks appear particularly active in the subordinated notes market. Since they cannot share equity, subordinated debt plays a more important role than for private banks.

Derry (1982) suggests that debt issues have other costs that are not easily measured and may be impossible to quantify. There is attached to the issue of debt an opportunity cost that has to be factored into the decision. Generally, the market will only accept a certain degree of leverage for a bank. One must remember that a debt issue now reduces the bank's ability to issue debt later. it is also highly likely to increase the cost of any future issue due to the bond buyer.

An alternative to either common stock or subordinated debt is preferred stock, which is a hybrid of the two forms. Although preferred stock adds to the equity base, it is treated in the same manner as debt in the computation of cost of capital since the financing charges associated with it are derived in the same manner. Preferred stock is safer than equity capital but riskier than debt from the investor's perspective. From the issuer's perspective, it provides flexibility but lacks the tax deductibility associated with interest on debt. The latter is a major drawback to the use of preferred stock. The tax shield does not exist, and the true cost of preferred stock is higher than debt even at the same stated rate, flotation costs and market adjustments (Derry, 1982).

In Chapter 3, when the researcher analyzed Spain's definition of regulatory capital, it was indicated that the hybrid capital instruments such as preferred stock, were not included in the capital definition. Therefore, preferred stock is irrelevant in our analysis of capital augmentations in the Spanish banking system.

The access to capital markets and capital financing is a major issue when the external sources of capital are considered. In finance theory, the assumption of equal access to capital markets is frequently invoked[8].However, in the real world of banking capital markets, equal access is a fiction, as numerous banks simply have no opportunity to tap domestic capital markets and obviously they have no access to foreign capital markets. Therefore, any model considering the determinants of capital investment should take into consideration the fact that there exist differences among credit institutions in the possibilities of tapping domestic and foreign capital markets. There are banks which can tap both capital markets; some can only tap the domestic capital markets; others have no access to capital markets at all. This important difference in access to capital markets must be captured in models of capital augmentation through, for example, using dummy variables for those banks with access to capital markets.

In Chapter 4, we discovered that Spanish savings banks and many private banks are not quoted on any Stock Exchange. This appears to give lower possibilities of tapping domestic and international capital markets to those banks than for banks quoted on domestic and/or international Stock exchanges. This is a feature that should be captured in our empirical models for the Spanish banking system.

D) *The Determination of the Cost of Capital.*

The cost of capital influences not only the tenacity with which the bank management will argue for lower capital requirements but also numerous internal decisions (Edmister, 1986). Edmister argues that after determining the cost of capital for each source (debt, retained earnings and new equity), bank management is in a position to plan for future capital needs. Essentially bankers can continue to raise capital from the same sources and in the same proportions as it has done in the past. Alternatively, bankers can alter the sources tapped and proportions used to optimize its cost of capital.

The banker is very often assumed to face other than a perfectly elastic supply of capital so that a bank cannot float new equity, retain earnings or issue new debt without incurring an increasing cost of capital (Mingo and Wolkowitz, 1977). Therefore the cost of capital is specified as

$$g = g\ (K); \quad g_K > 0 \qquad (5.21)$$

Mingo and Wolkowitz (1977) specified the cost of capital in equation (5.21) as an average cost. However, since the capital supply function defines the marginal cost of capital, they assume that marginal cost is everywhere above average cost, so that an increase in marginal cost implies an increase in average cost (g). A capital market advantage is defined in terms of a relatively flat supply of capital curve, i.e. a low g_K[9]. To the extent that a credit institution is faced with a relatively more elastic capital supply function, it is able to augment capital without incurring as great an increase in cost. Second-order conditions require that $g_{KK} > 0$, which means that the cost of capital increases at an increasing rate.

The capital structure of most depository institutions includes some elements of each of the sources examined in the two previous subsections. The key to effective long-range capital planning is the proper mix of these elements (Derry, 1982). The best way to determine the optimum mix is to determine the overall cost of capital. We need to review the main models that can be employed to determine the cost of capital.

Yeager and Seitz (1985, p.105) indicate that one widely used model of computing the cost of equity is the dividend growth model:

$$K_e = \frac{D}{P} + g \tag{5.22}$$

where: K_e = Required return on equity

D = Dividends expected over the next year

P = Current market price of stock

g = Constant annual growth rate of dividends (expected to continue indefinitely).

Another model suggested by Yeager and Seitz to measure the cost of equity is the risk-adjusted required return approach:

$$K_e = R_f + b(E_m - R_f) \tag{5.23}$$

where : R_f = Rate available on risk-free investments, such as treasury bills.

b = A measure of sensitivity of returns for the particular security to conditions affecting common stock returns in general.

E_m = Expected return for securities in general.

The application of the dividend growth approach model requires stable dividend growth and the risk-adjusted return model requires historical market price data for stock. Lacking these, Yeager and Seitz argue that a firm may consider returns available on comparable securities for which there is an active market to estimate the returns available to investors in opportunities of equal risk.

Yeager and Seitz emphasize that for mutual institutions there is no possibility of a market price of equity. The Spanish savings banks are mutual institutions, and so none of the models above can be employed to calculate the cost of equity of those institutions.

The cost of subordinated notes and debentures is also considered by Yeager and Seitz (1985, p. 106). The cost of subordinated notes begins with the yield to maturity of existing notes, or the interest rate that would be required to sell new securities of this kind. Since interest is a tax-deductible expense, the effective interest cost is less than the yield to maturity. The after -tax cost of debt is as follows:

$$K_d = Y(1 - T) \tag{5.24}$$

where: K_d= After-tax cost of debenture debt

Y = Yield to maturity on existing debenture or required yield on new debentures

T = Effective marginal corporate rate tax.

A general model which computes an overall cost of capital can be found in Gardener (1992), p.30). His model calculates a weighted average of cost of capital (WACC) in the following manner:

$$K_c = \sum w_i k_i \tag{5.25}$$

where: K_c= WACC

w_i= market value weight of capital funds type i in the bank's capital structure

k_i= specific, after-tax cost of capital funds type.

In this context, Sinkey (1992, p.67) suggests a model to help banks develop funds-raising strategies to minimize its overall funding costs and maximize the value of the firm. His model is denominated EVA (Economic Value Added) and is a practical illustration of the importance to management of allocating and managing capital internally:

$$EVA = (R_c - K_c) \times K \tag{5.26}$$

where R_C is return on capital, K_c is cost of capital and K is average total capital. This model shows clearly than when the cost of capital exceeds the return on capital, management is not adding "economic value" to the firm.

The problem with these models for our purposes is that market values of capital funds are needed. Again, since there are many Spanish banking institutions (savings banks and many private banks) with no market value of capital funds, the models cannot be generally applied to our sample of the Spanish banking system. Due to the very limited sample of private banks quoted on the Stock Exchange, the market value analysis will be restricted only to those banks.

In order to overcome the problem of not having market values for most of the banking institutions in Spain, one needs to find in the literature a measure of cost of capital that can be generally applied to the Spanish banking institutions. One of the measures of cost of capital, which has been one of the measures most frequently found in the literature is the current rate of return on equity (ROE) (Derry 1982). The advantage of this measure is that it is available for all the banks in the Spanish banking sector

Zimmer and McCauley (1991) discuss three potential problems in using current profit rates as proxies for cost of capital. The problems are the following:

a) Profitability: if investors expect a bank's profitability to rise, its current profit rate understates its true cost of capital because investors are paying up for earnings not yet in evidence.

b) Cyclicity of profits: if a firm is having a bad year, its current profit rate does not proxy future profits well. In this case, the current profit rate would understate the cost of capital.

c) Undercapitalization: cost of capital can easily be overstated for an undercapitalized bank. If asset losses reduce a bank's equity to levels below regulatory capital standards, the bank must reduce assets, change business mix or augment capital. If new equity is issued to augment capital, the current shareholders will share current earnings with the new owners; if assets are reduced, the current shareholders will lose the income earned by the assets. In either case, earnings per share are set to decline. Investors for their part should recognize the impending dilution of their claim or asset shrinkage and value the share in anticipation of reduced earnings per share. As a result, the current earnings in relation to market capitalization of an undercapitalized banks will tend to overstate its cost of capital.

In spite of all the difficulties involved in the use of this measure of cost of capital, it is one of the measures that can be generally employed as a proxy cost of capital for all the banking institutions in Spain. This measure can be computed for all the banking institutions operating in Spain; it will then allow us to make comparisons across all the banking institutions in Spain on the effects of cost of capital on capital augmentations.

5.4.3.2.- *Portfolio risk.*

The second determinant of bank capital investment to be examined is the bank's portfolio risk. The portfolio risk of banking institutions is affected by market-based variables and regulation. In this section the researcher only considers the portfolio risk as a managerial determinant of bank capital investment and the effects of regulation on portfolio risk are left out.

In the marketplace, the two main factors to perceive whether a bank is solvent or insolvent are its portfolio risk and its quantum of capital. Insolvency occurs when the liabilities of a business exceed the value of its assets. The amount of shrinkage in assets that can occur without resulting in insolvency is related to the amount of capital in the financial structure. Thus, the risk of insolvency depends positively upon the risk of asset value shrinkage (that is, portfolio risk), and negatively upon the amount of capital in the financial structure. In other words, the lower is the bank portfolio risk, the lower the amount of capital needed in the respective financial structure.

The interaction between the amount of capital and portfolio risk shapes the philosophy of the RAR. As explained in Chapter 3, the interaction between the amount of capital and portfolio risk shapes the philosophy of the RAR. The RAR model can be defined as follows: one must first compute for each bank its RAR (R_a) in the following way:

$$R_a = \frac{C}{W} \tag{5.27}$$

where C is supervisory-measured capital and W are 'weighted assets' as defined in formula (3.1) in Chapter 3. The RAR for each banks is compared to the minimum specified regulatory level, R_s. A bank is presumed to have adequate capital if $R_a \geq R_s$. Condition $R_a < R_s$ is indicative a priori of inadequate capital. A bank in the latter condition, must augment capital and/or lower portfolio risk by reducing asset growth and/or changing business mix.

In order to examine how the RAR can change over time, the easiest way seems to differentiate the RAR with respect to time. Keeley (1988 p.12) differentiates the capital/assets ratio with respect to time to appraise how the ratio changes over time; his model can be found in formula (6.5) in the next chapter. His model has been applied to the RAR and it can be expressed as follows:

$$d(C/W)/dt = (C/W)\ [(1/C)(dC/dt) - (1/W)(dW/dt)] \tag{5.28}$$

where C and W are defined as in (5.27) and t is time. Equation (5.28) indicates that the rate of change of the RAR is equal to the percentage augmentation rate of capital minus the percentage growth rate of weighted assets' risk, multiplied by the initial RAR. Thus, banks can increase their RAR by increasing capital augmentation relative to growth rate of weighted assets' risk.

In the literature, one can find many classifications of bank portfolio risk and no generalized risk taxonomy can be exhaustive. Gardener (1989a) and Sinkey (1992, p. 401) include the following risks in their portfolio risks classifications: credit risk, country risk, liquidity risk, interest rate risk, leverage (debt servicing) risk, currency risk and contingent (arising from commitments) risk[10].

According to Sinkey (1992, p. 401), the critical portfolio risks in banking are credit or default risk, liquidity risk and interest-rate risk. Due to the important role that liquidity plays in the depository institutions (Sealey, 1983), liquidity risk will be examined separately in the next section. Now, the focus will be on credit risk and interest-rate risk.

Credit risk emerges from the fact that lending by banks is a risky business (Lewis and Davis, 1987, p. 76). Lenders are likely to be less well-informed than borrowers about the contingencies under which borrowers operate, and to be unable to control subsequent actions of borrowers to take advantage of this situation and escape fulfillment of their obligation. These factors generate uncertainty about the extent and speed of repayment of principal and interest, and hence give rise to default risk in bank lending. Bank managers must exercise discretion in deciding upon proper borrowers.

Sinkey (1992, p. 715) maintains that supervisors focus upon credit risk for commercial banks. Sinkey argues that the link between capital and credit risk is capital's ability to absorb losses due to default by bank's customers. He emphasizes that since credit risk has been the major risk faced by commercial banks in the past and most likely will be the critical risk for the future, the Basle Agreement (1988) ignores other sources of bank risk. However, as described in Chapter 3, the Basle Committee is now also looking at risks like liquidity and interest rate risk.

The interest rate risk is associated with losses from unexpected changes in interest rates. Such losses occur when unexpected increases in interest rates decrease the market value of an institution's assets more quickly than the market value of its liabilities. Kaufman (1984) maintains that this differential change in market values occurs if the banking firm's assets are less interest sensitive than its deposits: that is, if the earnings rates on assets adjust more slowly to market changes in interest rates than does the payout on deposits. Under the same balance sheet condition, the firm experiences a gain when interest rates decline unexpectedly.

Hence, banking institutions expose themselves to interest rate risk whenever the interest rate sensitivity of the two sides of their balance sheet is not equal. Interest-rate risk management is a key issue in the financial management of a banking firm[11].

As far as empirical evidence of the evolution of banks' portfolio mix and risk in Spain, is concerned, Table 5.2 gives some summary data of the evolution of the asset structure for both Spanish private and savings banks. Table 5.2 contains the same data as Table 2.9 in Chapter 2, but it only focuses on 1982 and 1987.

In Table 5.2, one can observe that the percentage of financial investment in loans decreased dramatically for private banks and moderately so for savings banks. The portfolio of securities decreased substantially for savings banks but only slightly for private banks. Investment in the interbank market and in monetary assets appears to have increased substantially. In particular, after 1984 investment in Treasury notes (Pagarés del Tesoro) increased substantially, even above what was compulsory owing to the lack of other investment opportunities. The disintermediation process explained in Chapter 2 seems to shape the evolution of Spanish banks' portfolios.

Table 5.2: Summary Data of Asset Structure for Private and Savings Banks (1982 and 1987). (%) (*)

	Private Banks		Savings Banks	
	1982	1987	1982	1987
Bank of Spain and monetary assets	7.2	22.0	9.3	25.4
Interbank market	5.1	14.1	9.2	11.3
Loans	74.7	51.4	52.3	46.2
Securities	12.9	12.6	29.2	17.1

(*) The numbers do not add up to 100 because of rounding.

Source: Trujillo et al, (1988, p.301)

The implications of Table 5.2 in terms of portfolio risk appear to be that the structure of aggregate on-balance-sheet portfolios of Spanish banks appears to have become less risky from 1982 to 1987. The percentage of loans and securities, which are generally riskier than monetary assets, has decreased. The percentage of monetary assets (mainly very liquid government bonds), in turn, has increased. Thus a less risky structure of Spanish bank's portfolio seems to have come about from 1982 to 1987.

5.4.3.3.- *Liquidity.*

The third managerial determinant of bank capital investment to be analyzed, is bank's liquidity. A separate section is needed for liquidity risk because of its importance in the banking firm. Sealey (1983) considers the importance of liquidity in the depository institutions by maintaining that since a large part of the services provided to the public by a depository intermediary is in the form of liquidity services, any model that ignores liquidity cannot adequately deal with this type of intermediary. One needs, then, to consider liquidity in our model of bank capital augmentations to reflect adequately the nature of the banking firm.

Liquidity refers to the ability to meet financial obligations as they come due. Bank liquidity management is the process of generating funds to meet contractual or relationship obligations at reasonable prices at all times (Sinkey, 1992, p. 426). Sinkey (1992, p.420) suggests a model for the confidence in a depository institution, which includes liquidity. The actual model is expressed as follows:

$$\text{Confidence} = f[NW, SOE, IQ, L(G)] \tag{5.29}$$

where NW stands for net worth or capital, SOE stands for stability of earnings, IQ stands for the quality of information regarding the bank's earnings and asset quality, and L(G) stands for liquidity as a function of government guarantees such as the U.S. federal safety net. Both capital and liquidity play a key role for the confidence in a banking firm.

Sealey (1983), in a model of the depository financial intermediary, emphasizes that the impetus for the existence of intermediaries is the demand for liquidity services by investors. Depository intermediaries produce such liquidity services, and investors are willing to pay a premium for liquidity since a penalty cost is incurred for being illiquid. Sealey also maintains that liquidity is a key issue in the valuation of a financial intermediary since the difference between the valuation equation of a financial intermediary and that of a nonfinancial firm is accounted for by a liquidity premium paid by the public in exchange for liquidity services.

The most important link between liquidity and capital adequacy has to do with the main function of capital adequacy: helping to preserve bank solvency. Crouhy and Galai (1986) argue that while insolvency yields liquidity problems to any kind of corporation, the reverse is quite specific and of vital importance to the banking industry. The holder of any financial instrument, like a bond, cannot get the corporation to redeem it before it legally matures, even if bad news is learned. However, depositors, can withdraw their funds in person or by writing cheques. A rapid withdrawal of funds by some depositors might generate panic among other depositors, and further trigger a bank run. These liquidity problems force the bank to sell assets at distress prices and to borrow at very high rates. This is likely to produce losses which might exceed the bank capital. In this process, a bank's reputational capital becomes impaired.

Regulators tend to focus mainly on capital adequacy, but as Crouhy and Galai (1986) maintain, recent history shows that illiquidity, rather than the lack of capital *per se*, is a primary cause of banking firms economic insolvency. A liquidity crisis might itself result from a loss of public confidence in the bank. The inability of the bank to maintain confidence might be associated in some ways with the insufficient capital base of a bank. Then the cost of liquidating assets plays a vital role in explaining why a bank confronted by liquidity problems has become insolvent.

Therefore, one of the main functions of bank liquidity is to demonstrate to the marketplace, which tends to be risk-averse dominated, that the bank is "safe". The same role is played by the bank capital adequacy. As a conclusion, we could say that good liquidity management could lead to less liquidity risk and *ceteris paribus*, less risk held by the bank. If banks hold less risk, *ceteris paribus*, the adequate capital required for a bank is also lower. Thus, in this sense, the better the liquidity management, the lower the capital adequacy needs for a bank.

As far as the liquidity evolution of Spanish banks is concerned, Tables 5.2 and 5.3 provide some empirical evidence of it. Both tables display summary data of the asset and liability structure of the Spanish banks, respectively, and give us insight into the evolution of the liquidity of Spanish banks. Tables 5.2 and 5.3 summarize Tables 2.9 and 2.10 of Chapter 2.

In Table 5.2, one can note that the more liquid assets (monetary assets) have increased dramatically as a percentage of total assets from 1982 to 1987, which appears to imply that the asset side of the aggregate Spanish banks has become more liquid. In Table 5.3, it can be observed that on the liability structure, the most demanding liabilities in terms of liquidity, such as current and savings accounts, have decreased as a percentage of total liabilities. Therefore, on both sides of the balance-sheet, Spanish banks have apparently reduced their liquidity risk from 1982 to 1987.

Table 5.3: Summary Data of Liability Structure for Private and Savings Banks (1982 and 1987). (%) (*)

	Private Banks		Savings Banks	
	1982	1987	1982	1987
Checking and savings accounts	41.1	37.5	57.6	50.3
Term and credit deposits	48.4	28.9	40.6	36.7
Negotiable liabilities	4.2	5.5	0.1	0.6
Asset endorsement	--	23.3	--	6.2
Other	6.4	4.8	1.5	6.2

(*) The numbers do not add up to 100 because of rounding.

Source: Trujillo et al, (1988, p. 303)

5.4.4.- The Effects of Capital Adequacy Regulation on Bank Capital Augmentations.

The microeconomic effects of bank capital adequacy regulation on bank capital augmentations are our main area of concern in this thesis. There is some theoretical literature which has analyzed the impact of solvency regulation on the bank capital augmentation process. A related issue to be explored is the impact of bank capital adequacy regulation on banks' portfolio risk. This issue is very important in this context, since regulatory capital augmentations in a RAR scheme can be accomplished by reducing bank portfolio risk.

This subsection is divided into two parts. In the first part, the literature that has studied the effects of capital adequacy regulation on bank capital augmentations is surveyed. Then a review is undertaken of the literature which has appraised the impact of capital adequacy on bank portfolios.

5.4.4.1.- *The Effects of Capital Adequacy Regulation on Bank Capital Augmentations.*

A) *The Impact of Capital Adequacy Regulation on Bank Capital Augmentations with no Deposit Insurance.*

Regulators' notions of what constitutes an adequate level of capital are related in microeconomic terms to bank portfolio composition; in macroeconomic terms they are related to the competitive conditions and the general levels of risk in the system[12]. Peltzman (1970) argues that the critical test of regulatory effectiveness in microeconomic terms is the degree to which regulators succeed in getting the bankers' investments decisions to conform with regulatory standards.

The regulators have attempted to systematize their notions of how capital should respond to portfolio factors in various formulae for capital adequacy. An important reason for this systematization of bank capital adequacy requirements is to substitute a "rule of law" for regulatory discretion and to demonstrate the objectivity of supervisory judgment, since a formula will convince bank management that its special situation is receiving comparable treatment and equitable consideration. It seems that departures from the formulae are permitted, but the formulas are supposed to yield an estimate of adequate capital for the "average bank" (Peltzman, 1970, p. 9).

The systematization of capital adequacy standards is very important for the reason that the variables of concern for regulators and bankers are often the same. It permits us to test the effectiveness of regulation by first determining the amount of capital that would be adequate for the supervisory authorities and then comparing it with the actual amount held by banks.

Osterberg (1991) documents the interactions between the regulatory effects and the market forces effects and the difficulty in discerning the influence of such guidelines. He argues that the primary difficulty in discerning the influence of capital regulation guidelines lies in disentangling the impacts of regulatory and market forces.

Banking theory seems to support the view that capital requirements may have significant effects on bank conduct and structure (Gardener, 1988b). In this context, Mingo and Wolkowitz (1977) document a model with strong neoclassical microeconomic roots in which profit maximization is assumed to be managements's goal with the primary external constraint being the regulator's soundness requirement. By solving the model, they determine how the bank's balance sheet would be adjusted in response to a change in regulatory requirements. They hypothesize the following balance sheet:

$$A + A' + C = D + K \tag{5.30}$$

where A = loans, A' = government securities, C = required cash reserves, D = total deposits and K = capital.

In their model bank profits are defined as the difference between revenue and costs which can be written as:

$$\Pi = pA + RA' - gK - hD \tag{5.31}$$

where p is the rate of return on loans, r is the rate of return on government securities, g is the cost of capital, and h is the cost of deposits.

Mingo and Wolkowitz assume that the manager maximizes bank's economic profits (Π) subject to a regulatory-imposed soundness constraint (τ). The soundness function measures a bank's strength by comparing the weighted quantities of assets to the weighted quantities of liabilities in a bank's balance sheet. The soundness function is

$$\tau = aA + a'A' + cC + kK - cD \tag{5.32}$$

where all lower letters represent the weights associated with balance sheet entries. The weights are all positive values, and $c > a' > a$. Therefore, for bank with given total assets and capital, an increase in loans necessarily comes at the expense of a decline in securities or cash (which have larger soundness weights). Additional bank capital (K), no matter what the asset form in which the capital proceeds are held, implies greater soundness. Greater deposits (D) imply less soundness, unless deposits are held entirely in the form of cash.

The model is solved via the method of Lagrange multipliers. This involves taking first-order partial derivatives with respect to each of the endogenous variables (A, a, K, D), and the Lagrange multiplier (λ).

When solving the model, the impact on bank capital of an increase in regulatory-imposed soundness is given by the following expression:

$$\frac{dK}{d\tau} = \frac{(a'+k)\left[\dfrac{Ap_{AA} + 2p_A}{(a' - a)}\right]\dfrac{dA}{d\tau}}{[Kg_{KK} + 2g_K]} \tag{5.33}$$

which gives a positive value, under reasonable governing parametric conditions. Thus, they demonstrate that under reasonable governing parametric conditions, a regulator-imposed improvement in soundness will result in an increase in bank capital. They also demonstrate that an improvement in soundness will result in a decrease in deposits, an increase in loan quality and a decrease in loan levels. They also emphasize that the greater is a bank's capital market advantage, the more prone it is to make its adjustment in its capital position, leaving loan quality and deposits relatively unchanged. Hence, the effects of capital regulation interact with the access to capital markets (a managerial variable previously reviewed in this chapter).

As a main conclusion of this section, the theoretical literature appears to support that there are major effects of bank capital regulation on banks' capital augmentations, and those effects seem to be positive. In other words, the higher the solvency constraint, the higher the bank capital.

B) *The Impact of Capital Adequacy Regulation on Bank Capital Augmentations with Deposit Insurance.*

A major issue on the impact of solvency regulation on bank capital augmentations is the existence of a deposit insurance system and its effects on capital augmentation. We need to review the main literature on that issue to reflect better the Spanish model of capital augmentation since the Spanish solvency regulation includes a deposit insurance system.

Earlier on in this chapter, it was noted that the major interest of bank capital adequacy legislators is to raise the overall level of protection of deposits. The date of the onset of regulation in the U.S. (the 1930s) coincides with the institution of a Federal deposit insurance and a series of reforms designed to make the banking system more stable. All of this seems to serve to lower the banker-desired capital stock, and this can partly or completely compensate the level effect of compensation (Peltzman, 1970). This conflict between the higher supervisor-desired capital stock and the lower banker-desired capital stock is due to deposit insurance. Once a deposit insurance system is set up, bankers might try to substitute deposit insurance for capital and regulators attempt to prevent their doing so (Peltzman, 1970).

With no deposit insurance and ignoring nondeposit liabilities, the balance sheet identity requires that total assets are equal to total deposits plus capital; hence, greater capital implies that, for any given asset portfolio, there is a lower probability of asset losses resulting in a decline in depositors' net worth. However, if deposits are insured, depositors are unlikely to worry about a bank's capital position. Consequently, Mingo (1975) argues that for purposes of attracting and maintaining deposits funds, deposit insurance would appear to be a direct substitute for capital in the eyes of bank management.

Nevertheless, Mingo (1975) also argues that deposit insurance cannot be a perfect substitute for bank capital for purposes of guaranteeing "soundness". Even if all deposits were insured at zero cost to bankers, there would still be differences in bank capital positions arising from different attitudes towards insolvency risk.

Sharpe (1978) has provided a formal setting for the analysis of capital adequacy in the presence of deposit insurance. Using a state-preference approach, he worked out a measure of that adequacy which takes into consideration the risk of banks' assets, of the interest rate risk associated with deposits, of the relationship existing between them and, finally, of the ratio of the value of banks' assets to the default value of deposits. Thus, a bank can be said to have an 'adequate capital' in this environment if the present value of the insurers' liability is not larger than the insurance premium.

An indirect confirmation of the substitution effect between capital and insurance can be derived from Taggart-Greenbaum analysis (1978) which aimed to measure the effects of a variety of regulatory settings on capital decisions of the banking firm. Considering banks' capital both as a source of funds (enabling banks to purchase earnings assets) and as a cushion (absorbing fluctuations in assets value), three models on the bank capital decisions under different regulatory settings are developed. The first, when only reserve requirements exist, the second when both a reserve requirement and an interest ceiling on deposit interest rate exist and, the third when a compulsory deposit insurance is added to the restriction of the second setting.

They assume that, apart from any risk reduction to shareholders, the protection that additional capital provides to depositors may induce adjustments in deposits terms which in turn benefit the shareholders. They found in every case a marginal benefit for the bank to increase its own capital. Comparing the three different regulatory environments, the incentive to augment equity results were weaker in the third environment than in the first two. This occurs because the deposit insurance system fails to reward banks for the loss-protection function of capital. Thus, in that case banks will aim to augment equity only if deposits are insufficient to finance favourable lending opportunities: insurance becomes a good substitute of capital for soundness purposes.

Taggart and Greenbaum (1978) also show that with partial insurance the incentives for bank shareholders to increase bank capital depend upon the extent of deposit insurance coverage, the degree of monopoly power and the effectiveness of deposit rate ceilings on partially insured deposits. Deposit rate ceilings on uninsured deposits provide an incentive for credit institutions to augment their capital as a means of competing for deposits.

Buser, Chen and Kane (1981), in a study of the deposit insurance and the value of the banking firm, argue that exclusive reliance on an explicit flat-rate premium would interfere with the simultaneous promotion of sound banking practices by supervisors and regulatory oversight for nonmember banks of the deposit insurance. The reason for this is that a value-maximizing nonmember bank would not join the deposit insurance if the explicit insurance premium exceeded the tax subsidy on deposit borrowings. At flat rates below its break-even level, an insured bank would reap subsidies from taxes and insurance. In this situation, the combined subsidy would strictly be a function of bank leverage. Recognizing the existence of implicit as well as explicit prices for the insurance, Buser, Chen and Kane see that the deposit insurance fund currently achieves a comparable effect by employing a risk-rated structure of implicit premia in the form of regulatory interference. Regulatory standards for capital adequacy emerge as the critical element in the insurers' pricing strategy, in that those standards determine the anticipated net value of deposit insurance to stockholders as a function 0of bank leverage.

Since in practice deposit insurance coverage is less than complete, Dietrich and James (1983) wonder if the private incentives provided by uninsured depositors (i.e. adjustments in deposit terms associated with capital alterations) have a significant effect on the level of bank capital. They believe that it is likely that the factors affecting uninsured depositor's demand for bank capitalization may be similar to the factors affecting the insurer's desired capital levels. However, Santomero (1984) finds that over the past several decades, failed institutions have been dealt with in a manner that has protected all depositors, rather than only the insured category. Therefore, the concerns of the noninsured depositors in terms of some assurance of the solvency of the bank, seem to have been made less relevant.

To sum up in this subsection, one can draw the conclusion that the literature on the impact of deposit insurance on capital augmentations appear inconclusive. Some authors maintain that there is a substitution effect between capital and deposit insurance. However, other authors argue that the substitution effect is not always necessarily the case.

5.4.4.2.- *The Effects of Capital Regulation on Portfolio Risk.*

A) *The Impact of Capital Regulation on Portfolio Risk with no Deposit Insurance.*

The effects of capital adequacy regulation on bank portfolio risk is a related issue to our research. There is a rich and extensive literature on the impact of bank regulation on asset and portfolio risk[13]. The researcher focuses on the effects of capital regulation on bank portfolio risk.

Typically the mere addition of capital to the bank's balance-sheet is assumed to reduce risk (Di Cagno, 1990, p. 30). The capital base of a bank protects the institution from the risk of insolvency by absorbing losses in times of poor performance.

Koehn and Santomero (1980) demonstrated that an increase of a regulatory capital-asset ratio causes a reshuffle of a bank's portfolio from less risky to riskier assets. The degree to which this reshuffling occurs depends upon the risk aversion coefficient of the bank. For highly risk-averse institutions, the elasticity value of high risk assets with respect to the capital constraint is less than the elasticity for other institutions with less risk aversion. They argue that the impact of the required capital-asset ratio upon the average probability of failure of the bank is ambiguous. They maintain that the relationship between the bank portfolio risk, the amount of bank capital held and the chance of bankruptcy is not straightforward. In other words, an increase of the capital constraint may lead to a lower as well as to a higher probability of bank failure depending upon the amount of relative risk aversion shown by depository institutions.

Furlong and Keeley (1987), however, suggest that regulatory increases in capital standards will not require greater efforts to restrain asset risk. On the contrary, the marginal rate of increasing risk assets declines as leverage falls. Consequently, less leverage (more capital) reduces the gain from risk taking. In their theoretical model, they introduce a further differentiation in the analysis of the effect of capital requirements on bank riskiness: the actual possibility of bankruptcy. When this possibility is not introduced in their theoretical model, the results arising from an increase of capital requirements on bank riskiness are identical to those suggested by Koehn and Santomero (1980).

However, restricting the analysis to the situation where bankruptcy is not possible makes it useless for policy provisions since capital regulation is necessary only when bank failures may actually take place. So Furlong and Keeley include in their model the probability that bankruptcy occurs given by the fact that the bank effectively would pay less than the promised rate on deposit if the rate of return on assets and leverage were lower than expected.

The impact of the imposition of different capital adequacy regulatory ratios has been explored by Lackman (1986). He emphasizes that in theory, the imposition of different capital adequacy ratios might all have distinct effects on the overall riskiness of bank portfolios. In the theoretical model developed by Lackman, when the capital/deposits ratio is applied, this always reduces the variance of return on equity, but to varying degrees among different banks. It will also increase the expected return and the probability of losses. When the capital/risky asset ratio is applied, this causes a shift of bank portfolio towards less risky assets and reduces the variance of return on capital. The last ratio examined by Lackman is the adjusted risky asset ratio which is shown to cause a shift of bank portfolios towards less risky assets and reduces the variance of the return on capital.

Thus, different capital adequacy schemes are likely to have distinct effects on bank decisions in terms of bank portfolio and capital structure. The last two ratios (capital/risky asset ratio and adjusted risky asset ratio) seem to produce the results which appear closer to what bank examiners prefer.

Table 5.4 summarizes the main findings in the theoretical literature on the impact of bank capital adequacy on portfolio risk. The main conclusion that one can draw is that the literature is inconclusive since there are contradictory findings. The effects on portfolio risk are different across different capital ratios schemes. If risk is contained in the regulatory capital formula (such as in capital/risky assets and capital/adjusted risky assets), the effects on portfolio risk that the regulators desire (lower risk) can be accomplished. There are also different results depending on whether the bankruptcy possibility is included or not in the model. When it is included, the desirable regulatory objectives can be achieved.

Table 5.4 : Summary of Theoretical Effects of Capital Regulation on Banks' Portfolio Risk.

Authors	Case analyzed	Impact / Comment
Koehn and Santomero (1980)	$\frac{\text{Capital}}{\text{Assets}}$	Dependent on risk-aversion coefficient (possibility of riskier portfolios)
Lackman (1986) Three cases:	(a) $\frac{\text{Capital}}{\text{Deposits}}$	Reduces the ROE variance and increases expected return and probability of losses.
	(b) $\frac{\text{Capital}}{\text{Risky Assets}}$	Less risky portfolios and lower ROE variance.
	(c) $\frac{\text{Capital}}{\text{Adj. Risky Assets}}$	Less risky portfolios and lower ROE variance.
Furlong and Keeley (1987) Two cases:	(a) With possibility of bankruptcy	Lower portfolio risk
	(b) Without possibility of bankruptcy	Results similar to Koehn and Santomero (1980)
Di Cagno (1990)	Review of the different cases	Survey of the literature

B) *The Impact of Capital Regulation on Portfolio Risk with Deposit Insurance.*

The existence of a deposit insurance system may give insured bankers an artificial incentive to undertake more risk than they would in the absence of regulation and deposit insurance (Santomero, 1984; Di Cagno, 1990). Santomero (1984) believes that the mantle of regulation has in and of itself a built-in incentive to increase risk and leverage. The deposit insurance system guarantees all depositors up to a statutory limit which results in the liability of the depository institution being *de jure* a riskless asset for these depositors. Accordingly, there is no incentive for these depositors to respond to bank riskiness *per se*. Di Cagno (1990) emphasizes the fact that much of the risk failure passes to the deposit insurer; this might lead aggressive management to follow a more expansionary and riskier policy. Hence, deposit insurance could have the perverse effect of increasing, instead of reducing, the riskiness of the banking system.

The effects of capital requirements on banks portfolio risk with deposit insurance have been analyzed by Kareken and Wallace (1978). Employing a state-preference framework and comparing a laissez-faire equilibrium model with one including both deposit insurance and capital ratios, they conclude that a capital requirement, by itself, does nothing to forestall bankruptcy.

Given a basic profit function where assets, deposits and other liabilities constitute the set of choice variables for the banks and assuming the cost of insurance included in the total cost sustained by the bank, Kareken and Wallace worked out the corresponding equilibrium for each of the combined insurance schemes considered.

In particular, apart from the deposit insurance which remains always binding, they studied the existence of a minimum amount of bank capital constraint, the prohibition of issuing other liabilities (interest rate ceiling) and two different portfolio constraints. The first portfolio constraint imposes that whatever state of the world occurs, the bank can meet some fraction of its commitment to the owners of its deposits and other liabilities; the second regulation framework limits the differences between the various state-specific pay-off of portfolios.

Assuming that banking institutions are profit-maximizers, they determined, through the basic profit function, both competitive and monopolistic banking industry equilibria in a *laissez faire* environment. Kareken and Wallace then introduced, through comparative static analysis, the different combined insurance-regulatory schemes and appraised their effects on the optimal equilibrium. Therefore, they demonstrated that if bank liabilities are insured at a variable premium and banks do not have other regulatory constraints, the relevant profit function remains precisely that of the *laissez-faire* banking industry.

To approximate reality, they introduced two kinds of insurance-regulatory schemes in the previous framework. Under the first, all bank liabilities are insured at a fixed premium and capital standards, interest rate ceilings and the first portfolio constraint apply. Under the second, all bank liabilities are insured at the previous premium and all the previous regulations apply, but the second kind of portfolio constraint is employed. In that case, the level of equilibrium of total deposit liabilities results in lower than the *laissez-faire* case. A positive insurance rate acts in that equilibrium as a tax. Thus, it would become optimal only if regulation makes bank liabilities safe and then, those liabilities are nominally insured. In the second case, the equilibrium will also become optimal if regulatory parameters are such that there are no bankruptcy states and the insurance premium is equal to zero.

To sum up, Kareken and Wallace draw the following conclusions:

(i) Without deposit insurance and regulation, bankruptcy does not occur.

(ii) Under a fixed premium insurance scheme, the banking industry holds as risky a portfolio as regulation allows.

(iii) Hence, in this framework, regulation of banks constitutes a necessary complement to deposit insurance, rather than an alternative.

Osterberg and Thomson (1989), in a review of the literature, find that with risk- and leverage- related deposit rates and insurance premia, the incentive to increase leverage is smaller than when the deposit rates and insurance premia are fixed. Allowing explicit deposit costs to vary with risk and leverage also reduces the portfolio variance. In addition, asset choice is influenced by the response of the risk premium to increases in portfolio variance.

They also emphasize that, as in the case where explicit deposit costs do not vary with risk and leverage, the impact of increased capital requirements on portfolio behaviour for banks paying risk-based deposit insurance premiums is ambiguous. In both cases, the impact of increased requirements on asset choice is indeterminate, as are the responses of portfolio variance, expected profits and the probability of bankruptcy. Nevertheless, allowing deposit rates to vary with portfolio risk and leverage, results in a reduction in portfolio variance and in the incentive to increase leverage. These would seem to be desirable results from a regulator's viewpoint.

5.5.- SYNTHESIS AND TESTABLE HYPOTHESES.

This chapter has reviewed the main theoretical aspects which shape bank capital decisions, where capital adequacy regulation appears to play a key role. First, we surveyed the effects of capital regulation desired by bank regulators and supervisors: that is, the macroeconomic and particularly microeconomic objectives of capital regulation. Second, the researcher examined the interactions between bank capital adequacy regulation and the models of the banking firm and the issue of the preference for market-determined capital positions or regulation-determined capital positions. Then, the largest part of the chapter was devoted to the study of what banking theory considers as determinants of bank capital augmentations. A general model of capital augmentations, managerial determinants and the role of regulation were appraised.

From this survey of the theory of the determinants of bank capital augmentations, several relevant testable hypotheses may be developed. These are the main testable hypotheses that one can draw from the theory reviewed:

a) The impact of regulation on bank capital augmentations: in this context a number of sub-hypotheses arise:

a.1) Have bank capital adequacy standards formulated by regulators had any effect on bank capital augmentations ?

a.2) It was noted in this chapter that the regulatory capital augmentations may be obtained through lowering portfolio risk. Therefore, a related subhypothesis is: Have bank capital adequacy regulations had any impact on bank portfolio risk ?

a.3) What is the impact of deposit insurance membership on capital augmentations?

a.4) To sum up: To what extent have regulators succeeded in getting the banker's capital decisions to conform with regulatory standards ?

b) The impact of managerial determinants of bank capital augmentations: again several sub-hypotheses emerge:

b.1) To what extent have the cost of funds and the cost of capital influenced bank augmentations? In this hypothesis, several sub-hypotheses emerge:

b.1.1) What is the influence of internal capital generation (with the related issues of profitability, retained earnings and dividend policy) on bank augmentations?

b.1.2) To what extent has access to domestic and international capital markets influenced bank capital augmentations?

b.2) To what extent has bank portfolio risk been a determinant of bank capital augmentations?

b.3) Has liquidity management affected bank capital augmentations?

b.4) What other Spanish-specific determinants have affected bank capital augmentations?

c) Two final related testable hypotheses may arise from the two previous hypotheses:

c.1) To what extent is it possible to disentangle the impacts of regulatory and market forces ?

c.2) Does the impact of capital regulation depend on market forces ?

Once the main theories on the effects of capital regulation on bank capital augmentations have been analyzed and the main testable hypotheses that emerge from those theories have been promulgated, the next stage should be to explore the relevant empirical literature and methodologies that have attempted to test the regulatory effects of capital adequacy on capital augmentations. This will be the task of the following chapter.

NOTES:

1.- This is also the case for many other countries: see for example, U.S. Banking Act of 1933.

2.- See for example, U.S. Banking Act of 1933 and Spain's 3048/1977 Royal Decree whereby the Deposit Insurance Fund was created.

3.- See Spellman (1982, pp. 51-54) for a comparison of the production firm and a financial firm.

4.- The optimization process involves finding $[A^*, a^*, d^*]$ such that the relevant marginal revenues and marginal costs are equal: see Baltensperger (1980).

5.- See Sinkey (1992, pp. 102-105) for a survey of the evolution and development of the theory of the banking firm.

6.- The asterisk denotes intention or expectation.

7.- If one specifies only partial adjustment to expected deposit growth in any period and if deposits are growing secularly, the model would imply a continuously growing divergence between C^* and C. This is untenable in a model which attempts to explain how C^* and C are brought together.

8.- See, for example, Modigliani and Miller (1958); Copeland and Weston (1988, p.439) review the main assumptions of the finance theory with regard to capital markets.

9.- It should be noted that a relatively flat supply curve implies a relatively elastic supply curve.

10.- See Sinkey (1989) for a study of these types of portfolio risk.

11.- See Kaufman (1984) for an extensive analysis of interest rate risk management.

12.- The Basle Agreement (1988) considers the macroeconomic implications of competition and general levels of risk in the system.

13.- See Di Cagno (1990) for a survey of this literature.

CHAPTER 6 : EMPIRICAL MODELS ON THE EFFECTS OF BANK CAPITAL ADEQUACY ON BANK CAPITAL AUGMENTATIONS.

