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Structure-conduct-performance and efficiency in Gulf Co-operation Council (GCC) banking markets

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STRUCTURE-CONDUCT-PERFORMANCE AND EFFICIENCY IN GULF CO-OPERATION COUNCIL (GCC) BANKING MARKETS

A THESIS
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List of Acronyms

AE	Allocative Efficiency
APX	Alternative Profit X-efficiency
Avg.	Average
BA	Bahrain
BD	Bahraini Dinar
BDMS	Bank Deposits Market Share
BIS	Bank for International Settlement
BMA	Bahrain Monetary Agency
BLMS	Bank Loans Market Share
BSE	Bahrain Stock Exchange
C	Commercial
CBK	Central Bank of Kuwait
CBO	Central Bank of Oman
CD	Certificate of Deposit
CE	Cost Efficiency
CONC	Concentration
CR	Concentration Ratio
CRS	Constant Return to Scale
DEA	Data Envelopment Analysis
DF	Degree of Freedom
DFA	Distribution Free Approach (Analysis)
EC	European Community
EMU	Economic and Monetary Union
FDH	Free Disposal Hull
FF	The Fourier- Flexible
GCC	Gulf Co-operation Council
GDP	Gross Domestic Product
GNP	Gross National Product
IMF	International Monetary Fund
IS	Islamic

List of Acronyms (Continued)

Inv	Investment
K	Capital adequacy ratio
LR	Log Likelihood Ratio
M1	Money Supply 1
M2	Money Supply 2
Max	Maximum value
Min	Minimum value
MS	Market Share
N/A	Not available
No	Number
OLS	Ordinary Least Squares
RAC	Ray Average Cost
ROA	Return on Assets
ROE	Return on Equity
SA	Saudi Arabia
SAMA	Saudi Arabian Monetary Agency
SC	Scope efficiency
S	Asset quality ratio
SE	Scale Efficiency
SESRTCIC	Statistical Economic and Social Research and Training Centre for Islamic Countries
SFA	Stochastic Frontier Analysis (Approach)
SAR	Saudi Riyal
St.Dev	Standard Deviation
QMA	Qatar Monetary Agency
t	Time trend
TA	Total Assets
TD	Total Deposits
TB	Treasury Bills
TC	Total Cost
TE	Technical Efficiency

List of Acronyms (Continued)

TL	Total Loans
TFA	Thick Frontier Approach (Analysis)
UAECB	United Arab Emirates Central Bank
UEA	Unified Economic Agreement
UNDP	United Nations Development Programme
VRS	Variable Return to Scale
WTO	World Trade Organization

Abstract

This thesis examines the structure-conduct-performance hypothesis in six GCC banking markets, Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates between 1995 and 1999. Following Berger (1995) we distinguish among the four hypotheses [the two market power (MP) hypotheses (traditional SCP, and RMP) and the two efficient-structure hypotheses (X-efficiency and Scale-efficiency)] by incorporating into our performance models direct measures of X-efficiency and scale-efficiency. This provides more definitive results because the model specification can incorporate the reduced forms for all four hypotheses, and tests of the four hypotheses were performed by regressing measures of concentration, market share, X-efficiency and scale-efficiency against profitability (ROE, ROA and Alternative profit efficiency (APX). Our empirical findings strongly support the X-efficiency version of the efficient -structure hypotheses that cost X-efficiency helps in explaining the variability of bank profits. X-efficiency or superior management of resources is consistently associated with higher profits when controlling for the effects of the other three hypotheses. These findings indicate that; firstly, there is no evidence that market concentration enables banks to earn higher profits due to collusion. Secondly, market share appears to reflect bank's efficiency and not relative market power. The most important implications of these findings for GCC's policymakers is that, they should not be widely concerned about increasing concentration levels in banking markets from a competition standpoint.

CHAPTER I

1- INTRODUCTION

1.1 Aims and Methodology:

This study aims to investigate the profit–structure relationship in GCC banking markets (Saudi Arabia, Kuwait, Bahrain, Oman, Qatar and United Arab Emirates) by testing the market-power and efficient-structure hypotheses, during the 1990s. The main aim of this thesis is to investigate whether market structure really does matter in determining bank performance characteristics in the GCC member states banking markets in the period between 1995 and 1999. It aims to present evidence of the application of the SCP framework and the efficient structure hypothesis for the six GCC member state banking markets. This thesis builds on the prior approach of Berger (1995) considering the four hypotheses outlined, namely, the traditional SCP paradigm, the Relative Market Power hypothesis; the Relative Efficiency hypothesis and the Scale Efficiency hypothesis. We investigate the efficient structure hypotheses in an attempt to determine whether efficiency or market power factors are the main explanatory feature determining banking performance in the GCC member states banks. The efficient structure hypotheses is tested by using a stochastic cost frontier technique to derive measures of cost and profit X-efficiency and scale efficiency and then these are incorporated in the SCP regression model. The advantage of adopting this approach is that the relationship between performance and market structure will become clearer once the issue of efficiency has been adequately addressed. This empirical investigation aims to reveal interesting relationships and may help the relevant authorities and policymakers to better evaluate and understand the workings of GCC member states banking systems. If the traditional SCP hypothesis or the relative market power hypothesis is found to be evident in the GCC member states banking markets, this would imply that antitrust or regulatory policy should be aimed at changing market structure in order to increase competition or the quality of bank performance. If the efficiency hypotheses hold then increasing concentration in banking markets should not be of concern for policymakers in the GCC banking markets. As far as we are aware, this is the first study in which market power and efficiency aspects of the GCC banking markets have been investigated.

There have been various studies of the relationship between structure and performance in the banking literature. While European empirical banking research has not matched the volume of the US literature, a number of recent studies have sought to redress the imbalance as outlined in Goddard et al. (2001). However, the majority of SCP investigations are concerned with the US banking system where the structure of the market is quite different from other countries. The main difference lies in the fact that, in the US, many of the financial products such as retail deposits and small loans are offered on a local or domestic basis, and prices can differ quite significantly among these local markets. Therefore, the research emphasis tends to be on the relationship between local market concentration and performance measures. Moreover, the US banking market is relatively unconcentrated at a national level, as Berger and Humphrey (1997, p. 195) have noted:

> Although some financial products such as large certificates of deposits and large wholesale loans are competed on a nationwide basis, the US national market is extremely unconcentrated by world standards. for example, it would take over 2000 banking organizations to account for 90% of deposits in the US, while in most other developed countries 90% of deposits would be accounted for by fewer than 10 organizations.

The aim of this thesis is to investigate whether market structure or bank level efficiency are the main factors influencing bank performance in GCC states. The majority of the US literature tends to find that market structure influences bank performance although the statistical relationship is rather weak. More recent studies, such as Berger (1995) and Berger and Hannan (1997) find that bank-level efficiency is a more important determinant of bank performance. The European studies, however, tend to find stronger evidence that the traditional SCP paradigm holds- concentration influences performance (see Molyneux et al. 1996).

1.2 Study Motivations:

Heggestad (1979) identifies three main questions that tests of the SCP relationship in banking markets aim to answer:

Firstly, is it market structure or the complex regulatory regimes that really determine banking performance characteristics?

Secondly, which aspects of market structure and which types of regulations have the greatest impact on banking performance?

Thirdly, what aspects of bank performance are mostly affected by changes in market structure?

Once academic researchers have shed sufficient light on these issues, they may put forward policy recommendations to help establish those particular market structure characteristics that benefit both consumers and producers of banking services. Furthermore, Molyneux et.al. (1996, p. 93) has noted that " the study of the SCP relationship in banking is mainly used to evaluate which type of banking structure best serves the public in terms of both the cost and the availability of banking services". In addition to the aforementioned, there are three other main reasons that justify this study of the relationship between market structure and performance in GCC member states banking markets.

Firstly, as far as we are aware, there have been no previous studies that investigate market structure and performance relationships in GCC banking markets.

Secondly, the analysis will contribute to our general understanding of the determinants of bank performance in GCC countries.

Thirdly, an explanation of the relationship between market structure and bank performance in the GCC will assist researchers and policy makers in matters relating to potential changes in the institutional environment of the GCC banking industry, particularly the potential impact of banks mergers and acquisitions on industry structure and performance.

> There are other reasons why banking provides such an interesting academic and policy experiment for mergers. First, competition in banking has been restricted for a long time by geographic and other restrictions, so inefficiencies might be expected to persist. The market for corporate control in banking has also been quite limited, since nonbanks are prohibited from taking over banks, and the geographic barriers to competition have also reduced the potential for takeovers by more efficient banks. These restrictions on competition both in the product markets and in the market for corporate control may have protected inefficient managers. Humphrey et al. (1997,p.3)

Thus, the importance of the relationship between market structure and bank performance in general, together with the lack of empirical research on this relationship in the GCC member states banking markets, provides the main motivation for this study.

1.3 Background to the study:

The structure-conduct-performance paradigm, dating back to Mason (1939) and Bain (1951), has long dominated scholars thinking and public policy toward the effects of industry structure on firms' behavior, profit levels, consumer welfare, and total welfare (Shaffer, 1994). The conventional wisdom holds that an increase in the number of firms will generally lead to more competitive conduct, lower price-cost margins, reduced profitability of firms (approaching the competitive level as the number of firms grows large), greater output, higher consumer welfare, better allocative efficiency, and increased total welfare. Specifically there are two main interpretations for a positive statistical relationship between market structure and its performance. The traditional interpretation of the SCP paradigm is based on the proposition that market concentration fosters collusion among firms in the industry. According to this hypothesis, the degree of concentration of a market exerts a direct influence on the degree of competition among its firms. The more concentrated the market, the less the degree of competition. This hypothesis would be supported if the impact of market concentration on the performance of the firm was found to be significantly positive, regardless of the degree of efficiency of the firm. Thus, firms in more concentrated markets will earn higher profits (for collusive or monopolistic reasons) than firms operating in less concentrated ones, irrespective of their efficiency.

The efficiency hypothesis, on the other hand, has emerged as a challenge to the traditional interpretation of the SCP relationship. Demsetz (1973) developed the relative efficiency hypothesis. In this hypothesis, the explanation for the relation between market structure and the performance of the individual firm is efficiency. If a firm enjoys a higher degree of efficiency than its competitors, that is, if it has a relatively low cost structure, it can adopt one of two strategies: it can maximize profits by maintaining the present level of prices and firm size, or it can maximize profits by reducing prices and expanding firm size. If a firm adopts the latter strategy, the most efficient firms will gain market share and, as noted by Smirlock (1985), firm efficiency will be the driving force behind the process of market concentration. The hypothesis is supported (in the early literature) if the performance of firms depends on market share regardless of the degree of concentration in the market. There have been many empirical studies that have applied the traditional SCP framework or its variations on the US banking industry over the last thirty years. However, these studies have reported contradictory results. Some of them indicating a strong relationship between market structure (concentration) and performance, and others indicating no relationship at all or one of unexpected direction. Early US studies, for example, Vernon (1971), Fraser and Rose (1976) and Heggestad and Mingo (1977), Spellman (1981) and Rhoades (1982), suggest that collusive profits occur in U.S banking markets by reporting strong and significant relationships between market structure and bank profit rates. These studies have been criticized, for example by Gilbert (1984) and Osborne and Wendel (1983), for containing too many "inconsistencies and contradictions" to provide a satisfactory description of the SCP relationship in banking. More recent attempts at explaining the link between market structure and performance have concentrated on investigating the so-called "efficiency hypothesis". As noted above, the efficiency hypothesis maintains that an industry's structure arises as a result of superior operating efficiency by particular firms. Accordingly, a positive relationship between firm profits and market structures is attributed to the gains made in market share by more efficient firms; in turn these gains may lead to increased market concentration. That is, increased profits are assumed to accrue to more efficient firms because they are more efficient and not because of collusive activities. In support of their approach, Brozen (1982), Smirlock (1985), and Evanoff and Fortier (1988), report that "firm-specific efficiency" seems to be the dominant variable explaining profitability in studies of the U.S banking industry. However, other scholars have argued that banks' objectives are different than profit maximization (a central implicit assumption in the SCP framework), namely, to engage in expense-preference behavior (that is diverting more resources to management expenses rather than maximizing profits) or to alter the composition of their balance sheets portfolios in favour of less risky assets as market structure changes. In both of these cases the relation between performance measures and market structure would be very much weakened. Nonetheless, Kwoka and Ravenscraft (1986) find evidence of both cooperative and rivalrous behaviour among the largest firms across a number of different industries and suggest that the SCP framework may be inadequate in explaining bank performance variability. More recently, studies by Hannan

(1991) and Berger (1995) have made important contributions to the SCP literature. Hannan (1991) employed an explicit model of the banking firm to derive formally the most commonly tested relationships between market structure and bank performance. This model's main distinction from the traditional SCP paradigm lies in the association of bank performance measures with numerous market shares in various asset and liability categories that banks participate in, rather than one market share or concentration ratio as predicted by the SCP model. On the other hand, Berger (1995) refined the previous literature and tested the profit-structure relationship in banking by testing four hypotheses simultaneously. These are the two market power hypotheses (traditional SCP hypotheses and the Relative Market Power hypotheses) and the two efficient-structure hypotheses (X-efficiency hypothesis and scale – efficiency hypothesis) - put forward by Demsetz (1973) - by incorporating measures of bank efficiency directly into the SCP model. These efficiency measures distinguish between X-efficiency (X-efficiency version of the efficiency hypothesis) and scale-efficiency (scale-efficiency version). X-efficiency provides a measure of how effectively banks are using their inputs to produce a given level of output and covers all technical and allocative efficiencies of individual firms (that are distinct from economies of scale and scope). Scale efficiency is a measure indicating whether banks with similar production and management technologies are operating at an optimal level of scale.

Berger (1995, p. 405) criticized previous SCP studies because they did not include direct measures of efficiency in the modeling framework. He notes that:

> "Clearly this literature cannot distinguish among the various hypothesis without including direct measures of both X-efficiencies and scale efficiencies. Furthermore,... another difficulty with this literature is that the implications of the ES(efficiency) hypothesis regarding the effects of efficiency on market structure have never been tested. A necessary condition for the ES hypothesis to be true is that efficiency be positively related to concentration and/or market share. Again, direct measures of efficiency are needed for this task"

Berger's empirical findings on US banking during the 1980s provide some support for the X-efficiency hypothesis but no support for the scale-efficiency hypothesis. In addition, Berger (1995) also finds that bank market share is also important in explaining bank performance, namely that larger banks earn higher profits. This study advances the approach outlined in Berger (1995) and includes measures of bank cost, profit and scale efficiency into the standard SCP modeling framework. This allows us to examine the traditional SCP relationship and versions of the efficiency hypothesis for GCC banking in the 1990s.

1.4 Chapter Plan:

The thesis is divided into eight Chapters. Chapter one provides an introduction to the study, outlines the study background, motives, aims and methodology adopted in this thesis. Chapter Two provides a general background discussing the main features of Gulf States economies. The chapter briefly discusses the creation of the GCC organization, and reviews the economic performance and development process in the six states over the last two decades. Chapter Three, provides an overview of the structure of the financial systems in the six countries and analyses in more detail the structure and performance features of the respective banking systems. This chapter provides a picture of the structural and other market characteristics of each banking system and points out the major differences and similarities that exist between GCC banking markets. Chapter four focuses on the concepts of market structure and performance in banking focusing on the theories that explain the relationship between market structure and firm performance. It provides definitions of market structure, market conduct and market performance and examines the main SCP interactions. The chapter also considers measures of market structure, conduct and, performance. In Chapter Five we present the theoretical concepts of X-efficiency, economies of scale and economies of scope since bank's performance nowadays is often related to these issues (see Berger and Humphrey, 1997). Chapter Six describes the methodology that will be used to examine the SCP relationships in GCC banking markets. The general modelling framework and variables used in the study are outlined. Chapter seven presents the data sources and provides definitions for the variables used in our empirical analysis. The chapter proceeds to empirically investigate evidence of the four SCP hypotheses, namely; the traditional structure-conduct–performance hypothesis (SCP); the relative-market-power-hypothesis (RMP); the x-efficiency hypothesis (ESX); and the scale-efficiency hypothesis (ESS) in GCC banking markets. Chapter eight presents the conclusions and outlines the main limitations of this study.

Chapter II
The Gulf Co-Operation Council (GCC) Economies and Their Economic Development.

2.1 - Introduction:

> Although requiring careful interpretation, perhaps the definition that would now gain widest approval is one that defines economic development as the *process* whereby the real per capita income of a country increases over a *long period of time* subject to the ***stipulations*** that the number of people below an "absolute poverty line" does not increase, and that the distribution of income does not become more unequal. Therefore, economic development involves something more than economic growth. Development is taken to mean growth plus change. Economic development is thus much more than simple acquisition of industries. It may be defined as nothing less than the "upward movement of the entire social system" or it may be interpreted as the attainment of a number of "ideals of modernization," such as a rise in productivity, social and economic equalization, modern knowledge, improved institutions and attitudes, and a rationally coordinated system of policy measures that can remove the host of undesirable conditions in the social system that have perpetuated a state of underdevelopment.
> (Hermes, et al. 2000 p,517).

This chapter aims to identify and outline the economic and financial trends that have affected the economic development process and changed the face of the GCC member states economies (these are Saudi Arabia, Kuwait, Qatar, Bahrain, Oman, and United Arab Emirates) during the past two decades. Section 2.2 provides a short note on the creation of the GCC organization. The main aims and objectives are outlined and the potential economic benefits and gains from economic integration highlighted. Section 2.3 reviews the performance of the six GCC economies over the last two decades. The stages of their economic development processes are outlined using some basic economic indicators including growth in national GDP and GDP per Capita income. The section highlights general economic development trends and notes various structural reforms that have been adopted to promote economic growth and market development. Section 2.4 shed lights on the key role of oil and gas exports on GCC countries economic development process. And Section 2.5 discusses the various challenges facing policymakers over the medium-term and the impact of the development process. Section 2.6 concludes.

In general, GCC countries are reasonably homogenous in terms of their historical experience in the economic development process. A common feature of development is that all the GCC states began the present phase of their economic development with the substantial increase in oil prices in 1973. In every country, economic development that would normally have taken many decades was compressed into a few years (Presley, 1992). The economies of all GCC member states are ultimately dependent on revenues from oil production and therefore they depend heavily on the level of oil prices, despite attempts to diversify sources of income. This dependence on oil revenues, however, is gradually changing as various economies have undertaken policies to encourage other economic activities such as in manufacturing and services (Almannai, 2001). All countries are characterized by a desert environment and low population density (table 2.1), and the population tends to be heavily concentrated in a few major cities. Expatriate workers represent about one third of manpower in the region (UNDP, Human Development Report 2001, and table 2.1).

The GCC, currencies are pegged to the US dollar, except in the case of the Kuwaiti Dinar that is pegged to a trade-weighted basket of currencies of which the dollar is believed to account for about 70% (Cunningham, 1995). All GCC countries maintain a relatively open trade regime and seek to strengthen common terms of external trade. Moreover, the GCC Council approved, in 1999, a timetable to set up a custom union by 2005 and introduce a single currency by the end of 2008 (GCC Economic Bulletin, 2001). GCC countries face important policy challenges in view of an uncertain oil market outlook and the evolving trends in the regional and international economy. These are compounded by domestic developments, particularly the growing number of nationals entering the labor market (Azzam, 1998). To avoid undesirable consequences, the GCC countries, currently stress various economic adjustment programmes supported by structural reforms aimed at sustaining economic growth and promoting financial stability. That is because, insufficient policy response to less favourable external conditions carries the risk of low rates of economic growth, rising unemployment rates, and growing financial imbalances (Almannai, 2001).

2.2 The GCC Organization, The Aims and the Expected Gains from Economic Integration:

> Globalization and regionalization are not necessarily antagonistic, but rather mutually reinforcing. A bolder policy to increase integration in the global market could at the same time favor more dynamic regional integration efforts. The Arab countries need to integrate their economies with the rest of the world and in doing so they must come together and establish their own regional economic blocs. In today's world no nation can realize its full economic potential on its own. Only cross-border regional cooperation will maximize prosperity for each of the member states. (Azzam.1998, p8).

This sub-section outlines broadly the main objectives and achievements of the Gulf Cooperation Council (GCC) since it was established in 1981. An agreement between six Arab states of the Gulf was signed on May 25th1981 in Kuwait and this announced the creation of a new regional organization in the Middle East Known as the, "Gulf Cooperation Council for Arab States" otherwise known as the GCC. The GCC comprises Bahrain, the Kingdom of Saudi Arabia, Oman, Qatar, the United Arab Emirates and Kuwait (Table 2.1). The terms of the GCC constitution are comprehensive (for example, Article four GCC charter1981)[1] speaks of "the ultimate aim of unity" and an eventual confederate union emerging from the GCC framework.

[1] (See Appendix 1)

Table 2.1

GCC at a Glance

The GCC countries:

Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (U.A.E.).

Area and population:

The countries have 2 percent of the world's total land area, and their combined population in 2000 is about 30 million accounting for less than 1 percent of the total population of the world. In 2000 population growth in the GCC countries was 3.5 percent higher than the world average (1.7 percent per annum). Non-nationals comprise on average about one third of the population in the GCC countries. About 43 percent of the population is below the age of 15, and 60 percent is below the age of 25. (GCC Economic Bulletin, volume 16, 2001)

Petroleum and gas:

During 1999 total GCC oil production was about 4930 million barrels. This amounts to 13.4 million barrels per day on average, which represents 50% of total OPEC production and 20% of total world production. At the end of 1999 the GCC countries held about 45 percent of the world's proven petroleum reserves and 15 percent of the world's proven natural gas reserves. (GCC Economic Bulletin, volume, 16, 2001, p13-14)

Income, and Production:

The aggregate GDP of GCC member states was about US$ 321.5 billion at the end of 2000 and the GDP Per Capita income for 2000, was around US$10,500 ranging from US$7,564 in Saudi Arabia to US$19,666 in United Arab Emirates, compared to the world average of US$6,148. The World Bank's 2001 World Development Report ranks three of the GCC countries, the United Arab Emirates, Kuwait and Qatar, as high-income economies, and the other three countries (Saudi Arabia, Bahrain and Oman) as upper-income economies. (Source: World Development Report, 2001, and GCC Economic Bulletin volume, 16, 2001).

Social indicators:

Life expectancy (72 years) in the GCC countries is higher than the world's average (66 years). Other social indicators are also very favorable: the literacy rate exceeds 70 percent; the infant mortality rate is less than half the world average; the physician-population ratio is about 7 times higher than the world average; and primary school enrollment corresponds to 90 percent of school-age population, with female enrollment being almost equal to that of males.

*All data was obtained from the GCC Economic Bulletin, (2001),(Volume 16, Arabic Edition) and the World Development Report for 2001.

The countries have two percent of the world's total land area, and their combined population in 2000 according to the GCC Economic Bulletin, (2001) is around 30 million (accounting for less than 1 percent of the total population of the world) (see table 2.1).

The basic aims and objectives of the Gulf Co-operation Council are outlined in Article Four of its charter signed on may 25th 1981, these are as follows:

1. To implement co-ordination, integration and interconnection among member states in all fields in order to achieve unity among them;
2. To deepen and strengthen relations links and the scope of co-operation in various fields now prevailing among their peoples;
3. To formulate similar procedures, rules and regulations in various fields including economic and financial affairs, commerce, customs and communications, education and culture, social and health affairs, information and tourism, legislative and administrative affairs; and
4. To stimulate scientific and technological progress in the fields of industry, mineralogy, agriculture, water and animal resources; and to establish scientific research centers.

Other objectives including new rules allowing for the freer movement of GCC citizens, labour and goods within the region plus a relaxing of restrictions on real estate ownership, and licenses granted to practice businesses in any of the GCC countries are also mentioned in the GCC charter.

Consistent with these objectives, a variety of agreements in the fields of economics such as the (Unified Economic Agreement signed in 1981 (and reformed in December 2001), foreign affairs, education, defence, security and energy, have been signed between the members of the GCC organization. According to (Azzam, 1998) it was the first major attempt toward regional economic integration in the Arab world. In fact, the GCC was established based upon the expected benefits resulting from integration similar to the reasons for the establishment of the European Union, (Cunningham, 1995). One of its main objectives is to promote economic development (GCC Charter, 1981). The establishment of the GCC aimed to promote economic integration by gradually lifting the existing barriers to freedom of entry and capital movement in the region. The removal of such barriers were expected to yield substantial economic gains both of a microeconomic and macroeconomic nature. A major microeconomic benefit was expected to occur from the reduction in costs stemming from the removal of a wide variety of physical and technical barriers that existed in the trade of goods and services. The opening-up of all GCC national markets was also expected to facilitate greater competition between GCC firms, the exploitation of economies of scale and the elimination of X-inefficiencies, thus, resulting in further reductions in the prices of goods and services. In turn, lower prices are expected to cause an increase in demand for these products and services and consequently an increase in output. Firms increasing their levels of output may be able to reduce costs even further by exploiting economies of scale if such economies do exist. The main group reaping the benefits that should follow from the establishment of the internal market would be GCC residents (consumers) who should be rewarded with better and cheaper products and services. Greater competition is also expected to lead to the creation of new products and services as the need to innovative and gain competitive advantages over rivals is increased. Market integration is also expected to lead to significant macroeconomic gains as well. Lower prices are widely expected to positively influence the GCC member states output and hence accelerate economic growth, ease unemployment and reduce government budget deficits (where the increase in spending is less than proportionate than the increase in governments revenues). Furthermore, the integration process would be expected to result in lower inflation rates bringing about reduced interest rates and this effect should encourage investment (both public and private) and therefore cause further increases in economic growth.