6.1.- INTRODUCTION.

Once the main theories of the determinants of bank capital augmentations have been analyzed (where supervisory capital regulation appears to be a key determinant), we need to review the main empirical methodologies and models that have tested the impact of capital regulation on banks' capital augmentations. The purpose of this chapter is to examine the empirical literature on the effects of capital regulation on bank capital augmentations, from which we can construct our specific models that will be employed later on to test the effects of capital regulation on bank capital augmentations in the Spanish banking system. Thus, this chapter is best seen as a kind of "bridge" between the hypotheses we obtained from the main theories (in the last chapter) and our specific empirical tests for the Spanish banking system.

This chapter is organized as follows. In the next section, we review the main methodologies for measuring and evaluating the effects of any economic regulation. Then, we move on to our specific case: that is, the methodologies and models that the literature provides on the effects of capital adequacy regulation on bank capital augmentations. Finally, in the concluding synthesis the researcher surveys the main findings in the literature and lays down the main testable models.

6.2.- A GENERAL VIEW OF THE EFFECTS OF ECONOMIC REGULATION ON FIRM CONDUCT.

6.2.1.- Economic Regulation and Conduct.

In a broad sense, all firms are regulated today. They must comply with legislation laying down minimum wage rates, safe working conditions and environmental standards, to name just a few. However, in an important minority of industries the government actively intervenes and regulates business decisions in much greater detail (Weiss and Strickland, 1976, pp 1-3)[1]; one example of these industries is the banking industry (Revell, 1975; Llewellyn, 1986; and Gardener, 1986a)[2].

We are mainly interested in the effects of "economic regulation" on firm conduct and performance. By "economic regulation" we refer to both direct legislation and administrative regulation of prices and entry into specific industries or markets. We follow conventional treatment in distinguishing economic regulation from a host of other forms of government intervention in markets, including "social regulation" of environmental, health and safety practices, antitrust policy, and tax and tariff policies (Joskow and Rose, 1988).

"Conduct" refers to the behaviour (actions) of the firms in the market; to the decisions those firms make and also to the way in which these decisions are taken (Ferguson, 1988, p. 8). For example, it focuses on how firms set prices, how firms decide on their advertising and research budgets, or how firms decide on capital investment. In this thesis, we are merely interested in one aspect of bank conduct: that is, bank capital augmentation. We focus upon the hypothesis whether bank capital regulation affects bank conduct in terms of capital augmentations.

The effects of regulation are likely to depend upon a variety of factors: the motivation for regulation, the nature of regulatory instruments and structure of the regulatory process, the industry's economic characteristics, and the legal and political environment in which regulation takes place (Joskow and Rose, 1988). Given the substantial variation in these economic and institutional characteristics, the expected effects of regulation are likely to differ considerably across industries and through time.

6.2.2.-Methodologies for Measuring and Evaluating the Effects of Regulation on Firm Conduct.

The most basic question one can ask about economic regulation is whether it makes a difference to the behaviour of the regulated industry. Crampton (1964) argues that the enumeration of an endless succession of regulatory actions provides evidence, not of effective regulation but of the desire to regulate. The regulation may prohibit conduct that no one wishes to engage in or it may encourage conduct which will take place anyway. Even if the regulation deals with conduct that would take a different course in the absence of regulation, it is always possible that the objective so devoutly desired by the regulators will not be accomplished.

In order to determine whether the observed economic behaviour in a particular industry is due to the existence of regulation, the possible effect of regulation must be isolated from other factors influencing behaviour. Furthermore, if we aim to determine the effects of a certain regulation on the observed economic behaviour in the industry, we must isolate the possible effect of this regulation from other regulations affecting conduct.

According to Joskow and Rose (1988), there are four basic empirical methodologies for measuring the effects of regulation. These are the following:

a) Comparing regulated and unregulated firms and markets: if the only difference between the samples of firms analyzed is the nature of the regulatory constraints the firms are subject to, differences in behaviour and performance can be attributed to regulation. This approach may rely either on cross-sectional variation, comparing similar firms operating under different regulatory structures; or on time series variation, comparing the same firms operating under a changing regulatory environment. Both cross-sectional and time series analyses involve a common method. First, the dependent variable of interest - such as price, cost, or profitability - must be defined, and modelled as a function of exogenous economic characteristics that influence performance independent of regulation and a control for the influence of regulation. Regulation generally is measured as a dummy variable indicating whether an observation is drawn from the "regulated" or "unregulated" regime. The effect of regulation is inferred from the sign and magnitude of the coefficient on the regulatory dummy variable.

b) Using variations in the intensity of regulation: in many cases it may not be possible to obtain data on firms or markets that are subject to fundamentally different regulatory regimes. We may have observations only on firms and markets subject to qualitatively similar regulatory constraints. These situations are clearly not conducive to the "dummy variable" approach discussed above. Yet there may be quantitative differences in the regulatory constraints applied over time and space that, under particular theories of regulation and their effects, would be expected to yield differences in outcomes in one or more dimensions. These variations may arise from differences in regulatory structures or processes, or from the effects of changing economic conditions on regulation. Proper application of this approach requires a detailed understanding of variations in regulatory rules and procedures and the specification of a precise model of how these variations affect the behavioral and performance variables of interest.

c) Using controlled environment experiments: data generated by actual regulatory and economic conditions may not provide sufficient experimental evidence to estimate the effects of regulation[3]. As an alternative to relying upon the "natural experiments" provided by actual experience, evidence from controlled experiments is increasingly used to measure regulatory effects. These experiments are designed to generate data suitable for testing specific hypotheses about the effects of variations in institutional arrangements and public policies. Two types of experimental evidence are potentially available. Field experiments may be designed to study the behaviour of real economic agents. In these, economic conditions or institutional structures are varied in systematic ways, and behavioural responses are used to quantify the effects of alternative regulatory, public policy, or market arrangements. Laboratory experiments involve human experimental subjects taking part in a set of laboratory "games", designed to provide the subjects with economic conditions that they would face under various market and institutional arrangements. Institutional details can be varied in a way that carefully controls for other causal variables.

d) Structural / simulation models of regulated firms and markets: in all too many cases, none of the previous approaches can readily be used. For example, there may be no significant variations in regulatory regimes, in the intensity of regulatory constraints, or in economic conditions that would enable one to measure directly the effects of regulation on conduct and performance. Controlled experiments may be too expensive or too complex to perform. In these cases, structural models of behaviour or performance, combined with simulation techniques, may provide a means of estimating regulatory effects. The task is in some ways easier for firms operating in regulated industries than for those operating in unregulated industries. Regulatory agencies frequently collect detailed firm-level information on revenue, outputs, costs, capital stocks, etc.

A simple application of structural models employs asset pricing theory. Regulation may create assets that have value only in a regulated environment, such as operating certificates for regulated trucking companies, taxicab medallions and other types of licenses. If these assets are traded, their prices will reflect the capitalized value of expected regulatory rents accruing to the holder[4].

Table 6.1 provides for each of the four basic methodologies above two major examples of empirical work that have employed the respective methodology.

The approach to be employed in our empirical tests on the impact of bank capital regulation on banks' capital augmentations for the Spanish banking system during 1987-90 is (b): that is, using variations in the intensity of regulation. There are several reasons for this.

Firstly, there appears from our preliminary research and field survey to be different intensities of capital regulation for private and savings banks: that is, cross-sectional variation in the intensity of regulation across banking firms. Although they have to comply with the same standards, savings banks cannot issue share equity, which appears to be an important constraint compared with private banks. We wish to examine those differences between private banks and savings banks operating in Spain in order to appraise whether the capital augmentation model differs across private and savings banks.

Table 6.1 : Empirical Studies on the Effects of Economic Regulation.

Methodology	Author	Comment
a) Comparing regulated and unregulated firms and markets	Stigler and Friedland (1962)	Seminal paper on regulated electricity prices in "regulated" and "unregulated" U.S. states.
	Rose (1985)	Event study of regulatory rents in U.S. trucking industry
b) Using variations in the intensity of regulation	Gollop and Karlson (1978)	The structure of specific regulatory instruments is analyzed.
	Norton (1982)	Based on variation in regulatory resources.
...	...	...

c) Using controlled environment experiments	Smith (1982)	Designed to generate suitable data for measuring the effects of variations in public policies.
	Hong and Plot (1982)	The effects of regulatory pricing rules on inland barge transport in the U.S.
d) Structural / Simulation models	Schwert (1981)	Regulatory assets are measured for several U.S. industries.
	Smirlock, Gilligan and Marshall (1984)	Analysis based on Tobin's q which provides inferences independent of the form of regulatory ratemaking.

Finally, from the survey performed among several major banks in Spain, we found that those banks also monitor both BIS capital ratios (since 1988) and EC Directives solvency ratios (since 1989). Therefore, the intensity of regulation is likely to be different since BIS Recommendations and EC Capital Adequacy Directives were approved. We must determine whether this is the case for the Spanish banks in terms of capital augmentations. In other words, we must determine if the model of capital augmentations has changed for the Spanish banking system in 1988 (BIS Agreement) and in 1989 (EC Directive), when the intensity of capital regulation seems to have changed.

Once we know the approach to carry out our tests, we need to review the main methodologies and models that can be found in the literature which have undertaken tests on the effects of capital adequacy regulation on banks' capital augmentations.

6.3.- MAIN EMPIRICAL METHODOLOGIES AND MODELS TO TEST THE EFFECTS OF CAPITAL REGULATION ON BANK CAPITAL AUGMENTATIONS.

6.3.1.-Introduction.

There is a significant U.S. empirical literature that has tested the effects of bank capital regulation upon bank capital augmentations; early studies in this literature date back in 1970-75. But there are more recent articles containing methodologies and empirical models to measure these effects. This section will start with the early models and then move on to examine the more recent methodologies.

6.3.2.- Early studies.

Peltzman (1970) performed the first empirical study on the effects of capital regulation on bank conduct. He directly estimated the magnitude of the effect of government regulation on capital investment in commercial banking by testing the simple capital investment model for a bank that was explained in the equation (5.17) in Chapter 5. Two variables representing the influence of bank capital regulation on bank capital were included among the explanatory variables: a variable representing the bank capital adequacy ratio and the deposit insurance ratio.

In order to measure the effectiveness of bank capital regulation, he considered both the ability of regulators to prevent bank management from substituting deposit insurance for capital, and the ability of regulators to influence changes in bank capital when their standards of capital adequacy differed from those of bank management.

Peltzman tested the following equation, employing cross-section data using state aggregates of U.S. banks in the period 1963-65:

$$Y = f\ (X_{11}, X_{12}, X_{31}, X_{41}, X_{51}, X_{61}, (X_{62}, X_{63}, X_{64}), X_{71}, X_{72}) \qquad (6.1)$$

where:

Y = percentage change in bank capital, year t;

X_{11}= ratio of market value of bank equity capital to its book value, year t-1;

X_{12}= bank net operating earnings as percentage of capital, t-1;

X_{31}= ratio of U.S. government bonds to deposits net of cash assets, t;

X_{41}= ratio of bank capital to deposits net of cash assets, t;

X_{51}= average annual percentage change in deposits net of cash assets, previous five years;

X_{61}= percentage of bank deposits insured by the Federal Deposit Insurance Corporation (FDIC), t;

X_{62}, X_{63}, X_{64}= ratio of adequate capital to capital actually held by banks, t, where adequate capital is respectively computed by:

X_{62}= formula developed by the Board of Governors of the Federal Reserve System;

X_{63}= adjusted risk-assets formula;

X_{64}= formula developed by the Federal Reserve Bank of New York;

X_{71}= dummy variable (1 in 1963, 0 otherwise);

X_{72}= dummy variable (1 in 1965, 0 otherwise).

Peltzman's empirical model has desirable features for our research objectives:

1) His dependent variable is the capital augmentation rate, which is also our key dependent variable.

2) He defines two alternative definitions of rate of return: X_{11} and X_{12}. Since Spanish savings banks and many private banks have no market values, we have, then an alternative to measure rate of return for those banks.

3) The inclusion of the same type of regulatory variables we will estimate for the Spanish case: capital ratios and deposit insurance.

4) He distinguished between different years and our analysis will also distinguish between different years. However, unlike in Peltzman's article, dummy variables will not be employed in our research to distinguish between years; a different equation will be estimated for each year.

However, there are also important limitations of Peltzman's model for our research objectives. First of all, he uses data aggregated by state. We, however, are to use nonaggregated data for each bank. Variations in individual variables across banks in a state are not captured in data aggregated by state. However, with nonaggregated data, these variations are captured. Secondly, the measure of portfolio risk is included in the regulatory formula, and there is no separate measure of portfolio risk to test the influence of it on capital augmentations. Therefore, it is not possible to disentangle the effects of portfolio risk on capital augmentations. However, our analysis will comprise a variable representing supervisory capital regulation and a separate variable representing portfolio risk. Thirdly, no mention of the different access to capital markets is made in his model. Finally, there is no distinction between book-value capital, market-value capital and regulatory capital in his model, and there is no distinction across U.S. banks in terms of the different intensity of regulation. The latter is overcome by Mayne (1972).

Mayne's work (1972) tested the hypothesis that in the U.S. there exist significant differences in the amount of capital funds held by national banks, by state banks belonging to the Federal Reserve System, and by nonmember banks insured by the FDIC - differences that are not explained by inter-bank variations in asset and liability structure, earnings, growth, or economic environment. Mayne sets out to determine whether or not banks which are similar except for the supervisory jurisdiction under which they operate do, in fact, maintain essentially similar capital positions.

Mayne employed the following single equation linear model for cross-section data during the period 1962-1968. The sample of banks used each year of the period varied, ranging from 804 banks in 1962 to 727 banks in 1968 (operating in four U.S. states[5]):

$$C = \alpha + \beta_1 NA_i + \beta_2 SM_i + \beta_3 AS_i + \beta_4 TD_i + \beta_5 EG_i + \beta_6 EL_i + \beta_7 AG_i + \\ + \beta_8 CA_i + \beta_9 MR_i + \beta_{10} LO_i + \beta_{11} CO_i + \mu_i; \quad i = 1, 2, \ldots, n; \qquad (6.2)$$

n = number of sample banks in a cross-section year;

where:

C = average total capital funds in year t to average total assets in year t.

NA = dummy variable (1 for national banks in year t, 0 otherwise);

SM = dummy variable (1 for state-chartered Federal Reserve System member banks in year t, 0 otherwise);

AS (size) = assets, in millions of dollars, in logarithm form in year t;

TD (deposit structure) = ratio of average time deposits in year t to average total adjusted deposits in year t;

EG (earnings growth) = ratio of before-tax adjusted operating earnings in year t to before-tax adjusted operating earnings in 1961;

EL (earnings level) = ratio of before-tax adjusted operating earnings in year t to average total assets in year t;

AG (asset growth) = ratio of average assets in year t to average to average assets in 1961;

CA (liquidity) = ratio of cash accounts (cash in vault, Federal Reserve balances for member banks, due from banks) in year t to average assets in t;

MR (portfolio risk) = ratio of average minimum risk assets (total U.S. Government securities exclusive of Federal agencies units, plus securities loans to dealers and real estate loans) in year t to average assets in year t;

LO (loss experience) = ratios of average actual loan charge-offs and losses net of recoveries in year t to income from loans in year t;

CO (economic environment) = county growth code, integer values ranging from 1 (low) to 5 (high) representing average annual rates of growth.

Mayne's work has the following desirable features for our research objectives:

1) The inclusion of different intensities in regulation (with the use of dummy variables). Dummy variables will not be included to test different intensities in regulation, but different equations will be estimated for different types of institutions in order to test for distinct intensity in regulation.

2) The inclusion of several relevant variables for the Spanish case (as the field survey in Appendix A showed to be necessary): portfolio risk, liquidity and profitability.

3) The alternative specification of profitability (earnings growth and earnings level) and portfolio risk (MR - defined in formula (6.2) - and loss experience).

Mayne's work has some limitations in relation to our research. First it may be argued that too many variables were included in her model. This could result in statistical problems such as multicollinearity and interpretation problems. Due to the large number of independent variables, the role of key variables in the capital position cannot be clearly identified. Another disadvantage is the use of a limited sample of U.S. banks, which, then, cannot be considered the general case for U.S. banks. Our purpose, however, is to perform the tests on the whole Spanish banking system.

Mingo (1975) also suggested a model of capital augmentations. In his model, he tested two hypotheses:

1) Regulators have been unable to prevent bankers from substituting deposit insurance for bank capital.

2) Regulators have been unable to occasion increases in bank capital when such capital was deemed sub-standard by the bank examiners.

He tested the following model for 323 U.S. banks in 1970:

$$\%\ \Delta K = f(NI/K,\ US/TD,\ K/TD,\ \%\ \Delta TD,\ \%\ INS,\ ABC',\ MEMBER) \quad (6.3)$$

where

% ΔK = percentage change in bank capital in year t. Capital is defined as total equity capital plus reserves;

NI/K = proxy for expected rate of return; ratio of net income to bank capital in year t-1;

US/TD= measure of default risk of bank's portfolio; ratio of U.S. securities to deposits net of cash, year t;

K/TD = ratio of bank capital to deposit net of cash, year t;

%ΔTD = percentage growth in total deposits over previous three years;

%INS = percentage of total deposits insured by FDIC;

ABC'= negative inverse ratio of each bank's observed accounting equity capital to the amount of capital desired by the regulator;

MEMBER = dummy variable (1 if bank is Federal Reserve member, 0 otherwise).

The dependent variable and the first five explanatory variables in equation (6.3) are identical to Peltzman's specification. Most of these variables are included to explain the long-run desired capital-deposits position of the bank: $(NI/K)_{-1}$is a proxy for the expected rate of return on capital. It assumes that the last period's average return on capital is considered by the bank as an indication of the marginal return. Mingo maintains that since the marginal return on capital is likely to be below the average return, NI/K represents an overestimate of the banker's incentive to add to capital purely for investment purposes. The term % INS stands for the proportion of deposits in less volatile, small denomination consumer deposits; thus, the higher is % INS, the less need there is for bank capital as protection against failure. US/TD measures asset default risk, proxied as the proportion of the bank's portfolio held in riskless government securities. Since some of the change in bank capital can be attributed to an adjustment between the existing capital-deposit's position and the long-run desired position, the level of the capital-deposit's ratio (K/TD) is included as an explanatory variable. The percentage growth in deposits (% ΔTD) is also included as an independent variable because Peltzman's model and Mingo's model attempt to explain the capital investment process apart from straightforward responses to deposit changes.

In Mingo (1975), there are three major areas in which Peltzman's treatment is improved. First, since Peltzman employed data aggregated by state, he used the mean state ABC ratio as a proxy for supervisors' desires. However, there may be wide variation in individual ABC ratios across banks in a state. Therefore, two states with identical mean ABC ratios may have enormously different distributions of ABC ratios across individual depository institutions. Empirically, this can be potentially misleading for the reason that regulators are likely to pressure a bank to add to capital when its ABC ratio is low, but they are unlikely to call for capital disinvestment when a bank's ABC ratio is too high. Thus, aggregated data may be inadequate for purposes of measuring regulatory influence on capital.

Second, the basis for the use of disaggregated data is also the basis for expecting a nonlinear relationship between the regulator's view of the adequacy of a bank's capital stock and bank capital investment. In other words, it is likely that relatively greater pressure to invest is exerted by the supervisors on banks with relatively low observed capital. Consequently, one should expect the partial derivative $\partial(\%\ \Delta K)/\partial(ABC)$ to decrease in absolute value as the ABC value rises, becoming zero for ABC values greater than unity (i.e. for super- adequate bank capital positions).

Finally, once individual bank data are utilized, we may include other explanatory variables that may not be appropriate when aggregate data are used (i.e. MEMBER in Mingo's model).

6.3.3.- Recent studies.

During the 1980s there have been several empirical studies on the effects of capital regulation on bank capital investment and ratios. The first major empirical study is that of Dietrich and James (1983).

Their sample of banks was much larger than those of the previous studies. More than 10,000 U.S. commercial banks were included in the sample and the period considered was 1971-1975 which permitted them to achieve a statistical precision not possible in earlier studies.

Their procedure replicates the Peltzman/Mingo regression based on the following equation:

$$\%\ \Delta K = f\ (\underset{+}{NI/K},\ \underset{-}{US/TD},\ \underset{-}{K/TD},\ \underset{+}{\%\ \Delta TD},\ \underset{-}{INS},\ MEMBER,\ ABC') \qquad (6.4)$$

All variables are as defined in Mingo (1975). The regression coefficient on the ABC' variable is interpreted as the change in capital due to regulatory influence. The inverse formulation (ABC') is utilized to permit a nonlinear response to regulatory pressure, i.e. a capital response decreasing in absolute value as the regulator's ABC variable increases. According to the researchers, the negative formulation is employed for convenience, so that if regulation is effective, the expected sign on the ABC' coefficient is negative. The level of capital desired by the regulator is measured according to a complex weighted average of each bank's assets and liabilities.

Their empirical model has the following desirable features for our research:

1) It is the most advanced and refined model of bank capital augmentations. They learned from mistakes made by Peltzman, Mayne and Mingo and they developed the most refined model to date. Their model includes the variables that Spanish bankers in our field survey (see Appendix A) expressed to be determinants of capital augmentations: regulation and profitability.

2) They employed data during a period (1971-75) where most ceilings on U.S. interest rates had already been eliminated. Therefore, the competitive environment of their tests was the most similar of all the models we have examined to the Spanish case during 1987-90.

As far as the main disadvantages of their model, it must be said that unlike the Spanish case with private, savings and foreign banks, they do not distinguish among banks in terms of the intensity of regulation. Another disadvantage is that variables such as liquidity and access to capital markets are not included in their model.

Marcus (1983) and Keeley (1988) suggest empirical models that although they are not models of capital augmentations, the implications of the models are highly related to capital augmentations.

Marcus (1983) estimates a model of the determination of bank capital-asset ratios which differs in three ways from earlier research. First, time series, cross-section estimation is employed, rather than simple cross-section estimation. Second, market values rather than book values of capital are used. Third, the model allows asymmetric treatment of equity and subordinated debt.

Bank capital is defined by Marcus as the sum of the market values of equity and debt. The dependent variable in his equation is the ratio of capital to noncash assets. The capital measure includes subordinated long-term debt as well as equity. The independent variables used by Marcus are the following: market interest rate, the tax advantage of deposit relative to equity finance, a dummy variable for national banks, debt as a fraction of noncash assets, interest rate volatility, bank size and government bonds as a fraction of assets and two regulatory variables (cease-and-desist orders and a variable or regulatory pressure variable)[6]. He selected one hundred and fifteen banks at random from the 1978 Bank Compustat tape which includes data for 20 years through the end of 1977. Data going back at least 15 years were available for 44 of these banks.

Keeley (1988) examined the effectiveness of U.S. capital adequacy regulation during the period 1981-85, employing the data (coming from the balance sheet and income statements) of the 150 largest bank holding companies, where stock is publicly traded. His study investigated whether the new capital requirements, binding from December 1981, caused banks with capital ratios below the minimum to raise their book-value capital ratios to meet the new standards. With regard to previous studies he considered whether observed increases in book value capital represent an actual market-value capital infusion or whether they merely come from accounting changes. Keeley argues that there is not a close correspondence between book and market value. For example, banks might respond to more stringent capital regulation by selling and then repurchasing appreciated assets. This would increase the book value capital and assets by the amount of the capital gain. Thereby it would augment the book value capital-to-asset ratio, but it would have no impact upon the market value ratio of the risk exposure of deposit insurance system. This has implications for our study: it could be found that there is no correspondence between the evolution of book-value capital augmentations and market-value capital augmentations.

Hence it seems at least possible that banks meet the new capital requirements simply by making use of accounting techniques and that no real change takes place in bank's balance sheet. The issue of whether a market-value capital infusion took place is particularly important in judging the effectiveness of the capital regulation, because the risk exposure of the insurance fund depends upon the market values of bank's assets and liabilities and not upon their book values.

Therefore, Keeley studies first the changes in banks' book-value capital ratios caused by regulation; second, the sources of these changes; and third, the effects on market-value capital-to-asset ratios employing a measure based on stock prices.

In order to analyze the sources of the book capital-to-asset ratio changes, he differentiated the ratio of capital, C, to assets, A with respect to time:

$$d(C/A)/dt = (C/A)\,[(1/C)(dC/dt) - (1/A)(dA/dt)] \qquad (6.5)$$

Equation (6.5) indicates that the rate of change of the capital-to-asset ratio is equal to the percentage growth rate of capital minus the percentage growth rate of assets times the initial capital-to-asset ratio. Consequently, banks can increase their capital ratios by either augmenting capital growth relative to asset growth or *vice versa*.

Keeley's model could be helpful to test the impact of capital augmentations on capital ratios. His model has desirable features for our research objectives:

1) The study of the correspondence between book-value and market-value capital augmentations: Keeley indicates that there appears to be no correspondence between book-value and market-value capital. Our analysis should comprise an analysis of that correspondence.

2) The impact of capital augmentations on capital ratios: Keeley investigated how the evolution of U.S. banks' capital

ratios was affected by capital augmentations and/or changes in asset growth. Our research will explore the importance of the impact of both capital augmentations and changes in asset growth on capital ratios.

There is, for present purposes, a significant limitation in Keeley's analysis: he does not consider the influence of changes in portfolio risk on capital ratios. He only considers asset growth, but in a RAR environment, portfolio risk must included in the analysis.

6.4 .- MAIN EMPIRICAL FINDINGS AND SYNTHESIS.

6.4.1.- Main Empirical Findings.

The main empirical findings on the effects of bank capital adequacy regulation on bank capital augmentations are summarized in Table 6.2. Further explanation of the major points is provided below.

From Table 6.2, one can deduce that the empirical evidence provided by the studies survey may appear somewhat mixed and inconclusive. However, many of the contradictions have been overcome thanks to further improvements in the empirical models employed. Recent empirical models, like that of Dietrich and James (1983) have overcome many of the contradictions and difficulties of previous models.

Table 6.2 : The Effects of Capital Adequacy Regulation on Bank Capital Augmentations.

Authors	Year	Source	Comment
Peltzman	1970	JPE	No evidence that U.S. bank investment behaviour conforms to the regulatory standards.
Mayne	1972	JOF	Evidence seems to negate U.S. supervisory impact on bank capital.
Mingo	1975	JOF	Strong evidence of regulation effect's on U.S. bank capital.
Kimball Dietrich and James	1983	JOF	Findings consonant with Peltzman's: no evidence of regulatory effects on capital in U.S. banks
Marcus	1983	JOF	Regulators exert little influence on the response to to economy-wide shocks to bank capitalization in the U.S.
Hislop	1987	TB	A survey of large banks in London showed strong evidence of Bank of England's regulation impact on capital.
Keeley	1988	FRSF	Uniform capital requirements achieved their intended impact on book capital-assets ratios in the U.S.
Wall and Peterson	1988	JFSR	Evidence of U.S. regulatory effects on large banks equity capital-assets ratios.

Key to Abbreviations :

FRSF : Federal Reserve Bank of San Francisco Economic Review
JOF : Journal of Finance
JPE : Journal of Political Economy
JFSR : Journal of Financial Services Research
TB : The Banker

Let us add some relevant comments on the empirical results found in the literature. Peltzman (1970) also concludes that regulators have failed to maintain at least the same overall level of capital adequacy as would obtain without deposit insurance. Thus, bank management seems to treat deposit insurance as a substitute for bank capital.

Peltzman also explored the fact, not captured by the estimated model, that regulation might affect portfolio items other than capital. He underlined that crude evidence does not indicate that any such regulation-induced portfolio changes have occurred in the period under examination.

Mayne's conclusions (1972) are that although the evidence is somewhat mixed, it does not seem to support the hypothesis that there exists significant differences in the amount of bank capital held by national, state Federal Reserve System member, and nonmember banks, when the influence of other factors is held constant. The differences that are evident are rarely of such magnitude as to be important either in a statistical or economic sense. Mayne believes that systematic differences among the bank classes in management conservatism, or responsiveness to bank examiners' suggestions for additional capital, may offset differing agency standards which in turn, negates supervisory impact on capital.

On the contrary Mingo (1975) found strong evidence of regulation effects on bank's capital decisions: in Mingo's analysis, regulation influence on bank capital was statistically highly significant. Mingo's regression results (1975) indicate that lower ABC′ values are associated with higher rates of capital investment over the next time period; furthermore, the result is statistically highly significant. Hence, Peltzman's result that regulators' desires do not have any impact on bank capital investment is not substantiated. These results indicate that the level of bank capital is greater than it would be in the absence of bank capital adequacy regulation.

Mingo's regression results support Peltzman's conclusion that bankers treat deposit insurance as a substitute for bank capital. In addition, the evidence suggests that regulators have made no attempt to reduce this substitution effect. However, Mingo argues that this result does not necessarily imply ineffective regulation since regulators may be perfectly content with the trade-off between capital and insured deposits. Insured deposits are the least volatile of the bank's liabilities, and a greater proportion of insured liabilities lowers the risk of a general "run" on the bank.

The Dietrich and James (1983) differences in findings with respect to Mingo can be attributed to Mingo's failure to distinguish between the joint hypotheses, that regulators influence capital and that the capital adequacy measure employed is unrelated to factors affecting the demand for capital by uninsured depositors. Since in periods when interest rate ceilings are binding on large deposits (Regulation Q), the demand for capital by these depositors is likely to be the greatest, the period chosen (1970) for Mingo's analysis is open to question. Dietrich and James (1983) argue that utilizing the period 1971 to

1975 when interest rate ceilings on most large deposits were not binding, they find no evidence to support the view that regulators affect bank capital.

Marcus (1983) finds that the rate at which banks restored capital to accustomed levels was much lower in the latter half of the sample. This result is somewhat surprising: a typical convex cost structure for deviations of capital from its target level, together with economies of scale in raising equity, should have caused the large swings of capital in the 1970s to produce faster adjustment speeds. However, Marcus (1983) argues that the slower adjustment speeds are consistent with the notion that regulators do not judge banks by capitalization *per se*, but rather by capital relative to other banks.

Hislop (1987) reports a survey among several large banks in London by Coopers & Lybrand whose main objective was to evaluate the awareness and action taken on capital allocation. It was found that most banks were internally allocating their capital almost exclusively on the basis of the Bank's of England minimum regulatory requirements. Wall and Peterson (1988) also found that the primary capital guidelines imposed by U.S. regulators influenced changes in large banks equity capital-to-assets ratios in 1982-84.

The evidence found by Keeley (1988) strongly suggests that uniform capital requirements achieved their intended effects on book or accounting measures of banks' capital-to-asset ratios. By 1986, he found that virtually all banks were complying with the book-value capital requirements. Furthermore, the disparity of book capital ratios was reduced substantially - an effect consistent with the goals of the capital regulations.

Capital-deficient banks (those originally not complying with the regulatory requirements) augmented their capital ratios primarily by slowing asset growth relative to capital growth. This appears to suggest that the increase in book capital-to-asset ratios reflected a true reduction in leverage and not just an accounting gimmick.

Keeley showed that observed market-value capital ratios (based on banks' stock prices) did increase overall, but there seems to be no strong indication of a larger increase for capital-deficient banks. There are several explanations for this consistent with a regulatory-induced increase in capital ratios for the capital-deficient banks. The explanations include increased regulatory taxes or reduced subsidies, differential responses to overall stock price and interest rate changes, and differential changes in bank risk-taking. However, Keeley believes that differential responses to stock price and interest rate trends do not appear to play a large role.

6.4.2.- Synthesis and Testable Models.

The main empirical methodologies and models to test the impact of capital adequacy regulation on bank capital augmentations have been surveyed in this chapter. The early methodology introduced by Peltzman (1970) has been improved later by Mingo (1975) and Dietrich and James (1983). A model that can be employed to test the regulatory effects on bank capital augmentations is that of equation (6.4), which is a synthesis of Peltzman / Mingo / Dietrich and James methodologies:

$$\% \, \Delta K = f \, (\underset{+}{NI/K}, \underset{-}{US/TD}, \underset{-}{K/TD}, \underset{+}{\% \, \Delta TD}, \underset{-}{INS}, MEMBER, ABC') \qquad (6.4)$$

This model may be improved for the Spanish case by including other managerial variables that theory suggested might influence bank capital augmentations. Theories in Chapter 5 suggested that liquidity and cost of capital with the related issues of profitability, retained earnings, dividend policy and access to domestic and international capital markets are likely to affect bank capital augmentations.

This model may also be improved by considering different definitions of capital: book-value, regulatory capital and market-value capital. Within these three definitions of capital, one can consider different subdefinitions. For example, within book-value, as we examined in Chapter 4, one can consider different parts of the capital base. Within the regulatory capital, one can consider Tier 1 and Tier 2. Within market-valued capital, one can consider amongst others, market capitalization.

Once the results for different measures of capital and capital ratios based on the methodology of Peltzman / Mingo / Dietrich and James, have been obtained, a second set of tests based on Keeley methodology (1988) can be carried out to further examine regulatory effects. Keeley's methodology is based on equation (6.5) :

$$d(C/A)/dt = (C/A)\ [(1/C)(dC/dt) - (1/A)(dA/dt)] \qquad (6.5)$$

This equation indicates that the rate of change of the capital-to-asset ratio is equal to the percentage growth rate of capital minus the percentage growth rate of assets times the initial capital-to-asset ratio. Consequently, with this model we can test the impact of capital augmentations on capital ratios.

NOTES:

1.- See Weiss and Strickland (1976, Chapter 1) for a study of the characteristics of the regulated industries.

2.- See Revell (1975), Llewellyn (1986), and Gardener (1986a) for an analysis of banking regulation and supervision.

3.- This is a potential problem with all econometric work, and specifically (or more significantly) related to the efforts to estimate the effects of regulation.

4.- Schwert (1981) discusses many issues related to this method. Despite potential complications, regulatory assets permit a fairly clean test of profitability effects.

5.- Kentucky, Ohio, Pennsylvania and West Virginia.

6.- See Marcus (1983) for a detailed explanation of the use of these variables.

CHAPTER 7 : HYPOTHESES, MODEL, DATA AND INITIAL RESULTS

7.1.- INTRODUCTION.

The main purpose of this chapter is to develop a general empirical model of capital augmentations. This model will be applied separately to private and savings banks, and the initial empirical tests on the effects of capital adequacy regulation on bank capital augmentations will be performed. Since no savings bank in Spain has market-valued capital, and since our purpose is to establish a general model here for both private and savings banks, only book-value and supervisory (Tiers 1 and 2) capital augmentations will be considered. The market-value capital augmentations for the private banks quoted on the Spanish stock market will be analyzed in Chapter 8.

Before the empirical tests and results are analyzed, the researcher needs to provide the relevant hypotheses to be tested and the model to be employed in this chapter. As has been explained, the literature and evidence surveyed in the two previous chapters are used to develop our hypotheses and empirical model of capital augmentations. However, the researcher will have to refine the hypotheses and model in order to reflect more closely the characteristics of the Spanish banking system, our 'specific laboratory'.

It is necessary to review the main methodological issues that arise from the use of financial ratios since most variables in our model are expressed in the form of ratios. The researcher also needs to revise the main aspects of the statistical tools employed in the analysis.

Therefore, the chapter will be organized in the following manner. Firstly, the test hypotheses and the empirical model to be employed are specified. Then, the main methodological issues surrounding the use of financial ratios and multiple regression analysis are reviewed. Next, the data source is described. Then, a descriptive analysis of the summary statistics of the variables employed is undertaken, followed by the results of the tests. Finally, the synthesis of the chapter is provided.

7.2.- TESTING HYPOTHESES AND MODEL SPECIFICATION.

7.2.1.- Testing Hypotheses.

In this chapter, our main testing objectives are concerned with the following hypotheses:

a) What is the impact of bank capital regulation on capital augmentations of banks operating in Spain during 1987-90 ?

Is the impact different across different book-value and supervisory definitions of capital augmentations ?

Is the impact different across different types of banking institution (domestic and foreign private banks and savings banks) ?

Is the impact different in 1988 and 1989 when the BIS Agreement (1988) on international capital adequacy convergence and the EC Directive (1989/647) on Solvency ratios were approved, respectively ?

How does the existence of a Deposit Guarantee Fund affect capital augmentations ?

b) What managerial variables influence capital augmentations?

Are managerial influences more important than regulatory ones ?

How do variables such as profitability, cost of capital, portfolio risk, liquidity and access to capital markets influence capital augmentations in banks operating in Spain ?

Are there different impacts across different types of definitions of bank capital and across different types of institutions ?

The above hypotheses will be tested together in a model of capital augmentations for the banks operating in Spain. The next step is to specify such a model and the variables included in it.

7.2.2.- Specification of Model and Variables.

7.2.2.1.- *Model Assumptions and Specification.*

The model to be employed is a Classical Linear Regression Multivariate Model (CLR multivariate model). This implies that the dependent variable is a linear function of a specific set of independent variables, plus a disturbance term. It can be written as

$$Y_i = \alpha + \sum_{j=1}^{m} \beta_j X_{ji} + \mu_i \qquad (7.1)$$

where α is the intercept, β are the unknown parameters, μ is the disturbance term, j is the number of variables (j = 1,...,m), and i is the number of observations (i = 1,...,n). Kennedy (1992, p.45) writes the expression in terms of matrices as follows

$$Y = X \beta + \varepsilon \qquad (7.2)$$

where Y is a vector of observations on the dependent variable, X is a matrix of observations on the independent variables, β is the matrix of the coefficients of the linear function and ε is a vector of disturbances.

According to Kennedy (1992, p.43-45), the main assumptions of the CLR model are the following[1]:

(1) The expected value of the disturbance terms is zero. In other words, the mean of the distribution from which the disturbance term is drawn is zero. This can be expressed

mathematically as follows

$$E\varepsilon = 0 \qquad (7.3)$$

(2) The disturbance terms all have the same variance and are not correlated with one another. This can be written mathematically as:

$$E\varepsilon\varepsilon' = \sigma^2 I \qquad (7.4)$$

where σ^2 is the variance of the disturbances, ε' is the transposed matrix of ε, and I is the identity matrix. Assumptions (1) and (2) can be expressed as $\mu_1 \sim N(0, \sigma^2)$.

(3) The observations on the independent variables can be considered fixed in repeated samples. In other words, it is possible to repeat the sample with the same independent variables.

(4) The number of observations is greater than the number of independent variables and there are no exact linear relationships between these independent variables. This can be expressed mathematically as

$$\text{Rank of } X = K \leq T \qquad (7.5)$$

where K is the number of independent variables and T is the number of observations.

Our general model for bank capital augmentations in Spain has been constructed by both considering the main empirical models found in the literature and by refining the model to reflect more closely the Spanish case in terms of capital augmentations. Our general model can be expressed as follows:

$$\Delta K = f(\text{ Profitability, Cost of Capital, Portfolio Risk, Liquidity, } \Delta\text{Deposits, Capital Regulation, Deposit Insurance, Access to Capital Markets}) \qquad (7.6)$$

where ΔK are increases in capital (capital augmentations) and ΔDeposits are increases in deposits. The latter is included in the model in order to attempt to explain the capital augmentations process apart from straightforward responses to deposit changes.

One can express the above model in mathematical terms as follows (note that β_0 is the intercept):

$$\%\Delta K = \beta_0 + \beta_1 PF + \beta_2 CC + \beta_3 PK + \beta_4 LQ + \beta_5 \Delta D + + \beta_6 KR + \beta_7 DI + \beta_8 CM + \varepsilon \qquad (7.7)$$

where:

$\%\Delta K$ = variable representing banks' capital augmentations

PF = variable representing banks' profitability

CC = variable representing banks' cost of capital

PK = variable representing banks' portfolio risk

LQ = variable representing bank's liquidity

ΔD = variable representing deposits growth

KR = variable representing capital adequacy regulation

DI = variable representing deposit insurance

CM = variable representing access to capital markets.

The actual definitions and forms of the different variables are explained in the following subsection.

7.2.2.2.- *Variable specification.*

A) *Capital Augmentation.*

This chapter focuses upon the following three definitions of capital augmentations ($\%\Delta K$):

A.1) Supervisory Tier 1 Capital Augmentation ($\%\Delta K_1$): when this definition is employed, the dependent variable of the empirical model is the annual increase in the sum of book-value share equity and published reserves in the case of private banks; and foundation funds, published reserves, the Social Works funds in the case of the savings banks. As examined in Chapter 5, this is the preferred definition by regulators since it emphasizes increases in permanent capital within the banking firm.

Peltzman (1970), Mingo (1975) and Dietrich and James (1983) employed this same definition of capital growth. Subordinated debt and other financial instruments were not included in the definitions of supervisory capital in their samples. Peltzman used a sample of 1963-65; Mingo's sample was 1969-70; Dietrich and James employed a sample of 1971-75. All these studies employed U.S. banks' data.

The researcher will compute the values of $\%\Delta K_1$ as follows:

$$\%\ \Delta K_{1t} = \frac{(\text{Tier 1})_t - (\text{Tier 1})_{t-1}}{(\text{Tier 1})_{t-1}} \qquad (7.8)$$

A.2) Supervisory Tier 1 plus Tier 2 Capital Augmentation ($\%\Delta K_2$): the dependent variable with this definition, is the annual growth in the sum of Tier 1 (above) and subordinated debt (Tier 2). This is the actual definition of bank capital applied by Spanish regulators, but we must be aware that the subordinated debt is limited to 20 % of the calculated capital requirements and 30 % of total own funds.

Mingo (1975) performed tests with the inclusion of long-term borrowed capital in the definition of capital and he found that that inclusion did not affect the results that he obtained with only share equity and reserves.

The values of $\%\Delta K_2$ will be computed in the following way:

$$\%\Delta K_{2t} = \frac{(\text{Tier 1 + Sub. Debt})_t + (\text{Tier 1 + Sub. Debt})_{t-1}}{(\text{Tier 1 + Sub. Debt})_{t-1}} \qquad (7.9)$$

A.3) Book-Value Capital Base Augmentation ($\%\Delta K_3$): in this case the dependent variable will be the growth of the capital base computed as in Chapter 4. Therefore, in the case of the private banks, the book-value capital base augmentation will represent the growth in the sum of share equity, reserves, bad loans provisions and subordinated debt. In the case of the savings banks, it will include the growth in the sum of foundation funds, reserves, Social Works funds, bad loans provisions and subordinated debt.