As in the case of the EU and the establishment of a single currency, the GCC's plans for further integration and the introduction of a Gulf single currency by 2008 places considerable emphasis on establishing a single financial services market. The single market for financial services is expected to benefit the GCC member states economies as a whole. The full liberalization and integration of GCC member states capital markets are expected to work towards the elimination of those distortions and negative effects that stem from the misallocation of capital resources. Capital will move freely across national borders seeking the highest returns possible. Capital will have access to a wider range of markets and investments and therefore better allocation will result in attaining greater economic efficiency for the whole of the economy. Furthermore, full integration of capital, money and banking markets will bring forward ever more converging real interest rates across the GCC member states with the positive consequences that are associated with such an outcome.

> We should not lose sight of the growing influence of economic integration in the Arab Gulf upon the nature of the Gulf financial system and the functions of banking institutions. The Gulf Co-operation Council is now a very active body which is framing the Gulf economy along similar lines to that of the European Community; trade has already multiplied between member states as the industrialization process has continued, trade barriers have been reduced, and an increasing number of Gulf institutions formed in order to accelerate economic co-operation; one item on the large agenda is monetary integration and, if the European experience is indicative, this will embrace the harmonization of banking regulations, monetary controls and fiscal instruments on the process towards one Gulf central bank and a common currency. (Presley, et al. 1992, p16).

GCC countries have moved a considerable way towards achieving integration in the traded goods sector although in the financial services sector the process of regulatory reform and integration has been slower to develop. For instance, the Unified Economic Agreement signed in 1981 has lifted barriers to trade between the six GCC countries. Goods and services that originate in the GCC countries transfer free within GCC countries without tariffs or customs. The free trade zone within GCC countries has been established since 1983. In addition, the GCC countries approved, in 1999, a timetable to setup a unified custom union by 2005. The custom union plans to unify customs policies including tariffs imposed on imports to GCC countries.

Article seven of the Unified Economic Agreement states that: (See Appendix 1)

Member States shall co-ordinate their commercial policies and relations with other States and regional economic groupings and blocs with a view to creating balanced trade relations and favourable circumstances and terms of trade therewith. To achieve this goal, the Member States shall make the following arrangements:

1. Co-ordination of import/export policies and regulations; 2. Co-ordination of policies for building up strategic food stocks; 3. Conclusion of collective economic agreements in cases where joint benefits to Member States would be realized; and the 4. Taking of action for the creation of collective negotiating power to strengthen their negotiating position vis-a-vis foreign parties in the field of importation of basic needs and exportation of major products.

To maintain these objectives such as coordinating exports and imports policies collective delegations have taken place on several occasions to coordinate policy. For example a unified GCC delegation to discuss the introduction of a carbon tax (also known as the environmental tax) imposed by the USA and the EU on imports of oil and gas from GCC countries and other OPEC members was established so as to coordinate a unified GCC policy response. A collective delegation has also been established to coordinate the GCC imports of wheat from the USA and Canada, and a collective delegation is also established to negotiate live-stock imports from Australia and New Zealand. Furthermore, the GCC also works to coordinate oil policies by adopting a unified policy within the GCC itself and across OPEC countries to facilitate the stabilization of international oil prices. Moreover, the GCC governments operate to reach a common investment policy that directs domestic and foreign investments, and to initiate joint investment among member countries (Azzam, 1998). In this field, the GCC established the Gulf Investment Corporation in 1982. In terms of joint investment, the GCC set up the Gulf Investment Corporation in Kuwait, Gulf International Bank (GIB) in Bahrain, Gulf Limited Bank in Bahrain, the Standardization and Metrology Organization for GCC in Riyadh, the Technical Telecommunication Bureau in Bahrain, the Commercial Arbitration Centre for GCC in Bahrain, the Regional Committee for Electrical Energy Systems registered in Qatar, and the Electricity Grids Linking Commission in Saudi Arabia. The GCC member states reformed the Unified Economic Agreement of 1981 and signed a new Economic Agreement in 31st of December 2001. Article 4 of the reformed Agreement stated that 'GCC member states should coordinate their financial, monetary, and banking policies as well so as to boost coordination between monetary agencies and central banks among member countries and to ensure the success of the monetary union so that a single currency could be launched in 2008', (GCC Unified Economic Agreement. 2002, p.14, Arabic Edition). In 1997 decision taken by GCC finance ministers permitted national banks to open branches in GCC countries. This decision will helps in facilitating the cross-border expansion of Gulf banks. The GCC has also established the Gulf National ATM Network. Moreover, GCC states agreed in 1990 to collectively participate in the meetings of the Basle Committee and international conferences of banks, as well as to coordinate their participation in meetings of the International Monetary

Fund and the World Bank. In early 2001, the GCC council approved a timetable for the monetary union to adopt the US$ as a common peg for their currencies before the end of 2002. It also undertook steps to reach an agreement before the end of 2005 on the standards of economic performance that would be necessary to ensure the success of monetary union so that a single currency could be launched by the year 2008.

In addition to the potential gains expected from economic integration the GCC has other key objectives, like the co-ordination of other forms of non-economic and functional co-operation. Functional co-operation includes agreements in a number of different areas, for example, in the environmental protection area the GCC Commission for Natural Life Reserve was established in 1995. In defense the Aljaseerah Shelled Forces was established in 1983, and in education the Gulf University was established in Bahrain in 1985. These non-economic types of co-operation are also important elements reflecting the ongoing integration process within the GCC.

So far this section has provided a general overview of the main aims and objectives of the GCC Organization and its achievements. In the following section we discuss the economic performance of the GCC over the past two decades.

2.3The Region's Economic Development Process and Economic Performance over the Past Two Decades:

2.3.1 GCC Member States Economic Performance from 1975 to 1985 (The Phase of Prosperity).

> The economies of the GCC countries share many structural features, face similar constraints, and are influenced broadly by the same set of trends in the world economy. Over the years, the oil income has created a modern physical and social infrastructure and substantially raised the standard of living of the population. The countries have established a tradition of open and liberal trade and exchange policies, low inflation, and stable currencies. They also share a relatively narrow non-oil revenue base and large dependence on imports of goods and labor, increasing their vulnerability to adverse exogenous developments. (Sassanpour, 1996, p.20).

The GCC member states economies are heavily dependent on oil and they became prosperous in an unusually brief time span (Presley, 1992). This prosperity and wealth emerged over a period of less than 30 years. The sharp increases in oil prices in 1973-74 after the Arab-Israeli war in 1973, led to the rapid emergence and concentration of wealth in the GCC economies. Oil revenues were responsible for transforming what were previously barren and poor countries into modem economies with vast infrastructures (Cunningham, 1995). On the other hand, their sudden wealth as a result of oil means that not only the pace of development but also the form of development is unusual,(Wilson et al. 1992) because, usually economic problems are associated with the reliance on a single commodity (oil). Any adverse fluctuations in the price of this commodity will of course be reflected in a reverse influence and effect all economic activities and every aspect of life in the country.

The GCC member states maintained continuous budget surpluses until 1982, (Presley, 1992), when the decline in oil prices led to a renewed budget deficit in most countries (Saudi Arabia, Oman, Bahrain), despite that, oil remained the most important exported good, and the main source of foreign exchange earnings (Sassanpour, 1996). The importance of oil as a major source of wealth also means that the economies of the Gulf are subject to unusual fluctuations in the level of wealth and the development process is unpredictable (Cunningham, 1995).

The prosperity in GCC states reached its highest level after the increase in oil prices in late 1979 and the beginning of 1980 following the Iranian revolution, and the first Gulf War between Iraq and Iran at the beginning of 1981, but this situation did not continue. Although the GCC member States increased their oil production the oil price fall in the middle of 1982 and its continued decline until 1986 resulted in an average reduction of real GDP growth of about 2.7% over the 1982 to 1986 period and a 12% annual decline in GDP Per Capita (Table 2.2).

Generally speaking, in the early part of the 1981-85 period despite declining-oil prices, export receipts increased allowing the GCC countries to record large external current account surpluses averaging around 19% for the period between (1975-80) to 7% for the period (1981 -1985), (see table 2.2), which enabled the GCC countries to build up foreign reserves.

The policy objectives of improving the social and physical infrastructure, diversifying the economic base, and containing inflationary pressures were addressed through a two-pronged strategy. First, with a view to insulating their economies from foreign inflation, the GCC authorities abandoned the link between their currencies and a depreciating SDR, and established a de facto peg with the U.S. dollar which led to a significant real effective appreciation of all GCC currencies (Cunningham, 1995). Second, expenditures on development projects increased, and some countries actively pursued policies to promote basic industries based on their large hydrocarbon resources (Cunningham, 1995).The sizeable budget surpluses started to diminish from 1982 as expenditures continued to increase in some countries while revenues declined due to the steep slide in oil prices. While some countries

(Saudi Arabia, Oman and Bahrain) had large budgetary deficits, the region as a whole recorded an annual average deficit of 1 percent of GDP and an external current account surplus equivalent to 7 percent of GDP during 1981-85 (table 2.2). Foreign reserve positions remained sustainable and inflation decelerated to an average rate of less than 1 percent per annum (table 2.2).

Table 2.2 Basic Economic Indicators 1975-1994					
	1975-80	1981-85	1986-89	1990-91*	1992-94
	(In percent per annum)				
Real GDP growth	9.6	-2.7	1.7	8.9	1.7*
Oil	...	-11.7	9.4	18.5	0.2*
Non-oil	...	4.5	1.2	4.7	1.9*
Inflation	10.7	0.5	0.6	3.2	1.4*
GDP per capita(US$)	25000	17000	7800	8300	8450
	(In percent of GDP)				
Budget					
Total revenue	55	51	38	38	35
of which: oil and gas revenue	...	37	23	30	27
Total expenditure	45	52	50	52	46
Current	...	24	35	36	38
Capital	...	21	13	7	7
Overall surplus/deficit (-)	10	-1	-4	-13	-10
Balance of payments					
Exports	78	62	49	56	50
Imports	44	51	46	49	48
Trade account surplus	34	11	3	7	2
Current account surplus/deficit (-)	19	7	-1	-7	-6
Overall surplus/deficit (-)	3	1	-2	--	-3

Sources: IMF, World Economic Outlook; IMF, International Financial Statistics; 1996

*. Excluding Kuwait.

2.3.2 Economic Reforms in GCC countries

With the continued erosion of oil prices during 1986-89, economic conditions represented by increases in fiscal deficits, rising rates of unemployment, and increasing social demands associated with the sluggish economic growth and large internal and external financial imbalances emerged (Sassanpour, 1996). In response, the authorities implemented adjustment policies involving mainly cuts in public expenditure, particularly capital outlays which declined from an average of 21 percent of GDP during 1981-85 to 13 percent of GDP during 1986-1989 (table 2.2). Adjustment was further facilitated by the significant real effective depreciation of GCC currencies (Saudi Arabia, and Oman). Despite the expenditure cuts, and given the severity of the decline in oil revenue, the aggregate budget deficit increased to 4 percent of GDP during 1986-89, while the external current account position shifted to a deficit of 1 percent of GDP during the same period (table 2.2). External borrowing by some GCC countries limited the drawdown in foreign reserves (Cunningham, 1995).

> The process of structural economic adjustment adopted by GCC countries consists of reforms and measures aimed at reducing internal and external imbalances, transforming the economy towards a market oriented one and placing it on a sustainable long-term growth path. The policy areas that are typically featured in the adjustment program include: reduction of budget and current account deficits, liberalization of pricing policies, reforming monetary and fiscal policies, removing trade barriers, developing financial and capital markets, improving the efficiency of the public sector (including privatization of public enterprises) and boosting the country's main productive sectors (agriculture and industry). (Azzam, 1998, p.43).

These adjustment efforts in the GCC countries were being implemented within an international economic environment which was undergoing fundamental changes on several fronts. Two trends were of particular importance. First, ongoing global trade liberalization gradually lead to the lowering of tariffs; the dismantling of nontariff trade barriers; a reduction in producer subsidies; an expansion of trading blocs; and the strengthening of the institutional framework under the auspices of the World Trade Organization. Second, the continuing globalization and integration of financial markets facilitated private capital flows and created new financing options for many developing countries, along with greater risks. (Sassanpour, 1996).

The GCC countries economic reforms and adjustment process was interrupted when Iraq invaded Kuwait in the 2nd of August 1990. Notwithstanding the sharp jump in oil prices in the initial phases of the conflict and the higher oil production in some countries, crisis-related expenditures and transfers created significant pressures on the budgets and external current account positions of the GCC countries (Cunningham, 1995). Those countries directly involved in the conflict suffered the worst: the budget deficit in Kuwait exceeded an estimated 100 percent of GDP in 1990-91; that of Saudi Arabia increased to 17 percent of GDP in 1991; and the combined external account deficits of the two countries amounted to US$54 billion in 1991 alone (Presley, et al. 1992). Excluding Kuwait, the aggregate external current account deficit of the GCC countries increased to 7 percent of GDP in 1990-91(table 2.2), and their combined official foreign reserves declined further.

The GCC countries emerged from the Gulf crisis in a weaker economic and financial position at a time when the resumption of the adjustment process was further complicated by the continued downward slide in oil prices and a slowdown in global economic activity (Cunningham, 1995). Economic growth in the GCC moderated to an average of 2 percent per annum in 1992-94, (table 2.2), real per capita GDP declined, and the lingering expenditures and transfers related to the conflict prevented significant reductions in the internal and external imbalances (IMF, 2000). For the region as whole, the average budget deficit in 1992-94 (10 percent of GDP) was higher than that of the pre-crisis period (4 percent of GDP), despite the much lower levels of capital expenditure (table 2.2). Similarly, at 6 percent of GDP, the aggregate external current account deficit was higher than the average during the 1986-89 period (1 percent of GDP) and foreign reserves positions eroded further,(table 2.2). By 1994, although the stock of external debt stabilized at about 12 percent of GDP, debt service payments had increased sharply (Sassanpour, 1996).

2.3.3 New Initiatives to Accelerate Economic Reforms

From 1995 most GCC countries intensified their adjustment efforts in response, inter alia, to an unfavourable oil market outlook (Azzam, 1998). The investment income, which in some GCC countries comprised a large share of government revenue, has declined while debt servicing has increased. Expenditure on social sectors has increased in line with a growing population, and outlays on defense and security have remained high (Sassanpour, 1996). Pressures on expenditure also come from a large and growing government wage bill. Nonetheless, the GCC countries are undergoing major demographic changes characterized by a rapidly growing and young population, with important implications for the labour market (IMF, 2000). According to (Azzam, 1998), traditionally, the government sector has absorbed a large number of new entrants to the labour force, reflecting the policy of guaranteed employment, higher wages, and the social status and other benefits associated with government employment. Fiscal constraints, however, currently limit this possibility while the number of people searching for jobs increases day by day. According to (IMF, 2000), the main challenges facing the GCC member states policymakers are maintaining high levels of employment while reducing the role of the public sector in favour of the private sector.

In response to these challenges GCC countries, and in particular Kuwait, Oman, and Saudi Arabia, introduced medium-term recovery package plans at the beginning of 1995 incorporating balanced budgets by the year 2000, as well as measures to increase non-oil revenues, and promote private sector growth and human resource development. In other countries, similar policies, have also been formulated (IMF, 2000).

Several measures implemented, for example, include the introduction of a sales tax, and increasing corporate profit taxation, steps have also been taken to remove various subsidies that result in substantial price distortions. As regards government expenditures, the aim is to control the growth of wages and salaries and maintain sustainable levels of capital expenditure. Nevertheless, larger private sector participation in the economy, in fact, is one of the key objectives of privatization in the all GCC member states (Azzam, 1998). Thus, GCC countries have also introduced new legislation in the second half of the 1990s, aimed at simplifying investment procedures, and opening their economies to greater foreign participation. Various mechanisms of privatization, for example have been adopted (Stock Market flotation, Build Operate and Transfer Contracts for large infrastructure projects, Leasing Out to Private Sector, Commercialization of Public Enterprises and so on), to promote the role of the private sector in production and investment and to extend the privatization programme to major entities and large corporations. Steps also have been taken to allow foreign investment participation in petrochemical activities. Consideration is also being given to liberalizing foreign participation in drilling and exploration activities in the oil sector. At the end of 2000 the private sector accounts for less than 40% of GDP in most of the GCC countries (GCC Economic Bulleting, 2001). The plans also implement employment policies that aim to absorb the growing number of workers entering the labour market, while reducing employment in the public sector, for example, the immigration of low-skilled expatriates has been limited. Furthermore, GCC countries have implemented what is known as the Offset Programme, where, foreign firms that are awarded government contracts are required to reinvest between 20% to 30% from the contract value in joint ventures with local-owned firms

> Privatization of certain public sector enterprises is among the general objectives and strategic principles of the development plans in all the GCC countries. Governments of the region are committed to increasing the role of the private sector in their economies. Privatization could reduce the financial burden on the governments and render several public sector institutions more efficient. The income generated from privatization could be used to retrain the national workforce and help assimilate them in the private sector as well as retiring existing public sector debt. (Azzam,1998, p.97)

Generally speaking, the experience of the GCC countries in diversifying their economic structure and reducing their reliance on oil revenue falls into three broad categories. In some GCC countries, such as Kuwait, the emphasis has been on downstream diversification through asset acquisitions in other countries. In some other countries, such as Saudi Arabia, economic diversification was carried out through developing a domestic non-oil sector with significant participation by the private sector. Other countries have followed a mix of these two policies, broadly defining their strategies on the basis of their oil resource profile, foreign exchange reserves, and investment opportunities at home.

> All oil-rich economies are making very basic decisions about economic development questions, but not every Gulf state has answered these questions in the same way. All have utilized their oil resources, but to varying degrees; all have grown dependent upon oil export markets as well as supplying the domestic market; but a different emphasis has been placed upon the use of oil revenues. Kuwait, for example, has placed a relative emphasis upon the acquisition of foreign assets rather than upon industrialization; Saudi Arabia has sought the creation of an industrialized economy through the Saudi Arabian Basic Industries Corporation (SABIC), the twin industrial cities of Yanbu and Jubail and the general support given to the private sector in the form of cheap finance, tax concessions, industrial estates and preferential treatment in domestic markets; less emphasis has been given to buying into industry abroad. Presley (1992, p 5).

2.3.4 GCC Economic Performance during the 1990s

2.3.4.1 Economic growth in GCC countries during the 1990s

One of the traditional macroeconomic growth measures used to reflect economic development is change in Gross Domestic Product. This represents the change in value of final goods and services currently produced. GDP data are, in practice, used not only as a measure of how much is being produced but also as an indicator of the welfare of the residents of a country. Economists talk as if an increase in real GDP means that people are better off (Fisher et al. 2000), although the distribution of this growth can obviously have an important influence on the populations well-being. GCC countries economic performance as measured by the annual growth in real GDP has improved from about 0.5 percent on average over the period 1980-1990 to around 6.8 percent between 1992-1999 (table 2.3).

Table 2.3 Real GDP growth, annual percent change of GCC countries over 1980-99 (US$, millions)

Country	1980-91 Average	1992	1993	1994	1995	1996	1997	1998	1999	1992-99
Kuwait	-6	83.5	20.8	3.3	7.1	17.0	-3.4	-15.7	17.2	16.2
Qatar	-2	11.1	-6.4	3.0	10.4	11.3	24.7	-9.2	18.9	8
Emirates	0	4.4	0.9	7.1	11.9	12.1	5.0	-6.0	10.1	5.7
Bahrain	2	2.9	9.5	7.0	5.1	4.3	4.1	-2.6	7.1	4.7
Oman	8	9.8	0.3	3.4	6.8	10.7	3.7	-10.6	10.4	4.3
Saudi. A	1	4.4	-3.8	1.4	6.4	10.6	3.5	-12.4	8.5	2.3
GCC	.5	19..35	3.68	4.2	7.8	11	6.26	-9.41	12	6.86

Source: GCC Economic Bulleting, various Editions

The enhanced real GDP growth of these countries through the 1990s perhaps can be partially attributed to the economic reforms and/or various measures undertaken by most of the GCC countries in the early 1990s to improve market-oriented policies in these countries. It can also be attributed to the lower degree of oil price volatility throughout the 1990s relative to the

1980s. The fastest growing economies include those of Kuwait, Qatar, and the United Arab Emirates.

Table 2.4 Per capita GDP for GCC countries (US$),

Country/Year	1970-79	1980	1985	1990	1995	1999	2000
Kuwait	24400	18500	11400	8610	13553	13160	17040.7
Qatar	27550	25400	14600	17609	16642	21898	30205.1
Emirates	29200	27900	20000	18250	17755	17745	21273.2
Bahrain	12400	10000	7300	9004	10103	9956	11540.6
Oman	3800	3600	5700	7182	6477	6724	8245.8
Saudi.A	9000	10200	5710	6662	6798	6525	8312.9
GCC	17725	15933	10785	8144.5	8555	8712	10362.2

Source: GCC Economic Bulletin, volume 16, 2001

In terms of real GDP per capita, GCC countries have witnessed significant changes over the last two decades. As shown in table 2.4 in the 1970s the GCC GDP per capita (on average) was around US$ 17,725, compared with US$9,000 for the 1980s and US$8900 during the 1990s. The lack of growth in per capita GDP could be attributed mainly to the negative consequences of the oil market downturn during the 1980s and 1990s compared to the 1970s, given that oil revenues still account for more than 45% percent of GDP. It also may be attributed to the negative consequences of second Gulf War in 1991 where countries in the region were burdened with significant war expenses. Furthermore, the population growth rate in the GCC averaged around 3.5 % throughout the 1990s, one of the highest population growth rates around the world and this placed an increasing burden on public finances, (World Development Report, 2001)[2] and also helped reduce GDP per capita levels.

[2] GCC annual population growth during the 1990s at 3.5% was more than double the annual 1.5% growth of the world population.

2.3.4.2 Trade, Government Finances, Inflation and Investment in the GCC during the 1990s.

Overall, the trade balance for GCC countries experienced surpluses during the 1990s, although these surpluses were subject to high volatility. Given that oil exports represents 80 to 90 percent of the total exports of GCC countries, then the volatility of GCC countries trade balances are almost entirely determined by oil prices. Again this confirms the key role of oil on the economic activities of GCC countries. Economic activities in the GCC depend heavily on government expenditures, however, despite the efforts of GCC countries to diversify their income sources to avoid fluctuations in oil prices, government expenditures in turn are also heavily dependent on oil prices. In general, during the 1990s the GCC countries ran budget deficits, although, a significant improvement has occurred in the second half of the 1990s.

Table 2.5 GCC direction of Trade during the 1990s Exports, Imports and Balance of trade (US$ Million).

Item/Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Exports(F.O.B	85056	82088	91912	90931	92940	105558	124893	131060	95942	115625	172067
Imports(C.I.F)	45010	53340	64577	61300	59420	67110	70261	80147	80000	74129	79030
Trade Balance	40045	28750	27335	29632	33520	38489	54633	50913	15941	41496	93037

Source : Arab Monetary Fund, 2002 (www.amf.org.ae).

The aggregate budget deficit measured as a ratio to aggregate GDP was 11.5 %, on average, for 1990 to 1995 and this had fallen to 3% through 1996 to 2000 (see table 2.6). Clearly, the link between government revenues from oil and the improvements in budget deficit over the latter period is clear.

Table 2.6 GCC Total Government Revenues and Expenditures during the 1990s (US$ M)								
Year/Item	Oil Revenue	Non-Oil Revenue	Total Revenues	Investment Expenditure	Current Expenditure	Total Expenditure	Surplus/ (Deficit)	%GDP
1990	53441.6	13577.9	69574.4	11979.2	24588.8	92758	(23183.6)	12
1991	48837.1	13968.4	66104.4	7521.9	39687.2	103399.1	(37294.7)	20
1992	18798.3	5109.0	67016.0	11926.9	28601.6	88795.2	(21779.2)	10
1993	20992.8	4906.1	74305.0	10813.2	28314.4	91647.6	(17342.6)	8
1994	45188.7	5474.5	62577.7	12673.5	28499.8	84846.9	(22269.2)	11
1995	52077.8	17033.8	71770.9	19421.8	68878.6	88300.4	(16529.5)	7
1996	64557.9	20124.7	88380.1	20779.6	77096.9	97876.5	(9496.4)	3
1997	72838.6	20563.8	97251.8	23912.7	79109.7	102736.4	(5484.6)	2
1998	39715.2	26089.9	69975.3	23261.1	74754.5	98015.6	(28040.3)	12
1999	55355.0	20405.1	79949.9	14113.6	81574.6	95776.2	(15826.3)	6
2000	85451.7	20509.3	112350.9	16277.6	94940.5	111406.7	944.1	+.002

Adopted from: GCC Economic Bulletin, various Editions, and author's own estimatin.