Mayne (1972) employs this definition of bank capital when she tested the supervisory influence on bank capital. Instead of employing the capital augmentation, she used the capital base to asset's ratio as the dependent variable.

The values of $\%\Delta K_3$ will be calculated as follows:

$$\%\Delta K_{3t} = \frac{(\text{BV Capital Base})_t - (\text{BV Capital Base})_{t-1}}{(\text{BV Capital Base})_{t-1}} \qquad (7.10)$$

B) *Profitability (PF).*

The first independent variable considered is profitability. Rather than the retained earnings ratio, we have taken profitability for the initial tests. The reason for this is that the concept of retained earnings and dividend pay-out is irrelevant for the Spanish savings banks (they do not pay out dividend), and thus in order to reflect in the same manner the impact of internal capital generation on capital augmentations, it will be proxied by profitability.

Foster (1986, p. 67) defines profitability as the ability of a firm to generate revenues in excess of expenses. He emphasizes that when making comparisons across firms (or over time), it is useful to control for differences in their resource base. He suggests three ratios as alternative ways of expressing relative profitability: profit margin, return on equity and return on assets. They all have the same numerator (net income), but different denominators: total revenue, total equity capital, and total assets[2].

Sinkey (1992, p.271) discusses the implications of the three profitability ratios in the banking firm. Accounting ROE measures profitability from the owners's perspective. Its main shortcoming as a measure of bank profitability is that ROE can be high because a bank has inadequate equity capital. In addition, a bank with negative book equity but positive profits would show a negative ROE. By decomposing ROE into ROA and the equity multiplier, this dilemma can be resolved. Therefore, according to Sinkey, ROA is the preferred accounting measure of bank profitability. It measures how profitably all of a bank's assets are employed. Sinkey maintains that the profit margin represents a bank's ability to control expenses, rather than as a fully informative measure of profitability.

Mayne (1972) uses the ratio of before-tax adjusted operating earnings in year t to average total assets in year t as the measure of profitability level. Mayne finds a positive relationship between this variable and capital increases. This positive association is consonant with retained earnings being the primary source for increasing bank capital. The ROA relevant for the capital augmentations of year t is that of year t-1, since the retained profits of year t-1 are those which make capital augment in year t. Thus, the ROA of year t-1 is, in our opinion, the relevant measure of profitability in the present context.

The choice of ROA of year t-1 is also justified for practical reasons. The cost of capital variable will be expressed in terms of ROE. Therefore, ROA of year t-1 will represent profitability in the present context in order to avoid expressing both profitability and cost of capital with the same variable.

The profitability measure (PF) will be calculated in the following manner:

$$PF_t = \frac{(\text{Before-Tax Net Income})_{t-1}}{(\text{Total Assets})_{t-1}} \qquad (7.11)$$

C) *Cost of Capital (CC).*

The second independent variable is cost of capital. There are no market values for savings banks and many private banks operating in Spain, and no dividends payout for savings banks. Thus, if one wishes the cost of capital variable to be the same for all the banks, one cannot take a definition which includes market values and/or dividend payouts.

Derry (1982) suggests that the present rate of return on common equity (ROE) may be employed as a measure of the cost of capital. This, then, may be considered as a proxy for the required return that a bank's managers believe that it is necessary to reach in order to fulfill owner's expectations in terms of the return on their equity. In this context, one would expect the sign of the impact of cost of capital on capital augmentations to be negative. However, an interpretation problem emerges. ROE may also be considered as a measure of profitability and, thus, the expected relationship would be positive. Peltzman (1970), Mingo (1975) and Dietrich and James (1983) employ the ratio of net income in year t to lagged capital in year t-1 as a proxy for the expected rate of profitability in banking.

Therefore, for the reasons expressed above, one must be very cautious about the interpretation of the sign of the variable representing cost of capital. The researcher will employ the present rate of ROE to represent a proxy of this year's cost of capital. It can be expressed as

$$CC_t = \frac{(\text{Before-Tax Net Income})_t}{(\text{Equity})_t} \qquad (7.12)$$

D) *Portfolio Risk (PK).*

The fourth determinant of bank capital augmentations considered is portfolio risk, which plays a key role in the model since capital standards are computed according to the risk held in the bank's portfolio. The interpretation of this variable can be twofold:

- First of all, it is a market-based managerial variable since it is important for bank managers to keep a proper balance between portfolio risk and capital in order to achieve a good market value. A bank which is considered too risky and/or is considered to have low capital is likely to have a low value in the marketplace and may be considered by depositors and investors as an unsafe institution.

- However, its interpretation may also be a regulatory one. Since in the current capital regulation in Spain there exists a specific ratio whereby the portfolio risk of assets and capital standards are linked, the parameter of this variable may also be understood as the effect of the risk-based capital adequacy on bank capital augmentations.

In the literature, there seems to be a predominance of the capital-market measures of bank risk[3]. Sinkey (1992, p. 406-7) suggest three market measures of bank risk: (1) total return risk, (2) market or systematic risk captured and (3) non-systematic or firm-specific risk. A bank's total insolvency risk consists of systematic risk and unsystematic risk. The Capital Asset Pricing Model (CAPM) provides a method for measuring the risk that cannot be eliminated (systemic risk) and calls it β (beta). Statistically β, is equal to

$$\beta_j = \frac{Cov(j,M)}{Var\ (M)} \tag{7.13}$$

where Cov(j,M) is the covariance between the return on the *j*th security and the return on the market portfolio.

However, the researcher will not employ market-based measures of bank portfolio since there is very limited data for the Spanish banks and no general model could be suggested. Instead, similar measures to those found in the literature of capital augmentations will be utilized.

In the empirical literature, several proxies have been used to represent portfolio risk in order to avoid capital-market-based and overly complex expressions of bank portfolio mix risk. Peltzman (1970), Mingo (1975) and Dietrich and James (1983) employed the ratio of U.S. government bonds to deposits net of cash assets as a measure of asset default risk. This ratio measures the proportion of the bank's portfolio held in riskless assets. However, Mayne (1972) utilized the ratio of average minimum risk assets (total U.S. Government securities exclusive of Federal agency issues, plus securities loans to dealers and real estate loans) to average assets. The higher the ratios, the less risk from default associated with the portfolio and hence the less capital required.

Our portfolio risk variable will be built employing the ratio of Spanish Government securities in a bank's portfolio to total assets. The portfolio risk variable is defined as the annual increase in portfolio risk, since our variable of interest (capital augmentations) is also defined in terms of increases. The higher the increase in portfolio risk, *ceteris paribus*, the higher the capital augmentation needed.

Our variable representing portfolio risk (PK) is as follows:

$$PK_t = \frac{(\text{Ratio A})_t - (\text{Ratio A})_{t-1}}{(\text{Ratio A})_{t-1}} \qquad (7.14)$$

$$\text{where Ratio A} = \frac{(\text{Public Sector Securities})}{\text{Total Assets}}$$

E) *Liquidity (LQ).*

The fifth variable in our empirical model measures the impact of bank's liquidity on bank's capital augmentation. As indicated in Section 5.4.3, Sealey (1983) and Crouhy and Galai (1986) maintain the important role of liquidity for the solvency of the banking firm. Mayne (1972) is the only case in the literature of capital augmentations where the impact of liquidity on bank capital is accounted for.

Several measures of bank liquidity have been suggested in the literature. Sinkey (1992 (p. 535-40), in a review of the main measures of bank liquidity, classifies liquidity into two main segments: (i) the liquidity that can be stored in a bank's balance sheet and (ii) the liquidity that can be purchased in the marketplace. Sinkey argues that measuring stored liquidity is easier since it is difficult to gauge the confidence that money and deposit markets have in a particular borrower. A measure of stored liquidity will be used since there are only data available on stored liquidity for all the banks[4].

Mayne (1972) employs the ratio of average cash accounts (cash in vault, Federal Reserve Balances for member banks, due from banks) to average assets as a proxy for liquidity. Her results show that the higher the ratio of cash to total assets, the higher the capital ratios. This seeming anomaly may be understood according to Mayne when it is realized that an association between two variables does nor necessarily imply a cause-and-effect relationship. Mayne argues that the liquidity variable may be a measure of management conservatism in which case a bank that holds a high level of cash assets could also be expected to desire a sizable cash cushion.

However, one could also expect the sign of this variable to be negative since the lower the liquidity of the firm, the higher the risk and hence the higher the capital required. Thus, one must be cautious about the interpretation of the sign of this variable.

Our measure of liquidity will be expressed in terms of annual increases of the liquidity ratios. Our liquidity ratio (Liq. ratio) is cash accounts (cash and Bank of Spain's balances) to total assets. Our variable (LQ) is measured as follows:

$$LQ_t = \frac{(\text{Liq. Ratio})_t - (\text{Liq. Ratio})_{t-1}}{(\text{Liq. Ratio})_{t-1}} \tag{7.15}$$

F) *Deposits Growth (ΔD).*

The percentage growth in deposits is included as an explanatory variable because our empirical model for Spain represents an attempt to explain the capital augmentation process apart from straightforward responses to deposit changes. Peltzman (1970), Mingo (1975) and Dietrich and James (1983) also included this variable in their models since they also attempted to explain bank capital increases apart from simple responses to deposit trends.

The variable will be defined in the following manner:

$$\Delta D_t = \frac{(\text{Total Deposits})_t - (\text{Total Deposits})_{t-1}}{(\text{Total Deposits})_{t-1}} \tag{7.16}$$

G) *Capital Regulation (KR).*

In order to measure the response of bank capital augmentations to regulatory standards of capital adequacy, one must employ a variable that contains a formula used by regulators in bank examinations. We saw in Chapter 3 that the Spanish capital standards regulation includes two ratios: (i) a specific or risk-based ratio and (ii) a generic ratio. The impossibility of computing the risk-based capital ratios because of the lack of regulatory data on the different types of assets held by banks in their portfolios prevents us from computing the risk-based ratios. Therefore, the analysis will focus on the generic ratio (capital/total investment), which can be computed with the data available.

In the literature, the ratio employed to measure the impact of capital regulation on bank capital augmentations is the ratio of supervisory required capital to capital actually held by banks (Peltzman, 1970; Mingo, 1975; Dietrich and James, 1983). This variable measures the regulator-desired increment to bank capital. Peltzman (1970) used three different formulas of capital adequacy : a formula developed by the Board of Governors of the Federal Reserve System, an adjusted risk-assets formula and a formula developed by the Federal Reserve Bank of New York[5]. Mingo (1975) and Dietrich and James (1983) employed the same regulatory capital formula in which "desired" capital is calculated using a complex formula which attaches subjective weights to each of the major balance-sheet items. These authors define the regulatory capital variable (denominated ABC') as the negative inverse of the ratio of each bank's observed accounting equity capital to the amount of capital desired by the regulator. The inverse formulation is used to permit a nonlinear response to regulatory pressure, i.e., a capital response decreasing in absolute value as the regulator's ABC variable increases. The nonlinear response to regulatory pressure reflects the likelihood that relatively greater pressure to augment capital is exerted by regulators on banks with accounting capital far below the required capital than on banks whose accounting capital almost achieves the required standard. They use the negative formulation for convenience, so that if regulation is effective, the expected sign on the ABC' coefficient is negative[6].

Our capital regulation variable (KR) for the Spanish banking system will be computed as the negative inverse of the ratio of each bank's observed regulatory capital to the amount of regulatory capital desired by the Spanish regulators in the generic ratio (Spanish regulator-desired capital = 5 per cent of Total Investments)[7]. This is calculated as follows:

$$KR_t = - \frac{\text{Regulator-desired Capital}_t}{\text{Actual Regulatory Capital}_t} \tag{7.17}$$

H) *Deposit Insurance (DI).*

One of the main hypotheses this research aims to test is that Spanish regulators have been able to prevent bankers from substituting deposit insurance for bank capital. The Spanish

Deposit Guarantee Fund is not explicitly obligatory, but practically all banks are members of the Fund. This fact prevents us from representing this variable as a dummy.

In the U.S. literature, the most common way of measuring the impact of deposit insurance on capital augmentations has been through the percentage of total deposits insured by the FDIC (Peltzman, 1970; Mingo 1975; Dietrich and James, 1983). However, this variable cannot be applied to the Spanish case since there is a fixed percentage of deposits for all banks that wish to join the Deposit Guarantee Fund, and all the banks would have the same percentage of deposits insured, and only irrelevant results would be obtained.

The variable employed to represent the deposit guarantee will contain the annual contribution to the Deposit Guarantee Fund for every bank, which varies according to the increase (or decrease) of the deposits in every bank. For example, a bank which experiences an important increase in its deposits will need to make an important contribution to the Fund in order to insure those new deposits and to maintain the required percentage of all deposits in the Fund. In order to account for the different sizes of the banks, the annual contribution to the Deposit Guarantee Fund (DGF) will be divided by total assets. Total assets are employed instead of total deposits in order to avoid multicollinearity of this variable with the deposit growth variable. Thus, the deposit insurance variable (DI) will be computed as follows:

$$DI_t = \frac{(\text{Contribution to DGF})_t}{\text{Total Assets}_t} \qquad (7.18)$$

Sinkey (1992, pp. 160-162) argues that in the practice, *inter alia*, the safety net to depository institutions reflects a regulatory practice based on the too-big-to-fail (TBTF) doctrine as a manifestation of the government guarantee behind deposit insurance. When a bank, especially a large one, has serious financial difficulties, one of the actions that bank supervisors appear to encourage is to arrange for another bank to assume the insured deposits. When this practice (which is called a purchase-and-assumption transaction in the U.S.) is used, the buyer assumes all of the failed bank's liabilities. This results in 100 per cent deposit insurance protection.

This practice of protecting large banks has apparently established a public perception and expectation that big banks are too important to fail outright. In terms of our variable DI, the TBTF doctrine appears to imply that big banks, which usually give large contributions to the Deposit Guarantee Fund, might be encouraged to substitute deposit insurance for capital: that is, to rely on the regulatory safety net rather than on their own safety cushion (capital).

Following the same line of reasoning as Peltzman (1970), Mingo (1975) and Dietrich and James (1983), if regulation is successful at preventing substitution of deposit insurance for capital, the coefficient of this variable should be insignificantly different from zero. A significantly negative coefficient would indicate some failure of the Spanish regulators to prevent substitution of deposit insurance for capital.

I) *Access to Capital Markets (CM).*

The last variable included in this initial general model of capital augmentations for the Spanish banking system is access to capital markets. This variable is generally ignored in the empirical literature of capital augmentations, but it seems a key variable in capital augmentations, particularly when they need to increase capital beyond the internal capital generation rate.

Sinkey (1992, p. 770) maintains that although in finance theory the assumption of equal access to capital markets is frequently invoked, in the real world equal access is a fiction, since a large number of banks simply do not have the opportunity to tap domestic and international capital markets. Thus, there seems to be different opportunities to raise capital externally.

In order to reflect the different access possibilities to capital markets, a dummy variable (CM) has been created. This variable is equal to 1, when the bank is quoted on any Stock Exchange, and is equal to zero when the bank is not quoted on any Stock Exchange. This variable will not be included in the empirical model for the savings banks since no savings bank in Spain is quoted in any Stock Exchange. The coefficient of CM will give the difference between the capital augmentations of the banks quoted on the Stock Exchange (apparently, with easy access to capital markets) and that of those banks not quoted.

7.3.- METHODOLOGICAL ISSUES.

7.3.1.- Introduction.

This section is devoted to the review of the main methodological problems which may arise from the use of the econometric tools and the form of the variables (ratio) used in our empirical analysis of the impact of capital regulation on bank capital augmentation in the Spanish banking system. Fundamentally, this section will only consider the methodological issues relevant to our empirical analysis.

Basically, two methodological issues need to be discussed: (i) the use of regression analysis and (ii) the use of financial ratios to represent the variables included in the model. Firstly, the main issues of the regression analysis are appraised. Then, the main issues in the use of financial ratios are discussed.

7.3.2.- Regression Analysis: Main Methodological Issues.

In this subsection, the main methodological issues of the use of the regression analysis tools in our empirical study are analyzed. This subsection will only focus upon the issues involved in our analysis. First the main issues related to the use of the Ordinary Least Squares (OLS) estimators are reviewed. Then, the problems with the model specification are examined and the solution to overcome them is specified. Next, the main issues with the use of dummy variables are evaluated. Finally, the main tests undertaken in our analysis are specified.

7.3.2.1.- *Ordinary Least Squares (OLS).*

The OLS estimators will be used to obtain our empirical results. The OLS estimators generates the set of values of the parameters that minimizes the sum of the squared residuals and is denoted by β^{OLS}. According to Kennedy (1992, p. 44-45), the OLS estimator is extraordinarily popular among econometricians and this popularity stems from the fact, that in the context of the Classical Linear Regression Model, the OLS estimator has a large number of desirable properties.

Kennedy suggests eight criteria to determine how the OLS estimator rates in the context of the CLR model. The criteria are the following:

(1) Computational Cost: all computer packages include the OLS estimator for linear relationships, and many have routines for nonlinear cases. Therefore, the OLS estimator is desirable for its computational ease.

(2) Least Squares: sine the OLS estimator is designed to minimize the sum of squares residual, it is automatically optimal on this criterion.

(3) Highest R^2 (coefficient of determination): R^2 is the square of the correlation coefficient between the dependent variable and its OLS estimate. R^2 is given by the sum of squared variations of the estimated values of the dependent variable about

their mean (the regression sum of squares or ESS) divided by the the total variation of the dependent variable about its mean (the total sum of squares or TSS). Then, it is given by ESS / TSS or by 1 - (RSS / TSS), where RSS is the sum of squared residuals. Thus, since the OLS estimator is designed to minimize the sum of squared residuals, it will automatically be optimal on the highest R^2 criterion.

(4) Unbiasedness: an estimator β^* is said to be an unbiased estimator of β if the mean of its sampling distribution is equal to β. The assumptions of the CLR model, explained at the beginning of this chapter, show that the OLS estimator is an unbiased estimator of β.

(5) Best Unbiasedness: among all linear unbiased estimators of β, β^{OLS} can be shown to have the smallest variance-covariance matrix in the context of the CLR model. If one adds the additional assumption that the disturbances are distributed normally, it can be shown that the OLS estimator is the best unbiased estimator.

(6) Mean Square Error: using the best unbiased criterion allows unbiasedness to play an extremely strong role in determining the choice of an estimator, since only unbiased estimators are considered. It may well be the case that, by restricting attention to only unbiased estimators, we are ignoring estimators that are only slightly biased but have considerably lower variances. This trade-off between low bias and low variance is formalized by using as a criterion the minimization of a weighted average of the bias and the average. However, this is not

a viable formalization, because the bias could be negative. One way to correct for this is to use its square. When the weights are equal, the criterion is the mean square error criterion. Kennedy (1992) maintains that it is not the case that the OLS estimator is the minimum mean square estimator in the CLR model. This is the OLS estimator's weakest point.

(7) Asymptotic criteria: the sampling distribution of most estimators changes as the sample size changes. In many cases, it happens that a biased estimator becomes less biased as the sample size becomes larger and, in turn, the mean of its sampling distribution shifts closer to the true value of the parameter being estimated. Econometricians have formalized their study of these phenomena by structuring the concept of an asymptotic distribution. Since the OLS estimator in the CLR is unbiased, it is also unbiased in samples of infinite size and thus is asymptotically unbiased. Kennedy (1992) indicates that the variance-covariance matrix of β^{OLS} goes to zero as the sample size goes to infinity, so that the OLS estimator is also a consistent estimator of β.

(8) Maximum Likelihood: the maximum likelihood principle of estimation is based on the idea that the sample of data at hand is more likely to have come from a "real world" characterized by one particular set of parameter values than from a "real world" characterized by any other set of parameter value. The maximum likelihood estimate (MLE) of a vector of parameter values β is simply the particular vector β^{MLE} that gives the greatest probability of obtaining the observed data. It is impossible to

calculate the maximum likelihood estimator given the assumptions of the CLR model, because these assumptions do not specify the functional form of the distribution of the disturbance terms. However, if the disturbances are assumed to be distributed normally, it turns out that the β^{MLE} is identical to β^{OLS}.

In the literature of the impact of bank supervision on bank capital augmentations, several authors have employed the OLS estimators to obtain their results (Peltzman, 1970; Mayne, 1972; Mingo, 1975; Dietrich and James, 1983). As described in Chapter 6, these studies provide an important methodological background to the empirical analysis we will undertake.

7.3.2.2.- *Model Specification : Problems and Solution.*

The main problem with regard to the model specification is the possibility of an incorrect set of independent variables in our model. According to Kennedy (1992, p. 91-92), the consequences of using an incorrect set of independent variables fall into two categories:

(1) Omission of a relevant independent variable. There are basically three main consequences :

- In general, the OLS estimator of the coefficients of the remaining variables is biased.

- The variance-covariance matrix of β^{OLS} becomes smaller.

- The estimator of the now smaller variance-covariance matrix of β^{OLS} is biased upward, because the estimator of σ^2, the variance of the error term, is biased upward. This causes inferences concerning these parameters to be inaccurate.

(2) Inclusion of an irrelevant variable. There are two main consequences:

- The OLS estimator and the estimator of its variance-covariance matrix remain unbiased.

- Unless the irrelevant variable is orthogonal to the other independent variables, the variance-covariance matrix becomes larger; the OLS estimator is not as efficient.

In order to obtain the correct set of explanatory variables, the first and foremost ingredient is economic theory (Kennedy, 1992). If economic theory cannot defend the use of a variable as an explanatory variable, it should not be included in the set of potential independent variables. Such theorizing should take place before any empirical testing of the appropriateness of potential independent variables. The researcher has followed this criterion when specifying our empirical model of capital augmentations for the Spanish banking system. The empirical model of bank capital augmentations is based upon the determinants that banking theory suggests. This makes the model and general empirical approach more robust.

Unfortunately, there is a limit to the information that economic theory can provide in this respect. For example, economic theory can suggest that lagged values of an explanatory variable should be included, but will seldom suggest how many such variables should be included. The model also must contain particular features of the population analyzed, such as our case, the Spanish banking system, which may have not been directly suggested (or completely covered) by the economic theory. In short, 'good' theory and respective empirical methodologies may also need to be adjusted and modified in order to reflect the particular 'laboratory' data and conditions. The researcher has followed this approach.

7.3.2.3.- *The Use of Dummy Variables.*

One needs to review the main aspects of the use of dummy variables in the regression analysis since one dummy variable is included in the equations: this variable is the access to capital markets (CM).

Explanatory variables are often qualitative in nature (e.g. banks quoted in the Stock Exchange versus banks not quoted in the Stock Exchange), so that some proxy must be constructed to represent them in a regression. Dummy variables are used for this purpose. A dummy variable is an artificial variable constructed such that it takes the value unity whenever the qualitative phenomenon it represents occurs, and zero otherwise[8]. Once created, these proxies, or dummies as they are denominated, are employed in the CLR model just like any other explanatory variable, yielding standard OLS results.

Dummy variables coefficients are interpreted as showing the extent to which behaviour in one category deviates from some base (the "omitted" category). In our case, the researcher wishes to examine the extent to which banks with easy access to capital markets (proxied by quoting in Stock Exchange) deviate from those banks with no easy access to capital markets (not quoted in Stock Exchange), in terms of capital augmentations.

Kennedy (1992, p. 218) maintains that most researchers find the equation (containing a dummy variable) with an intercept more convenient because it allows them to address more easily the questions in which they usually have the most interest: namely whether or not the categorization makes a difference and if so by how much. If the categorization (e.g. between banks with easy access to capital markets and those without easy access to capital markets) does make a difference, by how much is directly measured by the dummy variable coefficient estimates. Testing whether or not the categorization is relevant can be done by running a t test of a dummy variable coefficient against zero. This will be further examined in next subsection.

In the empirical literature on bank capital augmentations, dummy variables have been employed in the equations estimated. Peltzman (1970) employed dummy variables to distinguish between the different years (1963 and 1965). Mayne (1972) used dummy variable for the different bank regulatory classes (national banks, state-chartered Federal Reserve System member banks and state nonmember banks). Mingo (1975) and Dietrich and James (1983) employed a dummy variable to distinguish between Federal Reserve member banks and nonmember banks.

7.3.2.4.- *Main Tests in our Analysis.*

In this chapter, the following tests will be undertaken after obtaining the regression equations: test of significance, test for multicollinearity, test for heteroskedasticity and test for autocorrelation. The first test is to examine the significance of the parameters and of the model as a whole. The other three tests consider the three main problems that might emerge in our analysis. Let us review the main aspects of these tests:

A) *Tests of Significance:* broadly speaking, a test of significance is a procedure by which sample results are used to verify the truth or falsity of a null hypothesis (Gujarati, 1988, p. 109). The key idea behind the tests of significance is that of a test statistic (estimator) and the sampling distribution of such statistic under the null hypothesis, (H_0). In the language of statistics, the stated hypothesis is known as the null hypothesis. The null hypothesis is usually tested against an alternative hypothesis, denoted by H_1. The decision to accept or reject the null hypothesis is made on the basis of the value of the test statistic obtained from the data at hand. Two tests of significance will be performed:

A.1) Testing the Significance of Individual Regression Coefficients: if one invokes the assumption that $\mu_i \sim N(0,\sigma^2)$, then one can use the t-test to test a hypothesis about any individual partial regression coefficient. Our null hypothesis will be that, β_i is zero: that is, the variable which that parameter represents has no linear influence on the dependent variable, in our case, bank capital augmentations. This is postulated as

$$H_0: \beta_i = 0 \quad \text{and} \quad H_1: \beta_i \neq 0 \tag{7.19}$$

The t-statistic can be obtained as follows:

$$t = \frac{\hat{\beta}_i - 0}{se(\hat{\beta}_i)} \tag{7.20}$$

which follows the t distribution with n - k degrees of freedom, where $\hat{\beta}_i$ is the estimated value of β_i, se stands for standard error, n is the number of observations, and k is the number of independent variables. If the computed t value exceeds the critical t value in the t-distribution table at the chosen level of significance (denoted by α), one may reject the null hypothesis. The researcher undertakes two-tail tests[9]. The level of significance chosen is $\alpha = 0.05$ which gives a 95 per cent confidence. In our case, if the null hypothesis is rejected with 95 per cent confidence coefficient, it means that the independent variable has a significant influence on the dependent variable (in our case, bank capital augmentations) with 95 per cent confidence.

The use of the t-tests, as they are denominated, is so common that most packaged computer programs designed to compute the OLS estimators have included in their output a number called t-statistic for each parameter estimate. This will appear in the output obtained from Minitab, which is the packaged computer program employed in this research.

A.2) Testing the Overall Significance of the Regression: in this case we test the hypothesis that all slope coefficients are simultaneously zero:

$$H_0 : \beta_1 = \beta_2 = \cdots = \beta_k = 0 \qquad (7.21)$$

versus

H_1 : Not all slope coefficients are simultaneously zero.

One needs to compute the F-ratio as follows:

$$F = \frac{ESS/(k-1)}{RSS/(n-k)} \qquad (7.22)$$

where ESS is the regression sum of squares, RSS is the sum of squared residuals. If $F > F_\alpha(k-1, n-k)$, one rejects the null hypothesis; otherwise one may accept it, where $F_\alpha(k-1, n-k)$ is the critical F value at the α level of significance (in our case α = 0.05). If one rejects the null hypothesis at $\alpha = 0.05$, it means that the regression is significant as a whole with 95 per cent confidence.

Most regression packages routinely calculate the F value along with the usual regression output. This will also appear in the output obtained with Minitab.

Once the tests of significance have been introduced, one needs to introduce the other three tests to be undertaken, which are associated with the three main problems that may emerge in the regression analysis.

B) *Test for Multicollinearity:* it is possible to have an approximate linear relationship among independent variables. Kennedy (1992, p. 176) argues that although the estimation procedure does not break down when the independent variables are highly correlated, severe estimation problems arise. The OLS estimator in the presence of multicollinearity remains unbiased; the R^2 statistic is unaffected. The major undesirable consequence of multicollinearity is that the variances of the OLS estimates of the parameters of the collinear are large (Gujarati, 1988, p. 290).

A very popular means of detecting multicollinearity is through the use of the correlation matrix. The off-diagonal elements contain the simple correlation coefficients for the given data set. Cooper and Weekes (1983, p.195) and Kennedy (1992, p. 180) maintain that a high value (about 0.8 or 0.9 in absolute value) of one of these correlation coefficients indicates high correlation between the two independent variables to which it refers. The researcher will compute the correlation matrix for all the variables employed in the regressions in order to detect potential bilateral multicollinearity.

Having high variances means that the parameter estimates are not precise and hypothesis testing is not powerful. Gujarati (1988, p. 293) suggests that a high R^2 but few significant t ratios is one of the symptoms of multicollinearity: this is another way of detecting multicollinearity.

With the statistical package used by the researcher the program will signal and drop any variable causing multicollinearity.

C) *Test for Heteroskedasticity:* heteroskedasticity occurs when the disturbances do not all have the same variance. In the variance-covariance matrix of the disturbance vector, if the diagonal terms are not all the same, the disturbances are said to be heteroskedastic. If they are all the same, they are said to be homoskedastic (which is one of the assumptions of the CLR model).

According to Kennedy (1992, p. 114-5), the main consequences of heteroskedasticity are as follows: (i) the OLS estimator remains unbiased, but it no longer has minimum variance among all linear unbiased estimators, and (ii) as a result of this, hypothesis testing can no longer be trusted in this context.

In order to test for heteroskedasticity, we will follow a test suggested by Newbold (1984, p. 586). Consider a regression model:

$$Y_i = \alpha + \beta_1 x_{1i} + \beta_2 x_{2i} + \dots + \beta_k x_{ki} + \varepsilon_i \tag{7.23}$$

linking a dependent variable to k independent variables, and based on n sets of observations. Let a, b_1, b_2,..., b_k be the usual least squares estimates of the coefficients of this model, so that the predicted values of the dependent variable are

$$\hat{y}_i = a + b_1 x_{1i} + b_2 x_{2i} + \dots + b_k x_{ki} \tag{7.24}$$

and the residuals from the fitted model are

$$e_i = y_i - \hat{y}_i \tag{7.25}$$

In order to test the null hypothesis that the error terms, ε_i, all have the same variance against the alternative that their variances depend on the expected values

$$\alpha + \beta_1 x_{1i} + \beta_2 x_{2i} + \dots + \beta_k x_{ki} \tag{7.26}$$

we estimate a simple linear regression. In this regression, the dependent variable is the square of the residual, that is e_i^2, and the independent variable is the predicted value, $\hat{y}_i$.

Let R^2 be the coefficient of determination in this auxiliary regression. Then, for a test of significance level α, the null hypothesis is rejected if nR^2 is bigger than $X^2_{1,\alpha}$, where $X^2_{1,\alpha}$ is that number exceeded with probability α by a chi-square random variable with 1 degree of freedom.

D) *Test for Autocorrelation:* autocorrelation occurs when the disturbances are correlated with one another. Then the off-diagonal elements of the variance-covariance matrix of the disturbance term are nonzero, and the disturbances are said to be autocorrelated. Kennedy (1992, p. 119) suggest that autocorrelated disturbances could arise for several reasons: spatial autocorrelation, prolonged influences of shocks, inertia, data manipulation and model misspecification. He also maintains that autocorrelation arises most frequently in time series models.

The consequences for OLS estimation in a situation of positive first-order autocorrelation (the most common in econometric work) are similar to those caused by heteroskedasticity as suggested by Gujarati (1988, p.360): the OLS estimators are still linear-unbiased, but they are no longer efficient (i.e. minimum variance). Thus, the usual t and F tests are no longer valid in the presence of autocorrelation.

In order to detect autocorrelation, the researcher will use the Durbin-Watson (DW) test. Most packaged computer regression programs provide the DW or d statistic in their output. This statistic is computed from the residuals of an OLS regression and is used to test for first-order autocorrelation. First-order autocorrelation occurs when the disturbance in one period is a proportion of the disturbance in the previous time period, plus a disturbance. In mathematical terms, it can be expressed as $\varepsilon_t = \rho\varepsilon_{t-1} + u_t$, where ρ is the first-order autocorrelation coefficient. The DW can be computed as $d = 2(1-\hat{\rho})$ where $\hat{\rho}$ is the first-order autocorrelation coefficient estimate. Since $-1 \le \rho \le 1$, this implies $0 \le d \le 4$. These are the bounds of DW.

Table 7.1: Durbin-Watson d Test: Decision Rules.

Null Hypothesis	Decision	If
No positive autocorrelation	Reject	$0 < d < d_L$
No positive autocorrelation	No decision	$d_L \le d \le d_U$
No negative autocorrelation	Reject	$4-d_L < d < 4$
No negative autocorrelation	No decision	$4-d_U \le d \le 4-d_L$
No autocorrelation, positive or negative	Do not reject	$d_U < d < 4-d_U$

Source: Gujarati (1988, p. 378)

When there exists no first-order autocorrelation, the DW is approximately 2.0. The further away the d statistic is from 2.0, the less confident one can be that there is no autocorrelation in the disturbances. Unfortunately, the exact distribution of this d statistic, on the hypothesis of zero autocorrelation, depends on the particular observations on the independent variables, so that a table giving critical values of the DW is not available.

However, Durbin and Watson were successful in deriving a lower bound d_L and an upper bound d_U such that if the computed DW lies outside these critical values, a decision can be made regarding the presence of positive or negative serial correlation. The decision rules for the DW test are given in Table 7.1.

7.3.3.- The Use of Financial Ratios.

After the revision of the main aspects of the regression issues relevant to our empirical methodology, one needs to examine the main issues related to the use of financial ratios in our model. In the initial model we have included several financial ratios of the Spanish banking firms to represent certain economic characteristics of the institution. In the empirical literature on bank capital augmentations, the use of financial ratios is very common and most variables appear in the form of ratios (Peltzman, 1970; Mayne, 1972; Mingo, 1975; Dietrich and James, 1983; Keeley, 1988).

The motivations for examining data in ratio form have been suggested by many authors. Foster (1986, p.96) suggests the following motivations for the use of financial ratios:

- To control for the effect of size differences across firms or over time.

- To make the data better satisfy the assumptions underlying statistical tools such as regression analysis (for example, homoskedastic disturbances).

- To probe a theory in which a ratio is the variable of interest. In our case, the capital ratios held by banks play a key role in the analysis.

- To exploit an observed empirical regularity between a financial ratio and the estimation or prediction of a variable of interest (for example, the risk of a security or the likelihood of a firm declaring bankruptcy).

Barnes (1987) also recommends the use of ratios to control for industry-wide factors. It is suggested that corporations may use industry averages to identify areas of abnormal performance in their own organization. Rees (1990, p. 121-4), apart from the already mentioned motivations of standardization for size and identification of industry benchmarks, maintains that the ratios act as a summary statistic (the substitution of a small set of ratios to replace the complexity of the detailed financial statements).

An important assumption underlying the use of ratios as a control for size differences is strict proportionality between the numerator and the denominator (Foster, 1986, p.96). The strict proportionality assumption implies in the case, for example, of the capital-to-assets ratio that Capital = p *x* Assets, where p is the proportionality factor. The existence of a constant or intercept term in the relationship and/or the existence of a nonlinear relation between the two variables represented in the ratio (due for example, to economies of scale), imply that there exists no strictly proportional relation between the two variables in the ratio.

The main problems with the empirical use of ratio analysis are suggested by Rees (1990, p. 124-8)[10]. These include :

(i) Ratio selection: given the volume of published financial information on any particular company, the scope for camouflaging significant indicators in a mass of detail is considerable. A solution could be to employ traditional sets of key ratios which have become established.

(ii) Accounting estimation: ratios based on accounting numbers incorporate, and sometimes exaggerate, the limitations of accounting statements[11]. Foster (1986, p.223) and Rees (1990, p. 126) argue that firm managers have some leeway to "manage" or "smooth" the behaviour of the accounting numbers (the so-called "window-dressing"). Thus, it is important to select the most convincing accounting estimator of any variable of interest.

(iii) Unavailable data: unfortunately, the financial reports of private companies are often severely delayed. This will not be a problem with our analysis, since we have chosen years when all the relevant data are available for the Spanish banking sector.

(iv) Unsynchronised data: in many countries, companies' accounting year-ends are varied and this may cause problems when making comparisons. This research will not have this problem since we have taken only the 31 December data for every year.

(v) Non-standardized accounting: accounting policies and practices can vary across firms with little to guide the analyst. This is not our case, since there exists accounting standards for all firms operating in Spain and particularly, the banking sector data are also standardized.

(vi) Negative numbers: they can be problematical where a transformation of the original data is required, possibly to approximate better to a normal distribution. Certain transformations, such as logarithmic or square root, are impossible for negative numbers. However, negative numbers can often be avoided. For example, growth rate can be expressed as a ratio of the preceding value rather than a percentage change.

All things considered, although some reservations must be considered with regard to the use of financial ratios, it is apparent that ratio analysis offers a useful and convenient method of financial statement interpretation, and the researcher will employ financial ratios in his analysis.

7.4.- DATA SOURCE.

The empirical analysis of this chapter will be based on public accounting balance sheet and income statement data of samples of the private and savings banks operating in Spain during 1987-90. The original samples employed in this Chapter contain 121 private banks (there are two banks less than in the exploratory analysis of Chapter 4 since they did not have all the data needed) and 76 savings banks operating in Spain for 1987-89 and 64 savings banks in 1990 (some savings banks merged during 1990). The banks included in these original samples account for over 99 % of the total assets of the Spanish banking sector. Only those banks with all the relevant information available throughout the period are included.

The existence of outlier observations must be taken into consideration. Foster (1986, p.100) defines an outlier as "an observation which appears to be inconsistent with the remainder of that set of data". Barnett and Lewis (1978, p.4) argue that it is a matter of subjective judgment on the part of the observer whether or not s/he picks out some observation for scrutiny. In this sense, if the empirical tests show that there appear to be outliers in our sample and they affect the results negatively, and no other functional form of the equation (by transforming the variables) can improve the results, those banks may be deleted from the sample in order to obtain better empirical results.

If necessary, the samples employed in the empirical analysis may be reduced considerably in order to obtain a good fit in the regressions and to avoid statistical problems such as multicollinearity, heteroskedasticity and autocorrelation. When the sample is reduced considerably, one must be very cautious about the implications of the findings since they may not be generalized. The fact that many banks in Spain operate in different markets (local, regional, national and international markets) might result in a very heterogeneous sample and might cause poor statistical results. In this case, the sample would be reduced as much as necessary in order to obtain a homogeneous sample.

The private banks' data includes both domestic and foreign banks' data. The data have been taken from the Anuario Estadístico de la Banca Privada, published by the Consejo Superior Bancario.

The savings banks' data have been taken from the Balances y Cuentas de Resultados de las Cajas de Ahorro Españolas, published by CECA (Confederación Española de Cajas de Ahorro).

7.5.- DESCRIPTIVE ANALYSIS OF THE VARIABLES.

At this stage, one needs to examine the main summary statistics of the variables that defined in this chapter. Two main purposes govern this section. The first objective is examining the evolution of the key indicators of the variables (mean and standard deviation). The second objective is to identify potential outliers in our sample. In other words, some of the banks may have extreme values of some of the variables and this might damage the results of our tests. If this were the case, those observations would be deleted.

Let us start by studying two summary statistics of the variables (mean and standard deviation). Table 7.2 displays the mean and the standard deviation for the three measures of capital augmentations (ΔK_1, ΔK_2, ΔK_3) and the explanatory variables used (the variable CM is excluded since it is a dummy variable) in the equations for the Spanish private banks for several years.

In Table 7.2, one can notice that there seem to be outliers among the private banks in 1989 in terms of capital augmentations. The means and the standard deviations for the three measures of capital augmentations are far higher than for the other years. In 1989, there is a private bank in our sample which had a capital augmentation rate of around 140. This appears to lie behind the abnormal means and standard deviations in 1989.

Table 7.2 : Summary Statistics for Private Banks (1987-90)

	1987		1988		1989		1990	
	Mean	St.Dev.	Mean	St.Dev.	Mean	St.Dev.	Mean	St.Dev.
ΔK_1	0.174	0.884	0.300	0.572	1.38	12.88	0.137	0.958
ΔK_2	0.199	0.914	0.323	0.579	1.42	12.89	0.122	0.965
ΔK_3	0.165	0.765	0.266	0.547	1.41	13.28	0.103	0.664
PF	0.008	0.022	0.011	0.036	0.009	0.020	0.018	0.047
CC	0.204	0.294	0.243	0.417	0.42	1.712	0.422	1.880
PK	1.022	8.462	0.399	5.358	0.53	3.288	3.72	24.13
LQ	24.3	203.7	1.544	9.078	4.22	31.00	1.48	21.55
ΔD	1.78	14.91	7.51	55.16	9.53	98.71	21.16	98.82
KR	-1.08	1.055	-0.837	0.731	-0.84	0.634	-0.985	0.838
DI	0.0003	0.0003	0.0003	0.0003	0.0005	0.0005	0.0007	0.0007

The existence of outliers in the variables representing cost of capital (CC), portfolio risk (PK), liquidity (LQ) and deposits growth (ΔD) is a noticeable feature of their summary statistics since their means are well above 1 and the variables are expressed in terms of ratios whose expected values are usually well below 1. The variable PK (portfolio risk) has a positive average value during 1987-90. As this variable accounts for the increase in the volume of risk-free assets as a percentage of total assets, the positive mean during 1987-90 appears to indicate that the private banks have increased their average holdings of risk-free assets and *ceteris paribus*, they appear to have shifted from riskier portfolios to less risky portfolios.

The means and standard deviations of the variables representing profitability (PF) and deposit insurance (DI) seem to have an increasing trend in their means during 1986-89 in the case of PF since it is a lagged variable, and during 1987-90 in the case of DI. The increasing trend of the mean of the variable representing profitability confirms the evidence provided in Chapter 4 where it was shown that profits grew throughout the period 1986-89 for the private banks. The increasing trend of the mean representing the annual amount of resources devoted to deposit insurance as a percentage of assets seem to be shaped by the high growth rate in deposits, which can also be observed in Table 7.2.