Inflation rates in GCC countries, as measured by changes in the consumer price index, witnessed favourable improvement during the 1990's compared to the levels experienced during the 1980's (Table,2.7). Inflation averaged about 1.4 % per annum during the 1990s compared with 2.5% during the 1980s. These inflation rates are low compared to other developing countries, where, inflation averaged about 8 percent during 1990s and 12 percent during the 1980's (World Development Report, 2000). The low inflation environment resulting from global macroeconomic features as well as domestic restructuring programmes and tighter policy also helped contribute to improved government finances by the end of the 1990s.

Table 2.7 The rates of inflation in GCC countries as (%) over (1980-2000)					
Country/Year	1980-1990 Average	1991	1995	2000	1991-2000 Average
Saudi Arabia	2	1	3	1	1.4
Oman	2	3	1	-1	1
Bahrain	1	1.5	1.2	.7	1.2
Kuwait	3.7	2.6	1.3	.9	1.2
Qatar	2.9	3.7	1.8	2	2.2
U.A.E	3.9	3.8	2.6	2	1.7
GCC	2.5	1.9	1.7	.9	1.4

Source: Arab Monetary Fund, 2002 (www.amf.org.ae)

Domestic investment as proportion of GDP in GCC countries has decreased slightly from 17 percent on average in 1995 to 15 percent by the year 2000 (see table 2.8). This is mainly attributed to the large fall in government revenues in 1998 and also to a reduction in investment expenditures implemented by most GCC counties in order to reduce their budget deficits (see table 2.7). Regarding foreign investment, unfortunately, there is only limited information available for the first half of the 1990s, although the available indicators for the second half of the 1990s suggest that there was an increase in foreign direct investment in the region (table 2.9). This may be attributed to the new legislation and deregulations introduced in GCC countries to encourage foreign investment as well as the various structural reforms have taken place during the 1990s to improve infrastructure development.

Table2.8 Gross Domestic Investment of GCC countries as % of GDP (1995-2000)

Country/Year	1995	1996	1997	1998	1999	2000	1995-2000 Average
Saudi Arabia	21	18	20	21	22	23	20.8
Kuwait	15	15	14	16	12	15	14.5
Bahrain	13	9	6	8	10	9	11
Oman	12	14	13	14	15	15.6	14
Qatar	23	16	18	17	19	18	18.5
UAE	22	17	17	16	17	18	18
GCC	17	15	15	16	16	16	15

Sources: Arab Monetary Fund, 2002 (www.amf.org.ae)

Table 2.9 Foreign Direct investment in GCC countries as % of GDP (US$, Millions)

Country/Year	Annu. Ave 1980-1990	1990	1995	1998	1999	2000	1990-2000 Average
Kuwait	0	0	15	2.8	3	5	7
Oman	9	5	4.8	4	2	6	4
Saudi Arabia	N/A	N/A	N/A	3	4	4	2
Qatar	N/A	N/A	N/A	3	3.4	3.7	1.7
UAE	N/A	N/A	N/A	5	5.6	4.7	3
GCC	N/A	N/A	N/A	3.5	4	4.5	4

Source: Arab Monetary Fund, 2002 (www.amf.org.ae)

2.4 GCC Economic Development Process and the Key Role of Oil Revenues

Overall, concerning the economic position of the countries under study, various indicators suggest an improvement in the 1990s compared to the 1980s. As already mentioned, the economic growth of GCC member states (as measured by change in annual real GDP) slowed during the 1980s, averaging 0.5 percent compared to 5 percent for other developing countries over the same period. This relatively slow growth led to lower levels of investment and higher levels of unemployment. This was also associated with rising levels of external indebtedness[3] and fiscal deficits forcing the GCC countries to undertake macroeconomic reforms to promote economic growth. During the 1990s annual real GDP growth averaged 6.6 percent compared to 5.5 percent for all developing countries over the same period. The trade balance of GCC member states witnessed surpluses during the 1990s, however, these surpluses still suffered from high fluctuations depending on the value of oil exports. Inflation rates have also fallen. While the internal debt of some countries is still high (The Ministry of Finance and National Economy of Saudi Arabia has announced that its internal debt is about SAR 700 Billions double the country's GDP), (SAMA Annual Reports 2001), the external debt as a percentage of GDP appears to be following a declining trend. Investment levels have also witnessed improvement in the second half of 1990s specifically foreign direct investment. Finally, GCC countries have continued to reduce their budget deficits and by 2000 the bloc experienced budget surpluses. However, the improvement in the general economic position of the countries under study during the latter part of the 1990s is primarily linked to increased oil prices. The mining sector (oil being the main item) is still the major economic activity and dominates the development process. Table 2.10 shows the relative importance and growth rates of the mining

[3] In 1991 after the Gulf war the external debt of Saudi Arabia amounted to (US$ 55 Billion), (Cunningham, 1995).

and non-mining sectors (aggregate values) as a percentage of the aggregate GCC GDP. It shows clearly how fluctuations in oil revenues directly influence the mining sector's relative importance and its growth rates and this, of course, is reflected in the GDP figures. For example when oil prices slumped in 1998 the relative importance of the sector contributing to GDP fell from 36%to 27% (table 2.11). However, this was not the case in 1999 and 2000 when the growth of the sector increased by 37% and 60%, in 1999 and 2000 respectively and mining increased its share of GDP from 27% in 1998 to 32% and 42% in 1999 and 2000 respectively, (table 2.11). (Again this just confirms the extent to which GCC countries are still heavily dependent on oil revenues).

Table 2.10 The Relative Importance and Growth Rates of Aggregate Mining and Non-Mining Sectors as (%) of Aggregate GCC Countries GDP.

	Mining Sector		Non-Mining Sector	
Year	Relative Importance	Growth Rate	Relative Importance	Growth Rate
1990	38	40	62	5
1991	38	7	62	10
1992	39	8	61	4
1993	33	-18	67	8
1994	34	7	66	1
1995	35	14	65	8
1996	37	15	63	5
1997	36	1	64	6
1998	27	-34	73	3
1999	32	37	68	5
2000	42	59	58	5

Source: GCC Economic Bulleting, Volume 16, 2001

The aggregate return from GCC oil production in 1997 was about US$100 billion a fall of 1.2% relative to 1996, this was because oil prices started to decline over the period. In particular between 1996 and1997, oil revenues for all the GCC countries declined: U.A.E (-6.4%), for Oman (-0.8%), Kuwait (-12.3%), Qatar (-3%), Bahrain (-7.5%), and (-2.3%) for Saudi Arabia. Oil prices continued their downward slide in 1998, worsening GCC economic conditions, for example oil revenues fell by 35% in Saudi Arabia and 30% in United Arab Emirates. By the end of 1998 aggregate GDP of the GCC was about (US$ Bill 230) and the GDP Growth rate fell by 10% relative to 1997 (table 2.12). At the beginning of 1999 oil markets recovered having a positive impact on the GCC. Aggregate GDP revenues rose to US$ 265 billion with a positive growth rate about 15%, this performance continued in the 2000 where aggregate GDP increased to US$ 320 billion and GDP increased, on average by a massive 22% (table 2.12). Qatar GDP for 2000 increased by 30%, Kuwait by 25%, Oman by 26%, Bahrain by 21%, U.A.E by 22% and 22% in Saudi Arabia. The revenues from non-oil sectors increased by 5% compared to the 1999 levels, to around US$ 185 billion, however, the non-oil sectors relative importance in GCC GDP fell from 68% in the 1999 to 58% by the 2000. Average Gross Domestic Product per capita increased by 10% in 1999 compared to 1998 and 20% in 2000 relative to 1999 (table 2.12). Taken together, one can see how the recent strong performance of GCC economies is inextricably linked to oil prices.

Table 2.11 The Aggregate GCC Member States GDP and GDP per capita and its annual % change

Year	GDP	%Change	GDP per capita	%Change in GDP per capita
1990	174229.4	13.0	8144.5	9.16
1991	178122.9	2.2	8445.	3.02
1992	201076.3	12.9	8937.0	3.04
1993	205114.7	2.0	8412.7	-4.6
1994	203993.0	-0.5	8233.2	-1.76
1995	224788.2	10.2	8653.4	5.9
1996	251001.3	11.7	9291.4	7.5
1997	259360.6	3.3	9211.9	-.1
1998	231654.2	-10.7	7946	-15
1999	2262198.6	13.3	8711.4	9.1
2000	321384.6	22.6	10362.2	14.7

Source: The GCC Economic Bulleting, Volume 16, 2001.

2.5:The Major Challenges and Constraints to Economic Development Process in the GCC

While the recent initiatives mentioned in section 2.3.3 have significantly strengthened the adjustment process that began in the mid-1980s, the nature and extent of emerging challenges is still on going. In almost all countries that followed a domestic investment policy, the development of the non-oil sector focused on petrochemical industries and other oil-based industries in which the countries had a clear comparative advantage. However, the petrochemical industries still remain vulnerable to international oil market developments and to restrictive trade practices in the main consuming regions. Moreover, most of the large non-oil industries in the GCC have remained in the public domain, reflecting the authorities' policy toward strategic industries and minority foreign participation, as well as the large capital requirements that have limited private sector entry. In agriculture and manufacturing, where private sector participation was significant, production has been supported by various subsidies and incentives that has burdened the budget and distorted the relative price structure. Despite the development plans outlined in the mid-1990s, the GCC countries have limited experience with privatization. In Kuwait, privatization has involved sales of shares of certain enterprises held by the Kuwait Investment Authority on behalf of the Government. In Saudi Arabia, so far, 30 percent of shares of the Saudi Arabian Basic Industries Corporation have been sold to the private sector.

> A broader privatization program aiming to create a more efficient economic system should be geared toward not only higher private sector activity, but also private sector decision making and majority ownership, tapping its dynamism, creativity, and entrepreneurial skills. This should proceed in tandem with a further liberalization of foreign direct investment to allow majority ownership. The proceeds from privatization should be used to retire public debt. In addition to a sound regulatory framework, the success of the privatization programs is predicated on transmitting the right price signals to the market. (Sassanpour, 1996, p.46).

A number of GCC countries have identified public utility companies as possible targets for privatization[4] (Alta'awon, 2002). This would require a prior adjustment in prices to ensure self-financing and a reduction in the burden on the budget in the future. There would naturally be short-term costs associated with the resulting resource reallocation, but these trends also offer significant potential for welfare gains in GCC countries if proper conditions are in place. The basic and perhaps the most important requirement is a stable domestic macroeconomic setting. Within this framework, a large and adaptable trade sector and a sufficiently diversified economic base would be required in order to benefit from a rapidly changing international trade environment (IMF, 2000). Moreover, according to (Azzam, 1998) the benefits to the economy from closer links to international capital markets could only be maximized through a diversified domestic financial sector and open and well-functioning markets which are well supervised and regulated.

> The GCC countries have small, but growing, domestic equity markets. In the future, these markets would be called upon to play a more active role in resource mobilization and increased equity financing for the private sector. In fact, this would be a key element for the success of the privatization program which, in turn, would contribute to its efficiency by increasing its size and depth. Increased investment opportunities at home would also help in attracting substantial savings held by GCC citizens abroad. The recent successful floating of public shares on the local markets (in Bahrain, Oman, Qatar, Saudi Arabia, and the U.A.E.) and their oversubscription in some cases suggests that substantial resources could be raised through the local markets. (IMF, 2000).

However, despite liberal exchange policies, the links between the equity markets in the GCC countries and the international capital markets have not been strong because: (i) there are restrictions on direct foreign participation in domestic equity markets; (ii) the financing requirements of a dominant public sector have been typically met through bank borrowing; and (iii) equity markets have been dominated by a few large-and mostly closed and family owned-private sector companies (Azzam, 1998). At the same time, excluding joint ventures in

[4] Saudi Arabia has identified the Saudi Telecom to be privatized in Dec 2002 and Saudi Airlines in 2003

the oil and gas sectors, direct foreign investment in the GCC countries has been insignificant because of the small domestic market and public sector control in major industries (e.g., petrochemical industries). As such, the direct benefits to the GCC countries from a closer integration of capital markets would only be significant if the domestic markets become more diversified and open.

At first glance, the GCC countries with their open and liberal trade regimes and a large external trade sector appear to be well-placed to benefit from the global trade reforms. However, the conventional measures of the degree of openness and the extent of integration of the GCC economies with the rest of the world need qualification. While in the GCC countries the share of total external trade to GDP (almost 100 percent in 1995-99) is probably among the highest in the world, and per capita exports (US$4,000 in 1999) reach the levels of industrial countries, these measures of openness are heavily influenced by oil trade Given the present production and export structure, the direct benefits to the GCC countries from the global trade reforms are likely to be limited, at least initially (Sassanpour, 1996, p.45)

2.6 The Conclusion:

On the May 25, 1981 the Gulf Co-operation Council (GCC) for the Arab States of the Gulf was created. The GCC, comprising Bahrain, the Kingdom of Saudi Arabia, Oman, Qatar, the United Arab Emirates and Kuwait, became the first major attempt toward regional economic integration in the Arab world. One of the GCC's main objectives is to promote economic development. A number of agreements in the fields of economics, foreign affairs, education, defense, security and energy, have been signed between the members of the GCC organization in order to promote economic development and broader integration process. This chapter has outlined and discussed the economic and financial trends that have affected the economic development process and changed the face of the GCC member states economies over the past two decades. In section 2.2 we outlined the main features of the GCC organization, its formation and major objectives. The potential benefits arising from GCC member state economic integration are also highlighted. In section 2.4 the performance of six GCC economies and the stages of economic development over the last two decades are reviewed and discussed using various economic indicators. The broad structural reforms and various government plans implemented by GCC member states to improve economic performance during the 1990s are also outlined. Challenges and constraints to the economic development process in GCC member states are briefly discussed in the final section.

All in all, it can be seen that, the economies of all GCC states are strongly dependent on oil prices, despite recent attempts to diversify industrial bases and sources of revenue.. Plans to encourage further economic diversification in the manufacturing and services sectors are ongoing. Since the early 1970s, oil revenues have transformed the GCC member states into modern economies. Crude oil exports, which are the preserve of the governments, remain the mainstay of economic activity, but refining industries, petrochemical plants, light industries and retailing are gradually assuming a larger role. Nevertheless, the basic structure of the economies, whereby the oil sector accounts for at least 30% of National GDP and government activity as a whole for around 60%, will probably remain the same for the foreseeable future. Sharp swings in oil prices have meant that economic growth in the GCC countries has been erratic during the last 20 years. After oil booms in the mid 1970s and the early 1980s, prices slumped in the mid 1980s bringing unfavourable economic conditions represented by increases in fiscal deficits, rising rates of unemployment, and increasing social demands associated with the sluggish economic growth and large internal and external financial imbalances. The GCC Countries were just emerging from recession when the Iraqi invasion of Kuwait ushered in an era of higher oil prices and, due to the removal of Iraqi oil from international markets, increased oil export revenues. As a result, the economies of the GCC member states experienced a mini-boom in 1991 and 1992. This was brought to an end by the precipitous fall in prices at the end of 1993. The aggregate GDP growth of the GCC countries was slightly negative in 1993 (-1%) but it resumed a positive increase of around 2% in real terms by the end of 1994, and 7% on average over the period 1995-97. However, this was not the case in 1998, when the oil prices slumped again causing aggregate GDP growth of GCC countries to decline substantially, on average a fall of 11 percent for the bloc overall. In 1999 and 2000 oil prices increased, shifting aggregate GCC Countries GDP growth from -11% in 1998 to 13% in 1999, and 23% in 2000 respectively.

The GCC's heavy dependence on oil has lead to a wide-ranging debate on the future of GCC member states economies. In the past, these countries were able to survive periods of low oil prices by drawing on their reserves, but by the early 1990s the effects of budget deficits became more structural in nature, which meant that this policy was no longer sustainable. Furthermore, recurrent government spending and defense purchases have grown to the extent that even in years of reasonably high oil revenues the GCC Countries were still in deficit. The governments of Saudi Arabia, Kuwait and Oman signaled their recognition of the problems by announcing five-year plans (1995-2000), (while other countries implemented similar policies) stressing the need to expand private sector activity within the economy and the increased privatization of various state industries.

This chapter provides a general overview of macroeconomic conditions of GCC member states economies. An important feature of the development process relates to improvements in the performance in the banking and financial system as well as further integration of the GCC financial systems. The following chapter, therefore, outlines the main characteristics of financial and banking systems of the countries under study. The aim is to investigate the role of financial institutions in the process of economic development in GCC countries.

Chapter III
The GCC Financial Systems: Structural Developments and Performance

3.1: Introduction

In chapter two, we analysed the broad macroeconomic features of GCC economies. This chapter outlines the main characteristics of the banking and financial systems of the six countries under study. Section 3.2 discusses the relationship between the development of the financial system and economic growth by describing the functional role of financial institutions in the economic development process. Section 3.3 presents an overview of the financial systems of the countries under study; these are Saudi Arabia, Kuwait, Oman, Bahrain, Qatar, and the United Arab Emirates. Section 3.4 discusses the stages of financial development, namely monetization and financial depth using some basic economic and financial indicators. It has been argued that the structural characteristics of banking markets are important determinants of how well individual banks operating in the market might serve their customers (Rose, 1987). Section 3.5, therefore, investigates the main structural features of the six banking markets including the level of concentration. Section 3.6 examines the recent performance of GCC banks and section 3.7 is the conclusion.

3.2 Financial System Design and the System Functional Role in Economic Development:

> One critical factor that has begun to receive considerable attention more recently is the role of financial markets in the growth process. The positive link between financial depth, defined broadly as the level of development of financial markets, and economic growth is in one sense fairly obvious. That is, more developed countries, without exception, have more developed financial markets. Therefore, it would seem that policies to develop the financial sector would be expected to raise economic growth. Indeed, the role of financial development is considered by many to be the key to economic development and growth (Khan et, al. 2000, p.3).

In general, financial system can be broadly divided into four main parts: The banking system, non-bank financial institutions, financial/capital markets (equity, bonds, and other financial derivatives), and the regulatory and supervisory system that represents the role of government policies related to stabilizing and controlling the financial system (Hermes, et al. 2000). Basically, financial development involves the evolution of financial instruments, financial markets and financial institutions (Azzam, 1998). In recent years, financial system development has gained increasing attention, both in academic and in policy circles. As is acknowledged in the recent literature, the financial system plays a crucial role in economic development [(Levine, 1997), Levine and Loyaza (2000), Beck et.al (1999), Khan (2000)]. Many papers have established a strong positive correlation between financial system characteristics and economic growth [see, among others (King and Levine, 1993a,b), (Hermes and Lensink 2000)]. The main functions of a financial system are to intermediate between saving and investing economic units. This includes selecting investment projects and the final users of financial resources according to their creditworthiness and monitoring the use of these resources. In particular, financial systems transform the maturity, liquidity, risk and return characteristics of the liabilities issued by borrowing units to meet the preferences of lenders (Levine, 1997). Greenwood and Jovanovic (1990) emphasize the role of financial intermediaries in risk pooling and monitoring functions by pooling savings for diversified investment projects and by monitoring the behaviour of the borrowing firms, banks ensure higher expected rates of returns which help to promote economic growth. Pagano (1993) provides a theoretical contribution showing how financial development may have a positive effect on economic growth. He stresses the role of financial institutions, e.g., banks, in providing important services such as facilitating trading, hedging, diversifying and pooling of risk, which stimulates savings mobilization, and allocates financial savings to the most efficient investment projects by screening and monitoring borrowers. Moreover, he points out that financial development may influence the private saving rate. Levine (1991) incorporates both portfolio diversification and liquidity management aspects to show the role of financial intermediaries in pooling consumers' liquidity risks via the securities market and concludes that setting up a stock market enhances economic growth. Chen, Chiang and Wang (1996) also suggest that financial intermediation increases investment projects and spurs economic growth by utilising more sophisticated and specialised production processes.

In both developed and developing economies, banks are the principal source of non-market finance to the economy (Khan, et al, 2000). Banks gather and assess information about prospective borrowers and their investment opportunities. The second function performed by banks is to serve as the principal repository for liquidity in the economy (Levine, et al. 1999). By pooling the transaction balances of many different transactors, banks can acquire large, diversified portfolios of direct claims on borrowers which enable them to meet liquidity demands while still holding substantial amounts of illiquid assets. Furthermore, banks offer longer-term deposits that must compete directly with other instruments available in the financial markets. The return on deposits must be sufficient to compensate for the risk and delayed consumption associated with accepting deposit claims on the bank. Furthermore, banks transform the longer-term, risky, illiquid claims that borrowers prefer to issue into safer, shorter-term, more liquid demand and savings deposits that savers prefer. This asset transformation often involves maturity transformation as well. Financial intermediaries enhance economic efficiency by overcoming frictions through channelling resources toward the most efficient investment, giving households access to economies of scale in processing information that enables the identification of investment projects and ensures that businesses act in ways that do not conflict with saver's interests. Becsi and Wang (1997) note that while there is no single general model that explains why banks exist, fundamental market frictions are probably the main rationale for the existence of financial intermediaries. Market frictions can be classified into either technological or incentive. Technological frictions prevent individuals from having to access economies of scale in the processing of financial services relating to potential borrowers. Overall, financial intermediaries have major roles to play in the economy; in particular, they help overcome various sources of market frictions and therefore help transform financial resources to their most efficient use, thus enhancing economic growth. Nevertheless, financial markets worldwide are rapidly becoming more integrated and thus better at allocating capital to its most productive uses (Azzam, 1998). The continuing liberalization of financial markets; the trend towards securitization (and hence tradability) of financial assets; and more effective management of risks and returns through the use of derivatives are all helping to lower barriers between domestic financial markets worldwide (Hermes, et al. 2000). A more efficient global capital market should be better able to match savings in the developed world with the profitable investment opportunities in developing countries (Azzam, 1998). However, the positive contribution the financial system can make to the process of economic growth depends, among other things, on how the system is designed (Lensink et al. 2000). Knowledge of exactly how the design of the financial system may help to improve welfare is of course of particular importance to under-developed economies.

> Many different aspects of financial system design play a role, such as the type of financial institutions that should be established, the design of the regulatory and supervisory system, and the role of government policies related to stabilizing and controlling the financial system. In a broad sense, the design of the financial system involves the choice between two dominant systems: the market-oriented financial system – which can be found in countries like the United States and the United Kingdom – on the one hand, and the bank-dominated system – which is in place in countries like Germany and Japan – on the other hand. Of course, a country may also opt for intermediate ways of designing its financial system. (Lensink *et.al.* 2000, p 510).

The choice for a particular financial system has direct implications for the type of financial institutions to be established, for regulatory and supervisory design and for the choice of government policies (Khan, 2000). In general, the design of the financial system involves the choice between market-oriented or bank-oriented financial system. However, the relative merits of bank-based financial systems versus market-based financial systems also have been the focus for recent empirical research. Proponents of bank-based systems note that:

(I) In highly liquid markets, information is quickly revealed to investors at large, creating a free-rider problem;

(II) Small outside investors are unable to exert corporate control due to superior information of managers and the likely collusion between managers and a few powerful members of the board; and

(III) Liquid markets make it easy for concerned stockholders to simply sell their shares rather than coordinate pressure against management.

The combination of all of these market failures leads to an inefficient allocation of saving. Those favoring bank-based systems argue that banks with their long-term relationships with particular firms, mitigate these market failures.

On the other hand, proponents of market-based systems focus on the weaknesses of bank-based systems, arguing that:

(I) Large banks tend to encourage firms to undertake overly conservative investment projects, and extract large rents from firms leaving them with low profits and little incentive to engage in new and innovative projects; and

(II) Shareholders have little oversight over bank managers who control not only banks but also, indirectly through financing, the firms. Furthermore, the advocates of market-based systems claim that the latter provide a richer set of financial instruments that allows greater customization of risk management techniques than in a more standardized bank-based system.

Emerging evidence suggests that neither view is fully correct (see among others Shleifer, and Vishny, (1997), Levine (1998, 1999b). However, Demirguc-Kunt et al. (2000) suggested that establishing a legal environment that credibly protects the right of investors is much more important than considerations involving comparisons between bank-based or market-based systems. Levine (1999b) on the other hand, convincingly argues that the choice is not either banks or markets. Rather, banks and markets provide complementary financial services to the economy, with both having positive implications for economic growth. In this context, the financial systems of the GCC states are all considered as bank-dominated systems similar to that in countries like Germany and Japan. Moreover, these markets are also considered underdeveloped markets by global standards. The capital markets (equity and bonds) are still in their early states of developments (Azzam, 1998).

> The Arab Gulf bond markets are still in their early states of development, mostly in government debt instruments denominated in the local currencies. The bond markets in the region are likely to gain added depth and versatility in the coming few years as the need increases for long-term capital borrowed at a fixed rate to spend on infrastructure and as international investors seek higher yields from newly emerging markets. This will complement the region's fast developing equity markets and provide a fresh source of financing for private and public projects. It will also encourage the creation of new risk management instruments such as interest rates futures and options, while adding to the scope of central banks to conduct monetary policy through open market operations. (Azzam,1998, p 69).

In developing countries, banking markets are characterized by high liquidity and a lack of complex financial instruments, either on the asset or liability side.

> In the majority of the developing countries where the financial system is less developed, competition is limited and most of the financial activities are dominated by a small number of financial institutions, usually commercial banks. The degree of competition among different financial institutions constituting the financial system can be measured by the concentration of the banking system's total assets. (Hermes et, al. 2000, p.511).

While regulations concerning financial institutions exist in all countries, these appear to be enforced more consistently and effectively in the developed countries compared to under-developed ones (Cunningham, 1995). Finally, financial innovation in developed countries has typically been led by market forces and the liberalization of markets, whereas in developing countries, such as the GCC, it has been predominantly at the behest of governments (Azzam, 1998).

3.3 An Overview for The Financial Systems in the GCC Countries

This section outlines from a historical point of view the development of the financial systems of the six countries under study Saudi Arabia, Bahrain, Oman, Qatar, Kuwait and United Arab Emirates. The structure and performance features of these banking systems of are discussed in more detail in the following sections.

3.3.1 Financial System of Saudi Arabia

The Saudi financial system is centred on 9 commercial banks, and one money exchanger all of which are wholly or majority owned by Saudi interests. The history of financial institutions in Saudi Arabia commenced in the 1900s when several foreign banks had offices in the Kingdom before the period of high oil revenues (Presley, 1992). The first local bank, National Commercial Bank, was licensed in the early 1950s. However, the modern history of the banking system in Saudi Arabia started in 1952 when the Saudi Arabian Monetary Agency (SAMA) was created to achieve a stable monetary mechanism. Before the establishment of SAMA, there was no Saudi currency until 1952 when the Saudi Riyal was issued (Cunningham, 1995). In 1976 the Saudi Council of Ministers ordered that all foreign banks in the Kingdom had to be put under majority Saudi ownership and a maximum foreign shareholding at 40% was set. During the next few years seven foreign banks converted their local offices into joint ventures. The last banking licence to be issued was to Al-Rajhi Banking and Investment Corporation, which began operations in 1988. The company had been operating as a money changer for many years and had strayed into the business of accepting deposits. By issuing a licence the financial authorities regularized this anomalous situation and brought the company within the purview of local banking regulations (Cunningham, 1995). Apart from the granting of a licence to Al-Rajhi, which must be considered an exceptional case, the banking market has been closed to newcomers since the early 1980s.The only other banking institutions are the five major state development banks which extend soft loans to infrastructural, agricultural and other strategic projects. These development banks established during the 1970s, include, Saudi Credit Bank, Saudi Agricultural Bank, Public Investment Fund, Saudi Industrial Development Fund and the Real Estate Development Bank. These institutions finance medium and long-term projects to supplement the short-term funds provided by commercial banks (Presley, 1992).

Central Banking and Regulation

The Saudi Arabian Monetary Agency (SAMA) is the Kingdom's central bank. It was created by royal decree in 1952 and given a charter in 1957 (Cunningham, 1995). SAMA's responsibilities vis-a.-vis commercial bank legislation were laid down in the Banking Control Law of 1966 which still forms the basis of banking regulation in the Kingdom (Azzam, 1998). SAMA reports to the Ministry of Finance and National Economy whose approval is required for many aspects of its regulatory activity. In practice, however, SAMA is free to act on its own initiative in technical matters relating to the management of the banking system (Alsuhaimi, 2001). Although SAMA is not technically a lender of last resort, it acts as one for all practical purposes (Cunningham, 1995). It is highly unlikely to allow any bank to collapse as a result of financial difficulties. In the days which followed the Iraqi invasion of Kuwait on 2 August 1990, SAMA moved swiftly to inject liquidity into the banking system to help the banks cover the massive withdrawals and transfers made by depositors. Its efforts extended to the import of actual US dollar bank notes which were distributed to the banks (Presley, et al. 1992).

No bank has collapsed since the formation of SAMA in the 1950s although in the late 1980s it was clear that some would have negative net worth if they made provisions commensurate with the size of their problem debt portfolios. These banks were allowed to continue operations until they were able to raise fresh capital with which to make provisions and strengthen their balance sheets.

SAMA is responsible for managing the exchange rate of the currency, the Saudi riyal, which is officially linked to the Special Drawing Right but effectively pegged to the dollar at $1=SR3.75. The riyal stabilised at this rate in 1986 after a series of small devaluations as the Kingdom struggled to balance its payments during the period of low oil prices. The currency came under pressure at the end of 1993 as speculation grew that low oil prices would again force a devaluation. Pressure was resisted, however, and in his budget speech on 1 January 1994 King Fahd specifically ruled out devaluation (Azzam, 1998). SAMA is also responsible for managing the bulk of Saudi Arabia's reserves. SAMA does not have a foreign office dedicated to managing its investments abroad (as Kuwait does with its Kuwait Investment Office in London). Most of the reserves which it manages are placed with overseas fund managers, (Cunningham, 1995).

In regulating the local commercial banks SAMA employs several key ratios.

- All banks must conform to the 8% capital to risk weighted assets ratio commonly known as the "Basle ratio". Conformity does not present the banks with problems and many exceed the 8% minimum with ease. Nearly all banks added substantially to their capital in 1991-93 either through public share issues or by retaining earnings. The large amounts of Saudi government debt which many banks now hold also ease the capital requirement (since government debt is zero-weighted for regulatory capital purposes).
- SAMA's guidelines state that loans should not exceed 65% of customers' deposits. Although the 65% figure is only a guideline it is closely monitored as an indicator of lending capacity in the kingdom, (Cunningham, 1995).

- A bank's deposits may not exceed 15 times its capital, reserves and retained earnings. Half of any excess deposits have to be placed with SAMA. A bank's obligation to do this is calculated on the basis of its end of year accounts, and deposits made with SAMA are not released during the course of the year even if the bank's ratio falls below the 15:1 multiple.
- Banks must place with SAMA 7% of their current account deposits and 2% of all other account liabilities, including margins and certificates of deposit. The banks do not receive interest on these deposits. Banks must keep 20% of their customer deposits as liquid reserves. Saudi treasury instruments and interbank deposits with maturities of less than 30 days, may be included in the calculation of this ratio.
- Banks may not lend more than 25% of their capital and reserves (excluding retained earnings) to a single customer. This percentage may be increased to 50% with SAMA's authorisation.

Financial Markets

According to (Azzam, 1998), Saudi financial markets are surprisingly underdeveloped given the size of the country's economy and banking system. This is a reflection of the historical importance of cash and liquidity in the banking system, and the fact that until the early 1990s the banks had no difficulty in attracting the funds they sought and borrowers had no difficulty in finding willing lenders. This situation started to change in 1993 when a slowdown in deposit growth, resulting from reduced repatriation of capital from abroad and a reduction in government oil revenues, combined with increasing demand for credit on the part of the government, and, to a lesser extent, the private sector. Referring to (Presley, 2000), the main gap in Saudi financial markets is the lack of medium-term liability instruments. The vast bulk of Saudi banks' deposits, both from customers and banks is in short term money. No Saudi bank has issued medium-term notes or bonds as part of its funding programme. Historically, Saudi banks have had large amounts of assets placed with banks abroad and these could be repatriated to cover any short-term liquidity requirements (Azzam, 1998).

Government Development Bonds

There has been some development of products on the asset side, although these have arisen mainly in the *context* of government debt, (Cunningham, 1995). In 1988 SAMA began to issue government development bonds (GDBs) on behalf of the Ministry of Finance and National Economy. The stated intention was to cover the government deficit (Presely, 1992). Yields on the bonds are theoretically linked to profits on unspecified development projects. In practice they are directly linked to the returns on US treasury bonds (Wilson, et al. 1992). The GDBs give a premium of 0.2% over US treasuries on the two-year bonds rising to a premium of 0.5% over five years on the five-year bonds. By the end of 1993 it was estimated that bonds outstanding totalled around $46bn of which about half were taken up by governmental institutions, (Wilson, 1996). Bonds may be bought on the secondary market by GCC institutions or individuals, Bahrain offshore banks and the overseas-based branches of Saudi companies. The GDBs proved popular with the banks when interest rates were falling in the early 1990s but when rates started to rise again in early 1994 purchases quickly tailed off (Azzam, 1998). The secondary market in bonds is thin, not least because all the banks are using the same criteria in determining whether to buy or not to buy (Alsahlawi, 1997). SAMA does, however, offer a repurchase facility for up to 25 % of banks' holdings of the bonds. In November 1991 SAMA started to issue treasury bills with maturities up to one year. Repurchase facilities (.for up to 75% of holdings) and reverse repurchase facilities exist (Cunningham, 1995).

Stock Market

Activity on the Saudi stock market started to increase towards the end of the 1980s with a series of public share issues. This trend accelerated after the Gulf war and in the two and a half years to the middle of 1994 11institutions (10 commercial banks and one Islamic bank) raised a total of$4.7bn in capital in response to the new capital adequacy policy imposed by SAMA, (Cunningham, 1995). Moreover, new publicly traded firms were established. However, after that the pace slackened reflecting a decline in the Saudi stock index and tightening liquidity in the economy (Azzam, 1998). From a peak of 1233 in April 1992 the Saudi stock index sank to around 1135 in July 1994 and hovered around that level until the end of the year. In fact, in the early 1990s the Saudi share market witnessed a systematic transformation, represented by the introduction of the Electronic Share Information System (ESIS). ESIS has contributed to the regulation and development of the operation of the market and restricted trading only through the central trading units at commercial banks, which are continually supervised and monitored by SAMA. At present SAMA undertakes the responsibility of developing, regulating and directly supervising the Saudi share market and its day-to-day operations (SAMA Annual Report, 2001). The Saudi share market recorded a marked improvement during 2000 due to increased economic activity and the ongoing policy of restructuring aimed at partially privatising state sectors. The share price index stood at 2258.29 at the end of 2000, rising by 11.5 percent over the end of the preceding year, and the total value of shares traded went up by 15.5% percent from US$ 15,078 million in the preceding year to US$ 17,411 million in 2000 (see table 3.1).

Table 3.1 Saudi Share Market Indicators over period from 1990-2000					
Year	No. of shares traded (1000)	Value of Shares Traded(US$, Mill)	Market Value of Shares (US$ M)	Number of Transactions	General Index (National Stock Indicator)(Points)
1990	17000	1,173	25,866	85,298	979.80
1991	31000	2,275	48,266	90,559	1765.24
1992	35000	3,651	54,933	272,075	1888.65
1993	60000	4,629	52,800	319,582	1793.30
1994	152000	6,632	38,600	357,180	1282.90
1995	117000	6,191	40,800	291,742	1367.60
1996	138000	6,770	45,780	283,759	1531.00
1997	312000	16549	59,456	460,056	1957.80
1998	293000	13,736	42,650	376,617	1413.10
1999	528000	15,078	61,045	438,226	2028.53
2000	555000	17,411	68,000	498,135	2258.29
Source: Saudi Monetary Agency Annual Report (2001, p. 331).					

Furthermore, the total number of shares traded increased to 555 million from 528 million in the preceding year, recording a rise of 5.1% percent, and market capitalization stood at US$ 68,000 million at the end of 2000 as against US$ 61,045 in the preceding year, rising by 11.5%, (SAMA, Annual Report, 2001).

To conclude, despite the downturns in the domestic economy resulting from the instability in oil prices and the Gulf War, the Saudi financial system has witnessed substantial progress over the past decade. Many banks have increased there capitalization, and the number of publicly traded firms also increased. Further, the stock market witnessed substantial expansion.

3.3.2 Financial System of Oman

Until 1970, there was no national authority responsible for the supervision of the incipient banking system. The number of banks was small and banking activities were limited in scale (Presley, 1992). The two monetary authorities that preceded the establishment of the Central Bank of Oman, namely the Muscat Currency Authority in 1970 and the Oman Currency Board in 1972 were not vested with full banking status, but, they had well prepared the ground for the emergence of the Central Bank of Oman. However the major event heralding the creation of the Central Bank of Oman was the launching of the Banking Law in 1974. At the end of 2001 the Omani banking system comprised seven local banks,11 branches of foreign banks and three specialised banks. The financial system as a whole also includes leasing companies, investment funds which are listed on the Muscat Securities Market (stock exchange) and 14 insurance companies, four of which are locally incorporated (Oman Central Bank Report, 2001). In 1995 the Central Bank issued regulations governing investment banking activities. Those banks which wished to conduct such activities had to apply for a special licence. At the end of 2001 five banks had been awarded investment licences. The five were Bank Muscat Al-Ahli Al-Omani, Commercial Bank of Oman, Bank of Baroda, Habib Bank A.G. Zurich and Habib Bank Ltd. The introduction of investment banking licences will not result in a clear separation between investment and commercial banks. Most local banks will in future conduct both types of business. The Central Bank's purpose in introducing the new legislation was to ensure that investment activity, which was only just beginning in Oman, would be properly regulated. The seven local banks dominate the market, accounting for about two-thirds of banking assets and up to three-quarters of deposits. Local banks have been reduced to their present number as a result of mergers carried out during the early 1990s. Three of the seven banks are the product of mergers or takeovers: Bank Muscat Al-Ahli Al- Omani (formed at the beginning of 1993 from Bank Muscat and Bank Al-Ahli Al- Omani), Commercial Bank of Oman (formed from the merger in October 1993 of Commercial Bank of Oman and Oman Banking Corporation) and Oman Arab Bank (which bought Omani European Bank in early 1994). Three other long-standing banks have retained their independence: National Bank of Oman, Oman International Bank and the Bank of Oman, Bahrain and Kuwait. Bank Dhofar Al-Ahli Al-Omani was established in 1990 and has been unaffected by the merger policy, (Cunningham, 1995).

In April 1992 the Central Bank gave local banks 18 months in which to raise their capital to OR 10 m (US$26m). Foreign banks had to show a minimum capital of OR3m. The previous minimum, for both local and foreign banks, had been OR1m. The Central Bank also offered incentives to merger in the form of a five-year tax break and cheap deposits which would be awarded according to the size of the new bank's capital. Oman is the only Gulf country successfully to have implemented a policy of bank mergers (Azzam, 1998).

Several local banks have non-Omani shareholders. The position at the end of 2000 can be summarised as follows:

Bank Muscat Al-Ahli Al-Omani: Societe Generale has a 10% stake.

Oman Arab Bank: Jordan's Arab Bank has a 49% stake and the managing director is seconded from Arab Bank.

Bank Dhofar Al-Omani Al-Fransi: Banque Paribas has a 10% stake and the general manager is seconded from Paribas.

Bank of Oman, Bahrain and Kuwait: Bahrain-based Bank of Bahrain and Kuwait, itself 50% owned by Kuwaiti financial institutions, has a 49% stake.

Commercial Bank of Oman: GIBCORP, the local joint venture between Bahrain-based Gulf International Bank and local interests, has a 42% stake and a management contract.

National Bank of Oman and Oman International Bank are wholly owned by local interests. Bank of Credit and Commerce International (BCCI) had a 40% stake in National Bank and a management contract before it was closed in July 1991.

Three of the local banks are clearly bigger than the others: Bank Muscat Al-Ahli al-Omani, National Bank of Oman and Oman International Bank. All had assets of around

$14,800m and deposits of around $13,500m at the end of 2000, (OCB annual report, 2001).

The Omani banking system is the smallest in the GCC. At the end of 2000 it had assets of $24.812bn which accounted for only 8% of the GCC total banking system assets (excluding the Bahrain offshore sector).

The banking system is regulated by the Central Bank of Oman. The Central Bank exercises considerable influence over local banks and there have been no recent examples of commercial banks in Oman defying their central bank's wishes. The Central Bank regularly reviews banking regulations. Changes to the rules are published in its twice monthly English-language newsletter Al Markazi and in the annual report. The most important regulations affecting Omani banks, as listed in the Oman Central Bank Reports 2001 are the following:

- Banks may not lend more than 15% of their net worth to anyone client.
- Total lending may not exceed 75% of deposits and net worth. This ratio rises to 85% when bills of exchange are included in the loan portfolio.
- Banks' open foreign exchange position may not exceed 40% of their net worth.
- 5% of customers' deposits must be kept with the Central Bank. Treasury bills may account for up to 60% of this 5% (that is, 3% of customers' deposits). In this and other Central Bank calculations, borrowings from banks overseas are counted as customers' deposits, while borrowings from local banks are not.

Omani financial markets are based on bank lending and trade finance for the major private sector companies (Azzam, 1998). In 1987 the Central Bank started issuing treasury bills and in 1991 began issues of bonds. The stock market, which opened in 1989, became an important feature of the local financial scene during the mid 1990s (Cunningham, 1995). Treasury bills, which have 90 day maturities, are issued by the Central Bank every two weeks. The value of bills outstanding can vary considerably from year to year depending on the banks' liquidity position. In 1999-2000 bills outstanding were valued at about $300-400m and accounted for about 1-1.5% of banks' total assets. The introduction of Government Development Bonds (GDBs) was a significant addition to Omani capital markets. The bonds are used as a way of funding the government deficit and may be bought by Gulf citizens as well as Omanis. The bonds usually have maturities of 5-7 years although there are occasional issues with longer or shorter maturities. (Presley,et al.1992). During 1999 the Muscat Securities Market (MSM) started to play an important role in local financial markets. During the year $186m in equity finance was raised by new companies and a further $63m was raised by existing companies seeking additional capital, (Almarkazi, 2000). The government is committed to privatising part of its holdings in local companies, and new investment opportunities will also arise from the government's policy of having new infrastructural projects, such as power stations and sewerage systems, constructed on a build-own-operate-transfer basis. The first such project, the Manah power station, was awarded in 1997 to an international consortium led by Belgium's Tractebel and including four local contractors. Authorities are keen to encourage overseas fund managers to invest in Oman and various regulations covering foreign direct investment have been upgraded and clarified during the 1990s. In theory, foreign direct investment is already possible, although in practice it shall remains subject to various restrictions (Azzam, 1998).

3.3.3 Financial system of Kuwait

There are six commercial banks in Kuwait, two specialized banks and one Islamic bank. There are also a large number of financial companies that are not regulated by the Central Bank of Kuwait, and these play an important role in local financial activity. Foreign banks are not allowed to have branches or representative offices. State-owned institutions, such as pension funds and overseas aid organizations also have a high profile in the market.

All six commercial banks are wholly owned by Kuwaiti interests, and the government has an indirect controlling interest in two of them: Bank of Kuwait and the Middle East and Burgan Bank. National Bank of Kuwait (NBK) is the pre-eminent bank and is universally recognised as an institution of international standing. In 1994 the Kuwaiti parliament passed a law allowing foreign investors to hold up to 40% of local banks, subject to approval by the Central Bank of Kuwait. (the law came into effect on 1 August 1994). No new banks have been licenced in Kuwait since 1977, when Burgan Bank started operations. The two specialised banks, Industrial Bank of Kuwait and Kuwait Real Estate Bank, are state owned and as their names imply, their role is to lend for industrial and real estate projects, although they do so at commercial rates of interest. Kuwait Finance House is the only wholly Islamic bank in Kuwait. Despite this difference, it competes with the commercial banks for deposits and assets and is very much part of the local financial scene.

There is one foreign branch in Kuwait: Bank of Bahrain and Kuwait. This is anomalous, since in theory foreign banks are not allowed to have branches. Bank of Bahrain and Kuwait is based in Manama and is 50% owned by Kuwaiti institutions. It is the large Kuwaiti stake which persuaded the Central Bank to allow a presence to what is almost a majority Kuwaiti-owned bank.

United Bank of Kuwait is a London-incorporated bank wholly owned by Kuwaiti financial institutions. The bank focuses on funds management (where it is active in Islamic banking products) and on commercial lending such as property, aircraft finance and housing. The bank is not permitted to have a branch in Kuwait.

Financial companies have in the past played an important role in local and international financial markets. The most prominent have been the companies known as the "three Ks": Kuwait Investment Company (KIC), Kuwait Foreign Trading Contracting and Investment Company (KFTCIC) and Kuwait International Investment Company (KIIC). The fist two are state owned and they merged at the end of 1996. The Kuwaiti banking system is the third largest in the GCC, after Saudi Arabia and the UAE, with assets at the end of 2000 of $47,864.3 Million.

The Central Bank is a powerful body in Kuwait, and is legally a lender of last resort. It is unlikely that the central bank would allow a local bank to collapse, or force an unhealthy bank to close. It stood behind Kuwait's banks when most were technically insolvent after the stock market crash in 1982 (also known as Souk al-Manakh) and it guaranteed customers' deposits (Azzam, 1998). The Central Bank is responsible for the exchange rate of the Kuwaiti Dinar (KD) which is pegged to a trade-weighted basket of currencies.

The Central Bank uses a standard array of regulations to monitor and control commercial banks' balance sheets:

- All banks must conform to the Basle ratios for risk weighted capital adequacy, although they are allowed to weight GCC risk as if it were OECD.
- A bank may not lend more than the equivalent of 10% of its capital base to anyone counterparty or group of counterparties.

- Banks are not allowed to take collateral against loans. (This prohibition is a legacy of the stock market crash in 1982, before which banks had lent recklessly on the basis of collateral).
- Banks may not lend more that 10% of their capital base to any other bank.
- Consumer loans may not exceed 10% of a bank's capital. There are no restrictions on the ratio of loans to deposits.
- The maximum permitted aggregate foreign exchange position is 15% of the capital base. Liquidity regulations are based on a weighted system whereby the short term liabilities have to be backed by a higher proportion of liquid assets than medium and long term liabilities. In addition to this main calculation, a bank's sight liquidity position is also calculated. Liquidity calculations are carried out twice a month.
- Whatever other conditions may obtain in a bank's balance sheet, liquid assets in KDs must constitute at least one-third of all liquid assets, and treasury bills and/or cash must constitute a minimum of total deposits up to one year.

Financial Markets

In general, the heyday of Kuwaiti financial markets was in the years before the 1982 stock market crash, when local companies and banks played a leading role in channelling surplus oil revenues from the Gulf into western capital markets (Presley, 1992). The year of the crash also marked the high point of Arab oil revenues, and by the mid 1980s lower oil prices and healthy economic growth in western countries had diminished the importance of Arab money to the world financial system. Arab financial institutions in general, and Kuwaiti ones in particular, focused more on internal markets and on readjusting to increasingly strained economic circumstances, (Cunningham, 1995).

From 1982 until the early 1990s Kuwaiti financial markets were in limbo as they reeled from the effects of the crash and were then hit by the Iraqi invasion, (Wilson, et al. 1992).

The only significant development of the market was the launching, in 1987, of Central Bank treasury bills and bonds. The general downturn in the Gulf economies at this time meant that banks were looking abroad for assets and that treasury instruments were a way of keeping the money in the country (Presley, 1992).

The commercial bond market started to revive in 1994-95. Kuwait Real Estate Bank issued KD15m ($50m) in five-year bonds at the end of 1995 to replace an issue which was maturing. It then issued a further KD20m in May 1996 to provide additional funding. In October 1997 the Kuwait Investment Projects Company issued KD12m in five-year bonds. The only other issue since the Iraqi invasion was for a local leasing company, Commercial Facilities Company. Demand for all the issues was healthy and it is expected that the bond market will continue its revival in the years ahead. Both of the Real Estate Bank issues were managed by National Bank of Kuwait while the Projects Company issue was managed by Kuwait Investment Company.

Stock Market

The Kuwait Stock Exchange (KSE) plays a major role in local financial markets and the government has committed itself to an extensive privatisation programme which will involve the floating of large blocks of shares in local companies. These sales were expected to be the main force reviving stock market activity during the late 1990s. In mid 1998 two stock market investment funds were launched with the aim of attracting new money into local stocks. For the first time, subscription was opened to resident expatriates. However, neither was well received by the market and government companies had to step in to cover the subscription. The KSE had languished since trading resumed after the Iraqi occupation and at the time when the funds were launched the prospects for significant capital growth across the index as a whole were minimal. While the success of the Commercial Facilities Company issue was expected to lead to subsequent successful offers for existing companies, there was little expectation that the stock market would develop as a vehicle for raising new capital, as was starting to happen in other Gulf Countries.

The Kuwaiti government periodically commissions consultants to propose long term strategic plans for the Kuwaiti economy. The best known of these was a lengthy study by the Massachusetts Institute of Technology, which was circulated around government ministries in 1998. These studies invariably propose a liberalisation of financial markets and the development of Kuwait into a regional financial centre. Offshore banking is sometimes mentioned as an option. There is almost no evidence to suggest that the government wants to pursue this course. The development of a major offshore banking centre appears unlikely and developments of capital markets businesses will probably occur at a gradual pace. In this respect, the development of financial markets reflects "the lack of vision and initiative which characterises much of Kuwaiti decision making in the 1990s".

3.3.4 Financial system of Qatar

Qatar has six locally incorporated banks and eight branches of foreign banks. All are classified as commercial banks and the local regulations make no distinction between commercial and investment banking. The financial system also includes 16 foreign exchange houses and seven insurance companies. Three of the insurance companies are locally incorporated and four are branches of foreign companies. All the locally incorporated banks are wholly owned by Qatari interests. Two of the local banks classify themselves as "Islamic banks" and so do not engage in interest based transactions, but in practice they compete for deposits and assets alongside the conventional banks.