The evolution of the variable that the researcher is most interested in is the variable representing capital regulation. A value of -1 indicates that the amount of capital required by the Spanish regulators, in terms of the Spanish generic ratio, and the amount of capital actually held by the bank are equal. A value below -1 indicates that the amount of capital actually held by the bank is lower than that required by regulators. A value above -1 (that is between 0 and -1, indicates that the bank holds more capital than is required by regulators.

In Table 7.2, it can be noticed that the private banks in Spain have a mean below -1: thus, there appeared to be a considerable number of private banks that did not satisfy the regulatory requirements. However, this changed from 1988 onwards, and the average values were between -1 and 0 during 1988-90. This indicates that the numbers of private banks that did not satisfy the regulatory requirements decreased in 1988.

One also needs to examine the evolution of the two summary statistics for the variables employed in our analysis for the Spanish savings banks; Table 7.3 shows those summary statistics.

One of the main features that one can observe from Table 7.3 is that the values of the means and standard deviations for each variable do not change dramatically throughout the period. Thus, it would appear that there are less outliers among the savings banks than among the private banks.

As far as the evolution of the means of the different measures of capital augmentations is concerned, one can observe that there have been smooth and continuous increases in the different definitions of capital during 1987-90. 1988 appears to be the time when the highest rate of capital augmentations took place during the period. In addition, the fact that the highest capital augmentations are in terms of the definition which includes subordinated debt (ΔK_2) seem to indicate that the use of subordinated debt has become very common among the Spanish savings banks. Although from the evidence in Table 7.2 one can notice that this also appears to be the case for the private banks, the importance of the subordinated debt for the savings banks seems higher than for the private banks. The reason for this might be the fact that the savings banks have a more limited set of possibilities to augment capital.

The variable representing profitability (PF) seemed to have a comparative lower mean value for 1989 than for the rest of the years. However, the variable representing cost of capital (CC) appeared to have the highest mean in 1987.

The means for the variable representing portfolio risk (PK) are negative during 1987-89 and positive 1990. Apparently, this would indicate that, *ceteris paribus*, the average portfolios of the savings banks became riskier during 1987-89 since their holdings of risk-free Spanish Government securities decreased during that period. However, this trend seemed to be reversed in 1990.

Table 7.3 : Summary Statistics for Savings Banks (1987-90)

	1987		1988		1989		1990	
	Mean	St.Dev.	Mean	St.Dev.	Mean	St.Dev.	Mean	St.Dev.
ΔK_1	0.199	0.124	0.252	0.196	0.145	0.224	0.246	0.334
ΔK_2	0.225	0.194	0.364	0.261	0.188	0.231	0.234	0.281
ΔK_3	0.180	0.138	0.331	0.252	0.174	0.198	0.229	0.220
PF	0.013	0.006	0.014	0.006	0.008	0.005	0.012	0.006
CC	0.388	0.200	0.189	0.128	0.265	0.174	0.248	0.142
PK	-0.107	0.128	-0.252	0.372	-0.180	0.223	0.103	0.495
LQ	0.045	0.167	-0.083	0.179	0.100	0.261	-0.679	0.099
ΔD	0.149	0.076	0.202	0.106	0.152	0.118	0.099	0.062
KR	-1.054	0.388	-0.930	0.343	-0.933	0.314	-0.836	0.238
DI	0.0007	0.00009	0.0002	0.00003	0.0002	0.00004	0.0002	0.00004

The means of the liquidity variable (LQ) appear to show that the liquidity positions improved in 1987 and 1989 and worsened in 1988 and 1990. The non-existence of outliers in the savings banks contrast with the existence of outliers with very extreme observations in terms of liquidity among the private banks.

The deposit growth variable reflects a very interesting result. Unlike the mean values for the private banks, which were extremely high and erratic for the presence of outliers, the mean values for the savings banks are comparatively far lower and far less erratic. Thus, there appears to be no extreme observations among the savings banks in terms of deposit growth and this gives far lower values for their means of deposit growth. In addition, 1990 seemed a particularly bad year for savings banks in terms of deposit growth. As 1990 was the year when the "accounts war" began in Spain, that low value for the savings banks might show that they have lost some ground in terms of deposits growth. This may lie behind that the mean values for the deposit insurance variable (DI) are also lower for the savings banks than for the private banks. Lower contributions to the Deposit Guarantee Fund were needed for the savings banks since they increased their deposits at a lower rate.

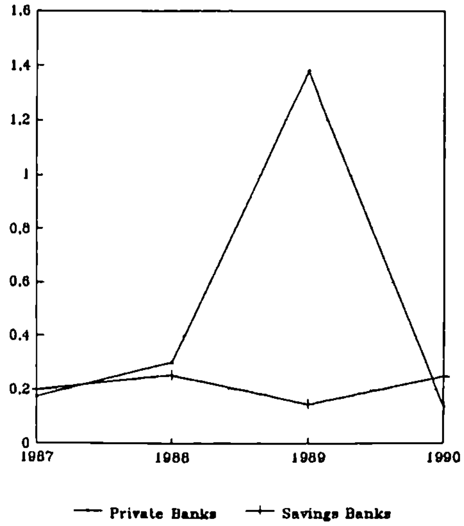
The final comments on Table 7.3 are devoted to the evolution of the capital regulation variable for the savings banks. In 1987, there seemed to be an important number of savings banks that did not satisfy the generic capital ratio since the mean is smaller than -1. However, since 1988, the number of savings banks that did not satisfy the generic ratio requirements decreased: their mean was between -1 and 0. This result was also found for the private banks in Table 7.2.

After examining the summary statistics, one can compare the evolutions of the average of the six variables associated with regulation (ΔK_1, ΔK_2, ΔK_3, PK, KR and DI) between private and savings banks, operating in Spain. In order to establish comparisons, one can plot the values obtained in Tables 7.2 and 7.3.

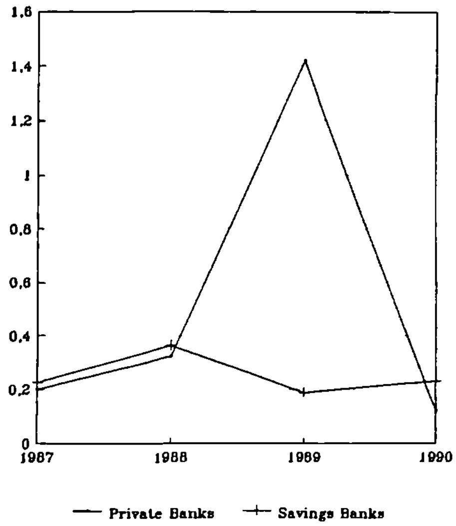
In Figure 7.1, one can observe the evolution of the three measures of capital augmentations for private and savings banks. A very noticeable feature is the existence of an abnormal mean of the three measures of capital augmentations for the private banks in 1989, which, as learnt in Table 7.2, was caused by the existence of extreme observations among the private banks. Leaving 1989 apart, the evolution of the averages for the the three definitions of capital augmentations appear to be relatively similar for private and savings banks. However, a few differences can be observed. First, savings banks have higher growth rates in the definitions ΔK_2 and ΔK_3 throughout the period (except in 1989). Once more, the reason for this might be the more limited possibilities of increasing Tier 1 regulatory capital for savings banks, which appears to lead them to employ more intensively other capital instruments (such as subordinated debt) than the private banks. By 1990, the savings banks have higher growth rates of capital even for the definition Tier 1.

The evolution of the mean of the variable representing portfolio risk (PK) for private and savings banks, is displayed in Figure 7.2. It can be observed that the private banks had positive averages throughout the period, which indicates that the holdings of risk-free assets increased in the portfolios of the private banks and *ceteris paribus*, the portfolios became less risky during 1987-90. However, the savings banks had negative values in 1987, 1988, and 1989, which indicates that they decreased their holdings of risk-free assets. Only in 1990 did they have a positive average of PK and increased their holdings of

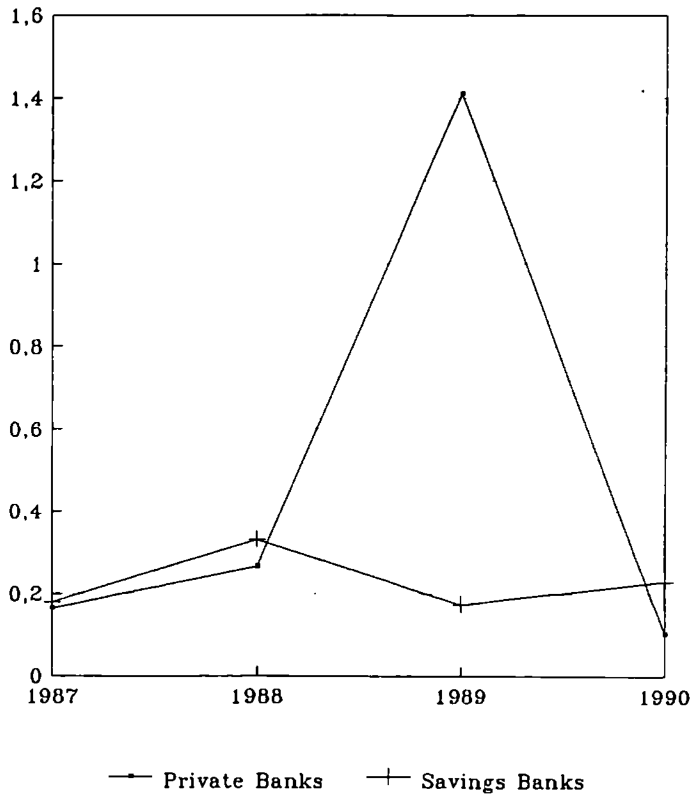
Figure 7.1: Mean of Capital Augmentations (K_1, K_2, K_3) (1987-90)



DEFINITION K1

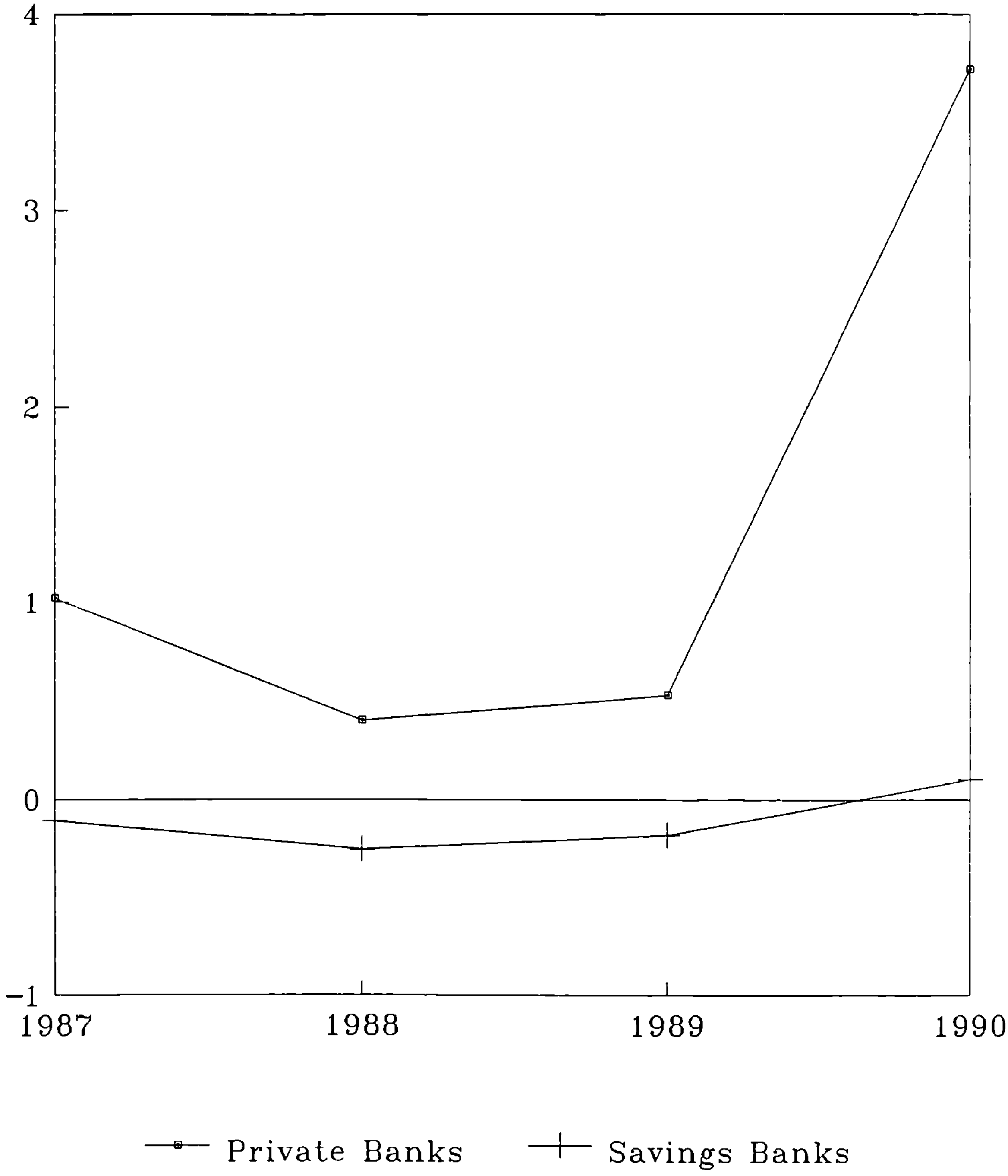


DEFINITION K2



DEFINITION K3

Figure 7.2: Mean of Variable PK (1987-90)



risk-free Spanish Government securities. These findings are in line with those in Figure 7.1: that is, savings banks as a whole increased their portfolio risks during 1987-89 and thus they needed higher capital augmentations than the private banks (result obtained in Figure 7.1).

Figure 7.3 shows the evolution of the variable representing capital regulation (KR = - Required Ratio / Actual Ratio). It can be observed, that except in 1990, the evolution of KR average for private banks parallels the evolution of KR mean for savings banks. Both types of institution had a value below -1 in 1987 (many banks maintained lower actual generic capital ratios than required) and both types of institution improved their position from 1988 onwards. The improvement in KR was higher for private banks in 1988-89 than for savings banks. Then, the average of KR deteriorated for private banks in 1990, which seemingly allowed the savings banks to have higher positions in terms of generic capital ratios than the private banks by the end of 1990.

Finally, the evolution of the variable representing deposit insurance (DI) for both types of institutions is displayed in Figure 7.4. As the Spanish Deposit Guarantee Fund is financed by a fixed premium and the risk held by the bank is ignored, the annual contribution to the Fund depends upon the growth in deposits. In Figure 7.4, one can find an expected result also obtained in Tables 7.2 and 7.3. Except in 1987, the means of the variable DI appear to be much higher for the private banks than for the savings banks. This is an expected result for the reason that the rates of deposit growth have been far higher for the private banks

Figure 7.3: Mean of Variable KR (1987-90)

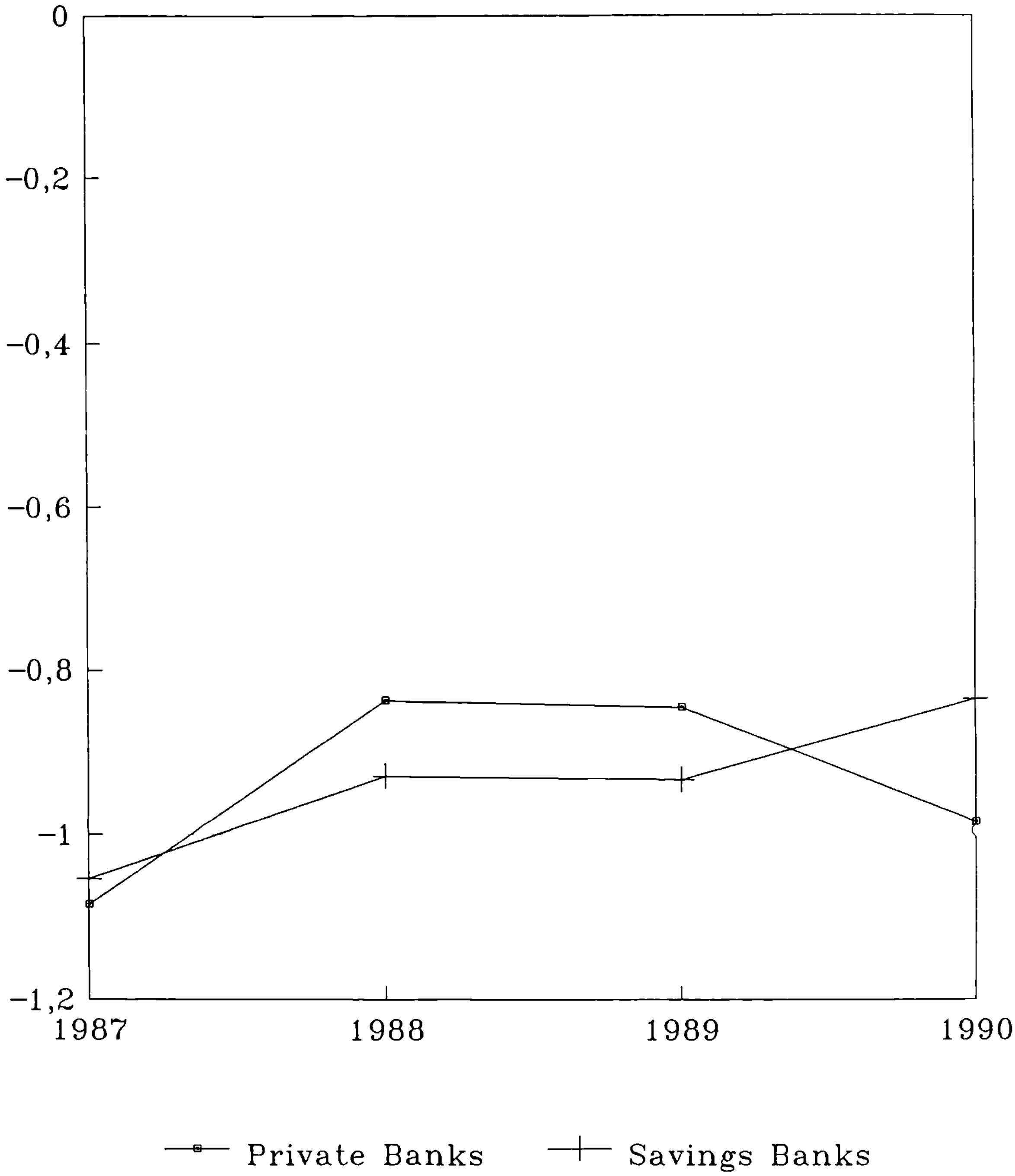
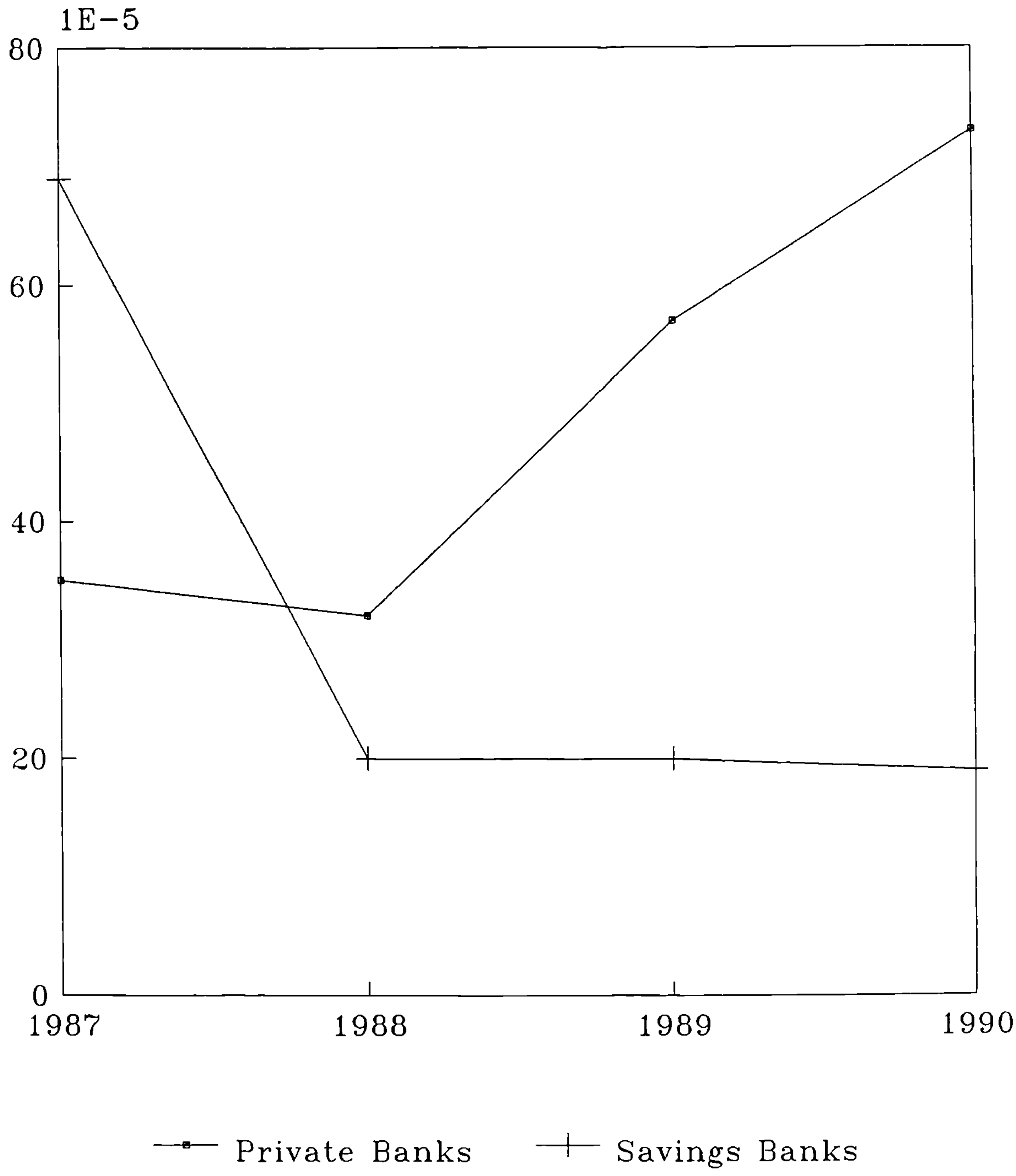


Figure 7.4: Mean of Variable DI (1987-90)



than for the savings banks during the period considered. Thus, the higher the deposits increase, the higher is the contribution to the Deposit Guarantee Fund.

As a conclusion of this section, one must say that the presence of outliers seems to be of importance and this may affect the quality of the empirical results. As a result, a considerable reduction of our sample, particularly for the private banks, may be necessary.

7.6.- TESTS AND INITIAL FINDINGS.

7.6.1.- Background.

The regression analysis presented here has been carried out for 1987-90. The choice of 1987 as the first year of our sample results from the fact that 1987 was the first year when complete freedom came into effect for the banking firms in Spain to set interest rates on liabilities and assets. Any attempt to include previous years involves the problem of regulated interest rates, which, as seen in Section 6.4.1, was Dietrich and James' main criticism (1983) of Mingo's analysis and findings (1975).

According to their institutional features, the researcher has divided the sample of banking firms operating in Spain into two main groups: private banks and savings banks. This distinction appears also justified by the verification that the behaviour of each group is different in terms of the capital augmentation model.

Before analyzing the actual results presented here, the different stages of our research that led to the actual results need to be examined. Firstly, we attempted regressions for private and savings banks separately with all the observations (121 private banks and 76 savings banks during 1987-89, and 64 savings banks in 1990). As the results were unsatisfactory (very low values of R^2 and no significant variables), several transformations were attempted.

The purpose of the first two transformations was to check for nonlinearity in the equation: Kennedy (1992, p. 94) suggest two types of transformations: employing squares of the observations and taking logarithms. Both transformations were attempted in our research, but no significant improvement was achieved in the fit of the regressions.

Next, the private banks' sample was divided into domestic and foreign banks on the grounds that (as suggested in Chapters 2 to 4), they seem to have different institutional characteristics. However, again no improvement in our results was obtained.

Then, the regressions were attempted in the context of panel data. Kennedy (1992, p.222) defines panel data as observations on a cross-section of individuals (or firms) over time. The fixed-effect model of panel data, in which the variables are transformed into deviations with respect to their means, was attempted. The fixed-effect model represents the structural differences across sample units through using different intercepts (Novales, p. 314). Kennedy (1992, p.225) argues that when the cross-section units is large and the number of time periods over which those units are observed is small, the fixed-effect model is recommended. However, no improvement in the fit of the regression was achieved even after eliminating several extreme observations and dividing the private banks' sample into domestic and foreign banks.

The actual results presented here are the best obtained in the different attempts. They result from reducing the sample for the different years by leaving out a set of extreme observations. These outliers were already found in the descriptive analysis of the previous section. Our statistical package, Minitab, flags the observations with large standard residual and/or large influence on the estimator: these observations prevented a good fit in the regression. Cooper and Weekes (1983, p. 157) and Foster (1986, p. 100) suggest this (reduced sample) approach to improve the fit of the model; Domenech and Perez (1992) in a study of the productivity of the Spanish banking sectors, also followed this same procedure.

The final samples which achieved the best and actual results were: 69 private banks and 58 savings banks in 1987; 83 private banks and 53 savings banks in 1988; 92 private banks and 51 savings banks in 1989, and 75 private banks and 48 savings banks in 1990. The reduction in the sample may imply that our model cannot be generally applied to all banks in Spain. However, it has been necessary to reduce the sample in order to obtain an empirical model that at least can be applied to a large sample of banks.

The private banks' samples have been reduced more than for savings banks, since the presence of outliers is higher among private banks. Therefore, savings banks appear to follow a more homogeneous pattern than private banks in terms of the variables we have employed pertaining to capital augmentations.

7.6.2.- Tests Results.

A) *Tests of Significance:*

A.1) *Testing the Significance of Individual Regressions Coefficients*: Tables 7.4 and 7.5 summarize the regression estimates for private banks and savings banks, respectively. The values in parentheses are t-statistics. The main results are:

a) *Private banks*: the critical t value with $\alpha = 0.05$ (95 per cent confidence) is 2.00. Thus, the significant variables for each definition of capital augmentation for private banks are:

* ΔK_1 : the variable representing cost of capital (CC) is statistically significant in two years (1988 and 1989 with a positive sign in both years). The variable representing deposit growth (ΔD) is also statistically significant in two years (1989 with a positive sign and 1990 with a negative sign). The variable representing easy access to capital markets (CM) is statistically significant in 1990 (with a positive sign). The rest of the variables, including the variables representing the impact of capital regulation and deposit insurance, are not significant in any year.

Table 7.4 : Regression Estimates for Private Banks (1987-90)

	1987			1988		
	ΔK_1	ΔK_2	ΔK_3	ΔK_1	ΔK_2	ΔK_3
Constant (1)	0.01358 (0.48)	0.01219 (0.42)	0.01185 (0.42)	0.00235 (0.63)	0.03462 (0.92)	0.02842 (0.72)
PF	1.678 (1.29)	1.763 (1.32)	1.662 (1.28)	-1.469 (-0.67)	-4.057 (-1.83)	-1.956 (-0.84)
CC	0.07388 (0.85)	0.06239 (0.70)	0.06527 (0.75)	0.4311 (3.83)	0.6169 (5.40)	0.4733 (3.95)
PK	-0.05284 (-1.73)	-0.05445 (-1.75)	-0.02803 (-0.92)	0.02122 (0.84)	0.01232 (0.48)	0.01386 (0.51)
LQ	-0.00402 (-0.46)	-0.00355 (-0.40)	-0.00091 (-0.10)	-0.00152 (-0.08)	-0.00330 (-0.17)	0.00314 (0.15)
ΔD	0.03466 (1.86)	0.03543 (1.86)	0.02039 (1.10)	0.01889 (0.76)	0.01238 (0.49)	0.03672 (1.38)
KR	0.01030 (0.48)	0.00773 (0.35)	-0.00141 (-0.07)	-0.02461 (-0.69)	-0.00785 (-0.22)	0.03223 (0.85)
DI	8.30 (0.24)	5.93 (0.17)	22.35 (0.64)	-22.91 (-0.33)	-43.52 (-0.61)	24.22 (0.32)
CM	0.03778 (1.59)	0.04290 (1.77)	0.02943 (1.24)	0.06886 (1.56)	0.05937 (1.33)	0.05504 (1.17)
Number Observ.	69	69	69	83	83	83
R^2	0.312	0.309	0.233	0.32	0.397	0.281
F-stat.	3.41	3.35	2.28	4.36	6.08	3.61
Multicol.	NO	NO	NO	NO	NO	NO
Heterosk.	NO	NO	NO	NO	NO	NO
DW stat. (2)	2.00	2.04	2.09	1.95	1.45	1.80
	NA	NA	NA	NA	ND	ND

	1989			1990		
	ΔK_1	ΔK_2	ΔK_3	ΔK_1	ΔK_2	ΔK_3
Constant	0.05596 (1.35)	0.04112 (1.12)	0.01544 (0.45)	0.04857 (1.98)	0.05234 (2.08)	0.03564 (1.26)
PF	0.400 (0.21)	1.436 (0.85)	1.969 (1.25)	0.7591 (0.80)	0.7996 (0.82)	1.288 (1.17)
CC	0.02742 (2.48)	0.20857 (2.12)	0.19569 (2.12)	0.08469 (0.88)	0.15815 (1.61)	0.0635 (0.57)
PK	0.01694 (0.89)	0.02402 (1.42)	0.01998 (1.26)	-0.01863 (-1.04)	-0.01570 (-0.85)	-0.02095 (-1.01)
LQ	-0.00739 (-0.50)	-0.00237 (-0.18)	-0.00138 (-0.11)	-0.00405 (-0.11)	-0.00111 (-0.03)	0.00489 (0.12)
ΔD	0.10703 (2.67)	0.02349 (0.66)	0.04984 (1.49)	-0.00921 (-3.20)	-0.01539 (-5.20)	-0.01465 (-4.41)
KR	-0.02735 (-0.64)	-0.04454 (-1.17)	-0.06308 (-1.77)	0.03618 (1.21)	0.0414 (1.35)	-0.00345 (-0.10)
DI	-26.76 (-0.83)	-15.54 (-0.54)	-16.99 (-0.63)	13.35 (0.62)	-4.42 (-0.20)	27.26 (1.10)
CM	-0.05488 (-1.38)	-0.05328 (-1.50)	-0.07989 (-2.40)	0.04644 (2.13)	0.03306 (1.47)	-0.00374 (-0.15)
Number Observ.	92	92	92	75	75	75
R^2	0.257	0.210	0.296	0.512	0.613	0.480
F-stat.	3.60	2.76	4.37	8.66	13.07	7.63
Multicol.	NO	NO	NO	NO	NO	NO
Heterosk.	NO	NO	NO	NO	NO	NO
DW stat.	2.00	1.99	1.93	1.64	1.68	1.72
	NA	NA	NA	ND	ND	ND

Notes:
(1) The t-statistics values are in parentheses.
(2) NA = No Autocorrelation; ND = No Decision

* ΔK_2:the variable representing cost of capital (CC) is the only variable that is statistically significant for the second definition of capital augmentation (including Tier 1 and Tier 2

capital) in two years (1988 and 1989 with a positive sign in both). The variable deposit growth (ΔD) is statistically significant in one year (1990 with a negative sign). No other variable is statistically significant in any regression.

* ΔK_3: the variable CC is statistically significant in two years (1988 and 1989 with a positive sign in both years). The variables deposit growth (ΔD, in 1990 with a negative sign) and easy access to capital markets (CM, in 1989 with a negative sign) are statistically significant in one year. The rest of the variables are not statistically significant in any year.

b) *Savings banks*: the critical t value with $\alpha = 0.05$ (95 per cent confidence) is 2.01. Hence, the significant variables for each definition of capital augmentation for savings banks are:

* ΔK_1: the variable representing capital regulation (KR) is statistically significant in the four years analyzed (with a negative sign in the four years). The variable representing profitability (PF) is also statistically significant in these four years (with a positive sign in the four years). The variable cost of capital (CC) is statistically significant in two years (1987 and 1990 with a positive sign in both). The variable deposit growth is only significant in 1988 (with a negative sign). No other variable is significant in any year.

Table 7.5 : Regression Estimates for Savings Banks (1987-90)

	1987			1988		
	ΔK_1	ΔK_2	ΔK_3	ΔK_1	ΔK_2	ΔK_3
Constant (1)	-0.11186 (-1.21)	-0.14934 (-1.51)	-0.0209 (-0.16)	-0.31958 (-4.21)	0.2135 (1.08)	0.1052 (0.63)
PF	12.162 (8.40)	13.317 (8.63)	10.662 (5.27)	13.397 (10.48)	1.571 (0.47)	-0.098 (-0.04)
CC	0.25892 (5.48)	0.19989 (3.97)	0.17927 (2.72)	0.09555 (1.78)	0.1970 (1.42)	0.1269 (1.08)
PK	0.07286 (0.93)	0.08290 (1.00)	-0.0315 (-0.29)	0.00481 (0.20)	-0.18394 (-2.96)	-0.16769 (-3.18)
LQ	0.02393 (0.65)	0.03465 (0.88)	0.05406 (1.05)	0.05948 (1.39)	-0.2380 (-2.15)	-0.17296 (-1.84)
ΔD	-0.1977 (-1.35)	-0.1552 (-0.99)	-0.0855 (-0.42)	-0.24248 (-2.44)	-0.7107 (-2.76)	-0.2824 (-1.30)
KR	-0.14999 (-4.14)	-0.18430 (-4.78)	-0.10609 (-2.10)	-0.29753 (-9.58)	-0.13331 (-1.65)	-0.17297 (-2.54)
DI	-88.7 (-0.73)	-84.7 (-0.66)	-165.7 (-0.98)	472.7 (1.49)	-233.3 (-0.28)	-152.5 (-0.22)
Number Observ.	58	58	58	53	53	53
R^2	0.842	0.819	0.641	0.843	0.433	0.422
F-stat.	38.07	32.25	12.73	34.63	4.90	4.69
Multicol.	NO	NO	NO	NO	NO	NO
Heterosk.	NO	NO	NO	NO	NO	NO
DW stat. (2)	1.90	1.82	2.25	2.01	2.15	2.55
	NA	ND	ND	NA	ND	ND

	1989			1990		
	ΔK_1	ΔK_2	ΔK_3	ΔK_1	ΔK_2	ΔK_3
Constant	-0.16214 (-2.86)	-0.13463 (-1.67)	-0.22182 (-2.81)	0.01157 (0.13)	-0.00532 (-0.07)	0.0168 (0.16)
PF	16.979 (12.31)	13.036 (6.67)	12.160 (6.34)	10.077 (7.73)	8.6096 (7.22)	6.214 (3.99)
CC	0.00135 (0.04)	0.03418 (0.66)	-0.04166 (-0.82)	0.19266 (2.72)	0.11044 (1.71)	0.05369 (0.64)
PK	-0.02396 (-1.05)	-0.01086 (-0.34)	-0.01119 (-0.35)	0.00169 (0.12)	-0.01411 (-1.13)	-0.02795 (-1.72)
LQ	-0.02429 (-0.96)	0.06572 (1.82)	0.07913 (2.24)	0.14479 (1.84)	0.14781 (2.05)	0.08585 (0.91)
ΔD	-0.0130 (-0.12)	0.0030 (0.02)	0.01828 (1.19)	-0.2825 (-0.97)	0.0802 (0.30)	0.0126 (0.04)
KR	-0.08130 (-2.94)	-0.03930 (-1.00)	-0.04250 (-1.11)	-0.15154 (-2.83)	-0.1381 (-2.82)	-0.08213 (-1.29)
DI	305.5 (1.52)	468.6 (1.65)	925.2 (3.31)	-196.6 (-0.74)	-71.6 (-0.29)	132.4 (0.42)
Number Observ.	51	51	51	48	48	48
R^2	0.830	0.571	0.545	0.770	0.733	0.455
F-stat.	30.04	8.18	7.35	19.08	15.69	4.76
Multicol.	NO	NO	NO	NO	NO	NO
Heterosk.	NO	NO	NO	NO	NO	NO
DW stat.	2.39	2.49	2.20	1.80	1.70	1.74
	ND	ND	ND	ND	ND	ND

Notes:

(1) The t-statistics values are in parentheses.

(2) NA = No Autocorrelation; ND = No Decision

* ΔK_2: the variable representing profitability (PF) is statistically significant in three years (1987, 1989 and 1990 with a positive sign in the three years). The variable representing capital regulation (KR) is statistically significant in two years

(1987 and 1990 with a positive sign). LQ (liquidity) is significant in two years (1988 and 1990) but the sign is different (negative and positive respectively). Cost of capital (in 1988 with a positive sign), portfolio risk (with a negative sign in 1988) and deposit growth (1988 with a negative sign) are statistically significant in one year. The variable representing deposit insurance (DI) is the only one with no significant impact on this definition of capital augmentation for savings banks.

* ΔK_3: profitability (PF) is statistically significant three years (1987, 1989 and 1990 with a positive sign). The impact of capital regulation (KR) is significant in two years (1987 and 1988 with a negative sign). Cost of capital (in 1987 with a positive sign), portfolio risk (in 1988 with a negative sign), liquidity (in 1989 with a positive sign) and deposit insurance (in 1989 with a positive sign) are statistically significant in one year. Deposit growth is the only variable that is not significant in any year analyzed.

A.2) *Testing the Overall Significance of the Regressions:* the critical F values with $\alpha = 0.05$ (95 per cent confidence) are 2.17 and 2.34 for private and savings banks, respectively. As the F values for all the regressions in Tables 7.4 and 7.5 are well above the respective, critical F values for private and savings banks, one can reject the null hypothesis that the regressions are not significant as a whole. Thus, it implies that all the regressions are statistically significant with 95 per cent confidence.

B) *Test for Multicollinearity*: in Tables B.1 and B.2 of Appendix B, the correlation matrices for all the variables in the regressions are displayed. Considering only the independent variables, one can note that all the correlation coefficients for both private and savings banks, seem to be well below 0.8-0.9 in absolute terms, which is the critical value for high correlation between two variables (see Subsection 7.3.2.4.). Therefore, there seems to be no high correlation among the independent variables in the regressions estimated in this chapter. In addition, the statistical package employed in our empirical analysis, Minitab, has signalled and dropped no variable causing multicollinearity in any regression. This has been reflected in Tables 7.4 and 7.5. Therefore, apparently, multicollinearity is not a problem in our analysis.

C) *Test for Heteroskedasticity:* Tables 7.4 and 7.5 indicate that the tests for heteroskedasticity show heteroskedasticity in no regression. The tests for heteroskedasticity have been computed as specified in Subsection 7.3.2.4 (C), and the tests show that no heteroskedasticity has been found in any of the regressions. This is a positive feature of our analysis since cross-section data often involve heteroskedasticity problems.

D) *Test for Autocorrelation*: in general, autocorrelation is not a serious problem with cross-section analysis. This seems to be the case in our research, in which according to the Durbin Watson statistic, no autocorrelated errors have been found in any of the regressions. Tables 7.4 and 7.5 show 9 regressions with no autocorrelation and 15 regressions with no clear-cut decision on autocorrelation. However, most DW values that mean 'no decision' are very close to 'no autocorrelation' values.

7.6.3.- Economic Interpretation of Initial Findings.

In order to analyze the findings presented in the previous section, the economic interpretation of our results will be divided into the following main areas:

7.6.3.1.- *Model Evaluation:* the first considerations are in terms of how well the model explains and predicts the conduct of the private and savings banks operating in Spain. One can observe that the R^2 values for the savings banks' regressions are much higher than for the private banks' regressions. This indicates that savings banks appear to fit much better in our model of capital augmentation than private banks. This seems to be the case for all the years and the three definitions of capital augmentations employed in our empirical analysis of this chapter.

Our model of capital augmentations seems to explain better the behaviour of savings banks in terms of capital augmentations than the behaviour of the private banks. Actually, one must acknowledge that the model appears to explain very little about the conduct of private banks in terms of capital growth. A possible explanation is that other variables have been left out of the model. Peltzman (1970), Mayne (1972), and Dietrich and James (1983) argue that a non-economic variable such as management philosophy or discretion also seems to play an important role in the way banks increase their capital. This could also be the case for the Spanish banking system, in which many heterogeneous institutions with different management philosophies and objectives operate in the banking market. We will return to this phenomenon below in this section.

7.6.3.2.- *The Impact of the Regulatory-Based Variables on Bank Capital Augmentations in Spain during 1987-90.*

A) *The Impact of Capital Adequacy Regulation*: the effects of the variable KR (capital regulation) on capital growth is very important in our research. Two related issues are important here:

(i) if the impact of capital adequacy regulation on capital augmentations differs between private and savings banks, and,

(ii) if the impact is different in 1988 when the BIS Agreement was promulgated, and in 1989, when the EC Directive on the solvency ratios was approved.

First of all, one can note that the variable KR is not statistically significant in any of the regressions for the private banks. In addition, the sign of the variable changes across different years and across definitions of capital augmentations. This makes the impact of capital regulation even more unclear for the private banks.

The impact of capital regulation for savings banks seems to be completely different. In 8 (out of 12) regressions for savings banks, the variable KR is statistically significant and the sign is negative. As was explained in Subsection 7.2.2.2 (G), the negative sign implies that capital regulation appears to have made savings banks augment their capital during the period examined. Thus, the impact of capital regulation on capital augmentations is seemingly much more clear for savings banks than for private banks. This is particularly true for the definition ΔK_1 (augmentations in Tier 1) since the variable KR is statistically significant in the regressions for the four years.

In the descriptive analysis of Section 7.5, we observed that the average values of KR in 1987 showed that an important number of private banks and savings banks had lower actual capital than required by the generic capital ratio. Even in this case, the impact of KR on capital augmentations in 1987 and 1988 for private banks was not significant. Other means like reducing portfolio growth must have been employed by the private banks, since in 1988 the average values of KR showed that private banks had improved their capital positions.

The results for the private banks in Spain are similar to those provided by Peltzman (1970), Mayne (1972) and Dietrich and James (1983) for the US banks. These authors also found no evidence of the impact of capital regulation on capital growth.

However, the results for the Spanish savings banks are apparently similar to those obtained by Mingo (1975) for the US banks. He also found evidence of significant impact of capital regulation on bank capital augmentations.