The only recent changes in the number of banks in Qatar involved the withdrawal of Citibank in the middle of 1990s; the closure, in 1989, of Bank al-Mashreq, a branch of the failed Lebanese bank of the same name; and the licensing, in 1991, of Qatar International Islamic Bank which is wholly owned by Qatari shareholders and is the smallest of the local banks. (Bank al-Mashreq has no connection with Dubai-based Mashreq Bank which has a branch in Doha.) The Central Bank of Qatar has not ruled out the possibility of issuing new banking licences (as some other Gulf central banks have done). In theory foreign branches may compete on equal terms with the local banks but in practice they sometimes find that they are disadvantaged by regulations covering bids for government business. Total assets in the Qatari banking system stood at US$32,541 m at the end of 2000, representing 9% of total GCC banking assets (excluding the Bahrain offshore market). Qatar is therefore the largest of the three small banking markets in the GCC (the other two being Bahrain and Oman). The size of the banking system has grown with reasonable consistency since the early 1980s. In the five years to the end of 2000 it grew by an average annual rate of 8%, which is well in excess of GDP growth. The locally incorporated banks dominate the financial scene: at the end of 2000 local banks accounted for 85% of total banking assets and 82% of deposits. Qatar National Bank (QNB), in which the government of Qatar has a 50% stake, is by far the largest bank, accounting for about 35% of local assets and deposits. The other local banks have market shares ranging between 5% and 13%. Among the foreign banks, British Bank of the Middle East, Grindlays and Standard Chartered have traditionally been the most active, although Banque Paribas was the second largest at the end of 1999. British Bank of the Middle East is the biggest foreign bank by a clear margin[1].

The Qatar Monetary Agency (QMA) fulfils central banking functions in Qatar. On 5 August 1993 an Emiri decree was issued establishing the Central Bank of Qatar. The governor of the Qatar Monetary Agency (QMA), Mr Abdullah Khalid Alattiya, became

[1] Recently the name changed to HSBC

governor of the Central Bank. The change of name and statutes has had little effect on central banking in Qatar since the regulatory improvements which have occurred since August 1993 could have been implemented just as easily under the QMA.

- Loans and overdrafts may not exceed more than 95% of a bank's customer deposits. Overdrafts may not exceed 50% of total lending. In a normal banking market this would not be a problem, but Qatari banks have traditionally extended a large amount of credit on an overdraft basis.
- Neither marketable securities nor long term investments may exceed 20% of a bank's equity. No single marketable security or long term investment may exceed 4% of equity.
- Liquidity regulations have been upgraded in recent years but the basic rules are that liquid assets may not exceed 35% of interbank borrowings and deposits, and that fixed assets may not exceed 20% of equity.
- No single interbank placement may exceed 20% of a bank's equity or QR200m ($55m).
- No single loan may exceed 25% of equity or QR50m.
- Lending to members of the bank's directorate may not exceed 25% of its equity and lending to any single director may not exceed 7% of equity.
- Banks must conform to the risk-weighted capital to assets ratio laid down by the Basle committee. In addition, a bank's equity must be equivalent to at least - 6% of its assets on a non-risk weighted basis.

Deposit rates must be within 0.75% of the Central Bank's range, which is typically 1.5% wide. It also sets maximum rates for lending. These maxima are qualified by two factors: the spread between lending and deposit rates for equal maturities may not exceed 3%, and banks may charge an additional 1 % on credits which exceed an approved limit or are extended without prior commitment. Until 1992 the QMA (as it was then) did not alter local lending rates to take account of international trends. Deposits other than savings accounts had been subject to a 5-7% range. Overdrafts and loans had similarly been restricted to 9.5% limit. In 1992 the deposit rates were reduced to 3.75-5.25% and the maximum rate on loans and overdrafts to 7.5%. After that, interest rates have responded in a limited way to international trends.

Financial Market

Qatari financial markets are the smallest in the Gulf and are unlikely to develop much during the next few years (Azzam, 1998). The banks' overwhelming focus on the liabilities side is on attracting deposits (especially from the government).The Qatari market is highly liquid and Qatari banks remained net placers of interbank funds even after banking conditions started to tighten in the early 1990s(Presley, 2000). The government of Qatar raised its first Euroloan in 1989 - $400m for the first phase of a major gas development project - and has since borrowed a number of times on international markets. Almost all the money raised in this way has come from international banks with QNB the only local bank to have had any significant role in the syndications (it often takes the role of agent bank). Project finance for industrial expansion has also been dominated by foreign banks. The stock exchange opened in early 1999. Limited share trading is conducted through local banks but the market is not a significant factor in the domestic financial scene.

3.3.5 Financial System of Bahrain

The Bahraini financial system is best known outside the region as an offshore banking centre (Cunningham, 1995), but it also comprises commercial banks, which focus on local business, and a small number of investment banks. Bahrain's financial sector also includes two specialised banks, namely the Housing Bank and the Bahrain Development Bank. The Housing Bank was established in 1979 as a government entity to support the construction industry in line with the government's policy of providing adequate housing for Bahrain's steadily increasing population. The Bahrain Development Bank, on the other hand, was incorporated in 1991 to enhance business activity and industrialisation in the country (Presley, 1992).

Although offshore financial business has declined considerably since the oil-boom phase which started in the middle of 1970s, till the first half of 1980s, Bahrain remains the most diverse financial centre in the GCC countries and has the greatest concentration of foreign banks of any country in the region (Azzam, 1998). Banking started in Bahrain when a branch of the Eastern Bank opened in 1921. This was followed by the British Bank of the Middle East in 1944, the National Bank of Bahrain in 1957 and the Arab Bank Limited in 1960 (Presley, 1992).

The offshore market was created as a result of a tacit agreement among Gulf countries at a time when the spoils of new-found oil wealth were being divided (Cunningham, 1995). It was decided that Bahrain would be given a free run to develop an offshore centre. Bahrain was a natural choice since the country's history as a trading nation gave it a cosmopolitan atmosphere and its government had no qualms about encouraging foreign institutions to set up offices there (qualms which other GCC countries, such as Saudi Arabia and Kuwait, have to this day) (Wilson, et al, 1992). A further point in Bahrain's favour was that it was (and remains) the only GCC country without substantial oil exports, so it had no option but to promote itself as the region's service centre (Azzam, 1998). A major step forward came in 1975 when the Bahrain Monetary Agency announced its plan to develop a centre in the Arab World for dealing in international liquidity that offered an attractive package to prospective participants in terms of regulatory and fiscal incentives as well as favourable working conditions including free exchange and trade controls. In particular, offshore banking units were exempted from maintaining reserves with the agency and from observing liquidity ratios. No tax was to be paid on the banks' income, and this exemption continues to be effective to date.

According to (Aljarrah, 2002) there was an Arabisation of Bahrain's offshore banking sector when major Arab banks established their headquarters on the island during the 1980s. The number of licensed offshore banking units reached 76 in 1984, but the number had declined to 47 by 1995 and 38 in 2000, in response to the international consolidation trend. According to the report of the World Trade Organization (2000), Bahrain's financial services, especially offshore banking, are well developed and the Government has continued to pursue reforms to further enhance and strengthen the financial services sector. There are no foreign ownership restrictions for offshore banks, whereas up to 49% of the total equity of a local bank may be held by foreign nationals. The insurance sector, which is regulated and supervised by the Ministry of Commerce, is subject to similar restrictions with regard to foreign investment. Furthermore, in 1977 the Bahrain authorities decided to introduce an exempt company (EC) registration, which enabled companies to incorporate in Bahrain without a Bahraini shareholding as long as they did not conduct business in the domestic market. In the same year, the Agency introduced a further category of banks to carry out investment business. The number of these investment banks grew from a small number in the 1970s to reach 23 in 2000 (BMA, Annual Report, 2001). These banks were allowed to participate in traditional investment or merchant banking business, particularly securities business. According to (BMA, Annual Report 2001) Of the 23 investment banks registered in 2000, there are six major locally incorporated institutions. These are Albaraka Islamic Investment Bank, Arab Financial Services, Arab Islamic Bank, Investcorp Bank, TAIB Bank(formerly Trans-Arabian Investment Bank) and United Gulf Bank. The others are foreign institutions such as Lehman Brothers, Merrill Lynch and Sumitomo Finance which are engaged in investment management.

The Bahrain Monetary Agency (BMA) acts as a central bank and regulates the offshore, commercial and investment banking markets. It was set up in 1973 with advice from the Bank of England and replaced the old Currency Board. In August 1994 the BMA removed the 12% ceiling on consumer loans, the final interest rate which had been subject to control. Other rates had been gradually removed during the preceding years. In November 1993 the BMA introduced a deposit protection scheme modeled on that run by the Bank of England. (Bahraini depositors are guaranteed to receive three-quarters of their deposits or BD 15,000 (US$40,000) whichever is less). In 1995-96 the BMA introduced regulations to cover the managing and marketing of mutual funds and the activities of financial advisors and agents. Prudential regulations governing banks' balance sheets are similar for all types of banks on the island. The principal regulations which apply equally to commercial, offshore and investment banks are as follows:

- No more than 15% of capital and reserves may be extended on one counter-party.
- No more than 30% of capital and reserves may be extended to the board of directors collectively, and no more than 15% may be extended to any single board member.
- Loans may not exceed 65% of deposits. For this purpose, 'deposits' include interbank lines as well as customers' deposits.
- Bank must conform to the Basle guidelines on risk-weighted capital adequacy but they are allowed to classify all GCC countries as the same degree of risk as OECD financial institutions.
- Five percent of customer deposits must be kept with the BMA.

- ❖ Banks' gearing ratios (ratio of non-capital liabilities to capital and reserves) may not exceed 20:1. The gearing ratio for investment banks is 10:1.
- ❖ There are no restrictions on the percentage of securities which banks may hold in the balance sheet, nor are there restrictions on the amount of consumer loans which banks may have.

The IMF noted that the Bahrain Monetary Agency had achieved full compliance with 24 of the 30 Core Principles of Basle and is largely compliant with another five (4 core and 1 sub-core) Principles. These 29 Principles cover virtually all of the supervisory factors that broadly encompass the fundamentals of a sound supervisory system (IMF, 2001).

There are 18 full commercial banks in Bahrain of which five can be considered "local". The others are branches of non-Bahraini banks. The five are National Bank of Bahrain, Bank of Bahrain and Kuwait, Al-Ahli Commercial Bank, Bahraini Saudi Bank and Grindlays Bahrain Bank. Bahrain Islamic Bank, although not classified as a commercial bank, should be grouped with the five since it competes with them for local deposits and lending business (Azzam, 1998). The commercial banks had assets of about US$24 billion at the end of 2000, representing 7.5% of total GCC commercial banking assets. In recent years the combined assets of the banks have been increasing steadily, with the sole exception of 1990, when the Iraqi invasion of Kuwait caused an outflow of funds.

Two local banks, National Bank of Bahrain and Bank of Bahrain and Kuwait, account for about 60% of local assets. They are both three times the size of their nearest rival among the local banks, Al-Ahli Commercial Bank.

For the commercial banks, financial market activity consists mainly of lending to local companies. Since competition for this business is intense, most banks try to maximise their consumer finance business, which offers higher returns. Banks also attempt to get an edge on their competitors by offering better banking technology in the form of payment cards and telephone banking. Nevertheless, the market is claustrophobic and will offer few new opportunities in the immediate future. As in other GCC countries, government deposits and government accounts in general are an important source of business (Azzam, 1998).

According to Aljarrah (2002) the government of Bahrain has identified Islamic banking' as one of the main economic growth areas. Islamic banking has similar principles to conventional banking, with the only exception that they must conform to Islamic law. Islamic finance prohibits charging interest for the use of money and disallows dealing in prohibited commodities. Islamic banking falls under four main categories: Murabaha is cost- plus financing (i.e, buying a product from a supplier and selling it to a customer for a profit; Musharaka is a profit sharing system that is similar to equity participation; Ijara involves leasing and Istisna is the financing of construction and manufacturing. Islamic banking is growing rapidly in the region and is attracting investors due to its profit potential in addition to religious factors, Al-Jarrah (2002). Referring to the report of the US Department of State, Bureau of Economic and Business Affairs, (2000), Bahrain claims to be the centre of the Islamic banking market in the region, 17 out of 30 Islamic banks in the Gulf region are located in Bahrain. In November 1999, Bahrain signed a Memorandum of Understanding with Lubuan, the offshore financial centre in Malaysia and the Jeddah-based Islamic Development Bank to create an International Islamic Money Market (BMA, Annual Report, 2001). In an effort to create a secure market, the BMA has issued regulations specifically for Islamic banks to prevent and detect institutional weaknesses (Aljarrah, 2002).

Bahrain's Capital Market:

The government debt market consists of the market for treasury bills and bonds. Since the end of 1992 the BMA, which issues these instruments on behalf of the government, has only sold new bills and bonds to cover maturing issues. The total outstanding remains a little below the government-imposed ceiling of BD300m ($800m). Bills have a maturity of 91 days and the bonds range from five years to seven years. In late 1998, Alba issued $50m in medium term bonds and further issues were planned by other local companies. The Alba issue was well received and the fact that it was tradable on the Bahrain Stock Exchange (BSE) added to the issue's attraction. The BSE itself is taking steps to widen share ownership and trading. In the mid 1990s trading was still thin, but in time the BSE aims to become a more important part of the local financial scene (Almannai, 2001).

There is a limited amount of corporate advisory work required by local industries which are contemplating expansion or privatisation. New ventures, such as a proposed power station to be financed on a build-operate-transfer basis also offer opportunities for advisory work. However, only the bigger banks have the expertise to undertake this (just as only they have the expertise to structure bond issues) and they usually face competition from offshore banks, which can easily get permission to engage in this type of local business (Azzam, 1998).

The government of Bahrain established an organized stock market in Manama in 1989 to regulate the listing and trading of securities and to control the members of the market. The objectives of the stock exchange market are to enhance the exchange in a way that serves the country's economic and development policies. Foreign or non- Bahraini companies listed on the BSE must be either joint stock companies or closed ' companies that have been incorporated at least three years prior to listing, and must have a paid-up capital of at least $US 10 million and have been making net profits from their principal activity three years before listing. Equities, bonds, mutual funds and currency warrants are currently the main listed securities on the exchange (US Department of commerce 2001). Efforts are under way to strengthen the role of the stock exchange in the economy by increasing the number of listed companies, introducing new investment instruments, cross-listing shares at the regional level, and developing automated depository, clearing and settlement procedures. The BSE's operations became fully automated in 1999, a service that enhanced its regional links and other services. By the end of 1999, there were 41 listed companies, with a market capitalization amounting to around BD 2.7 billion (BMA, Annual Report, 2001). The exchange is heavily dominated by commercial banks, investment firms, and insurance companies (Aljarrah, 2002).

Overall, the Bahraini financial system has been set up to be a financial centre in the Arab World that plays a major role in attracting oil money and re-investing this in international markets (Azzam, 1998). The participants in the Bahraini market, especially the offshore banking units, are offered attractive packages in terms of regulatory and fiscal incentives. Recently, the Bahraini authorities have introduced various international prudential regulations in line with the Basle supervisory core-principles. In addition, Islamic banking activity developments are well-advanced and are supported by the Bahraini authorities.

3.3.6 Financial System of United Arab Emirates

There are 19 locally incorporated commercial banks in the UAE and 23 foreign banks which have branches in the country. This gives the UAE more commercial banks than any other GCC state. A number of foreign banks have representative offices. The financial system also comprises seven investment banks. Despite the existence of the investment banks, there is effectively no distinction between commercial and investment banking as it is practised in global financial markets. In any case, financial markets in the UAE are at an early stage of development and the amount of investment banking activity is extremely limited (Azzam, 1998).

In recent years the only changes to the structure of the banking system involved the take over of the troubled Dubai-based Middle East Bank by another Dubai bank, Emirates Bank

International, and the closure and subsequent recapitalisation of Bank of Credit and Commerce International. In the mid 1980s Abu Dhabi Commercial Bank and Emirates Bank International (which was then called Union Bank of the Middle East) were used to take over the assets of banks which had run into difficulties. During the early 1990s, banks in Sharjah successfully resisted strong pressure from the Central Bank to merge.

The 19 local banks comprise four based in Abu Dhabi, six in Dubai, four in Sharjah, two in Ras al-Kheimah, and one in each in Fujeirah, Umm al-Quwain and Ajman. Abu Dhabian interests control three of the four banks based in Abu Dhabi: National Bank, Commercial Bank and Union National Bank (this last being the new name for the local operations of Bank of Credit and Commerce International - BCCI). Arab Bank for Investment and Foreign Trade (known as Arbift) is owned by Libyan Arab Foreign Bank.

The six Dubai banks include two which are state owned: National Bank and Emirates Bank International. Commercial Bank of Dubai and Mashreq Bank (which was formerly known as Bank of Oman) and Dubai Islamic Bank are partially owned. Middle East Bank is owned by Emirates Bank International. United Arab Bank has its head office and general manager in Abu Dhabi, but qualifies as a Sharjah bank because that is where its shareholders come from and because it is treated as a Sharjah bank by the Central Bank of the UAE. The other two Sharjah banks are Bank of Sharjah, which is managed by Banque Paribas, and Investbank. The national banks of the other Emirates are controlled by their respective ruling families.

Commercial banks' assets totalled $54.532 bn at the end of 2000, representing 25% of all banking assets in the GCC.(Saudi Arabia accounted for 45% of GCC assets and Kuwait for 15.5%). Assets in the banking system grew at an average rate of 7% in the four years to the end of 2000 (the latest available Central Bank figures).

Five banks dominate the UAE banking scene in terms of market share: National Bank of Abu Dhabi, National Bank of Dubai, Abu Dhabi Commercial Bank, Emirates Bank International and Mashreq Bank. The first two had assets just in excess of $26 billion at the end of 2000, while the other three had assets of around $15.3 billion. At the other end of the scale, five banks had assets of less than $1.3 Billion.

The UAE banking system is regulated by the Central Bank of the UAE which is a federal body based in Abu Dhabi. The principal financial ratios imposed by the Central Bank are as follows:

- Banks must conform to the Basle guidelines on risk-weighted capital adequacy, with two important qualifications. First, the ratio of risk-weighted capital to assets is 10%, rather than 8%, and no more than 4% may be tier two capital. Second, GCC countries are treated as if they are OECD risk.
- Large exposures to single customers are governed by rules laid down by the Central Bank in October 1996. The two main provisions specify a maximum exposure to corporate clients of 7% of net worth and to banks of 30% of net worth. The rules caused uproar when they were first announced, with banks saying that the 7% figure was far too low. Despite pressure from the financial community, the Central Bank did not alter its provisions and several banks subsequently increased their capital so as to be able to maintain existing commercial relationships.
- A loans to deposits ratio of one to one must be maintained, with "loans" being taken to mean all loans to non-banks and all exposure (including placements) to banks with a residual life of three months or more. "Deposits" consist of all deposits from customers and banks with a residual maturity of over one year and 85% of all customer deposits with a residual maturity of less than six months.

Deposits from banks with a residual maturity of less than six months are not included in the calculation.

- Banks must place with the Central Bank an interest-free deposit equivalent to 30% of all dirham-based lending to non-resident banks with a residual maturity of less than one year.
- No more than 25% of net worth may be invested in non-government securities. Government securities are excluded from this ceiling. Until recently "government securities" was taken to refer only to securities issued by the government of the UAE or the financial authorities of individual Emirates. However, the banks started to test the rule by buying securities issued by other governments, and it is now tacitly accepted that the 25% figure refers to securities of any government.

Financial Markets

Financial markets in the UAE are not sophisticated, lending to local companies and financing trade (particularly in Dubai, which acts as a re-export centre to the region) are the mainstays of local banking business. Portfolio management is important, particularly in Abu Dhabi, although in this the foreign branches have a clear advantage over the local banks. As in other Gulf countries, the banking market is so liquid that there has been no need to develop medium-term debt liability instruments. The shortage of local assets is seen in the fact that foreign assets accounted for 55% of all commercial bank assets in the UAE at the end of 2000. The government of the UAE does not issue treasury bills or bonds and does not appear to have any intention to start doing so in the near future.

In April 1999 the Central Bank initiated a new certificates of deposit programme with maturities ranging from one to 18 months. They are priced slightly below US dollar interbank rates and may be bought by local banks.

Stock Market:

The official stock market in the UAE opened at the start of 1999 in Dubai, before that most trading was conducted informally on the telephone through brokers, located mainly in Abu Dhabi and Dubai. At the end of 1998, there were 40 shares traded and 10 brokerage companies licensed by the central bank. Share prices are published in newspapers and price movements are monitored by the unofficial index set up by the National Bank of Abu Dhabi in 1989 with a base of 1,000 points.

In 1995 the central bank issued new regulations imposing minimum capital adequacy requirements for brokers and placing them under its direct control. The minimum capital requirement was set at Dh1 million ($272,000) for brokerage houses dealing in domestic shares and Dh 2 million ($545,000) for those trading internationally. The central bank made it necessary for brokers to obtain a license and prohibited dealers to operate in the market without authorization. The new regulations also made it mandatory for brokerage houses to be audited and their personnel to be qualified and reliable. The new rules were designed to end confusion in the market as several brokers were practicing without central bank permission, while others were not qualified to deal in shares.

The UAE Stock Market in its present form lacks rules and regulations. There is uncertainty about fair pricing and a reluctance amongst joint-stock companies to publish regular, timely and complete financial information. Furthermore pricing methodologies are not transparent and very little information is available on the companies whose shares are traded. Shareholding companies are not required to publish half-yearly results and the market is not open to international investors. Moreover, there is heavy concentration of share ownership with the government. Abu Dhabi has a majority stake in the Emirates Telecommunications Corporation (Etisalat), the largest listed company with a market capitalization of Dh17.8 billion ($4.85 billion) in 1999. At the end of 1999, total capitalization of listed companies reached Dh 85.6 billion (US$ 22.75 billion), making the UAE market the second largest in the Gulf after Saudi Arabia (National Bank of Abu Dhabi, Economic and Financial Report, January 2000).

To conclude this section, the financial systems of the GCC countries under study have witnessed major developments and reforms, especially over the last decade. These developments include the liberalisation of interest rates, the adoption of policies aimed at strengthening the financial capital of the banking and financial system, the introduction of prudential regulations in accordance with international standards and the modernization of stock markets aimed at providing a wider role in mobilising financial assets. These reforms have been aimed at improving the competitive advantage of the respective financial systems and enhancing the efficiency of the financial institutions operating in these countries.

3.4 Monetization, Financial Deepening and Economic Growth in the GCC countries

Each financial system in every different country has its own characteristics and structure. Identifying the structure of the financial system is important if one wishes to examine the efficiency features of such systems (Hermes. 2000). In addition, the development of an efficient financial system that can harness sufficient resources has been recognized as an important factor in promoting rapid economic growth in a country (Khan, et al. 2000). This development, referred to as "financial deepening", involves the design and implementation of policies that facilitate an increase in the monetization of the economy and at the same time fosters and develops a sound and diversified financial structure in order to, maintain monetary stability. As one of the measures of structure of the financial sector, financial deepening (financial depth) generally leads to lower transaction costs, an optimum distribution of risks and better investment choices (Lensink, et al. 2000). Thus, financial deepening encourages economic efficiency and is in line with the objectives of economic development. Therefore, the aim of this section is to investigate empirically the differences in the structure of the financial systems between the GCC countries. This task is accomplished by examining several indicators (measures) of financial depth, in the respective countries.

Several indicators of financial depth have been proposed in the literature and different indicators act as proxy indicators for different aspects of the financial system. Initially, such indicators were based on monetary aggregates, such as M1 or M2, mainly because these aggregates were widely available (Levine, 1997). However, such indicators may be a poor proxy for financial development, since they are more related to the ability of the financial system to provide transaction services than to the ability to channel funds from savers to borrowers. Indeed, economies with underdeveloped financial systems may have a high ratio of money to GDP, as money is used as a store of value in the absence of other more attractive alternatives (Hermes, et al. 2000). Consequently, researchers have shifted from narrower monetary measures (M1 and M2) to broader definitions, such as M3, which generally measure the total stock of liquid liabilities in the banking system. Although M3 overcomes various shortcomings associated with M1 and M2, it still contains M2 and therefore may be influenced by factors other than financial depth (Lensink, et al. 2000). More, recently, credit to the private sector has been favored as an alternative measure of financial intermediation. The main advantage of this indicator is that, by excluding credit to the public sector, it measures more accurately the role of financial intermediaries in channeling funds to the private sector. This is also, however, only a partial indicator of financial development. It only reflects developments in the banking sector (Khan, 2000).

Stock and bond markets, for example, are not taken into account. This weakness at first glance may be more relevant for industrialized than for developing countries.

> Industrialized countries have experienced significant non-bank financial development, while most of the financial development has occurred within the banking system in developing countries. Nevertheless, securities markets are becoming more important in a number of developing countries, and their role should not be ignored, (Levine, 1999, p. 42).

There has been extensive empirical work on the relationship between financial development and growth which has been largely surveyed in Levine (1997) and Levine (1998,1999a,b). One of the most influential studies on the subject is King and Levine (1993b), which shows that financial development has predictive power for future growth and they interpret this finding as evidence of a causal relationship that runs from financial development to growth. The study uses four measures of the level of financial development. The first is the liquid liabilities of banks and non-bank institutions as a share of GDP, which measures the size of the financial intermediaries sector. The second is the ratio of bank credit to the sum of bank and central bank credit, which measures the degree to which banks versus the central bank allocate credit. The third is the ratio of private credit to domestic credit, and the fourth is private credit as a ratio of GDP. The last two indicators measure the extent to which the banking system channels funds to the private sector.