The reasons why the effects of capital regulation seem more important for savings banks than for private banks must be explored. First of all, capital adequacy regulation seems more strict for savings banks than for private banks. Capital regulation may not be more strict for savings banks than for private banks in terms of the solvency ratios, but it certainly seems more strict in terms of the capital instruments that both types of institution can employ. Savings banks' management has less legal possibilities for increasing capital, which in turn, also reduces the leeway that management has with regard to augmenting capital.

The fact that very few variables in the empirical model are significant for private banks seems to indicate that other variables may have been omitted. As mentioned above in the model evaluation, in the literature of capital augmentations a non-economic variable like management philosophy or discretion has often been suggested as an essential variable with respect to capital augmentations. Management philosophy seems to play a more important role in terms of capital growth for private banks than for savings banks since the regulatory variables appear to influence savings banks' capital augmentations more than private banks' capital augmentations. In other words, as the impact of capital regulation is higher for savings banks than for private banks, the leeway for management philosophy that the regulation gives to savings banks is not as wide as the leeway given to private banks.

As far as whether the impact of capital adequacy differs over time as a result of the promulgation of the 1988 BIS Agreement and 1989 EC Directive are concerned, one must say that there seems to be no difference over time in terms of the impact of the variable KR. Thus, the impact of the BIS Agreement on capital augmentations from 1988 onwards and the impact of the EC Directive on capital augmentations seem not to be significant.

Although the latter evidence appears to contradict the field survey, in which several Spanish bankers affirmed that BIS and particularly EC capital ratios were being regularly monitored in their banking institutions, one can suggest several possible explanations for this phenomenon. Firstly, although the BIS and EC ratios have been becoming very important for both regulatory and strategic purposes in recent years, the ratios that banks operating in Spain had to comply with during 1987-90, are the Bank of Spain's specific and generic ratios. Hence, these two ratios seemed to be the most important ones during 1987-90. A second explanation is that the philosophy shaping the Bank of Spain's capital adequacy regulation is in line with the philosophy behind the BIS and EC regulations. Thus, the introduction of the BIS and EC regulations should not change dramatically the evolution of the bank conduct in terms of their capital augmentation. A third explanation is that, as was found in Chapter 4, the Spanish banks appeared well-capitalized in terms of the BIS and the EC ratios. When banks are well-capitalized, *ceteris paribus* the impact of the introduction of new solvency regulation (BIS, EC) is likely to be less significant on bank capital augmentations than when banks are not well-capitalized.

The evidence provided here indicates that the impact of capital regulation has differed significantly between private banks and savings banks, but it has not differed significantly over time during 1987-90 even if new international regulations (BIS, EC) were promulgated. The evidence indicating that there seems to be significant differences in the effects of capital adequacy regulation between private banks and savings banks could have very important strategic and policy issues that require further research.

B) *The Impact of Portfolio Risk*: as discussed in Subsection 7.2.2.2 D), the impact of the portfolio risk could be included either among the regulatory variables or among the managerial variables. It has been included among the regulatory variables for its implications for the risk-based capital adequacy regulation. The variable representing portfolio risk (PK) is only statistically significant in two regressions for the savings banks (in 1988 with a negative sign) and in no regression for private banks. This appears to imply that the portfolio risk has only a very limited impact on capital augmentation in banks operating in Spain. This seems to be against the philosophy of the present risk-based capital regulations (Bank of Spain, BIS, EC), which associate capital with portfolio risk. The only exception occurred in 1988: savings banks took into consideration their portfolio risk, when savings banks as a whole were holding lower actual generic ratios than required. At the end of 1988, savings banks as a whole had reached higher actual capital ratios than required for both augmenting capital and reducing portfolio risk.

A possible explanation of the limited impact of portfolio risk on capital augmentations could be found in the evidence provided in Chapter 4. It was found that the Spanish banking system as a whole seemingly kept very good risk-based capital standards. Therefore, *ceteris paribus*, there appears to be no strong need to change portfolio risk to maintain regulatory capital standards.

C) *The Impact of the Deposit Insurance* : the last regulatory variable considered is deposit insurance (DI). According to the evidence displayed in Tables 7.4 and 7.5, its impact on capital augmentations seems very weak since it is only statistically significant in one regression (in 1989 for savings banks with the definition ΔK_3). This would appear to confirm the evidence found in the field survey among the largest private and savings banks in Spain: most banks in the survey argued that the impact of deposit insurance on capital growth was unclear. In other words, no evidence can be provided with regard to whether deposit insurance makes banks augment capital or on the contrary, makes banks reduce capital (the 'substitution effect' analyzed in Subsection 5.4.3.1(B)).

The positive coefficient of DI in 1989 for savings banks could be statistically significant as a consequence of the impact of the regulatory decrease in the contribution to the Deposit Guarantee Fund for the savings banks, as described in Chapter 3. In this connection, a possible explanation is that as a result of the lower contribution to the Deposit Guarantee Fund, savings banks could have decided to allocate more resources to augment their capital.

7.6.3.3.- *The Impact of the Managerial Variables on Bank Capital Augmentations in Spain during 1987-90.*

A) *The Impact of Profitability* : profitability seems a key managerial variable for savings banks since it is statistically significant in 10 (out of 12) regressions. Naturally, it is highly significant for ΔK_1 (Tier 1 capital augmentation) since in practice the only way for savings banks to increase Tier 1 capital is through profitability (Reserves and Social Works Funds). Anyway, it is also significant for the other two definitions of capital augmentation since both definitions include Tier 1, and this reflects the great importance of profitability for all the definitions of capital for savings banks.

The important impact of profitability on capital augmentations for savings banks seems to contrast with the very reduced impact of profitability for private banks. The variable representing profitability (PF) is not statistically significant in any regression. This is an unexpected result since private banks may not need to rely on profitability so much as savings banks, but it was shown in Chapter 4 that the main source of capital for private banks is retained earnings. A possible explanation for this phenomenon is that profitability may not capture completely the evolution of retained earnings. Private banks pay out dividends and private banks' dividend policy has not been completely reflected in our model. The model for the private banks may be improved by including retained earnings instead of return on assets. This improvement will be attempted in Chapter 8.

B) *The Impact of Cost of Capital*: the interpretation of the variable representing cost of capital must be made with care since the present ROE has been employed as a measure of cost of capital. ROE may also be understood as a measure of profitability. The variable representing cost of capital (CC) is statistically significant in 6 regressions for the private banks (for the three definitions of capital augmentation in 1988 and in 1989), and, in 4 regressions for the savings banks. Thus, it would appear that cost of capital is more important for private banks than for savings banks.

The sign of the impact of cost of capital on capital augmentations is positive, which would appear to imply that the higher the cost of capital, the higher the capital augmentation. The latter does not support the economic theory which says that the higher the cost, the more expensive the capital augmentation and, *ceteris paribus*, the lower the capital growth.

A possible explanation for the positive sign may be as follows: the higher the profitability required (cost of capital) by shareholders, *ceteris paribus*, the harder bank managers will try to reach that level of profitability. If that level of profitability is achieved, as occurred in Spain during 1987-90 (Chapter 4), the higher the retained earnings that can be allocated to capital after fulfilling shareholders' required return. In other words, with high levels of earnings like in the Spanish banking system in 1987-89, both high required returns (cost of capital) by shareholders and investors and high retained earnings can be accommodated at the same time. If profitability is not under pressure, banks can reach the required return for shareholders and, at the same time, augment capital through retained earnings. In 1990, the situation changed as a result of the 'accounts war' (guerra del pasivo), in which the financial cost of deposits increased dramatically, and in turn, profitability came under pressure.

C) *The Impact of Liquidity*: the variable representing liquidity (LQ) is only statistically significant in three regressions for savings banks and in no regression for private banks. Therefore, the impact of a bank's liquidity on capital augmentations appears very weak for the Spanish banks, particularly for the private banks. The strong relationship between liquidity and capital decisions appears less evident in our analysis than as argued by Sealey (1983) and Crouhy and Galai (1986). Liquidity does not appear to be a very important variable in terms of capital augmentations in the Spanish banking system, particularly for private banks.

A peculiar feature of the evolution of this variable in our empirical analysis is the different sign of LQ between the 1988 and 1989-90 regressions for savings banks. This seeming contradiction could be justified by the effects of the decreasing trend in the regulatory required cash requirements during 1988-90. When the required cash ratio was lowered, the sign of LQ is positive, which appears to imply that savings banks could have engaged in augmenting the capital cushion in order to counteract the reduction in the required liquidity cushion. A reduction of the required liquidity cushion could be considered, *ceteris paribus*, as an increase in liquidity risk, which could induce banks to augment capital.

D) *The Impact of Deposit Growth*: the deposit growth is statistically significant in four regression for the private banks (in 1989 and 1990) and in two regressions for the savings banks (1988). In the case of the private banks, the behaviour of the variable deposit growth changes in 1990, when the sign is negative. In previous years the sign was positive, although only in 1989 was it statistically significant.

Up to 1989, the sign of the impact of deposit growth for private banks had been positive (the higher the deposit growth, the higher the capital augmentations). However, in 1990, the sign changed for the private banks. The effects of the 'accounts war', in which Spanish banks, particularly private banks, began to offer high interest rates on current accounts, seem to lie behind the change of sign. The high interest rates on sight accounts, attracted many deposits and it seemed that capital could not follow the fast pace of deposit growth.

E) *The Impact of Access to Capital Markets*: the impact of the access to capital markets was tested through a dummy variable (CM) only for the private banks quoted on the Stock Exchange. From Table 7.4, one can note that this variable is only statistically significant in two regressions (one in 1989 and one in 1990).

The variable CM appears to have played an important role in 1990, since the variable is statistically significant and with a positive sign. The high interest rates on deposits seem to have made private banks rely on external sources of capital to a larger extent in 1990 than in previous years, as a consequence of the pressure on profitability. In 1989, when profitability was not under pressure, the sign of CM was negative which appears to imply that banks with easy access to capital markets seem to rely very little on the external sources of capital so long as their internal sources of capital can be employed.

7.7.- SYNTHESIS AND FURTHER RESEARCH.

In this chapter, an empirical model of capital augmentation has been applied for private and savings banks operating in Spain. Three different (regulatory and book-value) definitions of bank capital were employed and four years (1987-90) were analyzed.

The Spanish bank capital adequacy regulation appears to be a stricter constraint for savings banks than for private banks. This is likely to result from the lower legal possibilities to augment capital, since savings banks cannot issue share equity. As a consequence of the latter, savings banks need to rely on their internal capital generation to a larger extent than private banks. In the private banks' capital augmentations, market-based variables such as cost of capital and access to capital markets seem to play a more important role than for savings banks.

In Chapter 8, the researcher will substitute the retained earnings in year t-1 for ROA in t-1 in order to capture better the way profitability influences private banks' capital augmentations. In this chapter, our aim was to apply the same model to private and savings banks. In the next chapter, *inter alia*, we will attempt to upgrade the analysis of bank capital augmentations by including other variables.

The empirical analysis undertaken in this chapter confirmed to the researcher that further research is needed in order to complete the evidence on bank capital augmentations in Spain. This research must focus basically now on:

a) Re-testing the empirical model of bank capital augmentations: two basic areas are important here:

- The use of retained earnings as the relevant measure of profitability for private banks.

- The use of market-value definition of capital augmentation.

b) Study of the impact of size on bank capital augmentations and bank regulatory capital ratios: so far, size has not been considered to explain bank capital augmentations in Spain. However, there exists certain literature that argues that size may be a crucial variable in many of a bank's capital decisions.

NOTES:

1.- See Kennedy (1992, chapter 3) for a review of the main features and assumptions of the CLR model.

2.- See Revell (1980) for a review of the main banking profitability measures.

3.- See Sinkey (1992, p. 407-410) for a review of the main market measures of bank risk applied to the banking firm.

4.- Nevertheless, liability management in Spanish banking institutions has become very important in recent years, especially for large banks. See Cuervo, Parejo and Rodriguez (1992, pp 225-232 and 251-257) for a study of importance and evolution of liability management in the Spanish banking sector.

5.- See Peltzman (1970, Appendix) for a discussion of these three formulas.

6.- In particular, ABC' = -1/ABC where ABC is the measure of capital adequacy utilized by regulators. The relationship between capital changes and the regulator's capital adequacy measure (ABC) is hypothesized to be of the form

$$\%\Delta K = - \beta \frac{1}{ABC} \qquad (7.27)$$

so that

$$\frac{\delta\ \%\Delta K}{\delta ABC} = \frac{\beta}{ABC^2} \qquad (7.28)$$

Thus, using ABC' permits a nonlinear response. Since the first term is expected to be less than zero if regulation is effective, multiplying the ABC ratio by -1 implies the expected sign of β is less than zero.

7.- Although the minimum Bank of Spain's generic ratio is 5 per cent, there could be cases in which certain banks, under determined circumstances (for example, those with serious financial difficulties), are requested to maintain capital ratios above the minimum.

8.- See, for example, Kennedy (1992, Chapter 14) for a review of the main characteristics of dummy variables and problems/ limitations with the use of dummy variables.

9.- The researcher has chosen two-tail tests instead of one-tail tests, since banking theory is not conclusive with regard to the expected sign of the coefficients of the different independent variables.

10.- See Rees (1990) for a detailed explanation of the main problems and techniques involved in the ratio analysis.

11.- See Foster (1986) and Rees (1990) for a review of the limitations of financial statement information.

CHAPTER 8 : FURTHER EVIDENCE ON BANK CAPITAL AUGMENTATIONS IN SPAIN

8.1.- INTRODUCTION.

In this chapter, further empirical tests will be undertaken in order to complete the evidence on bank capital regulation and capital augmentations in the Spanish banking system. The need for further research and tests in this area was suggested in the conclusions of the previous chapter.

The research in this chapter will focus on two main areas:

(i) Re-testing the empirical model of bank capital augmentations in Spain by employing a new measure of internal capital generation rate for private banks and by employing the market-value definition of bank capital augmentation for the private banks quoted on the Madrid Stock Exchange.

(ii) Analysis of the impact of size on bank capital augmentations.

Hence, the chapter is to be organized in the following manner. Firstly, the testing hypotheses are specified. Then, the empirical model of capital augmentations is re-tested. Next, the impact of bank size on capital augmentations is analyzed both theoretically and empirically. Finally, a synthesis and the conclusions for this chapter are drawn.

8.2.- TESTING HYPOTHESES.

In this chapter, our main testing objectives are concerned with the following hypotheses:

a) Hypotheses related to the empirical analysis in Chapter 7:

a.1) Is the empirical model of capital augmentations for private banks improved by substituting retained earnings in t-1 for ROA in t-1 as a measure of profitability ?

a.2) Is book-value capital a good predictor of market-value capital ? Can the conclusions drawn in Chapter 7 be applied to a market-value definition of bank capital augmentation ? What is the impact of capital regulation and profitability on market-value capital ?

b) Hypotheses based on the impact of size on bank capital augmentations:

b.1) Is the relation between market value of equity and book value of equity different across different bank sizes ?

b.2) Hypotheses based on the relationship capital growth - assets growth (based on Keeley, 1988):

$$d(C/A)/dt = (C/A)\ [(1/C)(dC/dt) - (1/A)(dA/dt)] \qquad (6.5)$$

b.2.1) Is the impact of capital augmentations on the generic ratios different across bank sizes ? (based on Keeley, 1988)

b.2.2) Are there differences across sizes in terms of retained earnings ? Can any size of private bank retain more earnings ? Does any bank size have an advantage in terms of the internal capital generation rate ?

b.2.3) What was the impact of the mergers between savings banks on capital augmentations in 1990 ? Is the increase in size a good strategy for savings banks in terms of capital augmentations in order to counteract the more limited legal possibilities of increasing capital ?

8.3.- RE-TESTING THE EMPIRICAL MODEL OF BANK CAPITAL AUGMENTATIONS.

8.3.1.- Introduction.

The evidence provided in Chapter 7 seemed to suggest that our empirical model of capital augmentations (described in Equation (7.7)) explains the way Spanish savings banks augment their regulatory and book-value capital better than for the private banks operating in Spain. One of the main empirical findings that seemed to contradict the theory and the field survey carried out among several Spanish bankers is that profitability does not affect significantly bank capital augmentations. Both banking theory in Chapter 5 and the field survey suggest that internal capital generation (resulting from a bank's profitability) appears to be the main capital source for private banks even if they have more legal sources for increasing capital. A new variable representing profitability must be tested in order to examine if the empirical results may be improved.

A crucial test must also be undertaken in this chapter for the private banks operating in Spain: testing the importance of market-value capital augmentations. In the previous chapter, two regulatory capital definitions and the book-value capital definition were analyzed. Now, it is essential to examine a definition of capital augmentations that is crucial for those private banks quoted on the Stock Exchange: the market-value capital. We must study whether the findings and conclusions from the previous chapter also hold for the market-value definition of capital augmentation. The main limitation in this analysis of the market-value capital augmentation is that, as seen in Chapter 4, the samples of private banks quoted on the Stock Exchange are small: 29 banks in 1987 and 30 banks in 1988-90.

In this section, the two tests mentioned in the two previous paragraphs are undertaken.

8.3.2.- Substituting Retained Earnings for Net Income in the Profitability Variable for the Private Banks.

8.3.2.1.- *Background.*

The researcher employed a homogeneous variable representing profitability (PF) for both private and savings banks: this was ROA in year t-1. For a savings bank, which retains 100 per cent of the profits that it generates, ROA in t-1 is a good proxy for the internal capital generation rate. However, for a private bank that is expected to distribute its profits between dividend payout and retained earnings, ROA in t-1 may not be the best variable to represent internal capital generation, since it does not capture the dividend policy of the private banking firm. Thus, the researcher must refine the variable representing the way profitability affects the internal capital generation by considering how the earnings are distributed in order to evaluate whether or not the empirical results are improved for private banks.

The measure employed now is the following:

$$PF^{*} = \frac{(\text{Retained Earnings})_{t-1}}{(\text{Total Assets})_{t-1}} \qquad (8.1)$$

In this section, the regressions undertaken in the previous chapter for private banks are re-tested by employing PF^{*} instead of PF. The definitions of bank capital augmentation considered here are the same as in Chapter 7: two regulatory bank capital augmentations (ΔK_1 and ΔK_2) and the book-value capital augmentation (ΔK_3). If the model is improved with PF^*, this variable will also be used in the next section when the tests with market-value capital are undertaken.

As in Chapter 7, two descriptive statistics (mean and standard deviation) of the new variable PF^* are analyzed. Table 8.1 displays the evolution of both statistics for PF^* during 1987-90.

Table 8.1: Summary Statistics for PF^* (1987-90)

	Mean	Standard Deviation
1987	0.00314	0.00465
1988	0.00412	0.00624
1989	0.00484	0.00583
1990	0.00570	0.00808

The mean of the variable PF^* increased continuously throughout the period considered; the standard deviation also increased throughout the period. The increasing trend in the average of PF^* appears to indicate that the mean of retained earnings grew more rapidly than total assets even in 1990, when bank profits came under pressure. Thus, the main internal source of capital has been increasing during 1987-90.

8.3.2.2.- *Results.*

The researcher has undertaken the same tests as in Chapter 7 (significance, multicollinearity, heteroskedasticity and autocorrelation) for the regressions with PF^*. Table 8.2 shows the results for the regressions when PF^* is employed.

The tests of significance for individual regression coefficients show that the variable representing retained earnings, PF^*, is statistically significant in three equations (two in 1989 and one in 1990). This seems to contrast with the results for PF in Chapter 7 since PF was not statistically significant in any regression.

The variable CC (cost of capital) is significant in 8 regressions, and it is again the most significant variable in general. The deposit growth variable (ΔD) is statistically significant in five regressions, and again in 1990 the sign of the coefficient is negative (whereas it was positive for 1987-90). The variable representing easy access to capital markets (CM) is statistically significant in three equations (one in 1989 with a negative sign and two in 1990 with a positive sign). The variables PK (portfolio risk) and LQ (liquidity) are not significant in any regression.

As far as the tests of significance for the other two variables, the variable representing the impact of capital regulation (KR) is significant in three equations (one in 1989 with a negative sign and two in 1990 with a positive sign), and the variable representing the impact of deposit insurance (DI) is also significant in three regressions (and in 1990 with a positive sign).

The tests for the overall significance of the regressions (F-tests) indicate that 11 regressions are statistically significant and only one is not significant (in 1987 for the regression with book-value capital augmentation).

Table 8.2 : Regression Estimates for Private Banks (1987-90)

	1987			1988		
	ΔK_1	ΔK_2	ΔK_3	ΔK_1	ΔK_2	ΔK_3
Constant (1)	0.02018 (0.81)	0.01988 (0.78)	0.02009 (0.78)	-0.00586 (-0.16)	0.00797 (0.20)	0.01006 (0.25)
PF*	1.130 (0.54)	1.030 (0.48)	1.678 (0.77)	8.643 (1.80)	2.121 (0.42)	3.227 (0.62)
CC	0.15514 (2.57)	0.14746 (2.38)	0.14466 (2.32)	0.2669 (2.34)	0.4702 (3.90)	0.3715 (2.99)
PK	-0.03801 (-1.31)	-0.04031 (-1.36)	-0.01985 (-0.66)	0.02045 (0.82)	0.00868 (0.33)	0.01226 (0.45)
LQ	-0.00512 (-0.65)	-0.00454 (-0.56)	-0.00023 (-0.03)	0.00370 (0.19)	0.00361 (0.18)	0.00723 (0.35)
ΔD	0.03880 (2.33)	0.03968 (2.33)	0.02036 (1.18)	0.01437 (0.59)	0.00784 (0.30)	0.03373 (1.27)
KR	0.01664 (0.95)	0.01491 (0.83)	0.00651 (0.36)	-0.05170 (-1.45)	-0.02963 (-0.79)	0.01635 (0.42)
DI	-0.62 (-0.02)	-3.41 (-0.10)	8.70 (0.26)	-52.20 (-0.74)	-58.46 (-0.78)	10.34 (0.13)
CM	0.03591 (1.56)	0.04131 (1.74)	0.02736 (1.15)	0.08379 (1.90)	0.06026 (1.29)	0.05955 (1.24)
Number Observ.	69	69	69	83	83	83
R^2	0.305	0.298	0.214	0.345	0.371	0.278
F-stat.	3.29	3.18	2.04	4.87	5.45	3.56
Multicol.	NO	NO	NO	NO	NO	NO
Heterosk.	NO	NO	NO	NO	NO	NO
DW stat. (2)	1.98	2.01	2.05	1.84	1.45	1.80
	NA	NA	NA	ND	ND	ND
⋮		⋮		⋮		⋮

	1989			1990		
	ΔK_1	ΔK_2	ΔK_3	ΔK_1	ΔK_2	ΔK_3
Constant	0.04033 (0.98)	0.02613 (0.72)	0.00351 (0.10)	0.04869 (1.60)	0.06906 (1.82)	0.06140 (1.61)
PF*	4.676 (1.38)	6.345 (2.13)	6.512 (2.32)	5.509 (2.43)	4.554 (1.62)	3.740 (1.31)
CC	0.2250 (2.23)	0.17131 (1.93)	0.17382 (2.08)	-0.06627 (-0.68)	-0.0108 (-0.09)	-0.0586 (-0.48)
PK	0.01303 (0.69)	0.01939 (1.16)	0.01561 (1.00)	0.01184 (0.65)	0.00633 (0.28)	-0.00163 (-0.07)
LQ	-0.00736 (-0.50)	-0.00218 (-0.17)	-0.00111 (-0.09)	0.01659 (0.40)	0.02707 (0.53)	0.03075 (0.59)
ΔD	0.10699 (2.71)	0.02424 (0.70)	0.05106 (1.56)	-0.00334 (-2.61)	-0.00305 (-1.92)	-0.00331 (-2.07)
KR	-0.04096 (-0.98)	-0.05682 (-1.54)	-0.07225 (-2.09)	0.07236 (2.20)	0.1068 (2.61)	0.06983 (1.69)
DI	-28.25 (-0.89)	-17.89 (-0.64)	-19.58 (-0.74)	65.91 (2.75)	65.00 (2.18)	93.32 (3.10)
CM	-0.05846 (-1.52)	-0.05377 (-1.59)	-0.07797 (-2.45)	0.07196 (2.71)	0.08969 (2.71)	0.04820 (1.44)
Number Observ.	92	92	92	75	75	75
R^2	0.274	0.245	0.327	0.646	0.600	0.538
F-stat.	3.91	3.36	5.04	15.06	12.37	9.59
Multicol.	NO	NO	NO	NO	NO	NO
Heterosk.	NO	NO	NO	NO	NO	NO
DW stat.	2.00	2.03	1.98	1.94	1.90	1.79
	NA	NA	NA	NA	NA	ND

Notes:

(1) The t-statistics values are in parentheses.

(2) NA = No Autocorrelation; ND = No Decision

The tests for multicollinearity (see correlation matrices in Table B.3 of Appendix B) seem to show that there was no high correlation between the paired independent variables: all correlation coefficients were well below 0.8-0.9 in absolute terms, and, in addition, no variable was signalled and dropped by the statistical package, Minitab when estimating the regressions. Thus, multicollinearity is not seemingly a problem in these regressions. The tests for heteroskedasticity indicate that no regression seem to suffer from this problem. The tests for autocorrelation (DW) show that no autocorrelation was found in 8 regressions, and that only in 4 regressions, could no decision be made.

8.3.2.3.- *Economic Interpretation of the Results.*

The results found in Table 8.2 compared with those in Table 7.4 for private banks and in Table 7.5 for savings banks (Chapter 7) appear to indicate the following findings:

a) *Model evaluation*: one can note that the model with PF^* appears to improve the results of Table 7.4. The values of R^2 and the F-statistic values are higher in Table 8.2 than in Table 7.4. In addition, more individual variables are statistically significant in the regressions with PF^* (retained earnings / total assets in year t-1) than in the regressions with PF (ROA in t-1). Thus, the fit of the model is apparently better with PF^* than with PF.

The empirical model of capital augmentation with a measure of retained earnings for the private banks operating in Spain seems to explain better the behaviour of the private banks in terms of capital augmentations for 1987-90 than the empirical model with a more general measure of profitability that does not consider the impact of dividend policy. An empirical model of bank capital augmentations for private banks that considers a very important bank policy like dividend policy is certain to explain better the behaviour of private banks in terms of capital augmentations. Therefore, it seems more robust to employ PF^* in the empirical analysis with market-value capital augmentations than to use PF.

b) *The Impact of the Regulatory Variables on Bank Capital Augmentations*: in Table 7.4, we observed that the variables representing the impact of capital regulation and the impact of deposit insurance on bank capital augmentations were not significant in any regression for the private banks in Spain; it was also found that the impact of portfolio risk on capital augmentations was very weak. In Table 8.2, one can note that the variable representing portfolio risk has again a very weak influence on capital augmentations. The non-significant influence of portfolio risk on capital augmentations seems again to contradict RAR philosophy. The variables representing capital regulation (KR) and deposit insurance are statistically significant in three regressions in Table 8.2.

The interpretation of the impact of capital regulation needs to be analyzed. The variable KR is significant with a negative sign for the third definition of capital in 1989 and with a positive sign for the first and second definition of capital in 1990. This contradiction seems to reinforce the hypotheses that the impact of capital adequacy regulation on bank capital augmentations is much weaker for the private banks in Spain than for savings banks: unlike the private banks' capital augmentations, which were rarely (and with different sign) affected by bank capital adequacy requirements, savings banks' capital augmentations were influenced by capital adequacy regulation in a larger number of regressions and years and the sign was negative[1] (regulation-induced capital augmentations). This appears to support again Peltzman's (1970), Mayne's (1972) and Dietrich and James' (1983) findings, in which no significant and clear impact of capital regulation on bank capital augmentations was found.

The influence of deposit insurance on capital growth is significant and with a positive sign in 1990. A possible explanation for the significance and the positive sign in 1990 is the impact of the increasing competition derived from the 'accounts war': 1990 deposits grew spectacularly and the contribution to the Deposit Insurance Fund followed suit. In addition, as a consequence of the 'accounts war' and the increasing competition for deposits, bank profitability came under pressure, and, in turn, *ceteris paribus*, banks could have been considered as riskier institutions in this very competitive environment. This is a possible explanation for why the impact of deposit insurance on capital augmentations was positive in 1990: the higher deposits growth resulting from the 'accounts war' led to private banks increasing their deposit insurance contribution, but this higher contribution did not affect negatively the capital augmentations in order to counteract the view that may have considered the banks as riskier firms in 1990.

c) *The Impact of the Managerial Variables on Bank Capital Augmentations*: the variable PF^* is statistically significant in three regressions and, in general, its coefficients appear to be higher than those in the equations with PF (Chapter 7). Thus, although the improvements of the model may be considered as modest, the use of PF^* has improved the results in terms of the impact of the internal capital generation on capital growth. However, the importance of profitability is higher for savings banks (Table 7.5) than for private banks. Private banks appear to rely less on their internal capital generation than the savings banks, since the private banks have more legal possibilities for increasing capital.

The effects of a wider range of capital sources for private banks can also be seen in the significant impact of the variable CM (easy access to capital markets) on capital augmentations in three regressions. It seems particularly important in 1990, when banks' earnings came under pressure, and private banks appeared to turn to external sources of capital.

The variable cost of capital (CC) is again the most significant variable for private banks. As in Chapter 7, this could be explained by the importance of shareholders' return expectations on the capital decisions in the private banking firms.

Seemingly, the variable deposit growth is also an important variable in terms of capital augmentations since it is statistically significant in five regressions. As in Chapter 7, the negative sign of ΔD in 1990 regressions seemed to be shaped by the effects of the 'accounts war': although private banks increased their capital in 1990, the capital growth pace could not follow the fast pace of deposit growth.

The non-significance of the liquidity variable seems to confirm the findings in Chapter 7: liquidity appears to be of little importance in terms of capital augmentations. Thus, no support has be found in the Spanish case for Sealey (1983) and Crouhy and Galai (1986).

All things considered, one must draw the following conclusion: although the empirical model of capital augmentations for private banks has been improved with the use of retained earnings (PF^*), the findings in this subsection still support the findings in Chapter 7. The empirical model still appears to explain better the behaviour for savings banks than for private banks. In addition, the impact of the capital adequacy regulation is still more important and stricter for savings banks than for private banks. Private banks seemed to have wider leeway in terms of the process of increasing capital.

8.3.3.- Empirical Analysis of Market-Value Capital Augmentations.

8.3.3.1.- *Introduction.*

The findings obtained with the two definitions of regulatory capital augmentation and the definition of book-value capital augmentation need to be re-tested on the definition of market-value capital augmentation for the Spanish private banks that have those values available.

Before re-testing the empirical model of capital augmentations for the market-value definition of capital, one must analyze the relationship between book-value capital and market-value capital in the Spanish banking system. There should be a 'bridge' between the book-value capital analysis performed in the previous chapter and in the previous section, and the market-value capital analysis to be undertaken in this section.

As described in Chapter 4, there is only a limited sample of private banks operating in Spain that are quoted on the Stock Exchange. Our empirical research on market-value bank capital augmentations will be based on the information disclosed by the Madrid Stock Exchange since it is the largest in Spain in terms of volume and it comprises a larger number of private banks than any other Stock Exchange in Spain.

As some of the banks have left the Stock Exchange and others have entered the Stock Exchange during 1987-90, the actual sample of private banks with market-value capital needs to be reduced from the original sample (Table 4.22) to those that have the information for two consecutive years. Indeed, in order to compute the capital augmentation for any bank in a certain year, the researcher needs the market values of capital for this year and the previous year. Therefore, a bank needs to have been quoted in those two consecutive years in order to compute its market-value capital augmentation, and, in turn, to be included in the sample of the year considered. The actual samples of private banks considered in this sections are: 23 banks in 1987, 24 banks in 1988, 27 banks in 1989, and 26 banks in 1990.

In the next subsection, the researcher analyzes empirically the relationship between book-value capital and market-value capital for the Spanish banks. Then, a descriptive analysis of the variables considered in the empirical model of capital augmentations is performed. Then, the results of the empirical analysis are reported and interpreted.

8.3.3.2.- *The Relation between Market-Value of Equity and Book-Value of Equity for the Spanish Banks.*

As described in Chapter 4, when the accounting representation of a firm's net worth diverges from its market value, the firm is said to have hidden capital. According to Sinkey (1992, p. 264), there are two sources of hidden capital: (i) accountants' misvaluations of the credit and interest rate risks embodied in items on banks' balance sheets and (ii) accountants' neglect of the contingent claims or values associated with off-balance-sheet activities and government guarantees that are not formally captured in the book-value figures.

In our empirical analysis, both book-value and market-value definitions of capital augmentations are used for the Spanish banks. As a link between both definitions of capital, one can estimate how well bank book values of equity reflect market valued equity for the Spanish banks.

Kane and Unal (1990) employ a statistical market value accounting model (SMVAM) in order to estimate the relation between market value of equity and book value of equity. They simply regress total market value (MV) of equity against total book value (BV) for a sample of U.S. banks during 1975-85:

$$MV = a + b\ (BV) + \varepsilon \tag{8.2}$$

where ε is a random-error term. In Equation (8.2), if $a = 0$ and $b = 1$, $MV = BV$. A positive intercept strongly suggest that the unbooked government guarantees behind federal deposit insurance were supporting bank market values. Keeley (1988) defines it as subsidized deposit insurance (which underprices risk). If the intercept is negative, then unbooked assets and liabilities serve as a drain on bank capital. If the estimated slope coefficient (b) is greater than 1, a premium exists, which can be interpreted as a reward for the present value of future growth opportunities not captured by assets in place. In contrast, when the slope coefficient is less than 1, it suggests accounting overvaluation of booked assets and liabilities relative to market valuations.

Kane and Unal (1990) found that the interest and market sensitivities of bookable and unbookable values often prove offsetting in sign. In particular, the evolution of the value and sensitivity of hidden capital at the nation's 25 largest banks during the interest-rate spike of 1978-1982 is consistent with the hypothesis that during this period increases in the unbookable value of FDIC guarantees and enhancements in franchise values fed by technological change and relaxations of regulatory restrictions cushioned a sharp decline in the valuation ratio for their net bookable assets.

Equation (8.2) has been estimated for the Spanish private banks with market-value capital information available during 1987-90, and the results are displayed in Table 8.3 and Figure 8.1. In Section 8.4, the same equations will be estimated separately for the largest banks and the medium-sized banks in the sample in order to examine the impact of size on the relation MV-BV for the Spanish banks.

Table 8.3 and Figure 8.1 appear to show that the intercept was positive in two years (1988 and 1990), and negative in the other two (1987 and 1989). However, if one observes the t-ratios for the four intercepts, they imply that no intercept is statistically significant. Two-tail t-values have been considered since there is no strong theory or view to support *a priori* direction in the sign of the intercept. As for the slope coefficients, both one-tail and two-tail critical t-values are considered, because the direction of the sign of the slope is expected to be always positive. With both values, they are statistically significant. One must test if they are significantly different from 1 (H_0: b = 1). This can be done through a very similar t-test to that of (7.20):

$$t = \frac{\hat{\beta}_1 - 1}{se(\hat{\beta}_1)} \tag{8.3}$$

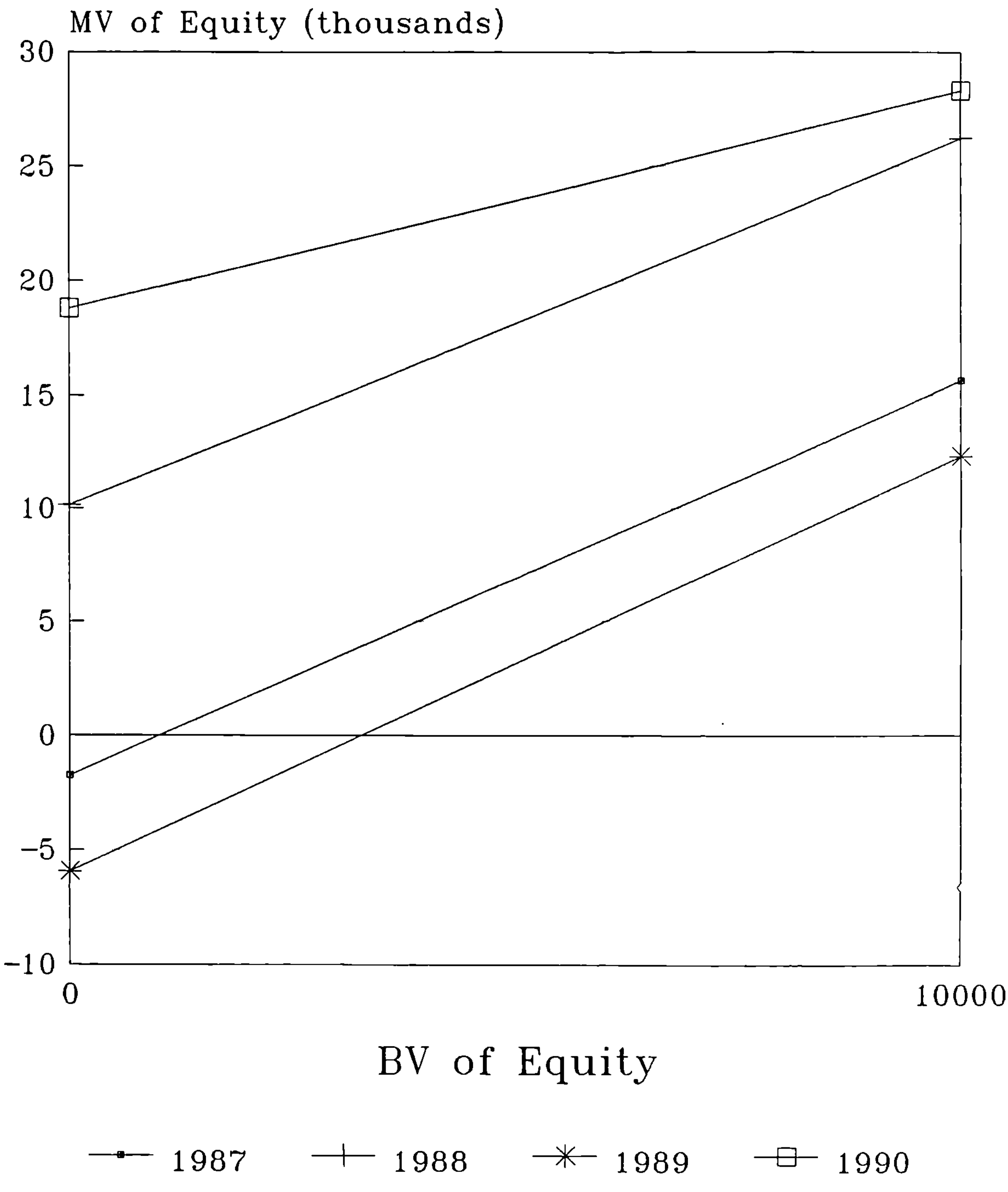
The slope coefficients are significantly greater than 1 for three years (1987, 1988, and 1989). The slope coefficient for 1990 is less than one, but it is not significantly different from 1.

Table 8.3: Estimates of the SMVAM for the Spanish Banks (1987-90) (intercept in Spanish pesetas million)

Year	Intercept (a)	Slope (b)	R^2	Number Observations
1987	- 1751.75 (-0.10)	1.9073 (10.65)	0.844	23
1988	10160.01 (0.44)	1.6079 (8.72)	0.776	25
1989	- 5974.06 (-0.45)	1.83589 (20.42)	0.943	27
1990	18766.44 (1.18)	0.95324 (10.55)	0.829	25

The findings here appear to indicate that Spanish banks had significant hidden value during 1987-89, and in 1990 the hidden value seems to disappear; even the market values are slightly lower than book values in 1990. As described several times already in this thesis, 1990 was the year when banking growth opportunities appear to weaken, and profits came under pressure.

Figure 8.1: SMVAM Regression Estimates (1987-90)



The values of the intercept are positive in 1988 and 1990, when the values of the slope coefficients are the lowest during the period, particularly in 1990. Thus, it appears that the unbooked government guarantees behind deposit insurance seem to support bank market values in those years when banks had the lower hidden capital (lower slope coefficients). Thus, when banks market values are falling as a result of lower hidden value, the government appears to enhance their guarantees for banks. This is particularly true for 1990 (in which MV falls below BV), and the value of the intercept is the highest during the period.

The TBTF doctrine seems to shape the government guarantees behind bank market values, since the banks quoted on the Stock Exchange are usually among the largest in Spain. When these large banks are unable to keep up their market values in terms of hidden value, the government guarantees seem to support them.

8.3.3.3.- *Descriptive Analysis of the Variables.*

There are two new variables that need to be defined: ΔK_4 and ΔK_5, which are the two measures of market-value capital augmentation employed in this analysis. The first variable of market-value capital augmentation is defined as follows:

$$\Delta K_4 = \frac{(\text{Market-value Capital})_t - (\text{Market-value Capital})_{t-1}}{(\text{Market-value Capital})_{t-1}} \qquad (8.4)$$

where the Market-value Capital = Number of Shares x Market Share Price.

The second variable of market-value capital augmentations is defined in terms of the ratio P/BV:

$$\Delta K_5 = \frac{(P/BV)_t - (P/BV)_{t-1}}{(P/BV)_{t-1}} \tag{8.5}$$

where P is computed as the Market-value Capital in (8.4) and the BV as the book-value definition of capital in Chapters 4 and 7.

The independent variables employed in this analysis have been already defined previously: CC, PK, LQ, ΔD, KR and DI were defined in Chapter 7; PF^* has been defined in this chapter. The dummy variable CM (access to capital markets) will not be used since all the banks considered were in the same category (value 1= easy access to capital markets).