> The empirical evidence finds a strong and statistically significant relationship between financial development and growth. It can, however, be argued that the relationship reflects reverse causality. That is, it is faster growth that leads to financial deepening. While this argument carries some weight, the large body of empirical evidence cannot be dismissed on the basis of this premise, since it would amount to assuming not only that growth affects financial development, which is realistic, but also that financial development has no effect on growth, which is certainly counterintuitive. Indeed, it is easy to think of many channels through which both variables affects each other, and therefore the real issue in the empirical literature is not of spurious correlations but one of *simultaneity bias*. In principle, it is possible to eliminate the simultaneity bias and some studies have attempted to tackle this problem by using instrumental variables or related econometric techniques.(Khan, 2000, p. 7).

The financial indicators in Table 3.2 summarize the development of monetization and financial deepening in Bahrain, Saudi Arabia, Kuwait, Qatar, Oman, and UAE over the period 1995 to 2000. Strictly speaking, no ideal method has yet been put forward in the literature to measure the process of financial deepening, (Levine, 1999). However, we examine how effective the banking system is in the process of channeling the loanable funds from savers to borrowers by examining the ratio of total assets held by the financial system to Gross Domestic Product (GDP). If the financial system of a country holds more assets relative to its GDP than others, then it is more likely for this system to capture a higher percentage of the funds in the whole economic system. At the same time, since money supply is the main component of financial assets, financial depth can also be measured by the ratio of money supply to GDP. In this context, differences in the definition of money supply should be considered: narrow money (M1) consists of currency in circulation plus banks' demand deposits, whereas broad money definition (M2) is M1 + banks' time and savings deposits. Narrow money is primarily a means of payments therefore the M1 to GDP ratio suggests the level of monetization of the economy, whereas M2 to GDP provides a broader measure of financial deepening. However, the ratio of demand deposits to total assets in the banking system is also considered. This ratio is a good indication of financial system deepening. If the banking system has a larger portion of total assets in the form of demand deposit accounts, the system is more capable of dealing with banking crises. The International Monetary Fund (IMF) provides standard definitions for these measures and publishes them for all member countries. The measures are in fact limited in that, some countries are more apt to use foreign currencies in making domestic payments and for the coverage of deposit institutions, and also, the types of deposits included in M2 tend to differ across countries (Levine, 1999). Recognizing these problems, we present these ratios along with other measures in Table 3.2 in order to give a rough indication of the different levels of financial development in the countries under study.

Despite differences relating to establishment and branching, every banking system in GCC countries has a group of dominant or 'core banks' which are recognized by both the authorities and the general public. If we take the size of individual economies into consideration the relative importance of bank assets in relation to gross domestic product can be analyzed. Table 3.2 shows that deposit banks' assets as a percentage of GDP for almost all GCC countries have increased substantially between 1995 and 2000. This measure is sometimes used to gauge the degree of financial depth in an economy. If we accept this as an acceptable measure then it would be fair to say that the financial systems of, Saudi Arabia, Qatar and the United Arab Emirate, hardly deepened between 1990 and 2000, whereas those of Oman, Kuwait and the Kingdom of Bahrain benefited from improved deepening. Table 3.2 also shows that commercial banks in GCC countries dominate the financial systems. In fact the relative importance of commercial banks has increased in the second half of the 1990s. Commercial banks are clearly the most important constituents of the financial system in these countries. Referring to the same table, the currency ratios for the six countries under study show that, in most cases, that time and saving deposits have become relatively more important between 1995 and 2000. Taken together, this suggests that the financial systems in these countries are not in the early stages of financial development and these financial systems have the ability to provide instruments that convince savers to deposit their funds in banks. Deposit rates have become more competitive and the increasing number of ATM machines have probably helped the financial deepening process. The narrow money indicator (M1/GDP) also suggests an increase in the majority countries under study.

Table 3. 2 GCC Monetization and Financial Deepening Indicators (%) Ratios					
Kingdom of Bahrain					
	1995	1997	1999	2000	952000 (Average
Currency outside banks/GDP	0.048	0.044	0.043	0.040	0.042
Demand. Deposits/GDP	0.10	0.18	0.12	0.10	0.12
M1/GDP	0.50	0.60	0.61	0.57	0.59
M2/GDP	0.65	0.70	0.73	.75	0.71
Total Financial System Assets/GDP	1.75	1.80	1.86	1.92	1.78
Commercial Bank Assets/GDP	1.15	1.20	1.30	1.48	1.01
Commercial Banks Assets/Total Financial system Assets	0.60	0.68	0.72	0.77	0.51
Kingdom of Saudi Arabia					
Currency outside banks/GDP	0.05	0.05	0.04	0.03	0.04
Demand. Deposits/GDP	0.17	0.15	0.20	0.19	0.17
M1/GDP	0.26	0.25	0.29	0.30	0.28
M2/GDP	0.51	0.53	0.55	0.58	0.54
Total Financial System Assets/GDP	0.70	0.75	0.77	0.83	0.79
Commercial Bank Assets/GDP	0.71	0.75	0.81	0.85	0.75
Commercial Banks Assets/Total Financial system Assets	0.81	0.84	0.87	0.89	0.86
Sultanate of Oman					
Currency outside banks/GDP	0.09	0.09	0.08	0.08	0.09
Demand. Deposits/GDP	0.09	0.11	0.08	0.08	0.09
M1/GDP	0.40	0.45	0.48	0.55	0.55
M2/GDP	0.61	0.68	0.69	0.72	0.65
Total Financial System Assets/GDP	0.90	1.2	1.19	1.28	1.05
Commercial Bank Assets/GDP	0.76	0.90	0.94	0.96	0.85
Commercial Banks Assets/Total Financial system Assets	0.86	0.88	0.88	0.91	0.90
State of Qatar					
Currency outside banks/GDP	0.03	0.02	0.01	0.01	0.015
Demand. Deposits/GDP	0.04	0.03	0.03	0.02	0.02
M1/GDP	0.25	0.22	0.26	0.23	0.24
M2/GDP	0.31	0.37	0.42	0.46	0.35
Total Financial System Assets/GDP	0.58	0.60	0.63	0.66	0.62
Commercial Bank Assets/GDP	0.48	0.50	0.55	0.61	0.55
Commercial Banks Assets/Total Financial system Assets	0.85	0.88	0.91	0.93	0.91
United Arab Emirates					
Currency outside banks/GDP	0.10	0.09	0.08	0.08	0.12
Demand. Deposits/GDP	0.22	0.26	0.28	0.30	0.25
M1/GDP	0.91	0.99	1.14	1.17	1.04
M2/GDP	1.22	1.36	1.57	1.60	1.45
Total Financial System Assets/GDP	2.22	2.63	2.65	2.66	2.47
Commercial Bank Assets/GDP	1.66	2.02	2.16	2.20	2.05
Commercial Banks Assets/Total Financial system Assets	.89	.88	.90	.92	0.90
State of Kuwait					
Currency outside banks/GDP	0.056	0.056	0.049	0.044	0.045
Demand. Deposits/GDP	0.10	0.11	0.11	0.10	0.10
M1/GDP	0.14	0.15	0.15	0.12	0.13
M2/GDP	0.82	0.84	0.93	0.94	0.88
Total Financial System Assets/GDP	1.85	2.03	2.20	2.25	1.97
Commercial Bank Assets/GDP	1.2	1.33	1.22	1.48	1.2
Commercial Banks Assets/Total Financial system Assets	0.65	0.64	0.52	0.54	0.58

Source: Author's own estimation

Table 3.3 shows the growth of credit to the private sector in GCC countries as measured by the ratio of private sector credit to GDP. This measure, as noted by Levine et al. (1998, 1999) show the extent to which financial intermediaries are channeling pooled savings to borrowers. As table 3.3 shows, these ratios have increased in all countries under study, suggesting that financial institutions are more efficient in employing their sources of funds, as the private sector is assumed to be more efficient than the public sector. Furthermore, such ratios capture the efficiency of financial intermediaries in monitoring, screening and controlling for credit risks.

Overall, these indicators suggest a growing role of financial institutions in the financing process and a wider role of commercial banks relative to other players in these financial systems. Financial development ratios suggest that the financial systems under study have deepened during the 1990s. It is also clear that banks operating in these countries play a major role in mobilizing financial assets and directing investment to supposedly efficient uses. Other factors that may have contributed to promoting financial deepness in the countries under study include the globalization of financial services that one would expect to increase competition and lead to improvements in the quality of financial services provision (Azzam, 1998). Presley, (2000, has noted the innovations that have occurred in GCC banking markets during the 1990s, for example, new products have been introduced, such as credit and debit cards, automated teller machines, interest bearing current accounts and cheque clearing has been speeded up. Moreover, competition for deposits has been broadened in urban areas with strong evidence of an increases in both price and non-price competition.

Table 3.3 Growth of credit to the private sector in GCC member states(US$, Millions)				
Country/Year	**Credit to private Sector**	**Total Credit**	**Credit to private Sector /Total Credit (%)**	**Credit to private Sector/GDP (%)**
Saudi Arabia				
1995	32400	43600	74	25
1996	33200	42725	77	23
1997	35700	50500	71	24
1998	42900	60100	71	26
1999	43300	49700	87	31
2000	44200	49900	89	33
Kuwait				
1995	9120	11135	81.3	36
1996	9525	11560	82.6	34
1997	13100	15590	84.1	48
1998	14500	16820	86	62
1999	15200	17480	86.9	55.6
2000	15800	18112	87.2	45
Oman				
1995	4058	5320	76	51
1996	4327	5455	79	54
1997	5832	6370	91	57
1998	6839	7112	96	58
1999	7221	8815	92	59
2000	7742	8567	91	62
Qatar				
1995	12100	25700	47	26
1996	13250	27300	48	28
1997	14600	26400	55	39
1998	15650	28550	54	39
1999	17250	28000	61	32
2000	17500	34000	51	33
Bahrain				
1995	6756	8780	75	44
1996	7580	10100	70	43
1997	8250	11970	68	42
1998	9200	13250	70	45
1999	10350	13560	76	50
2000	10860	15100	72	52
U.A.E				
1995	24929	25890	96	58
1996	28600	29700	95	58
1997	28710	30650	93	60
1998	33022	34980	94	73
1999	35994	36788	90	75
2000	37636	39650	91	77

Source: GCC economic Bulletin, various editions.

3.5 The Structure of GCC Banking Systems:

3.5.1 Why Does Structure Matter?

The preceding sub-section alluded to the considerable role played by financial systems in the economic growth process. The stages of monetization and financial depth in the six GCC countries are highlighted. However, given that the banking system is the cornerstone of financial systems in the GCC this section examines some of the major differences in the structural characteristics of various GCC banking markets.

It has been argued that the structure of any market is determined by a broad range of economic as well as non-economic factors (Gardener, et al. 1996). These non-economic factors include various geographical, legal, philosophical, political and social forces which mould the institutional character of banking markets over time. Consequently, GCC banking systems are characterized by a different array of institutions, organizational forms and legal frameworks, all of which have contributed to create their different market structures, for example, Bahrain is well-known as an offshore market. Furthermore, the United Arab Emirates, Oman and Qatar allow foreign banks to fully operate after they are licenced in these countries, while Saudi Arabia and Kuwait are virtually closed to foreign banks. (Although, recently, both Saudi Arabia and Kuwait granted licenses to some GCC banks to operate in their national market).

The aforementioned background begs the question: 'Why does structure matter?

Industrial economic theory suggests that there is a causal link between market structure and bank conduct and performance. More specifically it has been argued that, in concentrated markets, banks may earn collusive profits (Weiss, 1974; Heggestad and Mingo, 1977; Spellman, 1981; Rhoades, 1982). A substantial literature has burgeoned aimed at testing the theoretical SCP (structure-conduct-performance) relationship. It has been argued, however, that this literature contains various inconsistencies and contradictions to provide a satisfactory description of the SCP relationship in banking (Gilbert, 1984; Osborne and Wendel, 1983). Contemporary approaches to the explanation of the link between market structure and performance have emphasized an alternative 'efficient structure' hypothesis. This postulates that an industry's structure arises as a result of superior operating efficiency by particular firms. As a result, a positive relationship between bank profits and structure can be attributed to gains made in market share by more efficient banks. Various studies undertaken on the US banking industry (Brozen, 1982; Smirlock, 1985; Evanoff and Fortier, 1988), suggest that firm-specific efficiency seems to be the dominant variable explaining bank profitability. One of the major problems associated with the structure-performance literature is how to measure structure. Most of the studies use measures of concentration to proxy for market structure. Others consider measures that encapsulate the degree of openness of markets by considering exit and entry barriers.

Overall, structural measures are extremely naïve (Molyneux, et al. 1996). They barely take account of the main forces that influence the institutional nature of banking markets, such as the regulatory framework, sector-ownership and so on. It seems indisputable, however, that the structure of a market influences the way in which banks operate in that market. With these points in mind, we can examine a number of important factors affecting banking structure in GCC member states.

3.5.2 Banking Market Size and Concentration in GCC countries

When we refer to 'concentration', what is meant is the extent to which assets, funds and sources of revenue are controlled by the leading firms in the market place. The degree of market concentration will therefore depend on identifying the size of the market and of the firms that serve it. This section of the thesis, therefore reviews the changes in the banking structure of the countries under study over the last decade. It outlines the developments in the relative importance of the banks in the respective banking systems, the level of market concentration measured as market shares of the top three banks, and the growth of the financial assets of the banking systems under study. Table 3.4 illustrates the number of credit institutions in each country classified according to organisational form. It is possible to see from table 3.4 a slight overall reduction in the number of financial institutions at the GCC level, (specifically in Saudi Arabia, United Arab Emirates and Oman) and this is attributable to the few mergers and acquisitions that occurred through the 1990s between various banks. The commercial banks dominate the banking systems in all GCC member states. The banking system of United Arab Emirates is the largest in terms of the number of banks followed by the banking system of Bahrain. There still remain a large number of banks operating in these two financial systems. However, the Saudi banking system is the largest in terms of total assets. In fact, the Saudi banking system, in terms of asset size dominates the others. The total assets managed by Saudi banks account for around 47% of the total assets of all GCC banks (see table 3.5). Following the stages of banking sector development of banks as outlined by Gardener et al, 1996, it can clearly be seen that all GCC countries are characterized by the bank-oriented rather than the market-oriented stage, because capital markets are still underdeveloped compared with other industrialised countries (Azzam, 1998).

Table 3.4 The Structure of GCC countries Banking Systems by financial institution organizational form.						
Bahrain						
Type of Banks	1995	1996	1997	1998	1999	2000
Central Bank	1	1	1	1	1	1
Commercial	23	23	23	23	23	23
Investment	6	6	6	6	6	6
Islamic	5	5	5	5	5	5
Specialist	2	2	2	2	2	2
Total	37	37	37	37	37	37
Kuwait						
Central Bank	1	1	1	1	1	1
Commercial	6	6	6	6	6	6
Investment	5	5	5	5	5	5
Islamic	1	1	1	1	1	1
Specialist	3	3	3	3	3	3
Total	16	16	16	16	16	16
Saudi Arabia						
Central Bank	1	1	1	1	1	1
Commercial	12	12	11	11	10	10
Investment	0	0	0	0	0	0
Islamic	1	1	1	1	1	1
Specialist	5	5	5	5	5	5
Total	19	19	18	18	17	17
Oman						
Central Bank	1	1	1	1	1	1
Commercial	7	7	7	6	6	6
Investment	4	4	4	3	3	3
Islamic	2	2	2	2	2	2
Specialist	3	3	3	3	3	3
Total	17	17	17	16	16	16
Qatar						
Central Bank	1	1	1	1	1	1
Commercial	12	12	12	12	12	12
Investment	2	2	2	2	2	2
Islamic	3	3	3	3	3	3
Specialist	3	3	3	3	3	3
Total	21	21	21	21	21	21
United Arab Emirates						
Central Bank	1	1	1	1	1	1
Commercial	25	25	25	25	24	24
Investment	8	8	8	8	7	7
Islamic	4	4	4	5	5	5
Specialist	3	3	3	3	3	3
Total	41	41	41	41	39	39

Source: Bankscope, and various GCC Central Banks Reports.

- The Bahrain banking system included only the full incorporated local banks. The Offshore unit banks excluded.
- Money exchangers and non-bank investment institutions excluded from all financial systems.
- foreign banks representative offices excluded from Bahrain, Oman, and United Arab Emirates banking systems.

For the purpose of comparing bank sector concentration across the GCC, we use concentration ratios based on a denominator consisting of national market banking system total assets and total deposits for the three largest banks in each country. Table 3.5 shows the number of banks, the total assets and the three-firm concentration ratios in terms of (assets and deposits) in 2000. Although the Saudi banking system is the largest in asset size and has the smallest number of banks it is also the least concentrated. The Bahraini banking market is the most concentrated followed by Qatar. However, in terms of deposits, the Qatari banking system is the most concentrated. All in all, apart from the Saudi banking system, the degree of market concentration measured by the 3-firm assets or deposits ratio is similar across the rest of GCC banking systems.

Table 3:5 Market Size and Concentration of GCC Banking Sectors (2000).

	Size of Banking Sector		Concentration	
Country	Number of Banks	Total Assets (Mill US$)[2]	Concentration% of total National Market(3-Firm)	
			Assets	Deposits
Kuwait	16	47854.2	59	61
Saudi . A	17	122256.6	66	71
Qatar	21	32541.8	87	91
Bahrain	37[1]	25564.7	85	93
Oman	16	24812.2	62	74
U.A.E	39	54532.4	65	72
GCC	186	305561.3	70.3	75.8

1-Offshore Banks Units not included, in the Bahrain total assets banks
2- The assets of state-owned development banks and central banks are excluded from all banking systems.
Source: GCC, Economic Bulletin, volume, 16, 20001, p.21).

To illustrate the growth features of the respective countries banking systems, we evaluate changes in the consolidated balance sheet of the banking systems over the period 1995-2000. In particular, we analyze: total assets and assets quality, capital adequacy, customer deposits and off-balance sheet items. These items help to illustrate the growth of financial intermediation and provide an overview of the change in the soundness and efficiency of the banking systems over the last decade. Table 3.6 shows that the banking sectors in the six countries under study witnessed considerable growth in the size of their assets, deposits, equity, loans and off-balance sheet activities (in terms of nominal values) during the second half of the 1990s. However, there were significant increases in the size of problem loans and loan loss reserves in these countries. This perhaps was attributed mainly to the change in classification of the debts according to international standards. The favourable growth in the size of equity outlines the move to strengthen the financial position of the banking sector in these countries. The high growth on off-balance sheet items in general may be attributed to several reasons: firstly, this may reflect greater deregulation in GCC financial systems. Secondly, it may reflect the fact that banks in the GCC (like in western countries) have followed a strategy of diversification with respect to non-interest income by expanding into investment management and securities businesses. This of course, helps reduce the influence of unfavourable interest rate changes (and reduced margins) and at the same time may help lead to a greater stability in revenue generation.

Table 3.6 Average annual growth (%) of the main banking sector indicators (nominal values) for the six GCC member states over 1995-2000

Indicator/Country	Saudi. A	Qatar	Bahrain	U.A.E	Kuwait	Oman
Asset Quality Indicators						
Total Assets	4	6	9	6	5	5
Loans (net)	7	8	7	8	4	4
Problem Loans	2	4	3	3	1.6	1
Loan loss reserves	4	5	6	5	4	4
Capital Adequacy Indicators						
Total Equity	12	11	10	11	9	9
Other Indicators						
Customer Deposits	7	9	5	8	7	7
Off-Balance sheet items	14	10	15	12	16	9

Source: various editions of GCC central banks reports

3.6 The Performance of GCC Banking Systems:

The aim of this section is to evaluate profitability trends in GCC banking to see how structural developments may have influenced banking sector performance. Table 3.7 illustrates the trends in return on assets (ROA), return on equity (ROE) and net interest margins across GCC banking markets between 1995 and 2000. Profitability figures show generally improved returns: average return on Equity (ROE) within the GCC banking system increased from 12.4% in 1995 to 14.7% in 2000 while the average Return on Assets (ROA) rose from 1.5% to 1.7% over the same period. The profitability indicators also indicate improvements that reflect the ability of banks to better utilize their assets and improve their competitive advantage. Table 3.7 shows the trend in traditional margin based business. Net interest margin indicates the level of return generated on interest earning business therefore, a decline in interest margins may indicate an increased competitive pressure on interest related business. As can be seen from table 3.7 interest margins have fallen in the majority of GCC member states in the period 1995-2000. An important influence on interest margins in GCC banking markets has been a shift of emphasis to other non-interest income sources of earnings as noted in the previous section. This trend, indicative of the growth of securitization, off-balance sheet activity and non-banking product cross-selling opportunities, (for example, brokerage and mutual funds management) has been witnessed across virtually all the GCC banking markets. This is reflected in the increase in non-interest income (see table 3.8) and can also be linked to the downward trends in interest rates, which has contributed to the boosting of capital gains, and strengthened returns from securities trading and underwriting activities in general. Overall, given the increasingly varied and sophisticated demands of banks' customers, non-interest based income is increasingly likely to replace interest earnings on most banks' income statements. While trends in the sources of bank income can be characterized as a fall in interest margins compensated by an increase in non-interest income, the trend in cost levels show improved efficiency since 1995 over all countries.

Table 3.7: Banks' Aggregate Profitability Measures:									
State	Return On Assets			Return On Equity			Net Interest Margin		
	1995	2000	%Change 1995-2000	1995	2000	%Change 1995-2000	1995	2000	%Change 1995-2000
Bahrain	1.5	1.7	7	12.2	14.1	11.7	1.4	1.2	-8
Kuwait	1.4	1.5	6	10.6	13.3	12.4	3.6	3.2	-6
Oman	1.4	1.6	8	12.6	15.1	14.3	2.5	2.3	-7
Qatar	1.5	1.8	9	13.4	15.7	15.2	4.3	3.8	-11
Saudi. A	1.6	1.9	9	11.7	15.1	16.8	3.6	3.2	-6
U .A. E	1.7	1.8	7	10.8	13.3	12.1	2.1	2	-4
GCC	1.5	1.7	8	12.4	14.7	13.7	3.8	3.2	-8
Source: Calculated from banks consolidated balance sheet data obtained from Bankscope									

Table 3.8: Non-Interest Income Contribution to Total Income:					
Country	Non-Interest Income as a Percentage of Total Income				
Kuwait	1995	1997	1999	2000	% Change 1995-2000
Saudi. A	27	29	30	34	17%
Qatar	25	26	28	32	15%
Oman	28	33	35	37	18%
Bahrain	30	32	35	36	14%
U.A.E	26	28	31	33	16%
GCC	27	29	33	35	17%
Source: Calculated from banks consolidated balance sheet data obtained from Bankscope					

The usual measure for bank efficiency is the cost-income ratio. This measure can be influenced both by endogenous and exogenous factors. Adverse economic conditions affect the cost-income ratio in the sense that banks do not have total control over their income streams whilst obstacles such as restrictive labour law may hinder staff reduction and productivity improvements on the cost side. Table 3.9 shows that in all countries under study the general trend in bank efficiency has been upward. The improved cost performance of GCC banks in the second half of 1990s can be seen mainly as a consequence of lessons following the banking difficulties of the 1980s and early 1990s

Table 3.9: Cost to Income Ratio:					
Country	**Cost to Income Ratio**				
	1995	**1998**	**1999**	**2000**	**% Change 1995-2000**
Kuwait	**59**	**59**	**55**	**54**	**-8.8%**
Saudi. A	**62**	**62**	**57**	**55**	**-14.7%**
Qatar	**65**	**62**	**60**	**57**	**-12.7%**
Oman	**63**	**60**	**56**	**54**	**-7.9%**
Bahrain	**56**	**56**	**55**	**53**	**-5.3%**
U.A.E	**57**	**58**	**56**	**54**	**-3.2%**
GCC	**60.8**	**57**	**56.2**	**53.3**	**-7.8%**
Source: Calculated from banks consolidated balance sheet data obtained from Bankscope					

Most comparisons of cost efficiency usually use aggregate ratios relating cost to revenue or assets. Although these measures do not account for business mix, the risk profile of a bank nor the quality of services provided, it is these measures which are most frequently drawn up to use cross-country comparisons of bank operating efficiency(as shown in table 3.9). Table 3.10 illustrates the staff costs as a percentage of operating expenses ratio which is another commonly used measure of banking sector efficiency. The table shows that there seems to have been an overall fall in the proportion of staff costs in banking during the second half of the 1990s. Saudi Arabia, Kuwait and Oman respectively seem to have been the most successful in reducing staffing costs compared to other GCC countries during the second half of the 1990s.

Taking the cost and profit figures together, it appears that the performance of GCC banking markets have improved during the second half of the 1990s. While interest margins have fallen, banks have increased their non-interest income sources of revenue, and at the same time reduced costs. As a consequence, profit levels have improved, typically ROE's around the 15% benchmark, a level cited as what would be expected for a full service commercial bank. [2]

[2] Goddard, Molyneux and Wilson (2001) note that for banks to achieve added value for their shareholders, a full service commercial bank(undertaking retail, corporate, investment banking) would be expected to earn ROE's of 15%+.

Table 3.10: Staff Costs as a Percentage of Operating Expenses:						
State	Staff Costs as a Percentage of Operating Expenses					
	1995	1997	1998	1999	2000	%Change 1995-2000
Kuwait	58	58	57	55	54	-4.5%
Saudi A	58	54	54	53	52	-9.7%
Qatar	62	61	61	60	60	-1.6%
Bahrain	51	51	50	50	49	-1%
Oman	59	59	56	55	55	-3.2%
U.A.E	55	55	55	54	54	-1.4%
GCC	56.8	56	55.3	54.1	53.5	-2.6%

Note: Operating expenses include all expenses relating to regular banking business other than interest expenses. Staff costs are a part of the operating expenses. Staff costs include salaries and other employee benefits.

Source: Consolidated Banks financial statements, BankScope.

3.7 Conclusion

This chapter reviews the main features of the GCC financial systems under study; Kuwait, Oman, Qatar, United Arab Emirates, Saudi Arabia and Bahrain. In general, these countries have experienced various financial reforms aimed at strengthening the positive role of their financial systems in the economic growth process. The reforms in the six countries have mainly included moves to improve bank capitalisation in accordance with Basle standards and the introduction of other new prudential guidelines. Stock markets have been upgraded and they have begun to play a wider role in financing various economic sectors within their respective countries, although their importance still remains limited. Commercial banks still dominate GCC financial systems, where their share of total financial system assets ranged from about 58 percent in Saudi Arabia to about 85 percent in Bahrain. In addition, the banking systems of GCC countries are highly concentrated with the assets share of the largest three banks ranging from 59 percent in Saudi Arabia to about 90 percent in Bahrain, on average over 1995-2000. The banks in the countries under study also show favourable growth in terms of their asset quality, capital adequacy and profitability during the 1990s. Such indicators reflect an enhanced role for financial intermediaries in the process of economic growth and exhibit the positive impact of economic and financial reforms undertaken in these countries. Furthermore, financial systems have deepened in these countries and the proportion of credit allocated to the private sector as a percent of GDP has increased in all six countries, suggesting that banks have become more efficient in allocating financial resources within the respective countries.

Taken together, this suggests that the performance and efficiency of the financial and banking systems under study is likely to have improved during the 1990s. Although it is difficult to say specifically whether this improvement is a result of various reforms or improvements in the general macroeconomic environment, perhaps one can at least suggest that the reform process has had some positive influence.

Since the aim of this thesis is to investigate structure-performance relationships and efficiency in the six GCC banking systems the following chapter investigates the main theoretical concepts relating market structure to bank performance.

Chapter four: Structure-Conduct-Performance

Theoretical concepts, definitions and measures

4.1 Introduction:

This chapter discusses the theoretical concepts of market structure, conduct and performance. Section 4.2 provides definitions of market structure, conduct and performance and 4.3 examines the interactions in the SCP framework. Section 4.4 considers measures of market structure, focusing on traditional concentration measures, and inequality indices. The major empirical problems associated with such measures discussed in section 4.5. Section 4.6 outlines the determinants of the level of concentration and the following section 4.7 discusses the main features of bank performance. Section 4.8 outlines the theories describing the relationship between SCP and the final section 4.9 is the conclusion.

4.2 Definitions of Market Structure, Conduct and Performance:

To understand the link between market structure, conduct and performance it is best to first provide a clear indication as to the various definitions of market structure, conduct and performance.

4.2.1 Market Structure

A market could be defined as a mechanism where buyers and sellers exchange goods or services achieving the desired terms for both buyers and sellers. Shepherd (1985) defined a market as a group of buyers and sellers exchanging goods that are highly substitutable. This substitutability may be measured in terms of cross-elasticity of demand, which shows how sharply a price change for one product will cause the quantity sold of another product to change. Cross-elasticity of demand would be expected to be high between products within the market and low against products outside the market under study. Another definition provided by Houck (1984, p. 356)) notes that a market is:

> A collection of actual or potential sellers and buyers of a specific good or service, this collection has two characteristics (1) none of the buyers has the option of purchasing the item from sellers outside this collection and(2) none of the sellers has the option of selling the item to buyers outside this collection.The interaction of these buyers and sellers generates a set of interrelated prices and conditions of sale or use. The principles or facts determining which buyers and sellers are in this collection identify the market spatially,temporally,and politically .

In the context of banking, however, it is difficult to delineate the boundaries of banking markets (Gardener, et al, 1996). Problems relating to the definition of the banking market arise especially if there are a large number of firms providing close substitutes. George and Joll (1988), argued that consumer substitutability is the main criterion for defining the market but in practice, a great deal of judgment must be used in classifying firms, and the researcher must always be alert to the possibility that empirical results may be sensitive to the particular industry grouping that have been used. Moreover, defining the scope of banking markets becomes more complex when considering banking as a multi-product industry.The same bank may compete in both local, national and international markets, and across a wide array of product segments. According to Rose (1987), banking markets may be viewed in terms of transaction costs that includes the time and expense incurred in searching for information concerning the availability of product and prices, the costs of communication and delivery and commissions or fees needed to enlist the services of a broker or dealer. For example, chequing accounts can usually be associated with local markets because the marginal benefits for customers can be very low compared to the cost of looking for other alternatives. However, in the mortgage market, where the magnitude of benefits is worthwhile relative to the time spent and other costs associated with shopping around, the market may be national or even internationl. Rose also emphasises the size of the customer and the bank in the structure of banking markets. Where the customer is bigger in size (according to income or assets) then the demand for loans and other financial services is usually higher which leads to a larger banking market. In other words, where customer demands are relatively large, then markets will tend to become more national or international. Market structure therefore, describes the characteristics and composition of markets and industries in an economy. Structure can refer to the number and size distribution of firms in the economy as a whole, and also relates to the importance and characteristics of individual markets within the economy. The characteristics of market structure could be described by examining (either jointly or separately): the number of firms, the extent of product differentiation, entry conditions or (the extent of entry barriers), the level of integration within the market, and market concentration which represents that part of total market goods or services supplied or managed or produced by a few large firms in the relevant market. In the context of banking, Rose (1987) defines market structure as the number of banks and competing nonbank financial service firms serving in a given place, the particular services they offer in that market, the size distribution of banks and bank customers, the barriers to market entry, and the geographic dispersion of both banks and their customers. Greenbaum (1971) points out that the structure of banking also relates to aspects of organization and control in the banking industry. Thus, structure may also be described by the type of ownership, the number of bank offices and other properties.

There are several types of markets which describe the structures of firms, from markets with many firms which are equal in size with competitive rivalry to markets where there is only one supplier of financial services.The various categories of market, as presented in table 4.1, have been defined to reflect the degree of competition. At the extremes are pure monopoly with just one firm and pure competition in which there are many competitors, none having any significant influence on the market.

Table 4.1: Types of Market		
Market Type	**Main Condition**	**Familiar instances**
Pure monopoly	One firm has 100 percent of the Market	Electric, telephone,water ,busses
Dominant firm	One firm has 50-100 percent of the market and no close rival	Soap (Campbell), razorblades (Gillette),
Tight .oligopoly	The leading four firms combined have 60-100 percent of the market: collusion among them to fix prices is relatively easy	Copper,aluminium, ,TV broadcasting and Banking industry
Loose oligopoly	The leading four firms combined.have 40 percent or less of the market;collustion among them to fix prices is virtually impossible	Lumber, Furniture,hardware small machinery,magazines
Monopolistic competition	Many effective competitors,none with more than 10 percent of the market.	Retailing and clothing
Pure competition	Over 50 competitors, all with negligible shares	Wheat, corn, cattle,hogs
Sources: Adapted from Shepered(1985,page 4).		

It is clear from the table above that the main elements of market structure relate to the market share of individual companies and the sum of market shares of the largest firms in the industry (these elements of market structure are mostly described as an internal elements). The industrial organisation literature refers to the relative size of the top firms as market concentration. Market concentration can range from 100 per cent (if one firm controls the whole market) down to nearly zero (if there are an infinite number of firms in the market). Market type can range from pure monopoly to perfect competition.

Another aspect of market structure is the existence of barriers to entry. Entry barriers play a crucial role in defining industry structure (Goddard et al, 2001). If established firms are able to prevent entry, the extent to which competitive pressure imposes restraints on their pricing decisions and other aspects of conduct may be severley curtailed. This is likely to have far-reaching consequences for performance indicators as well. For instance, in a particular market there may exist a potential competitor ready to enter the market and likely to increase rivalry in the market. Anything that decreases the likelihood (or slows down the process) of these potential competitors coming into the market is a barrier to entry, (Molyneux, 1996). In contrast, the entry of firms into the market is considered as a catalyst to competition, and theory suggests that, if the number of firms in the market increases, it will become more competitive and therefore less concentrated. Bain (1956) defines entry as the establishment of a new firm that introduces new capacity that did not previously exist, or the conversion of existing plant and machinery already used by an established firm in another industry for use in the new venture. Bain's broad definition of barriers to entry includes any factors that allow established firms to earn abnormal profits without attracting entry. Stigler defines entry barriers as "a cost of producing (at some or every rate of output) which must be borne by a firm which seeks to enter an industry but is not borne by firms already in the industry. . ." (Stigler,1968, p.67). Entry barriers can be created by incumbents' favoured access to high-quality inputs that are in short supply, cheaper long-term finance, or from learning economies of scale. According to Caves and Porter (1977), such barriers may not only separate incumbents from potential entrants, but also separate groups of existing firms. Such groups may emerge due to product differentiation, vertical integration or differences in ownership. Shepherd (1997) distinguishes between exogenous and endogenous entry barriers. Exogenous barriers derive from structural characteristics of the industry, such as product characteristics and production technology. Endogenous barriers derive from conscious decisions taken by incumbent firms to seek to impede entry, through their own price or non-price decisions. Thus a market's structure is comprised mainly of the market shares of incumbent firms and the barriers to entries. In general, each market's structure lies somewhere between pure monopoly (a high market share and high entry barriers) to pure competition (a low market share and low barriers).

Table 4.2 Sources of entry barriers

I. Exogenous causes: external sources of barriers:

1. **Capital requirements:** related to minimum efficient scale of plants and firms, capital intensity, and capital market imperfections.
2. **Economies of scale:** both technical and pecuniary, which require large-scale entry, with greater costs, risks and intensity of retaliation.
3. **Absolute cost advantages:** many possible causes, including lower wage rates and lower-cost technology.
4. **Product differentiation:** may be extensive.
5. **Sunk costs:** any cost incurred by an entrant that cannot be recovered upon exit.
6. **Research and development intensity:** requires entrants to spend heavily on new technology and products.
7. **High durability of finn-specific capital (asset specificity):** imposes costs for creating narrow-use assets for entry, and losses if entry fails.
8. **Vertical integration:** may require entry at two or more stages of production for survival; raises costs and risks.
9. **Diversification by incumbents:** mass resources deployed among diverse branches may defeat entrants.
10. **Switching costs:** complex systems may entail costs of commitment and training, which impede switching to other systems.
11. **Special risks and uncertainties:** entrants' higher risks may raise their costs of capital.
12. **Gaps and asymmetries of information:** incumbents' superior information helps them bar entrants and may raise entrants' cost of capital.
13. **Formal, official barriers set by government agencies or industry-wide groups:** examples are utility franchises, bank entry limits, and foreign trade duties and barriers.

II. Endogenous causes: voluntary and strategic sources of barriers:

1. **Pre-emptive and retaliatory actions by incumbents:** including selective price discounts to deter or punish entry.
2. **Excess capacity:** the incumbent's excess capacity lets it retaliate sharply and threaten retaliation credibly.
3. **Selling expenses, including advertising:** increases the degree of product differentiation.
4. **Segmenting the market:** segregates customer groups by demand elasticities, and makes broad entry more difficult.
5. **Patents:** may provide exclusive control over critical or lower-cost technology and products.
6. **Exclusive controls over other strategic resources:** such as superior ores, favourable locations, and unique talents of personnel.
7. **Raising rivals' costs:** actions that require entrants to incur extra costs.
8. **Packing the product space:** may occur in industries with high product differentiation.

Source: Goddard et al, (2001, p. 42).

4.2.2 Conduct

Conduct, according to Ferguson (1988) refers to the behaviour (actions) of firms in a market, to the decisions these firms make and also to the way in which these decisions are taken. Conduct, therefore, focuses on how firms set prices, whether independently or in collusion with other firms in the market. It also influences the way the firms set policies on advertising and other matters such as research and development.

> Conduct relates to the way in which firms behave in a market including the nature of decisions these firms take and the way in which they are taken. It, therefore, focuses on such issues as firm price setting behaviour, how firms decide on advertising and R&D activities and such like. These factors are difficult to evaluate empirically compared with structure and performance characteristics. (Molyneux, 1996, p. 160)

Industrial organisation literature primarily focuses on the measurement of firm performance from which conduct is implied. Different types of market structure, however, will influence the conduct/ behaviour of firms. For example, under pure competition, each firm is a price taker and has no significant influence on price, where under imperfectly competitive market structures such as monopoly, each firm in the market believes that it can influence the price by changing the quantity of goods or services it produces. In other words the conduct of firms depends on the relevant market structure including such features as the number and size distribution of sellers and buyers, the extent of physical or subjective differentiation existing among competing sellers products, the ease of entry into the market , the ratio of fixed to total costs in the short-run for a typical firm, the level of vertical integration in the industry, and the amount of diversity or conglomeration characterising individual firm's product lines (see Scherer 1980, p.4). Market structure then is important in determining the conduct and performance of firms which in turn are instrumental in shaping the future evolution of the industry concerned, (Goddard, et al. 2001). The relationship between market structure, conduct and performance will be discussed in more detail in section 4.3

4.2.3 Performance:

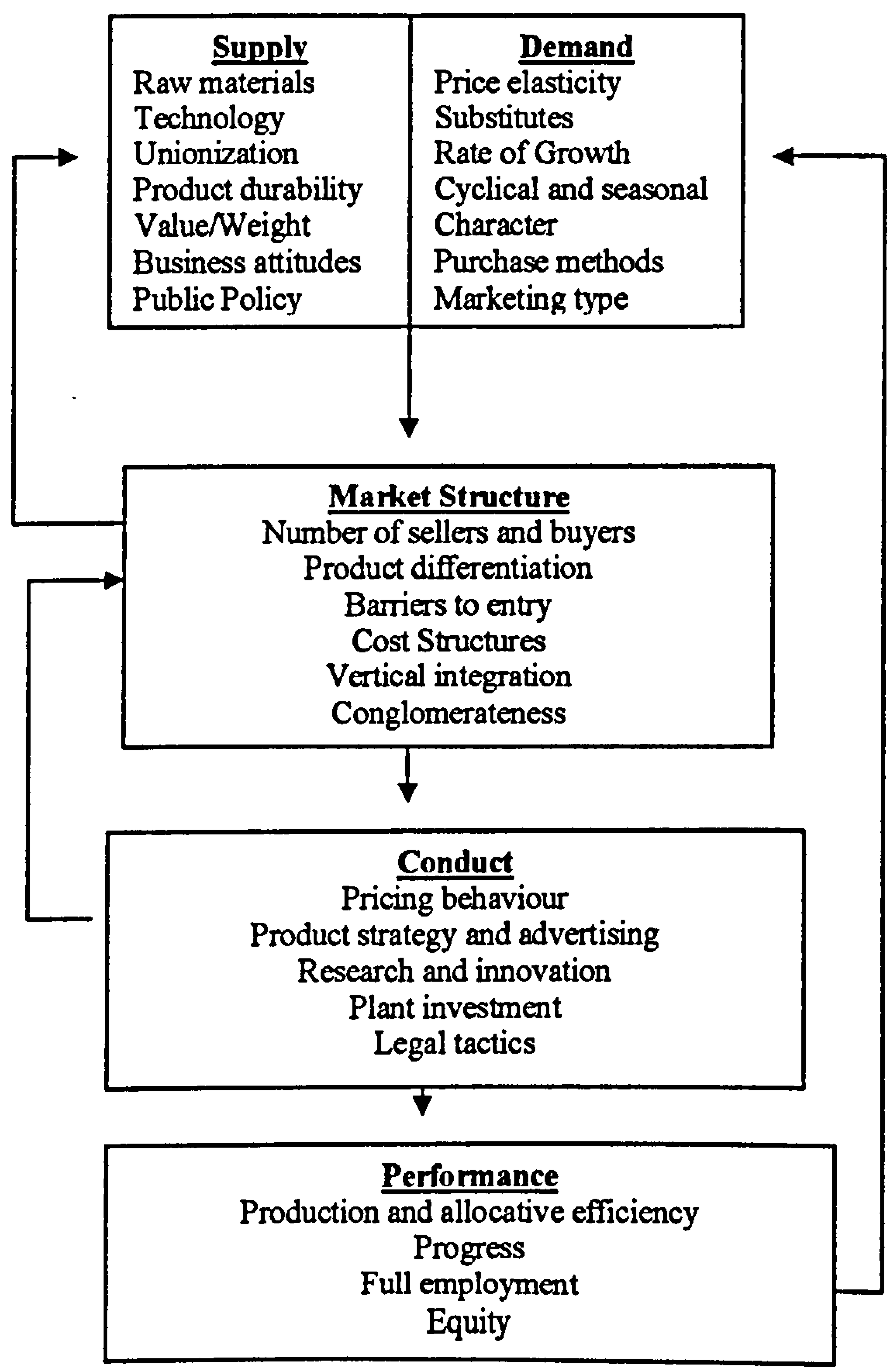
Firm performance in various industries or markets is said to depend upon the conduct of sellers and buyers in such areas as pricing policies and practices, inter-firm co-operation, product line and advertising strategies, research and development, and so on (Wilson, et al, 2001). In general, firm performance can be divided into two main elements: profitability and efficiency. Profitability represents a measurement of the relationship of the different components of costs and revenues and provide the basis to evaluate firm performance (Shepherd, 1997). It is usually used as the main index of a firm's economic performance, (Sinkey, 1999). Efficiency on the other hand, refers to how well a firm can yield a maximum value of outputs from a given total of input, (Mester, 1996). For the market as a whole, efficiency refers to the ability of the market to utilise scarce resources to meet consumers' demand for goods and services; that is, how well firms operate in order to optimise economic welfare, (Shaffer, 1994). (The concept of firm level efficiency is discussed in more detail in chapter 5). Performance measurement, therefore, is the quantitative assessment of efficient progress towards achieving a particular goal (Shepherd, 1997). In the case of banks, performance may be particularly affected by factors such as concentration in the local market, asset and liability management, the structure of the bank's branching operations, the level of M&A activity in the industry and so on (Hannan, et al, 1998). Moreover, as in other industries, the structure and the behaviour of banks will affect their market performance (Wilson, et al, 2001) and this interaction link will be discussed in the following section.

4.3The Interaction Relationship between Market Structure, Conduct and Performance

The structure-conduct-performance (SCP) approach based upon neoclassical theory has long been the predominant methodology in the study of industrial economics (Shaffer, 1994). It has been suggested that a bank's market structure, especially the number and size distribution of firms and the condition of entry, influences to some degree firm behaviour and performance, (Shepherd, 1997). In other words, there exists a relationship between structure, conduct/behaviour and performance. Structure can be considered as a major determinant of the degree of competition and the resultant performance in a particular market, (Goddard, et al, 2001). The general view is that competition in a more concentrated market will be less vigorous as compared to a less concentrated market and, as expected, the performance of more concentrated markets may be less desirable in social terms. The existence of rivalry leads to unique levels of profits, prices, advertising and other aspects of market performance that are desirable in social terms, (Berger, et al, 1998). Through the link of conduct, the performance of firms in a particular market is tied to the structure of that market (Molyneux, et al, 1996). Industrial economists have sought to identify sets of attributes or variables that influence economic performance and to develop theories describing the links between those attributes and end performance and these theories will be discussed later in this chapter (see section 4.8). However, the general descriptive model of these relationships was conceived initially by Mason (1939, 1949) and his model of industrial organisation analysis, nowadays referred to as the SCP approach, is shown diagrammatically in figure 4.1. The linkage between structure, conduct and performance then turns to identifying structural characteristics against models of firm and market behaviour, namely, perfect competition, monopoly, monopolistic competition and oligopoly as discussed in section 4.2.1 and shown in table 4.1.

Figure 4.1 A model of industrial organization analysis

Basic Conditions



Sorce: Scherer [1980 p.4].

Market theory focuses mainly on aspects of market structure which have an important influence on the behaviour of firms and buyers and on market performance, (Molyneux, et al, 1996). Market structure involving many firms of equal sizes is often assumed to generate superior performance (Shephered 1997). In this highly competitive market, excess profits above normal returns are quickly eliminated by the existing and new competitors. In the end, no one firm is likely to dominate the market. As Scherer (1982) points out, in the SCP model, markets that are characterised by one or a few firms with significant size disparities are more likely to be characterised by co-ordination of policies and collusive agreements. This will in turn lead to inferior performance in terms of the quality and the quantity of the services offered, higher prices, and profits that exceed a normal return.

So far we have noted that the direction of causality in the traditional SCP approach flows from market structure through conduct to performance in a unidirectional manner. This rests on the view that market structure is exogenously determined. In reality, however, firm performance and conduct affect market structure. For example, if market structure permits conduct which increases prices and enhances profits, this would attract new entry into the market, changing the structure of the market. Conversely, aggressive pricing strategies could force firms to leave the market. Concentration may influence performance, not only directly, say through collusion, but indirectly through its impact on advertising, research and development, and product differentiation. Non-price forms of competition may become more intense in concentrated markets that find it profitable to limit price competition (Gardener, et al, 1996). Performance (profitability) may be an important determinant influencing the level of advertising, research and development and (through investment) of scale economies in an industry. Figure 4.2 illustrates how the SCP relationship can be adopted to incorporate these more complex relationships. Part a) of the figure shows the traditional SCP relationship, and part b) shows the various interactions that exist between structure, conduct and performance, Note, however, that despite these more complex relationships, the main causality still runs from the structural criteria.

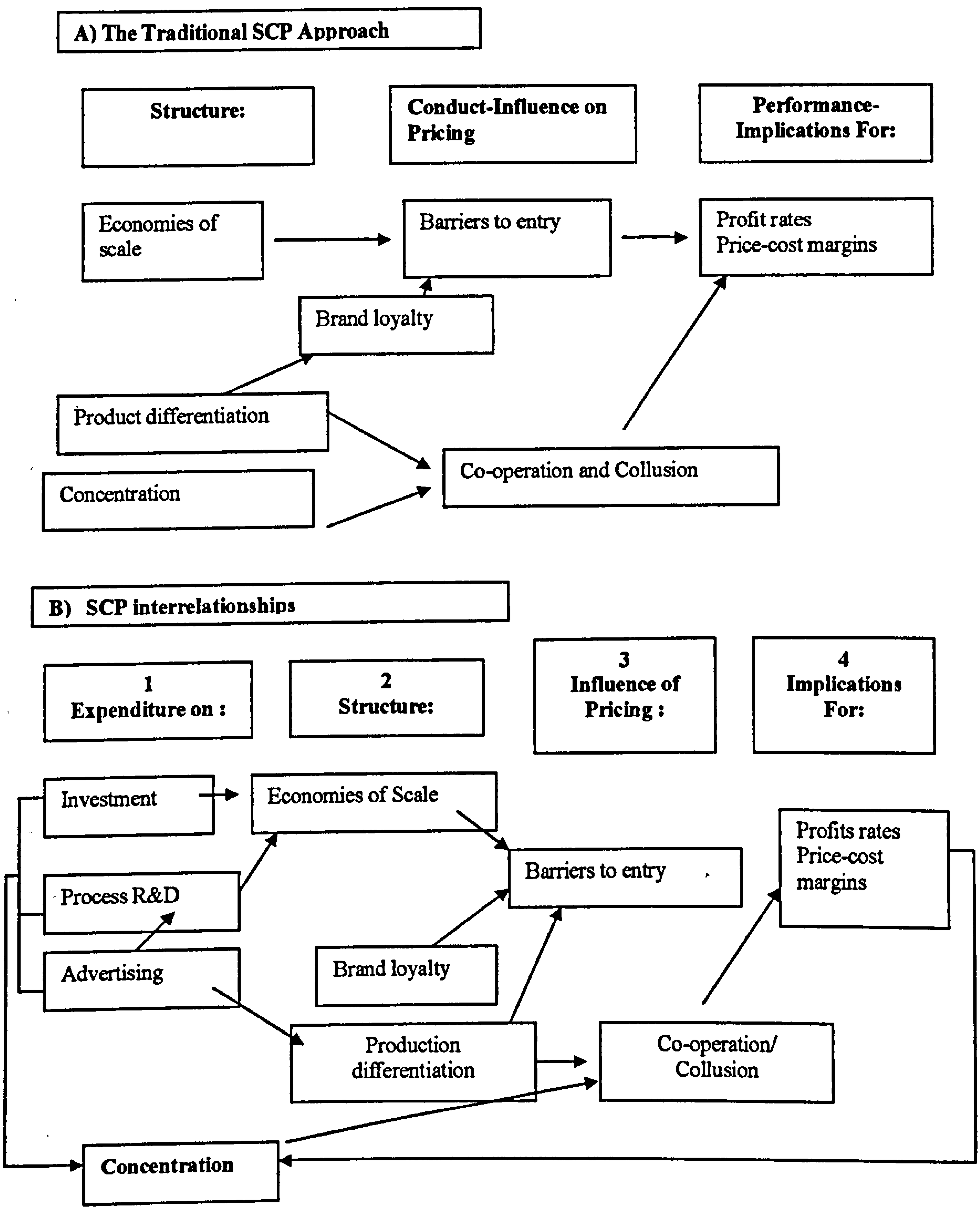
Market performance is therefore determined by the interaction of market structure and market conduct and at the same time market performance can be affected by structure and conduct. In the banking market however this is best illustrated by the descriptive model shown in table 4.3 which has been widely used in studies of industrial organisational structure.