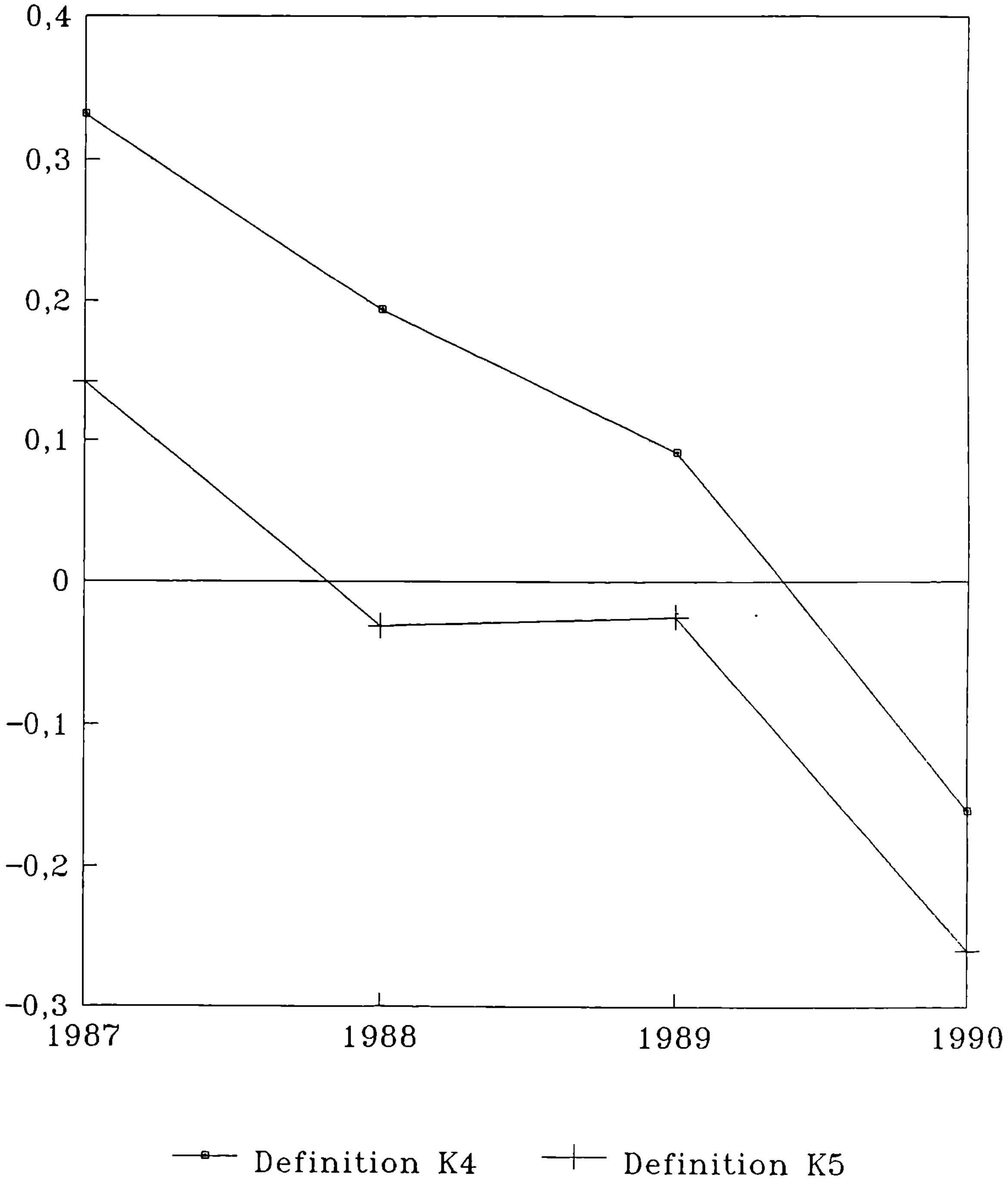
Table 8.4 shows the mean and the standard deviation for the variables and the sample employed in this section. The first feature that one can note is that the presence of outliers seems to be much more limited than in Table 7.2, when all the private banks were included. There seem to be less extreme observations because unlike in Table 7.2, the means of the variables do not reach dramatically different values over time and the standard deviations are not large in most cases. Although there are different trends and even different signs, the means of the variables seem to remain within a small interval. The only exception is the mean of PK (portfolio risk) in 1990. Therefore, the sample of private banks with market-value information seems to be more homogeneous than the sample of private banks considered in Chapter 7.

In Table 8.4 and in Figure 8.2, one can observe that the two means of the market-value capital augmentations variable seem to have a decreasing trend. The average of ΔK_4 is decreasing but positive during 1987-89, and it is negative in 1990, which indicates that the average market-value bank capital diminished in 1990. The average of ΔK_5 is positive in 1987, which appears to imply that the average of market-value capital augmented more than the mean of book-value capital in that year, and it is negative for 1988-90, which indicates that the mean of market-value capital augmented less than the average of book-value capital in 1988-89, and from the evolution of ΔK_5 it was found that the average market-value capital decreased in absolute terms in 1990.

Table 8.4 : Summary Statistics for Private Banks in the Market-Value Capital Samples (1987-90)

	1987		1988		1989		1990	
	Mean	St.Dev.	Mean	St.Dev.	Mean	St.Dev.	Mean	St.Dev.
ΔK_4	0.332	0.410	0.194	0.212	0.092	0.224	-0.160	0.222
ΔK_5	0.142	0.297	-0.031	0.211	-0.025	0.232	-0.260	0.224
PF^*	0.005	0.004	0.007	0.010	0.007	0.005	0.006	0.004
CC	0.270	0.183	0.289	0.125	0.316	0.143	0.322	0.143
PR	-0.030	0.481	0.013	1.770	-0.052	0.664	1.054	4.714
LQ	0.401	0.797	-0.100	0.272	0.038	0.399	-0.753	0.119
ΔD	0.260	0.373	0.477	1.757	0.139	0.303	0.113	0.105
KR	-0.851	0.347	-0.771	0.3051	-0.782	0.223	-0.761	0.197
DI	0.0006	0.0002	0.0006	0.0002	0.0009	0.0003	0.0011	0.0004

Figure 8.2: Mean of Capital Augmentations (K_4, K_5) (1987-90)



The decreasing trend in the means of both definitions of market-value capital augmentations could have resulted from two main causes: firstly, the 1987 Stock Markets crash and the slow recovery of the markets afterwards, which affected negatively almost every single share price in the market; secondly, the more fierce competition in the Spanish banking markets, particularly from 1990 onwards, could have induced expectations of profits coming under pressure and this seemed to influence negatively private banks' share prices in 1990.

As far as the regulatory variables (KR and DI) are concerned, the means of KR appear to show that the average bank in the sample had a generic capital ratio well above the required level and that position has improved during 1987-90. The means of DI also show an increasing trend.

The mean of the variable PF^* remains similar throughout the period. This is also the case for CC. The variable PK and LQ had negative signs in two years (1987 and 1989 for PK, and 1988 and 1990 for LQ) and positive signs in the other two years. The means of the variable ΔD were well above 10 per cent throughout the period.

All things considered, the main conclusions that one can draw from this descriptive analysis are that the sample of private banks operating in Spain with market-value information available is more homogeneous than the sample of private banks in Chapter 7 and that there seems to be a decreasing trend in banks' market-value capital augmentations during 1987-90.

8.3.3.4.- *Results.*

Employing ΔK_4 and ΔK_5 as dependent variables, two regressions have been estimated for each year during 1987-90. The researcher has undertaken the same tests as in Chapter 7 and those also reported in Section 8.3.2: significance, multicollinearity, heteroskedasticity and autocorrelation. Table 8.5 displays the results for the regressions with market-value bank capital augmentations.

In the t-tests for the significance of individual coefficients, the critical values are 2,069 in 1987, 2,064 in 1988, 2,052 in 1989, and 2,060 in 1990. Thus, no variable is statistically significant in 1987; two variables (PF^* and DI) are statistically in the regression with ΔK_5 in 1988; one variable (CC) is significant in the regression with ΔK_5 in 1989, and one variable (ΔD) is statistically significant in the two regressions for 1990.

The critical F-values to test the overall significance of the regressions are 2.74 for 1987, 2.70 for 1988, 2.60 for 1989, and 2.66 for 1990. Consequently, one can note that only two regressions (one in 1988, and the other in 1989) are statistically significant as a whole.

Both individual coefficients' significance and overall significance appear to indicate that the empirical model of capital augmentations has not been improved by employing *market-value* definitions of capital.

Table 8.5: Regression Estimates for Private Banks (1987-90)

	1987		1988	
	ΔK_4	ΔK_5	ΔK_4	ΔK_5
Constant (1)	1.1731 (2.24)	0.6868 (1.60)	0.1047 (0.42)	-0.5754 (-3.39)
PF^*	5.66 (0.12)	-20.24 (-0.51)	0.366 (0.06)	9.743 (2.26)
CC	-0.2656 (-0.28)	0.1974 (0.25)	0.1742 (0.41)	-0.3525 (-1.20)
PK	0.2316 (0.91)	0.0727 (0.35)	0.0495 (1.09)	0.0349 (1.12)
LQ	-0.3010 (-1.59)	-0.1660 (-1.07)	0.3814 (1.57)	0.1849 (1 .11)
ΔD	0.5182 (1.29)	0.0047 (0.01)	-0.0051 (-0.19)	0.0192 (1.02)
KR	0.4346 (0.96)	0.2148 (0.58)	0.2676 (1.10)	-0.0203 (-0.12)
DI	-733.1 (-1.86)	-409.2 (-1.27)	504.9 (1.39)	1014.6 (4.08)
Number Observ.	23	23	24	24
R^2	0.418	0.254	0.218	0.627
F-stat.	1.54	0.73	0.64	3.85
Multicol.	NO	NO	NO	NO
Heterosk.	YES	NO	NO	NO
DW	1.79	2.11	2.04	2.50
	ND	ND	ND	NA
⋮	⋮	⋮	⋮	⋮

	1989		1990	
	ΔK_4	ΔK_5	ΔK_4	ΔK_5
Constant (1)	0.2731 (0.68)	-0.0827 (-0.23)	-0.2962 (-0.83)	-0.2123 (-0.63)
PF^*	-20.18 (-1.24)	-3.56 (-0.24)	16.99 (0.93)	20.40 (1.18)
CC	-0.0007 (-0.00)	-1.0585 (-2.21)	0.2964 (0.44)	0.3947 (0.62)
PK	0.0425 (0.56)	0.0449 (0.67)	0.0036 (0.31)	0.0050 (0.46)
LQ	0.1764 (1.10)	0.0095 (0.07)	0.2184 (0.50)	0.6716 (1.63)
ΔD	0.1235 (0.76)	0.0071 (0.05)	-0.8849 (-2.10)	-0.9931 (-2.37)
KR	0.0630 (0.20)	-0.0033 (-0.01)	-0.1413 (-0.42)	-0.3673 (-1.15)
DI	-9.9 (-0.04)	480.3 (1.91)	83.2 (0.37)	34.8 (0.16)
Number Observ.	27	27	25	25
R^2	0.277	0.462	0.330	0.407
F-stat.	1.04	2.34	1.20	1.67
Multicol.	NO	NO	NO	NO
Heterosk.	NO	NO	YES	NO
DW	1.86	1.42	1.85	2.15
	ND	ND	ND	NA

Notes:
(1) The t-statistics values are in parentheses.
(2) NA = No Autocorrelation; ND = No Decision

As far as the tests for multicollinearity, the correlation matrices shown in Table B.4 of Appendix B, indicate that all the correlation coefficients between independent variables were well below 0.8-0.9 in absolute terms, and in turn there seems not to be high correlation between the independent variables. In addition, no regression has been signaled by Minitab. Therefore, multicollinearity is not apparently a serious problem.

As for the rest of the tests, only two regressions were found to have heteroskedasticity (one in 1987 and one in 1990). Two regressions had no autocorrelation and in the other six, no decision could be made in terms of autocorrelation.

8.3.3.5.- *Economic Interpretation of the Results.*

The economic interpretation of the results can be divided into the following main points:

a) *Model Evaluation*: the market-value capital results provided in the previous subsection seem to demonstrate that the empirical model of capital augmentations works better when regulatory and book-value capital augmentations are used. Indeed, the relatively weaker results found in the regressions with definitions of market-value capital augmentations for the private banks operating in Spain that are quoted on the Madrid Stock Exchange appear to indicate that the empirical model does not explain adequately the evolution of the market-value bank equity in Spain during 1987-90. Theoretical and empirical justifications can be suggested in the literature in order to explain why the fit of the model seems weaker for the market-value bank capital augmentations.

The models suggested in the literature of bank capital augmentations, on which the researcher based his empirical model, were not primarily conceived to explain the evolution of market-value capital augmentations. Rather, the emphasis was placed on book-value and regulatory capital. Hence, the empirical model employed in this thesis might not contain variables which are specifically related to the evolution of market-value equity, and which are beyond the scope of this research. Although the issues involved in the market valuation of equity are beyond the scope of this analysis, a brief synthesis of the main models and sources can usefully be included in order to substantiate the empirical difficulties and the need for the researcher to focus on the specific objectives of this thesis.

A theoretical justification for the poor fit of the model reflects simply the fact that valuing banks is conceptually difficult. The theoretical difficulties of valuing banks are succinctly captured by Copeland, Koller and Murrin (1990, p. 381):

> "Banks remain among the most difficult companies to value, because in spite of the multitude of regulatory and reporting requirements imposed on them, it is hard to determine the quality of their loan portfolio, to figure out what percentage of their accounting profits results from interest-rate mismatch gains, and to understand which business units are creating or destroying value".

These authors distinguish between an outsider and an insider trying to determine the value of a banks. Unlike for an insider, valuing banks is a more difficult task for an outsider because of lack of complete and accurate information about the risks that banks face. Although securitization and the development of secondary markets for some bank loans make the task of determining the quality of a bank's loan portfolio a little easier, it is still difficult for an outsider to determine accurately loan quality, and, consequently, the value of the loan portfolio. Since banks 'bet' on interest-rate and exchange-rate movements on a daily basis, monitoring these bets and mismatches poses a problem for an outsider. In addition, an outsider has difficulty determining the value and riskiness of the contingent claims associated with off-balance-sheet activities.

Unless profits are disaggregated by business unit, an outsider has difficulty in knowing which business units are driving the bank's success (creating value) or reducing it (destroying value).

Although Copeland, Koller and Murrin (1990) recommend the entity approach for valuing nonfinancial businesses, they prefer the equity approach for valuing banks. The entity approach focuses on after-tax, free cash flow from operations discounted by the weighted average cost of capital. Equity value, then, equals entity value minus the market value of debt. As a consequence of the difficulties in valuing banks employing the entity estimation (e.g., estimating the cost of capital for demand deposits), they recommend utilizing the equity method for valuing banks. This method equates equity value with forecast free cash flow (FCF) to shareholders discounted at the cost of equity. The foundations of this approach are (i) the definition of FCF to stock holders and (ii) use of the spread model.

Copeland et al. define FCF to bank equity holders as:

$$FCF = NI + NCO + S - U = (NI + NCO) + (S - U) = D \qquad (8.6)$$

where NI = net income, NCO = noncash outlays (e.g., depreciation and loan charge-offs), S = sources of funds from the balance sheet[2], U = uses of funds from the balance sheet[3], and D = dividend pay-out to equity holders. The first two terms in Equation (8.6) equal cash flow from bank operations, and the last two are cash flow needed for balance-sheet growth. The sum of these two items is mathematically equal to the dividends paid to stockholders.

According to Sinkey (1992, p. 262), spread management (managing the difference between lending and borrowing rates) captures the heart of the loan-and-deposit business of banking. Measuring bank net income using the spread model means incorporating transfer pricing and an equity credit. Assuming that within the bank the retail unit is supplying funds to the wholesale unit, and, thus, that there is a transfer rate representing the opportunity cost of funds to the retail unit as well as a rate for equity credit and for the opportunity cost of holding nonearnings reserves, the calculation of net income employing the spread model is as follows[4]:

(Spread on Loans) x (Loans) (the wholesale unit)
(Spread on Deposits) x (Deposits) (the retail unit)
(Equity Credit rate) x (Equity)
(Opportunity Cost) x (Reserves)
Net interest income
Operating expenses
Net operating income before taxes
Income tax
Net income

Since the purpose of the spread model is to estimate the profitability of internal business units, one should not confuse the equity credit with the cost of equity or shareholders' required rate of return. The cost of equity is not involved in the computation of the net income of the internal business units.

The allocation of shared costs also influences the profitability of business units within the bank. Copeland, Kollen and Murrin (1990) argue that business units should be assigned only the costs they would incur as stand-alone entities, with unallocated costs kept at headquarters as a cost center. They contend that most U.S. banks use cost-accounting systems to spread overhead costs across all of their business units. This cost allocation makes it difficult to determine cost efficiency by comparing internal costs with those of outside vendors.

It seems difficult, then, to employ the equity method to value U.S. banks. The same (indeed, multiplied) difficulties arise in the case of the Spanish banks, since there is a lack of reliable information in terms of business units within a bank, which prevents the equity model from being applied to the Spanish banks. Therefore, valuing Spanish banks seems conceptually very difficult, and this may lie behind the weak results found in the previous subsection.

There are also empirical and practical issues in the Spanish Stock Exchange that appear to lie behind the relatively weak results found in the previous subsection. As described in Chapter 2, although there have been improvements and reforms in the Stock Exchange, one of the main features of the Spanish financial system is the thinness of its stock market.

An illustrative example of the thinness of the Spanish stock market is that only a limited sample of stocks are considered sufficiently liquid for any major investor to contemplate buying them. Caminal, Gual and Vives (1990) reported that the number of quoted companies in the Spanish stock market was 312, but only about 60 stocks were active and frequently traded. With trading concentrated in a relatively small number of stocks, and an even smaller number of sectors, the market appears to be inevitably volatile with plenty of room for large-scale shareholders to manipulate stock prices.

As discovered in Chapter 2, when examining the market power of banks in Spain, one of the sectors of the stock market where large firms seem to 'control' stock prices is the banking sector. Econometric evidence of particular aspects of pricing in the Spanish equity market is provided by Rubio (1986) and Alonso and Rubio (1988). The price of the stock of a bank appears to be typically manipulated by the same institution buying or selling in the market. In Chapter 4, the market value of the big Spanish banks was found to be very high indeed, compared with other European countries.

Considering all the evidence reported so far in this thesis, three main reasons can be suggested for the high valuation of banks' stock in Spain:

1) Although in 1990 banks' profits seemed to come under pressure in Spain, the evidence provided in Chapters 2 and 4 appears to imply that the Spanish banking market had a relatively high profitable growth compared with other European Countries. This factor would influence positively the market valuation of bank equity.

2) In Chapter 4 and in Subsection 8.3.3.2, it was suggested that Spanish banks had 'hidden value' in their balance-sheets, which results in market-value equity tending to be higher than book-value equity.

3) There seems to be econometric evidence (Rubio, 1986; Alonso and Rubio, 1988) showing that stock prices tend to be manipulated, particularly banks' stock prices.

The last two factors (hidden value and price manipulation) seem to shape, to a large extent, the evolution of stock prices. They may lie behind the weak results of our empirical analysis of market-value capital augmentations. In addition, the sample of private banks quoted on the Madrid Stock Exchange is very heterogeneous since there are banks with stock frequently traded, and at the same time, banks with stock rarely traded. Thus, the evolution of the stock prices may be very different, which may lead to the non-existence at this time of a general model of market-value bank capital augmentation in Spain.

b)*The Impact of the Regulatory Variables on Market-Value Capital Augmentations in Spain*: keeping in mind the weak results in the fit of the empirical model of capital augmentations with market-value capital, it is not surprising to find that the individual coefficients are rarely significant statistically. Among the regulatory variables (PK, KR, and DI), only DI is statistically significant in one regression (in 1988). This seems to confirm the evidence of Chapter 7 and Section 8.3.2, in which the impact of the regulatory variables, particularly, capital adequacy regulation, seems much weaker for private banks than for savings banks. Therefore, private banks appear to have wider leeway in terms of decisions related to capital augmentations.

The fact that the market valuation of capital seems to be well above the book-value capital for private banks - that is to say, private banks seem well-capitalized in terms of market-value capital- could make the impact of capital regulation and other regulatory variables less crucial than if banks were badly capitalized. If banks were badly capitalized, *ceteris paribus*, the regulatory pressure and impact would be expected to become far stronger.

c) *The Impact of the Managerial Variables:* the individual coefficients of the managerial variables are statistically significant in four cases: PF^* is only significant in one equation (in 1988); CC is significant in one equation (in 1989); and ΔD is significant in two equations (in 1990). Again, the results seem very weak compared with what the theoretical and empirical literature suggests[5]. The literature of equity valuation and capital structure suggests that earnings (and the related issues of retained earnings and dividends) and cost of capital are two of the main determinants of equity valuation and capital structure. However, apparently this is not supported by the evidence provided in our market-value capital augmentation analysis of the Spanish private banks.

The variable ΔD is significant (with a negative sign) in the two equations for 1990. A possible explanation for this is again related to the 'accounts war' (guerra del pasivo). The fact that private banks engaged in an 'accounts war' in order to capture deposits could have been viewed by the stock market as a negative factor, leading to smaller margins and earnings, and higher risk, since certain banking firms may have engaged in riskier business in order to capture more deposits. Thus, one would expect the impact of the deposit growth on market-value capital augmentations to be negative.

8.4: THE IMPACT OF SIZE ON BANK CAPITAL AUGMENTATIONS IN THE SPANISH BANKING SYSTEM.

8.4.1.- Introduction.

In this section, the impact of size, a variable that has not yet been explicitly considered in our analysis, on bank capital augmentations is examined. Size is a variable on which the economic and banking literatures have devoted a great deal of attention.

As described in Section 8.2 (testing hypotheses), two main empirical analysis are undertaken in this section: (i) the impact of size on the relation between market value of equity and book value of equity, and (ii) the impact of size on bank capital augmentations, and the impact of these augmentation on the Bank of Spain's generic capital ratios.

This section is to be organized as follows. In the next subsection, theoretical and empirical background on the impact of size on bank capital augmentations is provided. Then, the relation MV-BV is estimated for different sizes. Next, following Equation (6.5) and some extensions of it, an analysis of the impact of size on bank capital augmentations is performed.

8.4.2.- The Impact of Size on Bank Capital Augmentations in Spanish Banking: Theoretical and Empirical Background.

As found in Chapter 2, in the Spanish banking system size became a very important issue in the late 1980s as a result of Spain's entry into the EC and the prospect of the Single European Market by 1992: a certain number of Spanish banks considered the possibility of increasing in size in order to be able to compete with the European banks[6]. In fact, the number of large banks seem to have increased during 1987-90. This can be observed in Table 8.6, where the number of Spanish banks listed on *The Banker's* World Top 100, 500 and 1000 banks in 1987 (Top 1000 were not available that year) and in 1990 are displayed. Size is measured in terms of capital value.

Table 8.6: Number of Spanish Banks in World Top Banks (1987, 1990)

	Top 100		Top 101-500		Top 501-1000	
	Private	Savings	Private	Savings	Private	Savings
1987	2	--	6	5	n.a.	n.a.
1990	4	1	8	3	10	10

Source: The Banker (1988, 1991)

In Table 8.6, one can note that the number of Spanish banks in the Top 100 has increased during 1987-90: in 1987, there were only two Spanish private banks and no savings bank in the Top 100; in 1990 this number doubled for the private banks; and there was one Spanish savings bank in the World Top 100. Two private banks and one savings that were in the Top 101-500 in 1987 had moved upwards in the list by 1990, and they were among the Top 100. The sum of the number of Spanish private and savings banks in the Top 101-500, remained the same in 1990, which implies that banks that were not in the Top 500 in 1987 had moved upwards in the list by 1990. Therefore, the number of Spanish large banks has increased in terms of international standards during 1987-90.

Another characteristic that one can observe in Table 8.6 is that the number of large private banks is higher than the number of large savings banks in Spain. This seems particularly the case in 1990, even after several mergers took place among savings banks.

The theoretical and empirical advantages of size in banking have been largely discussed in the literature. Revell (1987 and 1989) suggests several potential advantages of larger size in banking: cost economies[7], benefits of size on risk and capital, benefits of size on fulfilling large customers needs, easier access to international banking, a better position for the competitive struggle in the banking markets, and benefits on management. The researcher is merely interested in the analysis of the impact of size on bank capital decisions, and, particularly, on bank capital augmentations. The analysis of the rest of the potential advantages of size is beyond the scope of this study, and will not be undertaken.

One must examine the impact of size on the relationship between bank risk and capital. Revell (1989, p. 76) maintains that one of the undoubted advantages of size is the reduction of overall risk through the pooling of more individual risks: this pooling means that the probability of a loss that would be disastrously large in relation to the operations of the bank are much reduced. Therefore, there appear to be potential economies of scale in risk-bearing.

The scale economies in risk-bearing that accrue to large banks are part of the explanation of the fact that these banks normally have the lowest capital ratios in any banking system. The other part of the explanation is that the markets expect that the supervisory authorities will come to the rescue of any of the core banks with serious financial problems (Revell, 1987, p. 80). The TBTF doctrine seems to shape that expectation.

Peltzman (1984) provides empirical evidence of lower capital ratios for larger banks by showing a steady and cumulative dramatic decrease in the capital to assets ratio with bank size over the whole range of bank sizes for the Insured US Commercial Banks in 1980. He also remarks that the relationship has not always been so (it was found that the negative relationship between the capital to assets ratio and bank size holds only over the four smallest size classes for 1967).

Gilbert (1984) argues that the lower capital ratios for larger banks seem to reflect the implicit assumption by the bank regulatory agencies that larger banks bear less risk. Peltzman (1984) defines it as economies of scale in capital issue and it is viewed as the crucial determinant of the equilibrium bank size distribution in a deregulated environment. The issue of different capital requirements for different bank sizes is considered by Peltzman as one of the most important matters in the topic of capital adequacy because of its many potential consequences on the banking industry structure, competition and performance.

In contrast, Whitehead and Schweitzer (1982) find that the studies which investigate the determinants of bank risk find no systematic relation between risk and bank size. They study five different types of bank risk (credit risk, interest rate risk, operating risk, management risk, and overall risk). Since they find no systematic relation between risk and bank size, they argue that small banks appear to be on an equal footing with large banks. Dince and Fortson (1983) conclude that differences in capital requirements for large and small banks are arbitrary, and do not reflect differences in risk. They show that their survey does not bear out any consistent relationship between capital adequacy and risk as measured by the variance of return on assets and return on equity. Peltzman (1984) emphasizes that from the 1970s onwards, the relevant policy makers have given large banks a competitive advantage in the form of *de facto* socialization of the default-risk on large-deposit accounts by allowing them to operate with lower capital-to-assets ratios.

From the theoretical and empirical issues identified above, the researcher needs to test the impact of size on bank capital ratios in Spain. The researcher will study the impact of size on the Bank of Spain's generic capital ratios during 1987-90. This analysis will be undertaken by computing Equation (6.5) (based on Keeley, 1988) across bank sizes in order to examine the impact of size on the capital ratios as well as the impact of capital augmentations on capital ratios across sizes.

Lower capital ratios are not the only potential benefit for large banks. As described in Chapter 5, bank capital can be augmented from two main sources: (i) undistributed or retained earnings, and (ii) the raising of new capital on the market. In terms of retained earnings, if all banks had profits *ceteris paribus* one would expect larger banks to have higher absolute values of retained earnings. However, in relative terms (that is, in terms of retention ratios), one must test and prove that there are different levels of retained earnings across bank sizes. The relation between bank size and retention ratios is not so clear as the relation between bank size and the absolute value of retained earnings.

In terms of raising new capital on the market, Revell (1987, p. 80) contends that large banks can raise new capital more cheaply than smaller banks; not only may their risk premium be lower, but also the transactions costs of raising new capital are much lower for large companies than for small ones. In the case of the Spanish private banks, this appears to be true, since the private banks listed on the Spanish and international stock markets, and, in turn *ceteris paribus* which have easier and cheaper access to capital markets, are among the largest banks in Spain. They have easier access to new capital instruments, since their capital instruments are more easily negotiated because of the existence of secondary markets. They have cheaper access to new capital instruments, since the market has more information about these banks (and the banks with no market information are likely to pay a higher premium for the higher information uncertainty).

Table 8.7 provides empirical evidence of the advantage of larger private banks quoted on the Stock market in Spain, in terms of raising new equity (some of these data come from Table 4.13). One can notice that approximately 50 per cent of the new bank equity issues in Spain during 1987-90 are those of the banks quoted on the Spanish stock market. These large banks quoted on the Spanish stock market (between 25-30 banks during 1987-90) are in number only between 20 and 25 per cent of all private banks in Spain. Thus, the larger banks appear to have easier access to new equity issues, and, in turn, an advantage in terms of external sources of capital.

Table 8.7: New Equity Issues by Banks Quoted on the Spanish Stock Market (1987-90).

	New Equity Issues by Banks on the Stock Market	Total New Equity Issues
1987	23	39
1988	36	76
1989	24	55
1990	23	47

Source: Consejo Superior Bancario (1987-90), Own Results.

Finally, there is a practical issue in Spain that could have a significant impact of bank capital augmentations. This issue is the fiscal gains that could emerge from a process of increasing in size through mergers. The Spanish legislation exempts asset revaluations from the corporate income tax resulting from mergers[8]. This implies an immediate tax gain for both merging firms and an artificial subsidization of mergers. Consequently, Spanish banks appear to have another way of augmenting capital: increasing in size through mergers. The 'hidden value' in the banks' balance sheet may emerge by means of a merger at no tax cost, and, then augment bank capital.

Mergers seem to have been more common among savings banks than private banks during 1987-90. There was only one merger between private banks during that period: that of Banco de Bilbao and Banco de Vizcaya into BBV at the end of 1987. However, there were 12 savings banks involved in merger processes in 1990[9]. Thus, it seems that mergers are an instrument to increase size and augment capital that is more frequently employed by Spanish savings banks than by private banks. The lower possibilities to augment capital for savings banks could be one of the reasons shaping the mergers among them. From this, we need to study and test the impact of the mergers (increase in size) on capital augmentations for the Spanish savings banks.

8.4.3.- Size Effects in the Relation between Market Value and Book Value of Equity.

In Subsection 8.3.3.2, the researcher estimated the relation between market value of equity and book value of equity for the sample of Spanish private banks wich have market information available. In this section, the researcher investigates the potential size effects in that relation, and estimates the same regressions, but now the sample will be divided into two subsamples: the largest banks in terms of total assets (10 in 1987, 1989 and 1990, and 9 in 1988), and the medium-sized banks in terms of total assets (13 in 1987, 15 in 1988 and 1990, and 17 in 1989).

Kane and Unal (1990) also estimate the regressions described in Equation (8.2) ($MV = a + b\ (BV) + \varepsilon$) for different bank sizes in the U.S., in order to control statistically for heteroskedasticity and cross-sectional differences. Our purpose in undertaking these tests is to investigate to what extent the relation between MV capital and BV capital is different across sizes, and to what extent that possible divergence is caused by differences in 'hidden value' and by government guarantees.

The regression estimates of the relation MV-BV are displayed in Table 8.8 and in Figure 8.3. The intercept is represented by a, and the slope by b. The intercept is only statistically significant in one case (in 1989 for the medium-sized banks)[10], being always positive for the medium-sized banks, and being positive in two years (1988 and 1990) and negative in the other two (1987 and 1989) for the largest banks.

The slopes appear to be always higher for the largest banks than for the medium-sized banks. These are above 1 during 1987-89, and they are below 1 in 1990. They are only significantly greater than 1 for two years for the largest banks (1987 and 1989).

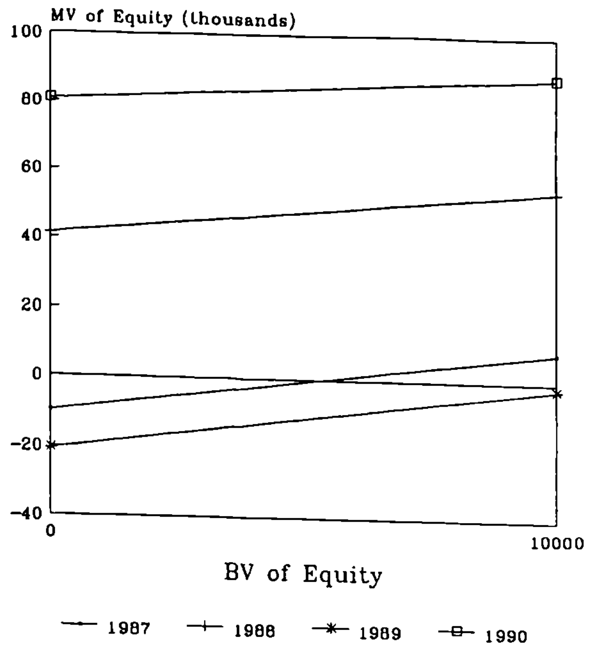
The results found in Table 8.8 seem to indicate that during 1987-89, the largest banks had significantly higher 'hidden value' than the medium-sized banks in the sample. In 1990, the slopes for both groups are very similar (below 1), and they imply that both groups of banks apparently had a dramatic decrease in 'hidden value', and even that there was an overvaluation of banks' assets.

Table 8.8: Estimates of the SMVAM across Different Sizes. (1987-90) (intercept in Spanish pesetas million)

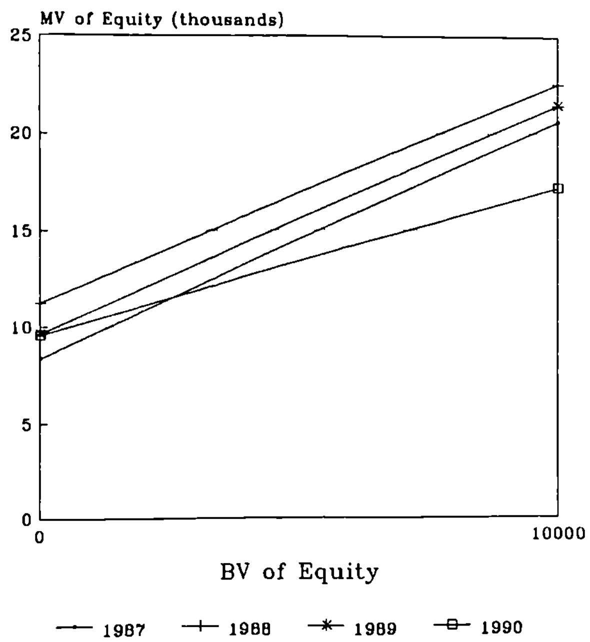
	Largest Banks			Medium-sized Banks		
Year	a	b	R^2	a	b	R^2
1987	-9840.04 (-0.17)	1.9514 (4.89)	0.75	8382.65 (1.45)	1.2221 (2.63)	0.387
1988	41339.63 (0.42)	1.4866 (3.13)	0.584	11231.85 (2.07)	1.1372 (3.66)	0.507
1989	-20710.39 (-0.38)	1.8873 (8.27)	0.895	9640.29 (3.20)	1.1833 (8.95)	0.842
1990	80792.53 (1.41)	0.7723 (3.74)	0.636	9572.28 (1.90)	0.7563 (3.55)	0.493

As far as the economic interpretation of the intercepts, the medium-sized banks seem to have the government guarantees behind their market values during the whole period. However, the largest banks had only positive values of the intercept in those years when the market values appeared to fall dramatically. In addition, the values of the intercept in 1988 and 1990 were far higher for the largest banks than for the medium-sized banks. This seems to imply that whenever the largest banks are unable to keep up their market values, the government guarantees emerge. This appears to support the TBTF doctrine, since whenever it is hard for a large bank to keep up its market values, the government guarantees emerge.

Figure 8.3: SMVAM and Size (1987-90)



Large Banks



Medium-sized Banks

To sum up, the main conclusions of this subsection is (i) that the largest banks seem to have higher 'hidden value' than the medium-sized, although in 1990 there was a dramatic decrease in market value; and (ii) although medium-sized banks seem to always have the government guarantees behind their market values, the government guarantees appear to reach far higher values when the largest banks cannot keep up their market values. The latter finding is again consistent with the TBTF hypothesis.

8.4.4.- The Impact of Size on the Bank of Spain's Generic Capital Ratios.

This section analyzes the possible size effects in the actual generic capital ratios maintained by the Spanish banks, and how those capital ratios came about during 1987-90. Specifically, the researcher first investigates whether the capital regulation caused banks with a deficient Bank of Spain generic ratio to raise regulatory capital, and whether there were differences across bank sizes in this context. Then, we examine how regulatory capital augmentations and asset growth affected the actual generic ratios held by Spanish banks, and whether there were differences across bank sizes in this context.

The methodology employed is an application of Equation (6.5) to the Bank of Spain's generic ratio:

$$d(K/I)/dt = (K/I)\ [(1/K)(dK/dt) - (1/I)(dI/dt)] \qquad (8.7)$$

where K is regulatory capital (Tier 1 plus Tier 2) and I is total bank investments (as defined in Subsection 3.6.2.3). The three main variables in Equation (8.7) are the actual capital ratio and the rates of capital augmentations and asset growth. Our analysis will compute these three variables for different sizes in the Spanish banking system.

Keeley (1988) distinguished between capital-deficient and capital-sufficient banks in his study in order to examine the effectiveness of U.S. capital regulation. In other words, his concern was whether capital-deficient banks in the previous year had increased their capital ratios, and if that increase in capital ratios was caused by capital augmentation and/or changes in assets. Our research will also divide the sample into capital-deficient and capital-sufficient banks to account for the possible different impact of capital regulation between capital-deficient and capital-sufficient banks in Spain during 1987-90: those banks with a generic capital ratio (capital / total investments) below 5 per cent in the previous year will be regarded as capital-deficient banks, whereas those with value equal to or above 5 per cent will be deemed as capital-sufficient banks.

In order to account for size, the two samples of private and savings banks have also been divided into four class sizes, respectively, according to the four quartiles in terms of total assets[12]: the first quartile comprises the smallest banks in the samples; the second and the third quartiles contain medium-sized banks; and the fourth quartile comprises the largest banks in the samples. Consequently, in the case of the private banks, each class size contains 30 banks (except that of the second quartile which contains 31 banks) during the whole period 1987-90, and in the case of the savings banks, each class size comprises 19 banks during 1987-89, and 16 banks in 1990.

The averages of the Bank of Spain's generic capital ratios, the regulatory capital augmentation rates and the investments growth rates across different bank class sizes and between capital-deficient and capital sufficient banks in Spain during 1987-90 are displayed in Table 8.9 for the private banks, and in Table 8.10 for the savings banks. The terms capital-deficient and capital sufficient refer to the previous year: for example, in the case of 1987, those banks that the previous year (1986) had a capital ratio below 5 per cent are considered capital-deficient (K-def), and those banks above 5 per cent in 1986 will be considered capital-sufficient banks.

Let us first consider the generic ratios. Comparing the the 'all banks' columns in Table 8.9 and Tables 8.10, one can note that the private banks tend to have higher generic ratios than the savings banks throughout the period 1987-90. The seemingly higher generic capital ratios for the private banks appear to be influenced strongly by the relatively very high values in bank class size 1. The presence of outliers or extreme observations in class 1 of private banks (very small banks) seems to shape the high values of the generic ratios. The existence of outliers was also found in Chapter 7, and here the very small banks seem to have been identified as those with extreme values.

Table 8.9: Private Banks: Average Generic Capital Ratios, Capital and Assets Growth Rate Across Bank Sizes. (1987-90).

Size Quart.	Average Generic Ratio			Average Capital Growth Rate			Average Investments Growth Rate		
	K-def	K-suf	All	K-def	K-suf	All	K-def	K-suf	All
				1987					
1	.240	.275	.264	-.306	. 418	.201	-.245	-.107	-.106
2	.032	.083	.059	.229	. 006	-.114	.147	.917	.544
3	.031	.079	.050	-.327	. 164	.263	.029	.185	.091
4	.028	.070	.056	.119	. 272	.221	.276	.159	.198
All	.067	.137	.107	.149	. 236	.199	.063	.258	.174
				1988					
1	.052	.356	.295	.112	. 194	.177	-.347	.205	.095
2	.042	.111	.073	.372	. 322	.350	.064	.180	.117
3	.041	.086	.062	.541	. 248	.404	.165	.165	.165
4	.048	.082	.066	.440	. 286	.358	.115	.152	.135
All	.044	.185	.124	.412	. 253	.323	.062	.179	.128
				1989					
1	.084	.370	.332	.322	5 .87	5.13	-.704	19.56	16.86
2	.038	.092	.075	.261	. 170	.199	.089	.254	.201
3	.040	.082	.064	.248	. 185	.213	.131	.248	.198
4	.041	.069	.059	.244	. 116	.163	.173	.271	.235
All	.044	.172	.132	.258	1 .94	1.41	.044	6.31	4.34
				1990					
1	.051	.350	.290	-.087	-. 180	-.162	-.209	.019	-.026
2	.051	.125	.098	-.002	-. 158	.101	-.091	.268	.141
3	.042	.061	.054	1.10	-. 069	.362	.125	.166	.152
4	.047	.073	.064	.281	. 143	.189	.129	.097	.108
All	.047	.163	.126	.380	. 004	.122	.011	.132	.094

One can observe from Table 8.10 that the average values of the generic capital ratios for the savings banks seem far more homogeneous than for the private banks. In the case of the private banks, it can also be noted that the largest banks (Groups 3 and 4) seem to maintain lower generic capital ratios than the smaller banks during 1987-90. In the case of the savings banks, this does not appear to be the case, since the capital ratios seem very similar across bank sizes. The evidence for the private banks operating in Spain is similar to that found for the U.S. banks[13].

Table 8.10: Savings Banks: Average Generic Capital Ratios, Capital and Assets Growth Rate Across Bank Sizes. (1987-90).

Size Quart.	Average Generic Ratio			Average Capital Growth Rate			Average Investments Growth Rate		
	K-def	K-suf	All	K-def	K-suf	All	K-def	K-suf	All
1987									
1	.041	.074	.055	.274	.196	.241	.128	.246	.178
2	.037	.065	.047	.313	.147	.253	.128	.101	.118
3	.040	.069	.051	.304	.168	.254	.132	.142	.136
4	.047	.064	.056	.190	.125	.152	.089	.123	.108
All	.041	.068	.052	.278	.156	.225	.122	.152	.135
1988									
1	.047	.070	.058	.385	.205	.299	.177	.243	.208
2	.046	.065	.053	.444	.234	.367	.167	.226	.189
3	.050	.070	.058	.554	.214	.410	.201	.215	.207
4	.058	.064	.062	.562	.245	.378	.207	.195	.200
All	.050	.067	.058	.482	.225	.364	.186	.218	.201
1989									
1	.055	.068	.065	.537	.220	.304	.153	.145	.147
2	.038	.061	.052	.243	.097	.151	.150	.141	.144
3	.048	.063	.060	.255	.223	.228	.176	.220	.213
4	.046	.055	.054	.127	.057	.068	.200	.211	.209
All	.045	.062	.058	.307	.150	.188	.164	.183	.178
1990									
1	.049	.069	.063	.298	.181	.217	.061	.066	.064
2	.052	.064	.060	.174	.126	.141	.078	.130	.114
3	.063	.064	.064	.596	.128	.275	.054	.080	.072
4	.055	.077	.067	.307	.298	.302	.116	.105	.110
All	.055	.068	.063	.340	.178	.233	.081	.095	.090

If one now analyzes the differences between capital-deficient banks and capital-sufficient banks, one can observe again that the presence of extreme observations in the small private banks (Class 1), particularly among the capital-sufficient banks, seem to influence the different results for private and savings banks.

Apparently, savings are again far more homogeneous. Considering the capital-deficient banks, and except in class size 1, savings banks tend to have higher capital ratios, and these ratios tend to approach the minimum required (0.05). In 1990, the average for all capital-deficient savings banks seems above 0.05, whereas capital-deficient private banks still remain with an average ratio below 0.05. This evidence again seems to be consistent with the results shown in Chapter 7, in which capital regulation was found to be a harder constraint for savings banks than for private banks. Those savings banks with values of the generic ratio below the minimum required appear to have improved in general their capital positions during 1987-90, whereas the average capital-deficient private banks have not reached the minimum required. Examining the differences across sizes, it can be noticed that both within the capital-deficient and the capital-sufficient banks, the differences in the case of the private banks appear once again to be larger than for the savings banks. There seems to be no clear size effects within capital-deficient and capital-sufficient savings banks in terms of generic ratios, yet in the case of the private banks, smaller banks appear to maintain higher generic capital ratios than larger banks.

In the case of the private banks, there tend to be larger variations (except for 1990) across sizes than between capital-deficient and capital-sufficient banks in terms of average generic ratios. This seems to be influenced by the extreme observation in bank class size 1. However, in the case of the savings banks, although the differences seem very small, there tend to be higher variations across sizes than between capital-deficient and capital-sufficient savings banks.

As far as how these generic capital ratios came about, one must analyze the capital and investments growth rates. If one first compares the 'all banks' columns for both rates for both private and savings banks, one can note that again the presence of extreme observations is seemingly more frequent among private banks than savings banks. Among private banks (particularly class 1, very small banks), there are negative averages of capital and investment growth rates (particularly in 1987 and 1990), and also there are huge capital and investment growth rates (in 1989). Once again, the average values for capital growth rates and investment growth rates appear to be far more heterogeneous for private banks than for savings banks. Both capital and investment growth rates tend to be higher for savings banks than for private banks. As far as the size effects in the capital and investment growth rates, the evidence does not appear to support any clear relation: in some cases the capital and investment growth rates are greater for the larger banks, and in other cases, are smaller than for the small banks. This seems to occur for both private and savings banks. Therefore, one could expect to find any rate of capital and/or investment growth in any bank size.

The average capital growth rates seem to be far higher than the investment growth rates, even when the investment growth rates reach average values around 20 per cent (0.20). This evidence seems to be consistent with the field survey, in which it was found that Spanish banks tend to alter capital growth, rather than investment growth, in order to improve their capital ratios.

If one now examines the average values for the capital-deficient and capital-sufficient banks, it can be noted that in the case of the savings banks, both capital-deficient and capital-sufficient banks seem to have a higher differential between mean capital augmentations rate and investment growth rates than in the case of the private banks. Therefore, savings banks appear to have made stronger efforts to augment capital than private banks during 1987-90, even if they have more restricted possibilities of increasing capital.

In both private and savings banks, the capital-deficient banks seem to have lower investment growth rates than the capital-sufficient banks[14]. In addition, the capital-deficient savings banks tend to have a higher differential between the average capital and investment growth rates than the capital-sufficient savings banks. However, this does not appear to be so clear for the private banks, since the presence of outliers seems to produce changes in the direction of the differential.

As far as the size effects in the differential between average capital augmentation rate and investment growth rate, the evidence is mixed: one can find years when the smaller banks had higher means of capital growth and/or investment growth rates than the larger banks, and one can also find years when the larger banks (both private and savings banks in Spain) had higher average values.

In the case of the private banks, the variations across bank sizes tend to be larger than those between capital-deficient and capital-sufficient banks in terms of both capital augmentations and investment growth rates. The presence of extreme observations (with negative values and very large values) again seems to be one of the causes shaping this result. However, in the case of the savings banks, the evidence is not so clear as that of the private banks: in terms of capital augmentations rates, the variations across bank sizes tend to be larger than the variation between capital-deficient and capital-sufficient banks only in 1989, whereas in 1987, 1988, and 1990, the former are smaller than the latter variations; in terms of investment growth rates, the variations across bank sizes tend to be larger than the variations between capital-deficient and capital-sufficient banks in 1987, 1989 and 1990, but the former are smaller than the latter variations in 1988.

The evidence provided here in terms of size effects seems to be clear only in terms of capital ratios: larger private banks maintain lower generic capital ratios than smaller private banks, whereas all sizes of savings banks maintain very similar capital ratios. However, in terms of capital augmentations, the evidence is mixed: there is no clear impact of size on capital augmentations, and further evidence on the impact of size on capital augmentations is needed in this thesis.

In order to provide further evidence to explain the size effects in terms of capital augmentations, one needs to disentangle the capital augmentations into internally generated capital augmentations (internal capital generation rate) and externally generated capital augmentations. In Section 8.4.2 (Table 8.7), evidence on the size effects in terms of external capital generation for the Spanish banks was provided. Now, we need to examine and provide empirical evidence on the impact of size on the internal capital generation rates. As there exist differences in the ways that private and savings banks distribute their profits (private banks pay out dividend and savings banks do not), and as in 1990 there were several mergers among Spanish savings banks that could have caused important effects on their capital augmentations, the study of the internal capital generation rate will be divided into two: one for the private banks, and the other for the savings banks. These are undertaken in the two following subsections.

8.4.5.- Size Effects in the Internal Capital Generation in the Spanish Private Banks.

The study of the impact of size on the internal capital generation rate for the private banks operating in Spain is based on Equation (4.1):

$$g = ROE \times RR \qquad (4.1)$$

where g is the internal capital generation rate, ROE is return on equity, and RR is the retention ratio. One needs to analyze the differences in terms of internal capital generation rates across bank sizes. In order to examine how these possible differences in internal capital generation rates came about, the variation in ROE and RR across sizes will also be examined.

In order to account for size, the sample of private banks in Spain, will be again divided in to the same quartiles as in the previous section. The distinction between capital-deficient and capital-sufficient banks will also be used in this analysis in order to investigate whether or not capital-deficient banks made stronger efforts to augment capital in terms of internal capital generation rates. As in the previous section, this distinction will again be undertaken on the basis of the Bank of Spain's generic capital ratios maintained by the private banks in the previous year.

Table 8.11 displays the means of ROE, Retention Ratios (RR) and the internal capital generation rates (g) across the four private banks' sizes, and between the capital-deficient and the capital-sufficient private banks in Spain for 1987-90. It must be said that the relevant values of ROE, RR and g for a certain year are those of the previous year: for example, the values for the internal capital generation rate in 1987 come from 1986, since the internal capital generation in 1987 results from the retained earnings of 1986 (ROE and RR).

In the columns 'all banks' of Table 8.11, one can note that class size 3 appears to have higher average internal capital generation rates throughout 1987-90; it can also be observed that the smallest banks (class 1) tend to have the lowest mean of internal capital generation rates. Thus, there seems to be certain 'economies of scale' in terms of internal capital generation in the Spanish private banks, although these economies tend to peter out for the largest banks (class 4). It seems that the top medium-sized private banks have a certain advantage with regard to internal capital generation.

Table 8.11: Private Banks: Mean of ROE, Retention Ratio and Internal Capital Generation Rate Across Bank Sizes. (1987-90).

Size Quart.	Average ROE			Average Retention Ratio			Average Internal Capital Generation Rate		
	K-def	K-suf	All	K-def	K-suf	All	K-def	K-suf	All
				1987					
1	.100	.097	.098	.302	.181	.217	.035	.028	.030
2	.212	.061	.134	.213	.331	.274	.293	.572	.405
3	.147	.214	.174	.293	.572	.405	.065	.132	.092
4	.434	.164	.254	.230	.370	.323	.041	.066	.058
All	.213	.128	.165	.260	.339	.305	.060	.061	.061
				1988					
1	.110	.080	.087	.524	.239	.296	.074	.028	.037
2	.288	.133	.218	.314	.453	.377	.112	.074	.095
3	.295	.226	.263	.402	.379	.391	.111	.099	.105
4	.129	.178	.155	.721	.394	.547	.084	.073	.078
All	.228	.144	.181	.472	.348	.402	.100	.063	.079
				1989					
1	-.138	.126	.090	.326	.290	.295	.083	.040	.046
2	.239	.137	.170	.351	.347	.348	.102	.072	.081
3	.227	.230	.229	.354	.460	.414	.105	.110	.108
4	.448	.202	.292	.508	.417	.450	.081	.082	.082
All	.256	.167	.195	.395	.368	.377	.095	.072	.079
				1990					
1	3.29	.121	.756	.163	.379	.336	.054	.057	.056
2	.254	.146	.184	.361	.346	.351	.077	.055	.062
3	.464	.245	.325	.294	.354	.332	.147	.081	.105
4	.124	.284	.231	.441	.358	.385	.042	.103	.083
All	.761	.195	.372	.332	.361	.351	.084	.073	.767

If one considers the distinction between capital-deficient banks and capital-sufficient banks, it can be noticed that except for 1987, the capital-deficient banks tend to have higher average internal capital generation rates than the capital-sufficient banks, and this tends to happen for all bank sizes. Therefore, seemingly, capital-deficient banks appear to have made stronger efforts in terms of internal capital generation than capital-sufficient banks.

The variation across bank sizes appear to be larger than the variations between capital-deficient and capital-sufficient banks in terms of internal capital generation rates. Thus, there seems to be more heterogeneous values across different private banks' sizes than between capital-deficient and capital-sufficient banks.

As far as how these values of internal capital generation came about are concerned, one can note that the relatively higher internal capital generation rate for bank class size 3 seems to result from the fact that its means of both ROE and RR are always in the highest range of values in the sample, although separately they are not necessarily the highest means of ROE and RR. The contrary appears to happen to the class size 1, which tends to maintain their means of ROE and RR in the lowest range of values in the sample. This results in this class size having the lowest internal capital generation rate.

Rather than having the highest ROE and/or the highest retention ratio (which could result in not satisfying shareholders' dividend expectations), it seems that a combination of comparatively high ROE and RR allows private banks in class 3 to have the highest average internal capital generation rate. The largest banks (class 4) had the highest average ROE in two years (1987 and 1989), but their internal capital generation rate was not the highest, since their average retention ratio was comparatively lower.

Capital-deficient banks tend to have both higher average ROE and RR than the capital-sufficient banks. This seems to reflect the stronger efforts made by the capital-deficient banks in order to augment their capital internally. However, the variation between capital-deficient and capital-sufficient banks in terms of both average ROE and RR seems to be lower than the variation across private bank sizes in Spain for 1987-90.

The main conclusion that one can draw in this subsection is that there seems to be certain 'economies of scale' in terms of internal capital generation, but they seem to peter out for the largest private banks in Spain. These economies of scale seem to be influenced by a combination of comparatively high (but not necessarily the highest) ROE and retention ratio.

8.4.6.- Size Effects and the Impact of Mergers on the Internal Capital Generation in the Savings Banks.

The case of the internal capital generation of the Spanish savings banks during 1987-90 need to be analyzed separately because of their peculiarities in terms of internal capital generation rate (their RR is 100 per cent), and because of the merger processes that took place in 1990. Savings banks in Spain do not pay out dividend and their retention ratios can be considered as 100 per cent. In addition, 12 savings banks were involved in mergers in 1990, and this could have influenced the capital augmentations of these banks as a result of the non-taxable 'hidden value' emerging from the merger (see Section 8.4.2).

The same analysis as in the previous subsection is undertaken here for the savings banks, but now the estimate of the internal capital generation rate is ROE as a consequence of RR being 100 per cent. Again, the relevant ROE for the internal capital generation of the year considered is that of the previous year. The results are captured in Table 8.12, which shows the average return on equity across savings banks' sizes and between capital-deficient and capital-sufficient savings banks.

In Table 8.12, one can note that the capital-deficient savings banks tend to have average values of ROE well above those of the capital-sufficient banks throughout the period 1987-90. Thus, the internal capital generation seems higher for the capital-deficient banks than for the capital-sufficient banks. This seems to reflect the stronger efforts of the capital-deficient banks in terms of profitability and internal capital generation.

As far as the differences in average ROE across bank sizes are concerned, it can be observed that the medium-sized savings banks (class size 2 and 3) appear to have higher average ROE than the very small (class 1) and the large Spanish savings banks (class 4) during 1987-90. Consequently, again there seems to be certain 'economies of scale' in terms of profitability and internal capital generation (up to class 3 - medium-sized banks) for the Spanish savings banks during 1987-90, but they tend to disappear for the very large bank sizes.

Table 8.12: Savings Banks: Average Return on Equity Across Bank Sizes (1987-90).

	Average ROE					
Size Quart.	1987			1988		
	K-def	K-suf	All	K-def	K-suf	All
1	.262	.183	.229	.333	.275	.306
2	.282	.156	.236	.441	.215	.358
3	.264	.254	.261	.429	.261	.359
4	.235	.158	.190	.263	.235	.247
All	.263	.184	.229	.377	.247	.317
	1989			1990		
	K-def	K-suf	All	K-def	K-suf	All
1	.123	.119	.119	.243	.162	.188
2	.167	.107	.129	.252	.219	.229
3	.181	.135	.142	.175	.180	.178
4	.169	.114	.122	.211	.158	.181
All	.157	.119	.128	.219	.181	.194

The variations of the average internal capital generation rates across savings banks' sizes seem only larger than those between capital-deficient and capital-sufficient savings banks in 1990. However, the variations across sizes tend to be smaller than the variations between capital-deficient and capital-sufficient banks in 1987, 1988 and 1989. Therefore, the variations across bank sizes tend to be more frequently quantitatively smaller than the variations between capital-deficient and capital-sufficient banks.

Finally, we need to investigate the impact of mergers on capital augmentations for the savings banks. The increase in size through mergers seems to have become an important strategy for savings banks: 12 Spanish savings banks were involved in merger processes in 1990. One of the main advantages of mergers appears to be the tax gains, since the 'hidden value' that arises in the mergers is non-taxable. Therefore, mergers seem to induce internal capital augmentations by allowing the 'hidden value' to be converted into on-balance-sheet capital.

The researcher has explored how the capital augmentations for the savings banks in 1990 were affected by the mergers. The sample of savings banks for 1990 (64 banks) has been divided into two subsamples: (i) those Spanish savings banks involved in merger processes in 1990, and (ii) those Spanish savings banks not involved in merger processes in 1990. The average capital growth rates have been computed across bank sizes (the same four quartiles as in Table 8.12), and between merged banks and non-merged banks for 1990. These results are shown in Table 8.13, which also displays the average ROE (the estimate of the internal capital generation rate for savings banks). One can note that the the mergers resulted in medium-sized and large savings banks (class 3 and 4).

Table 8.13: Savings Banks: Merger Effects on Capital Augmentations. (1990)

Size Quart.	Average ROE_{1989}			Average Capital Augmentation Rate		
	Non-merged	Merged	All	Non-merged	Merged	All
1	.188	--	.188	.217	--	.217
2	.229	--	.229	.141	--	.141
3	.199	.134	.179	.133	.888	.275
4	.221	.114	.181	.223	.433	.302
All	.206	.121	.194	.176	.585	.233

If one observes the average capital augmentation rates for the non-merged and merged banks, it can be noticed that the means of the capital augmentation rates for the savings banks involved in mergers seem to be far higher than those of the non-merged savings banks[15]. The average of the capital augmentation rate for the merged savings banks of class 3, seems to be particularly higher.

If one now compare the averages of capital augmentations with the average ROE for both merged and non-merged banks, it can be noted that those banks involved in mergers appeared to have lower average ROE (the estimate of internal capital generation) than those Spanish non-merged savings banks. It seems that mergers are a strategy mostly undertaken by those savings banks, whose internal capital generation rates were comparatively low.

The fact that the average capital augmentation rate for merged medium-sized savings banks (class 3) seems to be higher than that of the largest banks (class 4) could be indicating that in terms of capital augmentations, medium-sized banks benefit from mergers to a larger extent than the largest banks. In other words, the 'economies of scale ' in terms of capital growth that could result from mergers tend to be more important for the medium-sized savings banks than for the largest savings bank sizes.

Increasing in size through mergers for those savings banks with low internal capital generation could be an important strategy to augment capital. However, this strategy cannot be undertaken continuously because it would involve dramatic operational and managerial changes in the banks. Banks cannot afford to have such disruptive, dramatic changes continuously since the 'managerial restraint' involved in such a strategy may come into play[16]. In short, it may involve costs associated with changing management cultures and increasing management complexities associated with the new, reconstructed organisation. This strategy could be useful to augment capital on a short-term basis, but there seem to be more difficulties in employing the merger strategy on a long-term basis.

8.5.- SYNTHESIS AND CONCLUSIONS.

This chapter completes the empirical analysis of the bank capital augmentations and of the impact of bank prudential regulation on capital augmentations in Spain during 1987-90. In this chapter, the empirical model of capital augmentations for the private banks operating in Spain has been refined by employing a measure of profitability (PF^*) where only the retained earnings are accounted for; the results were improved with this profitability measure. However, the findings in the equations with PF^* support the findings in Chapter 7: our basic empirical model still seems to explain better the behaviour for savings banks than for private banks.

The empirical model of capital augmentations has also been estimated and tested for those private banks with market-value capital information available, and the relationship between market value and book value capital has also been estimated for those private banks. Apparently, as a consequence of the thinness and inefficiencies of the Spanish stock markets, the results were relatively weak.

Then, an empirical study of the size effects in terms of the Bank of Spain's generic capital ratios, capital augmentation rates and the internal capital generation rates has been undertaken. Larger private banks seems to maintain lower capital ratios than smaller private banks. Mergers seemed to play an important role in helping savings banks augment their capital.

The implications of the findings of Chapters 7 and 8 need to be studied. First of all, the possible contradictions found in the results of chapters 7 and 8 need to be discussed. In addition, the apparently different impact of bank prudential regulation on capital augmentations for private and savings banks, and also across sizes, seems to have implications on the competitive neutrality of the bank prudential regulation process in Spain. In this connection, the role of the market in regulating capital adequacy needs to be discussed. In the next chapter, the implications of all these issues for both bank supervisors and bank managers are analyzed.

NOTES:

1.- In Chapter 7, it was indicated that a negative sign of KR means that the capital adequacy regulation influences positively bank capital augmentations.

2.- The main sources of funds are net loan repayments, securities sales, decrease in reserves, decrease in cash and due, increase in deposits, increase in nondeposit debt and issuance of new equity (Sinkey, 1992, p. 262).

3.- The main uses of funds are new loans, securities purchases, increase in reserves, increase in cash and due, decrease in deposits, decrease in nondeposit debt and repurchase of equity (Sinkey, 1992, p. 262).

4.- See Sinkey (1992, pp 262-263) for an example of the calculation of banks net income using the spread model.

5.- See, for example, Copeland and Weston (1988, Chapter 13-16) for a review of the main determinants of equity valuation.

6.- See, for example, Revell (1987 and 1989).

7.- See also, for example, Lewis and Davis (1987, pp. 199-209) and Clark (1988) for a review of the main issues and findings on the economies of scale and scope in banking.

8.- The corporate income tax exemption is subject to discretionary government approval based on national interest grounds. This provides the government with a way for intervening in bank mergers.

9.- After 1990 there have been more mergers between private banks and between savings banks in Spain.

10.- Two-tail t-values are employed for the intercept, since there is no clear direction in the sign of a. However, one-tail and two-tail t-values are used for the slope, since the direction of the sign of the slope is expected to be always positive.

12.- This is an application of Humphrey's mean dispersion analysis (1987) for the measurement of cost economies in U.S. banking.

13.- Peltzman (1984)

14.- This evidence seems to be in line with the 'capital crunch' hypothesis (Syron, 1991; Peek and Rosengren, 1992; Torrero, 1992). This hypothesis implies that in order to reach the regulatory capital-adequacy ratios, the capital-deficient banking firms need to pursue lower rates of asset growth than the capital-sufficient banks. Peek and Rosengren (1992) provide empirical evidence of this phenomenon for the New England banks.

15.- A t-test was carried out to find out if the means of capital augmentation rates for 1990 were significantly different between merged and non-merged savings banks. The t-test showed that the mean of the capital augmentation of the merged savings banks was significantly higher (with 95 per cent level of confidence) than that of the non-merged banks.

16.- See, for example, Penrose (1980).

CHAPTER 9 : POLICY IMPLICATIONS

9.1.- INTRODUCTION.

This chapter examines the policy implications of the empirical findings of Chapters 7 and 8. As depicted in Figure 9.1, three main areas will be considered in this examination:

Figure 9.1: Main Implications of the Empirical Findings.

Implications of the Empirical Findings on the Impact of Capital Regulation on Bank Capital Augmentations in the Spanish Banking System during 1987-90

↓ 9.2 Role of the Market as Regulator

↓ 9.3 Theory of the Banking Firm in a Structural Deregulation - Supervisory Re-regulation Framework

↓ 9.4 Competitive Neutrality of Regulation

1) *Implications for the Role of the Market in Monitoring Capital Adequacy* : in the light of the findings of Chapters 7-8 for both regulatory and market-based determinants of capital augmentations, it is necessary to evaluate the role of the market *versus* the role of bank regulation in monitoring capital adequacy. In other words, the researcher must examine to what extent it is necessary to have capital adequacy regulation, and to which extent

the market alone could monitor capital adequacy in Spanish banking.

2) *Implications of the Findings in a Banking Deregulation - Supervision Re-regulation Framework*: in the period considered (1987-90), there have been two forces which have been shaping banking regulation in Spain very differently: (i) Structural deregulation or liberalization, and (ii) Enhancement of supervision, particularly in terms of capital adequacy requirements. These two seemingly contradictory forces appear to lie behind the somehow contradictory empirical findings for Spanish banking shown in Chapters 7-8.

3) *Implications for the Competitive Neutrality of Bank Prudential Regulation in Spain*: the apparently different effects of bank prudential regulation on capital augmentations for private and savings banks in Spain and also across different sizes, need to be read in terms of the existence (or non-existence) of competitive neutrality in regulation. In other words, the researcher needs to evaluate whether any type or size of banking institution in Spain benefits from capital adequacy regulation to a larger extent than others.

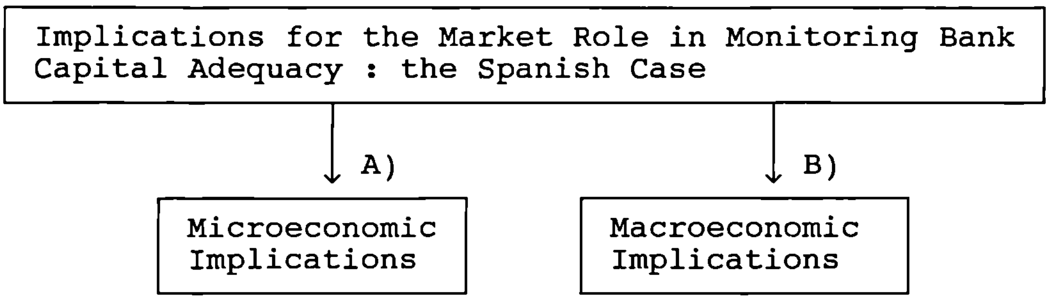
This chapter is organized as follows (see Figure 9.1). In the next section, the set of implications (1) are discussed. Then, implications (2) are examined. Next, implications (3) are considered. Finally, the conclusions are drawn.

9.2.- IMPLICATIONS FOR THE ROLE OF THE MARKET IN MONITORING CAPITAL ADEQUACY.

Our empirical analysis of the impact of capital adequacy regulation on bank capital augmentations in the Spanish banking system has implications for the role of the market (*versus* bank supervisors) in monitoring capital adequacy. In Chapter 5 in general, and particularly in Section 5.3.2, the researcher discussed the theoretical impact of bank prudential regulation and of the market-based and managerial variables on bank capital decisions, and particularly on bank capital augmentations.

As depicted in Figure 9.2, two main areas of implications can be identified with regard to the role of the market in monitoring bank capital adequacy:

Figure 9.2 : Main Implications for the Role of the Market in Monitoring Bank Capital Adequacy in Spain.



A) *Microeconomic Implications for the Banking Firm in Spain*: as indicated in Section 5.2, a basic aim of bank capital regulation is to increase microeconomic (the banking firm) and macroeconomic (the banking system) prudential safety and stability. This seems to imply that bank supervisors assume that regulation can obtain higher levels of micro and macro prudential stability of the banking markets than the market alone. Consequently, bank supervisors seem to assume, *inter alia*, that regulation monitors bank capital adequacy better than the market alone.

Bank capital adequacy, at a micro level, is basically, related to the amount of capital and the risks held by a banking firm. As far as the amount of capital held by a bank, there seems to be evidence that the key variable in terms of capital augmentations is capital regulation[1]. Thus, some major banks appear to allocate internally their capital primarily on the basis of supervisory capital standards. As found in Chapter 7, there could be some differences between Spanish private and savings banks in the way capital regulation affects capital augmentations: as a consequence of the different capital instruments that both types of institution can employ, capital regulation seems to be a harder constraint for savings banks than for private banks.

The evidence that some major banks may internally allocate their capital primarily on the basis of supervisory capital standards seems to imply either that supervisory capital standards are set too high and/or that management systems of internal risk allocation are inadequately developed (Gardener, 1991a). This can be applied to the Spanish case, since the field survey appears to indicate that most banks in Spain allocate their capital primarily on the basis of supervisory capital requirements. As the econometric analysis demonstrated, this seems particularly true for the savings banks.

As far as the risk held by a banking firm, it seems necessary to discuss the implications of the non-significance of the portfolio risk variable included in the model of bank capital augmentations. One of the basic aims of bank prudential regulation is risk containment both at a micro and macroeconomic level. In this context, it appears contradictory that there is no significant influence of portfolio risk on bank capital decisions in general, and on capital augmentations in particular. The fact that the portfolio risk variable (PK) does not comprise all the risks of the banking firm, and, therefore, may be considered as a crude representation of portfolio risk, could justify the non-significance of PK.

The difficulties in defining a ratio that would represent all the risks of the banking firm also emerge in the RAR model. Although the RAR model (employed in the Spanish regulation) may be considered as a very good methodology for practical capital-adequacy analysis, there are certain difficulties that need to be examined. Firstly, the use of capital ratios tends to (over-) simplify a bank's risks into a crude measure, which may not represent and capture all of the risks banking business. As described in Chapter 3, the Spanish risk-based capital adequacy requirements fundamentally consider only relative credit risk. As the banking firm faces a wider range of risks (for example position risk, settlement risk, interest rate risk and exchange rate risk), the Spanish capital-adequacy regulation should be extended to a wider range of risks. At BIS and EC levels, a wider range of banking risks for commercial bank capital-adequacy analysis is now being considered[2].

As reviewed in Chapter 5, several authors have emphasized that different capital ratios are likely to have different effects on the risks held by a banking firm (Koehn and Santomero, 1980; Lackman, 1986; Di Cagno, 1990). This seems to imply that bank supervisors need to be fully aware of the effects of particular supervisory capital ratios (alternatives) on risk containment. It is necessary to provide a theoretical and empirical basis to any capital ratio to be employed by regulators, and its impact on the risks of the banking firm need to be analyzed before it is implemented.

The role of the market (*versus* bank supervisors) in regulating and monitoring a bank's risk appears to be relevant in this context. It seems typical of financial markets that they have a tendency towards intense competition, overcapacity and overshooting behaviour under deregulation[3]. There seem to be risks associated with deregulated markets as institutions react to the new environment. Therefore, it seems that, in liberalised banking markets, banking institutions may be affected negatively by a too risky behaviour. Gardener (1989a) argues that the supervision of capital adequacy is one possible policy response to the perceived build-up of risks. In the case of Spain, after several banking institutions went bankrupt during the late 1970s and early 1980s, the enhancement of supervision in 1985 appeared to be a policy response to the build-up of risks associated with the liberalization of the Spanish banking markets.

The emergence of stricter capital standards, however, can give rise to other problems. Paradoxically, supervisory demands for more capital may even increase risk levels within the banking industry[4]. Any supervisory ratio system may operate as a 'tax' on the banks. One possible reaction, *inter alia*, is to seek increased profit in order to meet the new capital requirements. However, the law of diminishing marginal utility of money and the risk/return trade-off in finance theory indicate that higher potential returns are usually accompanied by more risks. If the latter are not priced correctly, a bank's net exposure may actually increase. Therefore, in a highly competitive environment, supervisory demands for increased capital adequacy may be risk-producing for some banks and the system as a whole. In the Spanish case, however, the evidence during 1987-90 did not appear to support this hypothesis (increased regulatory demands for capital are risk-producing). Nevertheless, this hypothesis of bank behaviour could become more evident in the future and Spanish bank supervisors should be aware of this possibility.

Next, the role of the market-based and managerial variables in regulating capital augmentations need to be examined. The impact of the market-based and managerial variables differed between private and savings banks. As a result of their higher dependence on internal capital generation sources, profitability was a very important variable for savings banks in terms of capital augmentations, whereas it seemed far less important for private banks. However, market-based variables like cost of capital and easy access to capital markets, seemed to play a more important role in the capital adequacy decisions of the private banks in Spain.

Unlike savings banks (in which as a result of the non-existence of shareholders, the interests of depositors and/or of the public authorities in control of the institution are likely to play a more important role than in private institutions), private banks need to consider and fulfill shareholders' interests. Therefore, in the private banking institutions in Spain, as a consequence of the existence of shareholders, the role of the market in monitoring bank capital decisions seems to be more important than in the case of the savings banks.

The findings for the the Spanish private banks are in line with the work developed by Pringle (1974), in which he views the capital decisions from the standpoint of shareholder interests, rather than from the viewpoint of depositors. In the banking institutions where shareholders' private interests are taken into consideration, Pringle finds that market-based variables play a key role in determining the institution's optimal capital position. In Spanish banking, this appears to be the case in the private banks, where there exist shareholders, in which the capital regulatory variable KR was not significant in any regression, whereas several market-based variables were significant (Chapter 7).

In the context of market-based versus supervisory capital adequacy positions, there are Spanish authors that maintain that the non-existence of private shareholders in savings banks seems to make a stronger case for regulation of savings banks than of private banks. Perez and Quesada (1991, p. 143) emphasize that savings banks need to be regulated because there are no stockholders that control the capital adequacy of those institutions. In other words, since private banks' capital adequacy are primarily controlled and monitored by shareholders', there seems to be a less strong case for the regulation of those institutions. This argument is in line with the findings which appear to indicate that capital regulation seems a stricter constraint for savings banks (the variable KR was statistically significant in several equations for the savings banks).

B) *Macroeconomic Implications for the Financial Stability of the Spanish Banking System*: there are different views in terms of the role of the market (*versus* regulation) in maintaining the financial system stability and avoiding financial crisis. Baltensperger and Dermine (1986) emphasize that no general macroeconomic case can be made for banking regulation or its deregulation. Rather than on macroeconomic grounds, it is on microeconomic grounds that a much stronger case can be developed: capital adequacy regulation appear necessary to lessen the probability of financial crises. Minsky (in Kindleberger and Laffargue, 1982, pp 13-47) has formalized the crisis-prevention role of regulation. He considers bank supervision as a way of aborting the periodic tendency towards crises that is enshrined within his financial instability hypotheses. However, Gardener (1989a) argues that despite the crisis-reduction role of capital regulation, there is no generally accepted theory that one can apply.

As examined in Chapter 2, during the last two decades in Spain there appears to be empirical evidence of the macroeconomic implications of capital adequacy regulation for the financial stability of Spanish banking markets. If one compares the situation of the banking markets in Spain before the prudential regulation was enhanced in 1985 (before 1985 the role of the market-based and managerial variables in monitoring bank capital adequacy seemed to be much more important than after 1985, when the new capital requirements were introduced), with the situation after 1985, one appears to find two very different worlds.

As described in Chapters 2 and 3, before 1985 bank supervision and prudential regulation in Spain did not seem to be monitored adequately by the Bank of Spain because of the lack of legal and technical instruments, which, otherwise, would have made banks comply with regulation. In this context, the bank capital decisions in Spain were apparently made in practice on a market-based and managerial basis, rather than on a regulatory basis. However, as noted in Chapter 2, the thinness and inefficiencies of the Spanish banking markets appeared to prevent the emergence of market signals from the poor solvency standards of some banks that could have helped to identify the banks with problems, and, in turn, to attempt to avoid the banking crisis. In a banking environment like this, in which there seemed to be no 'real' supervision and the market was unable to regulate capital adequacy, the risk positions of many banks increased, and contrarily, their solvency positions decreased. As a consequence of the poor solvency position of certain banks, several banks went bankrupt during the late 1970s and early 1980s, and Spain suffered one of the worst banking crisis that any OECD country has ever had.

As found in Chapter 4, after the introduction of the new risk-based capital adequacy requirements in 1985, bank solvency appears to have improved dramatically in Spain. It was found that most Spanish banks were well-capitalized during 1987-90 compared with their European counterparts. The introduction of the new capital adequacy standards in Spain in 1985 seems to lie behind those good levels of capitalization. In the field survey performed among several Spanish bankers, capital regulation was considered as a key variable in terms of capital augmentations. Thus, the enhancement of capital adequacy requirements at a micro level seem to have made banks improve their solvency positions. At a macro level, it appears to have increased the macro-financial system potential safety and stability of Spanish banking, since the number of bank failures fell dramatically after 1985. In other words, during 1985-90 the Spanish bank capital-adequacy regulation appears to have played the crisis-prevention role that Minsky (in Kindleberger and Laffargue, 1982, pp 13-47) suggested in a normative context.

All things considered, the role of the market in monitoring capital adequacy, especially when the banking markets are thin and inefficient in providing signals of banks with financial problems (for example, Spain before 1985), is very limited, and there could be negative consequences for the financial stability of the banking markets. The case for bank capital regulation seems stronger in the case of relatively thin and inefficient markets.

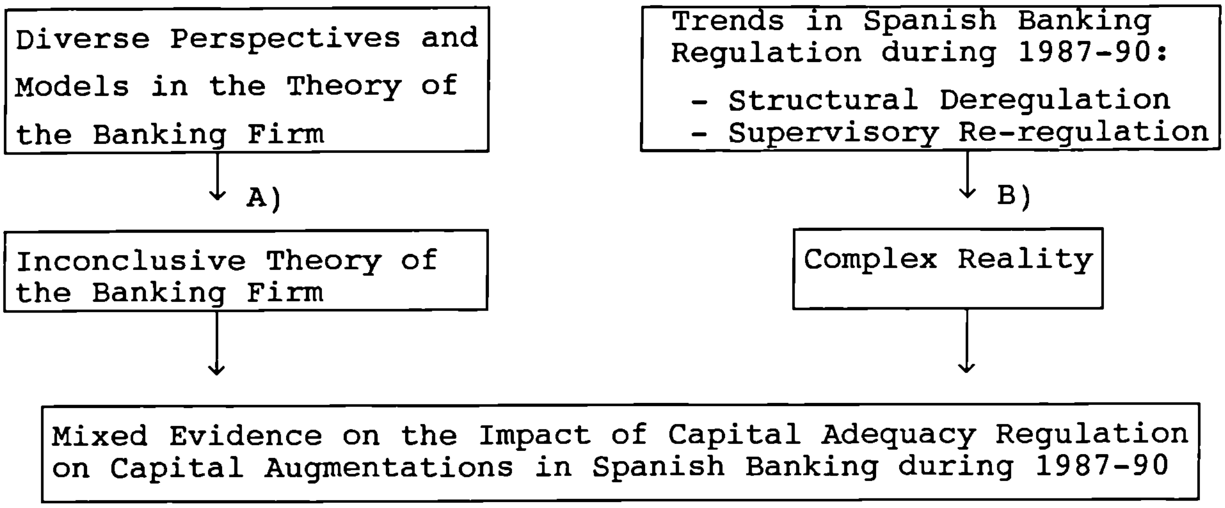
9.3.- IMPLICATIONS OF THE FINDINGS IN A BANKING DEREGULATION-SUPERVISION RE-REGULATION FRAMEWORK IN SPAIN.

The picture obtained in Chapters 7 and 8 about the effects of bank capital regulation on capital augmentations in Spanish banking during 1987-90 appears to be somehow confusing, since some of the findings seem contradictory. It was found that several signs of certain significant variables, such as deposit growth, deposit insurance and liquidity, changed over time, and across different definitions of capital augmentation. In addition, there were different directions in the impact of size on the relationship MV-BV, on the impact of size on bank capital augmentations, and on the Bank of Spain's generic capital ratios held by the banking institutions.

As depicted in Figure 9.3, the mixed empirical evidence can be justified with the two following causes:

A) *A Theoretical Justification*: the picture found in Chapters 7 and 8 may be considered as confusing, but so is banking theory. Banking theory is apparently inconclusive in most decisions of the banking firm[5]. In Chapter 5, the researcher surveyed the main theoretical studies on the effects of capital adequacy regulation on bank capital decisions (Table 5.1), and particularly on capital augmentations. Different models with different theoretical solutions were reviewed. This is an example of the confusing picture that banking theory provides and has led to a significant divergence between practice and theory in the banking world.

Figure 9.3: Main Explanations for the Mixed Empirical Findings.



In the latter connection, Santomero (1984) examined the specific complexities of the capital adequacy problem in the banking literature. He maintains that this complexity is true because the optimal choice of scale and leverage is determined by the assumed firm environment and the *raison d'être* of the firm. This can be applied to our analysis, since part of the complexity results, firstly, from the firm environment in the Spanish banking system during 1987-90, and, secondly, from the distinct traditional management philosophies between private and savings banks in Spain.

As far as the firm environment in the Spanish banking system during 1987-90 is concerned, this has suffered major changes during that period. The regulatory pressures and the resulting competitive effects have shaped the changing firm environment in Spanish banking during 1987-90. This is investigated in the second justification B).

As for the different traditional management philosophies between private and savings banks, these differences used to result from the distinct ownership and legal and operational features. However, as described in Chapter 2, nowadays the legal and operational differences between private and savings banks have practically disappeared. The main feature that distinguishes private and savings banks nowadays is ownership.

The differences in ownership are likely to produce differences in terms of the objectives of the banking institutions, since private banks' objectives will be shaped, at a fundamental level, by the shareholders; savings banks' objectives will result, at a fundamental level, from the philosophy of the public body (usually, local or regional government) that controls the bank. Although nowadays both type of banking institution generally pursue, *inter alia*, profit maximization, the earnings distribution, which affects the internal capital generation, will be different between private and savings banks.

Thus, although some of the complexities for the study of the Spanish banking firm have disappeared, a major complexity in terms of capital decisions still remains: ownership, and, in turn, the legal possibilities of augmenting Tier 1 capital. Private banks and savings banks in Spain still differ in terms of ownership, and, as we found in Chapter 7, in terms of capital augmentations. The competitive implications of the differences in ownership are discussed in Section 9.3.

B) *The Simultaneous Impact of Deregulation and Supervisory Re-Regulation*: during the 1980s, two main regulatory pressures have been shaping the banking world: (i) the structural deregulation process, whereby most Western banking industries, including the Spanish banking industry, have liberalized their banking markets, and (ii) the supervision (or prudential) re-regulation process, whereby the bank solvency regulation was strengthened and new risk-based bank capital adequacy standards were introduced in Western countries. As described in Chapter 3, the period chosen for the Spanish banking system in this analysis is 1987-90, in which both regulatory pressures were operating in the Spanish banking markets and affecting the banking firms in Spain. Although our main concern has been the impact of supervisory regulation (our regulatory variable KR) on capital augmentations, other variables included in the analysis, like liquidity and deposit growth, have been affected by deregulation.

In the banking literature, there has been virtually no theoretical discussion of the simultaneous effects that arise when controls in some areas are dismantled (deregulation) but controls in other areas are strengthened (re-regulation) (Fry, 1988, p.255). Unlike studies that focus only on deregulation[6] or only on prudential re-regulation, this study has analyzed a decision of the banking firm (capital augmentations) in which both regulatory pressures were operating. These two different regulatory pressures are likely to cause different results, and somehow, contradicting findings.

In order to study specifically how deregulation and re-regulation influenced the results very differently, one needs to divide the analysis into two separate parts: (i) the analysis of the impact of deregulation, and (ii) the analysis of the impact of supervisory re-regulation.

As far as the influence of deregulation on the findings, the main deregulatory forces during 1987-90 have resulted from:

a) Liberalization of the Banking Markets in Spain: although the total deregulation on interest rates was effective in 1987, other deregulatory measures were taken during 1987-90. As described in Chapter 3, these include the lowering of the obligatory investment ratios and liquidity ratios. In addition, in the case of the savings banks, the contribution to the Deposit Guarantee Fund was lowered in 1989. This deregulatory trend is likely to lie behind the changing signs over time for the liquidity variable and the deposit insurance variable for the savings banks. It is also likely to enhance competition in the banking markets, and, therefore, the changing sign for the deposit growth appears to be affected by this deregulatory trend.

b) Spain's Entry to the EC: the second deregulatory force in the Spanish banking markets has been Spain's entry to the EC in 1986 and the 1992 benchmark for the creation of the European internal market, whereby, *inter alia*, the banking markets had to be opened to the banking institutions of the rest of the EC. This deregulatory force, alongside the liberalization of the banking markets in terms of obligatory coefficients, seems to have encouraged competition, since EC banks have entered the Spanish market. Several of these EC banks have set up extensive networks of branches, and introduced financial innovations that have enhanced banking competition in Spain. This seems to lie behind the changing sign in the deposit growth variable, particularly in 1990 when the competition appeared to be more fierce.

As for the supervisory re-regulatory forces during 1987-90 for the Spanish banking system, the main re-regulatory trends have resulted from:

a) The Spanish Solvency Regulation: although the new capital adequacy requirements were introduced in Spain in 1985, it was noted in Chapter 8 that there were still a few banks which appeared to have capital ratios below the minimum required during 1987-90. Thus, the Spanish supervisory regulation seems to have needed several years years to accomplish the minimum level of capital for all banks in Spain. In other words, the impact of the new Spanish capital-adequacy regulation seems to have required several years to influence the capital decisions of all banks. In addition, it was found that the impact of the regulation appeared stronger on savings banks than on private banks. In other words, due to the seemingly higher restrictions that savings banks have to augment capital, this prudential re-regulatory force is a stricter constraint for savings banks than for private banks. This shows the complexity of the impact of capital regulation on the bank decisions, since the impact is different across different type of institutions, and, at the same time, it has needed several years to accomplish its objectives.

b) International Convergence in Capital Adequacy Standards: as explained in Chapter 3, there has been a convergence movement towards the international homogenization of capital standards, both at the BIS level and at the EC level. This seems to have resulted in an increasing complexity in the impact of capital adequacy regulation on bank capital augmentations. Although only the Spanish capital standards were obligatory for the banks operating in Spain during 1987-90, the field survey undertaken among the largest banks in Spain showed that most banks in Spain were also monitoring their BIS and EC capital ratios. This international re-regulatory force brings more complexity to the problem examined in this thesis, and seems to have influenced some of the confusing signs of the regulatory variables.

To sum up, the confusing picture drawn in the empirical results seems to result from the complexities involved in the study of the banking firm in general, and particularly in a deregulation - re-regulation framework, like in this research. In this latter context, theory cannot guide as to the net, incremental effects.

9.4.- IMPLICATIONS FOR THE COMPETITIVE NEUTRALITY OF BANK PRUDENTIAL REGULATION IN SPAIN.

As with all forms of regulation, the Spanish bank capital-adequacy regulation has major implications for the business operations of the banking institutions operating in Spain. Llewellyn (1989, p. 120) maintains that potentially there could also be implications for the structure of the banking industry. In this connection, the implications of the findings of Chapters 7 and 8 for the competitive neutrality of the banking institutions in Spain could be very important for the future of the banking structure in Spain.

First of all, one needs to distinguish between competitive equality and competitive neutrality. According to Gardener (1991a), the legitimate aim of 'level playing fields' has sometimes been misinterpreted as a corresponding objective of competitive equality. However, the concept of competitive equality is too complex to be implemented. First, the notion of competitive equality is most complex to conceive, let alone operationalise[7]. There exist different types of competitive equality (equality for depositors, equality for lenders, and equality for shareholders), and this typifies the conceptual and practical difficulties, since, first of all, one would need to decide what type of equality is to be targeted.

A second problem arises with competitive equality: no regulatory authority can make unequals equal (in a competitive sense) by simply prescribing the same capital adequacy ratios for all. In the Spanish case, as a result of the different types of ownership, one obvious reason is that private banks' cost of equity capital and savings banks' cost of equity capital are likely to differ. At an international level, banks' cost of equity capital differs in different countries. Competitive equality under these conditions would seek to relate minimum capital levels to the corresponding costs of capital. The operational problems and dubious economic logic of such attempts seem very clear, and, thus, the implementation of the concept of competitive equality of regulation is too complex and non-operational.

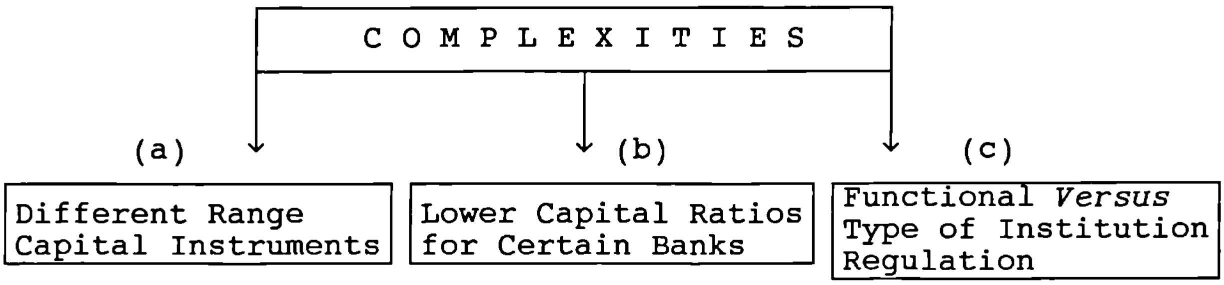
According to Gardener (1991a), competitive neutrality is a more useful and operational aim. At a national level, bank regulation should aim to ensure that no institution performing banking activities is disadvantaged compared with their competitors. At an international level, convergence should aim to ensure that banks in one country or market sector are not disadvantaged compared with their foreign competitors. The continual eroding of traditional institutional barriers between competing financial firms (that is, deregulation) implies that a greater emphasis in supervision must be accorded to functional supervision, rather than supervision of institutions. Gardener (1991a) argues that practical supervision should aim for competitive neutrality, consistent with systemic risk containment and market contestability, reducing the barriers to entry of new competitors.

One of the main objectives of the Spanish capital-adequacy regulation has been to introduce capital requirements which are competitively neutral across banking institutions. At an international level, this objective has also shaped the (1988) BIS Agreement on Capital Adequacy Standards and the (1989) EC Capital Adequacy Directive. However, in practice the competitive neutrality of the bank capital-adequacy regulation is still a complex concept[8]. As displayed in Figure 9.4, the complexity involved in the competitive neutrality of the Spanish bank capital regulation fundamentally results from the following three reasons:

(a) Although all banking institutions in Spain are subject to the same minimum capital requirements, the range of capital instruments that the different institutions are allowed to use, vary. For example, Spanish savings banks cannot issue share equity, which, as described in Chapters 7 and 8, seems to impose a serious constraint on their possibilities of augmenting capital externally. Therefore, competitive neutrality does not appear to be accomplished in terms of the possibilities to augment capital.

(b) The capital adequacy regulation in Spain fixes minimum (risk-based and generic) capital ratios. However, it may happen that a certain institution is asked to maintain a capital ratio above the minimum required. For example, although the minimum Bank of Spain's generic ratio is 5 per cent, there could be cases in which certain banks under determined circumstances (such as those with serious financial difficulties) are requested to maintain capital ratios above the minimum. In this case, even if such an action was deemed as necessary and crucial for the survival of the bank, the competitive neutrality philosophy would not be maintained. In Chapter 8, we found evidence that largest Spanish private banks seem to maintain lower generic capital ratios than the smaller private banks. Apparently, this evidence is not consistent with the competitive neutrality philosophy.

Figure 9.4: Main Complexities in the Competitive Neutrality Implications of the Spanish Bank Capital Regulation



(c) A complexity arises because the Spanish capital regulation is imposed on institutions rather than on functions. It implies that the Spanish capital requirements seem to be far more onerous on banks than on non-bank institutions performing banking activities. In other words, the capital requirements impose a 'tax' on the activities performed by banking institutions, whereas the 'tax' is not imposed on the corresponding banking activities of non-bank institutions. In this case, the competitive neutrality does not appear to be accomplished, since there are institutions performing banking activities that are not subject to the Spanish regulation.

The implications of these reasons, whereby, in practice, the competitive neutrality of the Spanish bank capital adequacy regulation may not be accomplished, need to be discussed. As far as the first reason (a) is concerned, the implications of the apparently stricter constraint on savings banks than on private banks, could induce savings banks to search for alternative ways to overcome such a constraint. A possible way for savings banks to circumvent the apparently stricter capital regulation is financial innovation[9]. Financial innovation is frequently employed to circumvent or to lessen a supervisory restriction (Gardener, 1989a). Although all banks subject to the capital regulation might attempt to lessen this supervisory restriction, as a result of the higher regulatory constraint in terms of the legal range of capital instruments, Spanish savings banks seem more likely to attempt to lessen the impact of this regulation.

The use of subordinated debt appears to have become a partial solution for savings banks in terms of external capital. However, subordinated debt is not deemed as primary or Tier 1 capital, and, thus, it has not solved the problem of needed Tier 1 capital augmentations for savings banks.

As described in Chapter 4, a financial innovation denominated 'participation capital' was introduced in Spain in 1988. It was meant to help savings banks augment capital. However, it did not appear to be attractive enough for savings banks, since no Spanish savings bank had issued participation capital during 1988-90. Therefore, it would seem that financial innovation has not solved the problems that savings banks encounter in terms of capital augmentations.

As we found in Chapter 8, a strategy that seems to be more effective for savings banks to lessen the impact of the more limited legal possibilities of augmenting capital is a merger process. The Spanish savings banks involved in mergers in 1990 had far higher capital augmentations than the non-merged savings banks. The tax exemption on the 'hidden value' that arises in a merger seems to be one of the major reasons behind these mergers, since it allows banks to convert 'hidden value' into accounting and regulatory capital at no additional tax cost. In other words, merged savings banks were able to augment book-value and regulatory capital at no extra tax cost. However, as discussed in Chapter 8, as a consequence of the managerial and operational difficulties involved in any merger process, this strategy is likely to be effective only in the short term, since it does not appear advisable for a bank to be engaged in mergers continuously.

There are implications of these mergers between savings banks for the structure of the Spanish banking industry. During 1987-90, as a result of the mergers in 1990, the number of savings banks have decreased, whereas the average size of the savings banks has increased. In other words, in the case of the savings banks' sector, there has been a concentration into a smaller number of larger banking units. One could argue that, *inter alia*, the stricter regulatory constraint on savings banks in terms of capital instruments appears to induce merger processes that could lead to a concentration process in the savings banks' sector. The capital supervisory constraint seems to be one the major causes behind the concentration processes in the savings banks. In other words, it would appear that the competitive neutrality of the bank capital regulation in Spain is not accomplished, since this regulation seems to benefit merged savings banks in terms of capital augmentations.

As for the second reason (b), the apparently different generic capital ratios maintained across bank sizes has implications for the competitive neutrality of regulation, and also for the structure of the Spanish banking industry. In Tables 8.9 and 8.10, the estimates of the generic capital ratios seemed to indicate that larger private banks held lower capital ratios than the smaller private banks, whereas the generic capital ratios across savings banks' sizes were very similar. In addition, private banks seemed to maintain higher capital ratios than the savings banks. These differences in terms of capital ratios across bank sizes and between types of institutions are not in line with the competitive neutrality philosophy.

If certain banks are explicitly or implicitly induced by bank regulators to maintain higher capital ratios, regulators are imposing a higher 'tax' on these banks. The setting of higher capital requirements for certain banks raises the required level of basic profitability, since capital needs to be raised (internally through retained earnings, or externally where the bank's profitability is equally important in order to attract external capital) and serviced. Therefore, the higher capital requirements for certain banks mean higher costs of capital, and in turn, *ceteris paribus*, a higher supply price of services by these institutions (Llewellyn, 1989). Consequently, those banks that are induced to maintain higher capital ratios are disadvantaged, and the competitive neutrality philosophy is not accomplished.

Another disadvantage for those banks maintaining higher capital ratios is the impact of the capital ratios on the rates of Return on Capital (ROC). In order to examine this disadvantage, the following formula will be examined:

$$ROC = ROA \,/\, (K/A) \qquad (9.1)$$

where K is capital and A is total assets. Essentially, bearing that formula in mind, one can argue that banks with higher capital ratios, *ceteris paribus*, need to have higher ROAs in order to obtain values of ROC similar to those of the banks with lower capital ratios. As ROC is the relevant performance measure for shareholders and potential investors, capital will flow to where rates of ROCs are highest[10]. The theoretical relationship between the bank capital-to-assets ratio and ROC is very frequently hypothesized to be negative[11]. Consequently, banks with higher capital ratios need to make stronger efforts in the form of higher rates of ROA, in order to obtain attractive rates of ROC for shareholders and potential investors. These stronger efforts to obtain attractive rates of ROC can be read as a disadvantage for those banks with higher capital ratios.

In Chapter 8, the researcher found evidence that the larger private banks in Spain maintained lower capital ratios than the smaller private banks during 1987-90. Peltzman (1984) found similar results for the U.S. banking system. The evidence found in our research seems to be consistent with the Spanish banking supervisory authorities acknowledging that larger banks bear less risk[12].

This evidence seems to have implications for the structure of the private banks' sector in Spain. The lower capital ratios for larger private banks imply the existence of 'economies of scale in terms of capital ratios', which could encourage private banks to increase size in order to take full advantage of those scale economies. Increasing size through mergers would have the additional advantage of the tax exemption on the capital augmentations resulting from the emergence of the 'hidden value'. One can argue that, again, the Spanish bank capital-adequacy regulation seems to benefit larger banks (in this case, larger private banks), and, somehow, seems to induce private banks to increase size. This could lead to a concentration into a smaller number of larger banking units, which could change the structure of the Spanish banking industry.

The empirical evidence in Chapter 8 also showed that private banks in Spain seemed to maintain higher capital ratios than savings banks during 1987-90. This can be understood as savings banks bearing lower risk than private banks, and, in turn, as savings banks needing lower capital ratios than private banks. This seems to be consistent with the regulatory decrease in the contribution to the Deposit Guarantee Fund for the savings banks in 1988[13]. This deregulatory decrease in their DGF contribution resulted from the fact that no Spanish savings bank had needed to be saved or helped by the DGF to overcome a financially difficult situation. Therefore, from this evidence, one can argue that Spanish savings banks appear to be generally less risky than private banks.

Finally, the competitive neutrality implications of reason (c) are likely to affect the business structure of banking firms in Spain. The fact that in Spain, non-bank institutions engaged in banking activities are not subject to the capital adequacy requirements implies that they are on a better legal footing, since they do not have to comply with the higher cost (in other words, 'tax') associated with obligatory capital requirements. Hence, banking institutions are disadvantaged in terms of capital regulation compared with the non-bank institutions performing banking activities.

There are authors who argue that competitive neutrality would need a common set of regulatory arrangements for all institutions potentially in competition with banks (Llewellyn, 1989, Gardener, 1991a). At both national and international levels, it is partly for this reason that it is likely that further attempts at regulatory convergence will be made to encompass a wider range of institutions and markets than just banks.

Llewellyn (1989) suggests that capital regulation encourages certain trends in the business structure of the banking firms that can be applied to those banking firms operating in Spain. These banking trends, whose main purpose is apparently to circumvent the higher cost that is comprised in the capital regulation, follow from (c)[14]:

1) The encouragement of off-balance-sheet business in order to raise the rates of ROA and ROC.

2) The development of fee income and non-balance-sheet services.

3) Securitisation of actual and potential bank assets to alleviate balance sheet constraints determined by capital[15].

4) Sales of parts of the business that are not sufficiently provided to generate the required ROC. This represents a restructuring of the business of the banking firm in Spain.

5) The trading of assets (such as asset endorsement, frequently observed in Spain[16]) to generate fee income.

6) The loss of high-quality assets if capital regulation implies a change in pricing in a way that makes some lending business less competitive with regard to the capital markets.

In a general strategic dimension many of these implications appear to indicate, at the margin, a shift in the nature of banking away from the traditional role of financial intermediation on the balance sheet, towards a brokerage role implying intermediation without expanding the size of the balance sheet; and, thereby, a lower proportion of financial intermediation business being conducted through the balance sheet of banks. As seen in Chapter 2, this disintermediation process appeared in Spain during the 1980s, and changed the structure of the banking business in Spain. This process is likely to continue, since financial intermediation activities conducted by banks are subject to ('penalized' by) the capital adequacy regulation, whereas financial intermediation conducted by non-bank firms is not subject to capital requirements.

9.5.- SYNTHESIS.

In this chapter, the implications of the findings in Chapters 7 and 8 have been examined. Firstly, the implications for the role of the market (*versus* bank regulation) in regulating and monitoring capital adequacy in Spain were studied. At a micro level, one can argue that the non-existence of shareholders in savings banks seems to make a stronger case for capital regulation of savings banks than of private banks. It was also emphasized that in order to capture all the risks of the banking firm, Spanish RAR capital ratios should be extended to a wider range of risks. At a macro level, the enhancement of supervisory regulation in 1985 seems to have increased the financial stability of the Spanish banking markets.

Secondly, the somewhat confusing picture of findings drawn in Chapters 7 and 8 was analyzed and justified: (i) banking theory appears to be inconclusive in many decisions of the banking firm, and (ii) two contradictory forces (deregulation and re-regulation) were influencing the Spanish banking markets during 1987-90.

Finally, the implications for the competitive neutrality of the Spanish capital adequacy regulation were discussed. Despite the regulatory efforts to obtain a 'level playing field' for all bank institutions in Spain, there seem to be cases in which the competitive neutrality is not maintained.

NOTES:

1.- There is also international evidence of this: see, for example, Hislop (1987), and Gardener (1990b).

2.- The EC Capital Adequacy Directive (CAD) and the Investment Services Directive take account of a wider range of bank risks.

3.- See, for example, Llewellyn (1986, p.64)

4.- See Koehn and Santomero (1980) and Gardener (1989a, 1991a).

5.- See, for example, Santomero (1984) and Sinkey (1992, pp 102-105) for a review of the theoretical models of the banking firm, in which different perspectives and models of behaviour of the banking firm are identified.

6.- See, for example, Cecchini's study on the Single European Market (Commission of the European Communities, 1988).

7.- Molyneux (1988) discusses the complexities involved in the concept of competitive equality.

8.- See Llewellyn (1989, p. 120-122) for an evaluation of the main reasons of the complexities involved in the competitive neutrality of implementation of the BIS and the EC capital requirements. Price Waterhouse (1991) surveys the main issues in the implementation of the BIS and the EC capital adequacy requirements in different countries.

9.- There is an extensive literature on financial innovation: see, for example, Podoloski (1986, Chapters 7 and 8) and Miller (1986) for a review of the main theoretical and practical issues on financial innovation.

10.- See Peltzman (1984).

11.- See, for example Peltzman (1984). However, contrary to conventional wisdom, Berger (1992) provides empirical evidence of a positive relationship between the capital-to-assets ratio and ROE for the U.S. banks during 1983-89.

12.- In Section 8.4.2, it was noted that a potential advantage of size is the higher possibilities of diversification, and, in turn, of lower risk.

13.- See Section 3.5.4 (Chapter 3).

14.- Tables 2.9 and 2.10 (Chapter 2) provide empirical evidence of the changes in the on-balance-sheet business structure of the Spanish private and savings banks during 1982-87.

15.- See Gardener and Revell (1987) for a study of the securitisation process in modern banking.

16.- See Table 2.10.

CHAPTER 10 : CONCLUSIONS AND LIMITATIONS

10.1.- INTRODUCTION.

In this final chapter, the main conclusions and limitations of this research are examined. This chapter attempts to summarize the main findings and limitations of this thesis.

Section 10.2 will be devoted to the conclusions, whereas Section 10.3 will revise the main limitations.

10.2.- CONCLUSIONS.

The importance of bank capital adequacy in an era of financial deregulation and intense competition, and the little empirical research on capital adequacy in the Spanish banking system, lies behind the motivation for the theoretical and empirical analysis of this thesis. This research has examined the impact of the Spanish capital-adequacy requirements on bank capital augmentations of the banking institutions operating in that country during 1987-90.

Until very recently, the Spanish banking sector has been considered as a rather static, sheltered, over-regulated and relatively inefficient sector. However, as studied in Chapter 2, major changes (liberalization, new perspectives in the prudential supervision of banks and Spain's entry to the EC) took place in the Spanish banking system during the 1980s that resulted in a dramatic transformation of the competitive conditions of the Spanish banking sector.

One of the most important aspects of the transformations in the Spanish banking system during the 1980s, was the changes in regulation. The liberalization of the Spanish banking markets was completed in 1987. The reform of the capital adequacy requirements in Spain in 1985, *inter alia*, resulted from the severe banking crisis that the Spanish banking industry suffered during the late 1970s and early 1980s. As described in Chapter 3, these capital adequacy requirements are merely related to credit risk, and are in line with the RAR model of the 1988 BIS Agreement and the 1989 EC Directives.

After 1985, the capital positions of the Spanish banks seemed to improve. The exploratory evidence provided in Chapter 4 seems to imply that during 1987-90 the Spanish banks were well-capitalized in terms of accounting, regulatory and market values of capital. They appeared to maintain higher capital ratios than banks in other major European banking systems.

After revision of the theoretical aspects that shape bank capital decisions in Chapter 5, several testable hypotheses with regard to the impact of capital regulation on bank capital augmentations were suggested. With the theory revised in Chapter 5, and a field survey undertaken among several Spanish bankers, an empirical model of bank capital augmentations was developed in order to test those hypotheses.

In Chapters 7 and 8, the methodology, tests and main findings were reported. The main findings of Chapters 7 and 8 are summarized in Table 10.1. In Chapter 9, the policy implications of these findings were discussed.

Table 10.1 : Main Empirical Findings in this Research

Feature	Main Findings
1) Fit of the empirical model in Spain	Better for savings banks than for private banks.
2) Impact of regulatory variables	Capital regulation seems a harder constraint for savings banks.
3) Impact of market-based variables	Profitability seems more important for savings banks. Cost of capital and access to capital markets seem more important for private banks.
4) Impact of size	a) MV-BV relationship appears consistent with the TBTF doctrine. b) Lower capital ratios for larger than for smaller private banks. c) Important impact of mergers on capital augmentations of savings banks.

The picture obtained in Chapters 7 and 8 appears to offer mixed evidence. This seems to result from the fact that banking theory appears inconclusive on many key decisions of the banking firm, and from the fact that two simultaneous regulatory pressures (structural deregulation *versus* supervisory re-regulation) were operating in Spain during 1987-90.

At a macroeconomic level, the main conclusions of this research seems to be that since the introduction of risk-based capital requirements in 1985, the Spanish banking system appears to have significantly higher levels of financial stability and safety than before 1985.

The main microeconomic conclusions of the empirical analysis are the following:

1) *The Fit of the Model*: in the case of the book-value and regulatory definitions of capital augmentations, the empirical model of capital augmentations seems to explain savings banks' capital augmentations far better than private banks' capital augmentations. There appear to be variables not included in the model, like management philosophy, which are very difficult to quantify, but which seemingly play an important role in terms of capital augmentations. Private banks appear to have wider leeway in terms of management discretion when it comes to capital augmentations.

When the empirical model of capital augmentations was applied to the market-value definitions of capital for the Spanish private banks quoted on the stock markets, the results were relatively weak. The difficulties suggested in the literature in employing market values and the relative thinness and inefficiencies of the stock markets in Spain seem to lie behind these weak results.

2) *The Impact of the Regulatory Variables:* the impact of capital adequacy regulation on capital augmentation appears to be different between private and savings banks. It was found to have an apparent strong influence on the process of capital augmentations for savings banks, whereas the influence on capital

augmentations for private banks is seemingly much weaker. Capital regulation appears to be a much stricter constraint for savings banks than for private banks. The fact that savings banks have a more restricted set of legal instruments to augment capital appears to lie behind the different impact for savings banks and private banks. Although the minimum required capital ratios are equal for both types of institution, the more limited set of capital instruments for savings banks seems to imply that these banks apparently have to operate in the increasingly competitive, Spanish banking markets with a stricter regulatory constraint. In this case, the competitive neutrality of regulation does not appear to be maintained.

Despite the promulgation of the BIS Agreement and the EC Directive in 1988 and 1989, respectively, the impact of the capital regulation variable did not change significantly over 1987-90. This seems to imply that although many banks monitor their BIS and EC solvency ratios, they still give more importance to the domestic capital ratios they have to meet: the Bank of Spain's specific and generic capital ratios.

As far as the impact of portfolio risk on capital augmentations is concerned, its influence seems to be very weak. This finding appears to be against RAR philosophy. A possible explanation is that Spanish banks seem to be well-capitalized during the period analyzed, and this could make the relationship of capital-portfolio risk less stringent.

In order to reflect fully the risks of the banking firm, the Spanish credit risk-based solvency ratio needs to be extended to other risks of the banking firm (i.e. liquidity risk, settlement risk, interest rate risk, etc.).

Finally, the effects of the deposit insurance on capital augmentations seem very weak and unclear. This confirms the opinions given by several Spanish bankers in the field survey. Two bankers said that deposit insurance does not affect capital augmentations, and four bankers said that the sign of the impact was unclear.

3) *The Impact of the Managerial and Market-Based Variables*: profitability seems to be a key managerial variable for savings banks. However, it does not appear to be so important for private banks. Profitability is a key variable with regard to capital augmentations since in practice it is the only way for savings banks to increase Tier 1 capital.

Market-based variables such as cost of capital, deposit growth and access to capital markets appear to be more important for private banks than for savings banks. However, liquidity seems to play a limited role in the process of capital augmentations in the Spanish banking system.

4) *The Impact of Size on Bank Capital Augmentations in the Spanish Banking System:* the estimations of SMVAM model for large private banks and medium-sized banks separately appear to imply that the largest banks have higher 'hidden value' than the medium-sized banks, although in 1990 there was a dramatic decrease in market value. In addition, although medium-sized banks seem to

always have the government guarantees behind their market values, the government guarantees appear to reach far higher values when the largest banks cannot keep up their market values. This is seemingly consistent with the TBTF hypothesis.

As far as the impact of size on bank generic capital ratios and how capital augmentation affected those ratios is concerned, the empirical findings seem to be clear only in terms of capital ratios: larger private banks appear to maintain lower generic capital ratios than smaller private banks, whereas all sizes of savings banks maintain very similar capital ratios. The findings for the private banks appear to imply that the competitive neutrality of regulation is not maintained. This advantage for larger private banks could encourage them to increase size and the private banking sector might become more concentrated.

In terms of capital augmentations, the evidence is mixed: there is no clear sign in the impact of size on capital augmentations. As a result, it was necessary to test the impact of size on the internal capital generation rates for both private and savings banks operating in Spain. In the case of the private banks, there seem to be certain 'economies of scale' in terms of internal capital generation, but they appear to disappear for the largest banks sizes in Spain. In the case of the savings banks, again there seem to be certain 'economies of scale' in terms of profitability and internal capital generation for the Spanish savings banks during 1987-90, but they tend to disappear for the very large bank sizes.

In the case of the savings banks, the impact of the mergers on capital augmentations was also estimated. It was found that the means of the capital augmentation rates for the savings banks involved in mergers seem to be far higher than those of the non-merged savings banks. Therefore, there seem to be benefits for the banks involved in mergers in terms of capital augmentations. In addition, the certain 'economies of scale ' in terms of capital growth that could result from mergers tend to be more important for the medium-sized savings banks than for the largest savings bank sizes. This advantage for merged banks could encourage banks to increase size through mergers, and the banking sector could become more concentrated.

10.3.- LIMITATIONS.

The limitations of the analysis undertaken in this research have been mentioned throughout this thesis. Nevertheless, the main limitations are summarized in this section.

As depicted in Figure 10.1, there are three main areas into which the limitations can be classified:

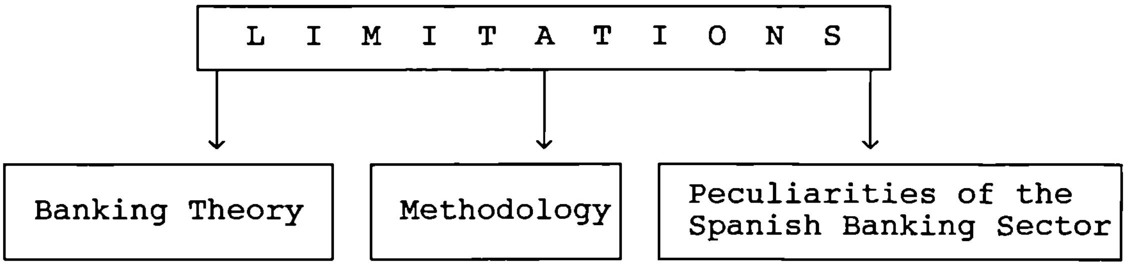
1) *Limitations of the Banking Theory*: as discussed in Chapter 9, banking theory is inconclusive on most of the decisions of the banking firm. Most aspects and problems of the banking firm can be viewed and solved from very different perspectives and models. This results in contradictory theories and perspectives. One must also consider that many of the perspectives employed in this research comprise assumptions and restrictions. Thus, there seem to be contradictions and restrictions in the banking theory, which

impose limitations on any analysis that attempts to explain the behaviour of the banking firm.

A major limitation of the banking theory with regard to the effects of bank regulation is that most studies focus either on the impact of deregulation *or* on the impact of supervisory re-regulation. However, there is very limited work developed in an environment in, which both deregulation and re-regulation are operating simultaneously (as in Spain).

In order to overcome some of the limitations of the banking theory, and in order to define a model of bank capital augmentations for Spain, the researcher performed a field survey among Spanish bankers.

Figure 10.1 : Classification of Limitations



2) *Methodological Limitations*: as described in Chapter 7, the use of statistical tools such as regression analysis, the econometric tests employed in this research, and the use of financial ratios can be very useful to obtain rigorous empirical evidence. However, these instruments have their own limitations.

It is necessary to emphasize that the kinds of empirical experiments and tests possible in social sciences, like economics, are restricted. Statistical tools such as regression analysis and dummy variables, and the use of financial ratios are a selection of the limited types of test that can be carried out.

3) *Limitations of our 'laboratory': the Spanish Banking System*: as described throughout this thesis, the Spanish banking system has certain peculiarities that involve limitations for the analysis. The dramatic transformations in the Spanish banking system during the last two decades seem to have helped foster the existence of a very heterogeneous sample of banking institutions. The heterogeneous sample of banks in the sector is an important limitation, since, as has happened to other researchers using Spanish banking data, it involves dividing the sample (into private and savings banks), and deleting several extreme observations.

The fact that only a certain number of private banks have market-value information imposes quantitative limitations on the market-value analysis. In addition, the thinness and inefficiencies of the Spanish stock markets appears to be a limitation for the quality of market-value information.

Finally, as a consequence of the lack of extensive market-value data, this research needed to rely heavily on accounting data, which seem to be manipulated more easily by the firm, and which might offer a somewhat distorted view of the firm. Nevertheless, it is accounting and regulatory capital adequacy data that banks and regulators do appear to target in practice.

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APPENDIX A
FIELD SURVEY

In this Appendix, the field survey that the researcher carried out among several private and savings banks is described. The researcher first spoke with four Spanish bankers (Banco de Santander, Bankinter, Banco Popular Español and Caixa de Pensions) in February 1992. In April 1992, in order to systematize the information, a written questionnaire was sent out by mail to twelve of the largest private and savings banks (Banco Bilbao Vizcaya, Banesto, Banco de Santander, Banco Popular Español, Bankinter, Banco Central HispanoAmericano, Banco Zaragozano, Banco Exterior de España, Banco de la Pequeña y Mediana Empresa, Caixa de Pensions de Barcelona, Caja de Madrid, Caja de Ahorros de Cataluña). It was optional to state the name of the institution in their responses to the questionnaire. Seven questionnaires were answered and returned in May 1992. The questionnaire, which was written and completed in Spanish, contained the following questions (the version presented here is the translation of the original questionnaire into English):

QUESTIONNAIRE

Name of the Banking Institution (optional):

According to the experience and knowledge that you may have, with regard to the impact of the capital adequacy regulation on your institution and on the Spanish banking system in general, answer the following questions:

1) Sort the following variables according to their importance when it comes to augmenting your institution's capital accounts:

__ The existing solvency regulation.
__ Profitability.
__ Cost of capital.
__ The market valuation of your institution's risk.
__ The easy access to capital markets to issue new equity and capital instruments.
__ Liquidity
__ Other variables (specify):

2) Tick the main action that you would carry out if your institution considered that the existing capital was 'inadequate' in terms of the definition of the solvency regulation (tick only one answer):

a) The capital accounts would be augmented.

b) The portfolio mix would be modified.

c) The asset growth would be reduced.

d) The three previous actions would be undertaken simultaneously.

e) Other actions (specify):

3) Tick the solvency ratios that your institution is regularly monitoring:

a) The specific ratio of the Spanish regulation.

b) The generic ratio of the Spanish regulation.

c) The BIS capital ratio.

d) The EC Directive capital ratio.

e) Other (specify):

4) Sort the following ratios according to the importance given in your institution when it comes to monitoring them:

__ The specific ratio of the Spanish regulation.

__ The generic ratio of the Spanish regulation.

__ The BIS capital ratio.

__ The EC Directive capital ratio.

__ Other (specify):

5) Tick according to your knowledge and experience the main impact of the existence of a Deposit Guarantee Fund on capital augmentations:

a) It reduces capital augmentations, and therefore, it produces the denominated 'substitution effect' of deposit insurance for capital.

b) It does not affect capital augmentations at all.

c) It induces capital augmentations.

d) The impact remains unclear.

e) Other effects (specify):

Additional Comments:

RESULTS:

The results of the questionnaire were the following:

1) In the first question, five banks answered that the existence of profits and the capital regulation were the two main variables considered in terms of capital augmentations. Three private banks also considered cost of capital as a very important variable but the savings banks put cost of capital at the bottom of the list. Liquidity, access to capital markets and the market valuation of the institution's risk were not considered so important as profitability and regulation. One of the private banks added a comment which said that they were very proud of having increased their capital accounts during the last ten years only by means of retained earnings (profitability).

2) In the second question, four banks answered that the only action they undertake is to augment capital. The other three banks answered c): the three actions would be undertaken simultaneously). The fact that 4 banks (out of 6) answered that the only action they would undertake is to augment capital appears to be against RAR philosophy.

3) In the third question, the Bank of Spain's specific and generic ratios and the EC solvency ratio were ticked by the seven banks. The BIS ratio was only ticked by two banks. Thus, it seems that the Spanish banks are more concerned with the evolution of the Spanish and EC capital regulation.

4) In the fourth question, the Bank of Spain's specific and generic ratios were considered the most important ratios in general. The EC ratio came third in five answers and first in one answer. The BIS ratio was generally considered at the bottom of the list.

5) In the fifth question, five banks said that the effects of the deposit insurance on capital augmentations is unclear whereas two banks said that it does not affect capital augmentations at all. Therefore, the impact of deposit insurance on capital augmentations appears unclear and very limited.

APPENDIX B
CORRELATION MATRICES

CHAPTER 7:

Table B.1: Correlation Matrices for Private Banks (1987-90)

1987

	ΔK_1	ΔK_2	ΔK_3	PF	CC	PK	LQ	ΔD	KR	DI
ΔK_2	.973									
ΔK_3	.961	.981								
PF	-.012	-.014	-.012							
CC	-.019	-.008	-.062	.505						
PK	.005	.001	.009	.039	-.048					
LQ	.177	.169	.147	.022	.151	-.021				
ΔD	.026	.022	.027	-.057	-.004	-.018	.055			
KR	.075	.085	.098	.165	-.323	.039	-.106	.020		
DI	-.085	-.097	-.075	-.047	.025	.019	-.103	-.111	.129	
CM	-.014	.017	.038	.096	.124	-.071	-.067	-.059	.122	.343

1988

	ΔK_1	ΔK_2	ΔK_3	PF	CC	PK	LQ	ΔD	KR	DI
ΔK_2	.980									
ΔK_3	.950	.968								
PF	-.057	-.065	-.051							
CC	.025	.025	.014	.062						
PK	.021	.045	.036	-.027	.338					
LQ	.097	.108	.102	-.034	-.026	-.008				
ΔD	-.044	-.018	.003	-.041	-.062	-.005	.146			
KR	.036	.020	.033	.070	-.673	-.020	-.036	.027		
DI	-.109	-.117	-.145	-.031	.094	-.129	-.174	-.133	-.047	
CM	-.015	-.020	-.013	.077	.084	-.053	-.107	-.074	.053	.395

1989

	ΔK_1	ΔK_2	ΔK_3	PF	CC	PK	LQ	ΔD	KR	DI
ΔK_2	.999									
ΔK_3	.999	1.000								
PF	-.039	-.039	-.037							
CC	-.023	-.024	-.030	-.277						
PK	-.012	-.014	-.014	.067	.015					
LQ	-.013	-.014	-.015	-.064	-.032	-.042				
ΔD	-.003	-.003	-.003	-.120	-.005	.357	-.004			
KR	.098	.103	.103	-.015	-.228	-.190	-.038	.078		
DI	-.091	-.094	-.094	.168	-.061	-.187	.046	-.095	.018	
CM	-.052	-.054	-.054	.243	-.033	-.106	-.076	-.054	.061	.282

1990

	ΔK_1	ΔK_2	ΔK_3	PF	CC	PK	LQ	ΔD	KR	DI
ΔK_2	.994									
ΔK_3	.977	.987								
PF	.032	.037	.057							
CC	.057	.059	.074	.541						
PK	.005	.007	.018	.012	.019					
LQ	-.013	-.012	-.014	.185	.046	-.007				
ΔD	-.132	-.136	-.181	-.045	-.034	-.020	-.015			
KR	.260	.261	.300	.050	-.080	-.072	.063	-.306		
DI	.029	.041	.084	-.068	-.060	.027	-.081	-.201	.230	
CM	.004	.015	.029	.006	-.032	-.068	-.060	-.123	.158	.293

Table B.2: Correlation Matrices for Savings Banks (1987-90)

1987

	ΔK_1	ΔK_2	ΔK_3	PF	CC	PK	LQ	ΔD	KR
ΔK_2	.792								
ΔK_3	.768	.847							
PF	.554	.291	.426						
CC	.592	.450	.408	.190					
PK	-.161	-.164	-.155	-.061	-.137				
LQ	-.063	-.039	-.052	.167	-.061	-.015			
ΔD	-.113	-.061	.017	.119	-.186	.090	.118		
KR	-.059	-.155	.027	.441	-.541	.124	-.194	.229	
DI	.262	.266	.109	-.014	.333	-.189	-.032	-.616	-.376

1988

	ΔK_1	ΔK_2	ΔK_3	PF	CC	PK	LQ	ΔD	KR
ΔK_2	.722								
ΔK_3	.730	.936							
PF	.161	-.050	-.116						
CC	-.004	-.066	-.105	.295					
PK	-.160	-.119	-.138	-.046	.154				
LQ	.046	-.129	-.120	.260	.029	-.399			
ΔD	-.139	-.166	-.077	.119	-.003	.351	-.107		
KR	.161	.149	.133	.268	-.107	.084	.142	.081	
DI	.211	.181	.187	.179	.038	-.550	.224	-.368	-.192

1989

	ΔK_1	ΔK_2	ΔK_3	PF	CC	PK	LQ	ΔD	KR
ΔK_2	.885								
ΔK_3	.825	.894							
PF	.489	.354	.395						
CC	.118	.079	-.016	.241					
PK	-.015	.021	.057	-.027	-.015				
LQ	-.138	-.135	-.135	-.259	-.132	-.016			
ΔD	-.006	-.016	.046	.169	.005	-.156	-.406		
KR	.279	.190	.343	.395	-.299	.149	-.045	-.185	
DI	.086	.137	.128	-.148	.138	-.042	-.048	-.499	-.022

1990

	ΔK_1	ΔK_2	ΔK_3	PF	CC	PK	LQ	ΔD	KR
ΔK_2	.979								
ΔK_3	.939	.971							
PF	.165	.162	.077						
CC	.341	.314	.211	.423					
PK	-.075	-.087	-.071	-.106	-.115				
LQ	-.321	-.328	-.330	.132	.056	-.113			
ΔD	-.058	-.041	-.141	.309	.209	.087	.004		
KR	.472	.470	.397	.314	-.065	-.230	-.176	.130	
DI	-.454	-.444	-.423	.085	.200	-.101	.351	-.108	-.338

CHAPTER 8 :

Table B.3: Correlation Matrices for Private Banks with PF^*.

	1987	1988	1989	1990
	PF^*	PF^*	PF^*	PF^*
ΔK_1	.052	-.002	-.073	.033
ΔK_2	.046	-.015	-.075	.042
ΔK_3	.051	-.020	-.075	.071
CC	.277	.214	-.017	.020
PK	.299	-.067	.056	.037
LQ	-.072	-.089	-.108	-.014
ΔD	-.054	-.087	-.079	-.060
KR	.175	.036	.125	.243
DI	.089	.189	.157	.073
CM	.220	.255	.297	.036

Table B.4: Correlation Matrices for Private Banks with Market-Value Capital (1987-90).

1987

	ΔK_4	ΔK_5	PF^*	CC	PK	LQ	ΔD	KR
ΔK_5	.816							
PF^*	.291	.069						
CC	.181	.045	.570					
PK	-.007	.038	-.306	-.201				
LQ	-.206	-.391	-.150	-.084	.011			
ΔD	.065	-.282	.059	.079	-.161	.695		
KR	.264	.234	.526	.336	-.624	-.498	-.307	
DI	-.394	-.092	-.243	-.208	-.060	-.407	-.489	.161

1988

	ΔK_4	ΔK_5	PF^*	CC	PK	LQ	ΔD	KR
ΔK_5	.470							
PF^*	-.005	.004						
CC	.152	.009	.411					
PK	-.114	-.159	-.163	-.180				
LQ	-.269	-.326	-.040	.008	-.169			
ΔD	.041	.120	-.063	-.036	-.050	.182		
KR	.203	-.129	.450	.180	-.614	.289	.106	
DI	-.080	.685	-.293	.077	-.358	-.483	-.040	-.174

1989

	ΔK_4	ΔK_5	PF^*	CC	PK	LQ	ΔD	KR
ΔK_5	.581							
PF^*	-.434	-.495						
CC	-.050	-.275	.308					
PK	.081	.001	-.070	.070				
LQ	.211	.198	.051	.335	-.239			
ΔD	-.024	-.196	.198	-.017	-.105	-.230		
KR	-.284	-.228	.679	.118	.147	.005	-.094	
DI	.264	.343	-.286	.563	-.120	.632	-.263	-.153

1990

	ΔK_4	ΔK_5	PF^*	CC	PK	LQ	ΔD	KR
ΔK_5	.932							
PF^*	.194	.081						
CC	.369	.296	.355					
PK	.026	.061	-.172	-.266				
LQ	.034	.220	-.203	-.210	.165			
ΔD	-.396	-.462	.165	-.054	-.044	-.111		
KR	.136	.041	.642	.165	.005	.230	-.011	
DI	.312	.257	.056	.668	.106	-.082	-.013	.017