Table 4.3 The Structure-Conduct-Performance Model

External Factors	⇒Structure	⇒Conduct	⇒Performance
Available technological methods for the production and delivery of financial services Regulatory supervision by federal and state authorities Economic conditions (level and growth of production availability and cost of productive resources, elasticity and growth of demand, and the price and availability of substitute products and services) ⇒ Demographic factors(distribution, growth and social profile of the population to be served)	structure of banking markets (number and relative sizes of competitors supplying and demanding banking services, entry barriers and geographic dispersion of suppliers and demanders)⇒	Bank management strategy and objectives (including pricing behaviour marketing programs and goals new service innovations and the development of new production and delivery systems) ⇒	price,quantity, and quality of financial services offered to public

Source: Adapted from Rose(1987,p. 36).

Figure 4.2 The Traditional SCP and SCP Interrelationship



Source: Hay and Morris (1990), p. 206

4.4 Measures of Market Structure:

> Among the most important characteristics that define the four main theoretical market structures are the number of firms, the degree of product differentiation, and the height of barriers to entry. The number and size distribution of firms are usually the most easily quantified aspects of market structure. (Goddard et al., 2000, p. 68).

Market structure can be described by examining (either jointly or separately) the number of firms, the extent of product differentiation, entry conditions, and the level of integration within the market. The most commonly used measure is market concentration. A concentration measure shows the level to which the production of a good or service is restricted to a few large firms. If a market has a small number of firms, or a great disparity in size between firms, the more concentrated and so less competitive the market will be. Ferguson (1988, p. 23) notes why concentration measures are the most widely used measures of market structure:

> The attraction of this measure is easily understood. Differences in the number and size distribution of firms are key factors distinguishing the theoretical models of perfect competition, oligopoly, monopoly and monopolistic competition. Market concentration is easily estimated since published data on the number and size distribution of firms are generally available. For other structural variables, published information is rare.

However, a major problem associated with S-C-P studies in banking relates to a seemingly simple but controversial issue; namely, how do we measure bank structure and performance, generally, as mentioned above. Defining what constitutes the "market" is, of course, problematic in banking, in view of the multiproduct nature of the modern-day financial services firm, although, the most commonly used measures are the three-firm or five-firm deposits or assets concentration ratio (Wilson, et al, 2000).

In general, banking structure will refer to the number, size and location of banks in a market (Molyneux, 1996), note that, the problem of characterising banking structure by size and concentration involves setting criteria for size, choosing a method of determining significant market areas, defining products and taking into account the influence of all competitors in these markets.

However, while all market structure measures, in general, are subject to their own idiosyncracies and limitations, they do usually tend to correlate highly with one another (Curry and George, 1983; Scherer and Ross, 1990; Goddard et al., 2001). The following section focuses on the desirable properties of market structure measures. Although, not all of the measures of concentration satisfy all of these criteria, and there is no perfect measure, (Wilson, et al. 2001).

4.4.1 Desirable Properties of Measures of Market Structure:

As we mentioned above, the most common measure of market structure is concentration. However, there are a wide range of statistical measures of concentration and it is important to analyse these measures because if they provide us with contradictory rankings of industry concentration then this has implications for how we interpret the SCP relationship. But before we consider the various concentration measures we should first discuss what constitutes a desirable property of a concentration measure. Hall and Tideman (1967) identified the following desirable properties:

1- The measure used must yield an unambiguous ranking of industries.

2- The measure should be independent of the size of industry but be a function of the combined market share of firms.

3- Concentration increases if the market share of any firm is increased at the expense of a smaller firm, that is, the 'principle of transfers' should hold.

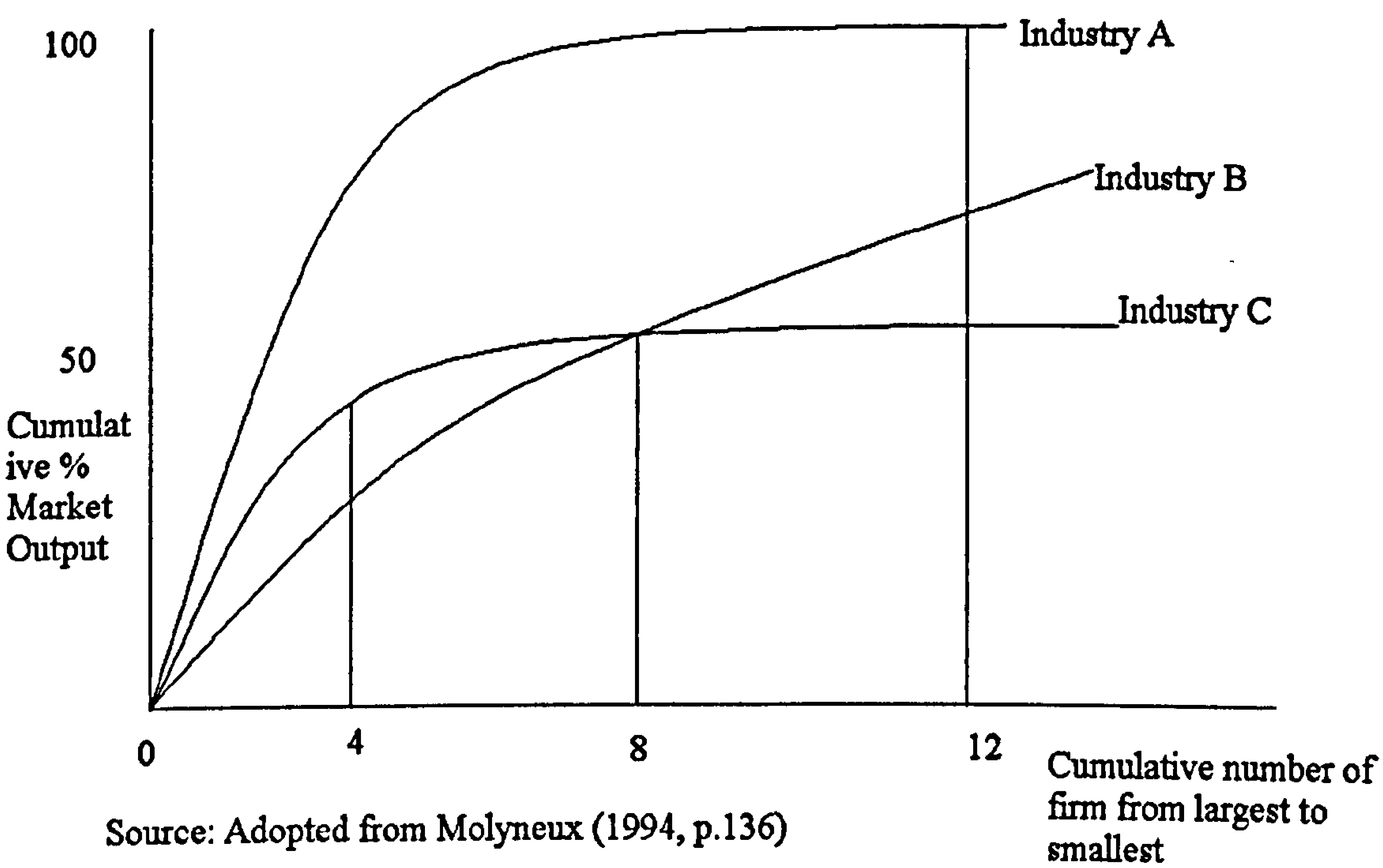
4- If all firms are divided into a given number of equal parts, the concentration measure should fall in the same proportion. For instance, if all firms are divided into two equal parts, the concentration measure should halve.

5- The concentration measure should be a decreasing function of the number of firms.

6- The limits of a concentration ratio measure should be zero and one. (some proposed measures do not exhibit this property per se but can be normalised to do so by expressing them as a proportion of their maximum value). Subsequently Hannah and Kay (1977) have proposed several other criteria that concentration indices should meet;

1- If one concentration curve lies entirely above another, it represents a higher level of concentration. An example of a concentration curve is shown in Figure 4.3 and shows the cumulative shares of market output attributable to the largest firms in the market.

Figure 4.3 Concentration Curves



Source: Adopted from Molyneux (1994, p.136)

On the above criterion, industry A is more concentrated since a given number of firms accounts for a higher proportion of output in A than in either B or C. the case is ambiguous for industries B and C because the four firm concentration ratio shows industry C to be more concentrated than industry B, whereas the twelve firm concentration curves do not intersect, the ranking of industries is unaffected by the number of firms chosen to calculate the concentration ratio.

2- If a large firm wins a customer from a small firm, concentration has increased. This is what is known as the 'principle of transfers'. A transfer of output from a smaller to a larger firm, which will increase the degree of inequality, should increase the value of the concentration index.

3- The entry of a new firm below some significant size reduces concentration. The entry of a new firm increases the number of firms in the industry and, therefore, decreases concentration, but if the new entrant has a sufficiently large market share, it could move the concentration curve upwards and, therefore, increase concentration.

4- Mergers increase concentration.

5- The contribution of a firm to the concentration measure tends to zero with its market share. Given these criteria and bearing in mind that there is no general consensus as to the relative importance of the above requirements, the following will examine the actual measures.

Cameron (1972) identifies two measures of banking structure:

1- Quantitative measure such as density, measured as a ratio of the number of bank offices to either population or area, the size of the banking system relative to the total economy, the size distribution of banks within the system and the geographical concentration or dispersion of bank offices and

2- None-quantifiable aspects such as the legal status of banking which may range from absolute prohibition to free banking.

In general, however, the degree of concentration in banking markets can be categorised using either static or dynamic measures. Static measures define concentration at a single point of time whereas dynamic measures focus on changes in concentration across time.

4.4.2 Static Measures:

The traditional static measures of market concentration include the number of firms serving the market as of a given date and the percentage of financial resources, such as assets, deposits and loans, controlled by the one, two,.....k largest banks in the market.

The first static measure commonly used in banking studies is simply the number of banks (N) in the market area. This method has a disadvantage in the fact that it ignores the relative size distribution of competing firms in the market.

4.4.2.1 Concentration ratio

The second simple static measure is the concentration ratio. The concentration ratio shows the share of the total market (e.g. measured by employment, sales, assets, deposits, and credits) that is accounted for by relatively few of the largest firms in that particular market.

The fewer the number of firms and / or the more disparate their sizes, the more concentrated (and less competitive) the market. For example, one, two,...k concentration ratios measure the proportion of banking sector assets or deposits controlled by the one, two, ..k largest banks in the markets. The calculation of concentration ratio is as follows;

$$CR_x = \sum_{i=1}^{x} s_i$$

Where *CR* is the *x* firm concentration ratio, and S is the percentage market share of the ith firm. X can be taken as any value, one, two, three, or five being the most usual in empirical research in banking (see Hannan et al, (1998).

A value which is close to zero would indicate that the largest x firms supply a small proportion of the market, whereas 100 percent would indicate a single supplier. However, using the concentration ratio has its disadvantages: The selection of the number of firms to be included is highly arbitrary and ignores the structure of the remaining firms in the market, Goddard et al (2001), (i.e. the medium-sized and small firms). However, these shortcomings may be partially corrected using an alternative measure of market concentration such as the Herfindahl-Hirschman index (HHI), entropy, Lorenz curve, Hall-Tideman index or the dominance index developed by Kwoka (1977).

4.4.2.2 The Herfindahl-Hirschman index (HHI) developed by Hirschman (1964) takes into account the number and market shares of all firms in the market. It is calculated by summing the squared market shares (in percentage terms) of all firms as follows:

$$HHI = \sum_{i}^{N}[S/J]$$

Where N is the number of firms in an industry and S is the percentage of deposits or assets controlled by the ith firm and J is total market share. The index can vary between the value of zero (where there are a larger number of equally sized firms) and one (where there is only one firm). The higher values of the index indicate a more concentrated market which presumably is less competitive and may generally generate less desirable performance from the social point of view. This index is often referred to as the 'numbers equivalent' measure of concentration. For example, say the *HHI* gives a value of 0.2; taking the reciprocals shows that this is the value that would be obtained if the market were made up of five equal-sized firms.

4.4.2.3 Rosenbluth or Hall-Tideman index

Hall and Tideman (1967) pointed out that the Herfindahl-Hirschman index has a major shortcoming in that, since the HHI weights each firm by its relative share, it implies that the relative sizes of firms are more important than the absolute number of firms in determining firm concentration. Hall and Tideman argue that the absolute number of firms in the industry should be stressed in a measure of concentration. To do this, they suggest weighting each firm's share by its industry rank thus giving emphasis to the absolute number of firms in the market.

The Hall-Tideman index is as follows:

$$TH = 1/(2 - \sum_{i=1}^{n} iSi) - 1$$

Where n is the number of firms in the market area; 1 is the industry rank of each firm; and Si is the percentage of deposits or assets controlled by the ith firm. TH has a range of zero to unity.

4.4.2.4Entropy:

Another static measure is the entropy co-efficient which is an inverse measure of relative concentration. The basic entropy measure developed by Theil (1967), analysed in detail by Jacquemin and De Jong (1977). It weights each firm's share by the logarithm of its reciprocal It is defined as:

$$E = \sum_{i=1}^{n} Si \log Si$$

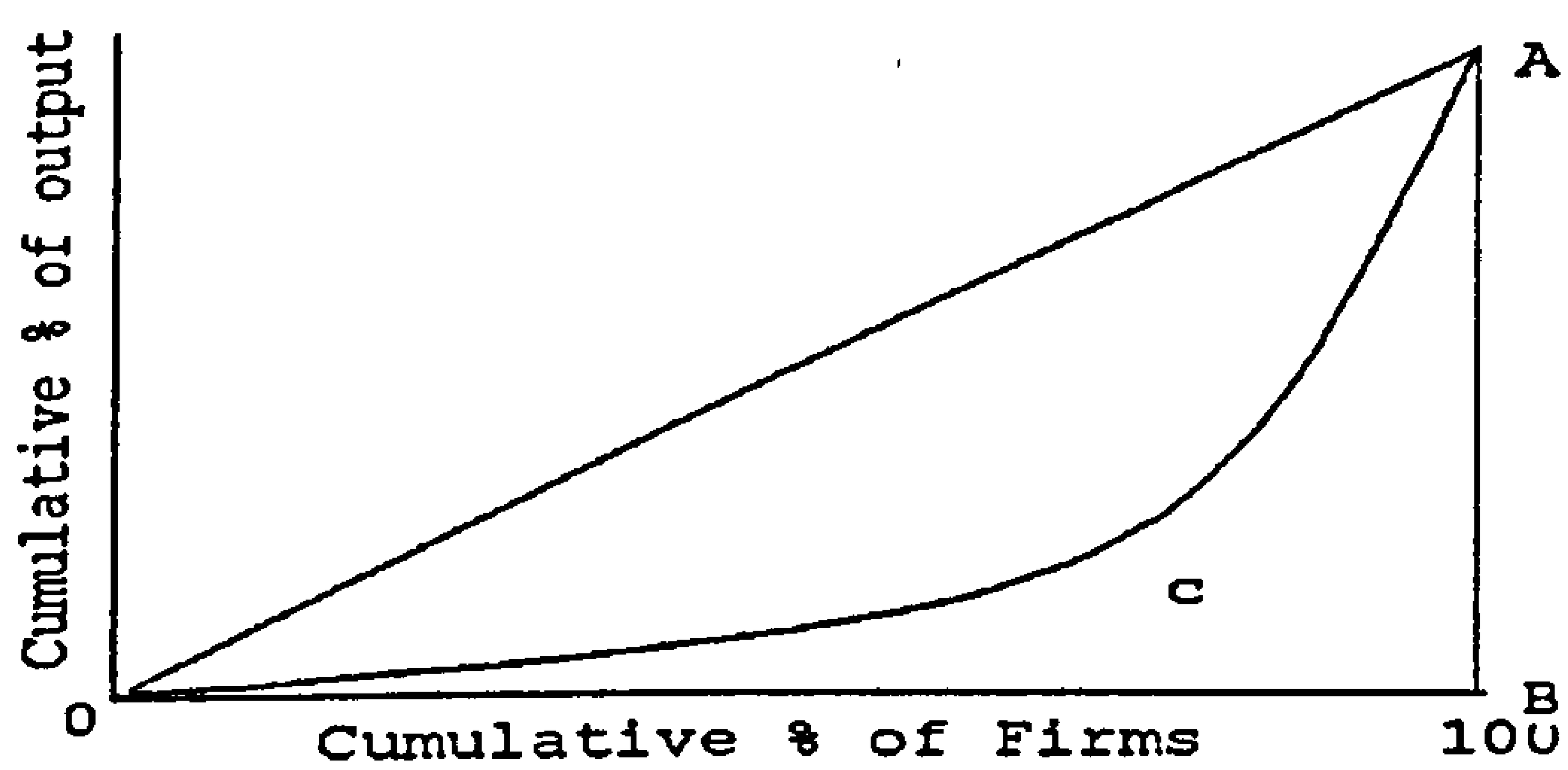
Where, E= entropy, Si = firm size relative to market structure. Entropy Indices of market concentration involve a more complex weighting scheme for firm size than the H-index (Molyneux, 1994).

This index measures the degree of disparity between the firms in the market. If all firms have an equal share, entropy is at a maximum and concentration at a minimum. If there is only one firm in the market, entropy is at a minimum (E=0) and concentration is at the maximum. The advantage of this measure is that it can be decomposed to show how different sub-groups contribute to the overall level of concentration.

4.4.2.5 Lorenz Curve

Another alternative measure is the Lorenz curve, a graphical technique which shows, as a continuous function, the percentage of, for example, total industry sales accounted for by any given fraction of the total company population, with the firms ranked in order of market share or size. Lorenz curves can be characterised numerically by means of the Gini coefficient, which measures the departure between the Lorenz curve actually observed and the curve that would appear if all firms had equal market shares or sales. The Gini coefficient ranges from 0 (indicating perfect equality of firm shares) to 1 (indicating total inequality).

Figure 4.4 explains graphically the deviations of the Gini coefficients from the Lorenz curve.



Source: Fergson (1988,p.27)

The figure shows a Lorenz curve for a given industry. The firms are ranked by size and cumulated from smallest to largest as a percentage of the number of firms in the market. This is plotted against the cumulative percentage of output. The greater the deviation of this curve from the diagonal line, the greater the inequality of firm sizes. Thus, the Gini coefficients summarise this information, i.e. is the shaded area OAC divided by the triangle OAB.

As mentioned above, the coefficients can vary between zero, when all firms are of equal size (i.e. when the Lorenz curve completes the areaOAB). However, the Lorenz curve has two main disadvantages:

1- It may suggest paradoxical inferences when an industry is occupied by a small number of evenly matched firms. For instance, the Gini coefficient for duopolists or triopolists with equal market shares is zero, but one could hardly conclude that monopoly power is absent in such cases.

2-The shape off the Lorenz curve and the value of the Gini coefficient are quite sensitive to errors in defining the number of firms in the industry.

The more borderline firms are included, the higher the indicated degree of inequality tends to be.

4.4.2.6 Hannah and Kay index

This index devised by Hannah and Kay (1977) is similar to the Hirschmann-Herfindahl index and, in fact, can be regarded as a special case of the latter. The Hannah and Kay index is:

$$\textbf{Hannah and Kay number equivalent index} = [\sum Si^{\alpha}\ ]1/1-\alpha$$

Market share is raised to the power (α), which is left up to the researcher.

Hannah and Kay suggest that the range 0.6 to 2.5 gives the best results, and one can see that if one choses A=2 then the index becomes the Hirschmann-Herfindahl index.

4.4.2.7 Hart and Prais: Variance of log of firm sizes.

Another widely used measure of inequality (or relative concentration) is that developed by Hart and Prais (1956) known as the variance of the logarithms of firms size (v) where:

$$V = 1/N\sum_{I=1}^{N}(\log Si)1/2[\sum_{i=1}^{N}\log Si]^2$$

Where Si is the market share of the ith firm

The measure is close to zero if firms are of a similar size, irrespective of the number of firms in the market. It is, therefore, subject to the same criticisms as the Gini co-efficient and can generate ambiguous concentration measures.

Finally, another static concentration measure is the dominance index developed by Kwoka (1977) which is:

$$D.1 = \sum_{I=1}^{n}[S/\Sigma Si - Si + 1/\Sigma Si + 1]^2$$

Where the differential market share between successively chosen firms is ranked by firm size. This index ranges between 0 and 1 with a value of unity denoting a monopoly.

4.4.3. Dynamic Measures

Traditionally, dynamic concentration measures are based on first differences (changes) in any of the other static measure mentioned above between a given initial year (t) and any future year (t+1) as follows:

$$\Delta C = \Delta Ct+1 - Ct$$

Superior measures of dynamic market structure include the share stability index developed by Prais (1958) and the dynamic concentration index developed by Grossack (1965) and Salley (1972) and the dynamic Hirfindahl index.

The share stability index developed by Rose and Fraser (1976) relates the market share held by a bank in a given base year with its share at the end of the period under study.

Hymer and Pashigian (1962) developed this model in the form

$$1 = \sum_{i}^{n}[Si,tSit+1]$$

This index (1) increases with greater changes in market share over the period from point t to t+1: the more unstable market shares are over the period, the higher the index. The dynamic concentration index is obtained through a linear regression of market shares for all firms in a given market at the end of the period upon their market shares at the beginning of the study period.

Finally the dynamic Herfindahl index which calculates the change in the level of the Herfindahl index between base and terminal years as follows:

D.H.I=HI-HI

A positive value for the index shows that concentration has increased and a negative value implies that concentration has decreased.

In a review of 73 US SCP studies from 1961 to 1991, Molyneux et.al.(1996) summarised the market structure measures using in the banking literature used in the banking literature. These are shown in table 4.4.

Table: 4.4 Market Structure Measures Used in the US SCP Literature

Measures of Market Structure	Number of times the respective market structure measures have been used in the SCP literature
Concentration ratios	
5-firm deposits	2
3-firm deposits	37
2-firm deposits	3
1-firm deposits	9
Herfindahl Index (H)	18
Deposits	2
Numbers equivalent (1/H)	16
Number of firms in the market	2
Gini co-efficients	2
Entropy	1
Hall-Tideman index	1
Dummy variables for markets with relatively low H	1
Change in H	1

Note: These market structure measures were found to be used in a review of 73 SCP studies
Source: Molyneux et al (1996, p.101).

It can be seen from the table that the most frequently used measure of market structure is the 3-firm deposits concentration ratio which is used in 37 studies out of the 73 studies reviewed. The second most frequently used is the Hirfindahl index followed by the number of firms in the market.

4.5: Practical Problems Associated with Concentration Measures:

Three major problems may a rise when measuring the structure of a banking market.

These are:

1- Difficulties in defining the scope of the banking industry; for example, whether or not to include all financial institutions; and ascertaining whether the market is exclusively national or it extends to international banking. Problems also of defining product areas given that, the bank is a multi-product services firm.
2- Difficulties in choosing a method of measuring the size of the institutions.
3- Different concentration indices may yield conflicting measures of market structure.

In the context of the first problem the size of the market is difficult to define, especially if there are a large number of firms providing close substitutes. Measurement problems are compounded given the multi-product nature of banking businesses. Asch (1983) notes that, consumer substitutability is the main criterion for defining the market, but 'in practice' a greater deal of judgement must be used in classifying firms, and the researcher must always be alert to the possibility that empirical results may be sensitive to the particular industry grouping that have been used. However, in defining the scope of the banking industry, the majority of US empirical SCP studies have only included the number of the commercial banks in their studies; for example, Edwards (1964), Frazer and Rose (1971), Smirlock (1985) and Evanoff and Fortier (1988). On the other hand, Goldberg and Rai (1996) include commercial and saving banks in their study covering eleven European countries, and

Molyneux and Teppet (1993), Lloyd-Williams et.al. (1994), and Molyneux and Forbes (1995) include all relevant financial institutions in their research design. The majority of US studies focus on local domestic banking markets, usually defined as Standard Metropolitan Statistical Areas (SMSA) (but sometimes as rural counties). Studies such as those undertaken by Short (1979), Bourke (1989) and Goldberg and Rai (1996) provide international comparisons and therefore focus on national banking markets, thus treating each single country as a market and eliminating the kind of problems that a rise in defining local areas for each country.

In relation to the second problem, there are also difficulties in choosing a method to measure bank size. The market share of individual firms can be measured by using a whole range of variables, for example, total assets, output, value added, employment, etc. Different variables are quite likely to yield different concentration rankings and therefore it is up to researchers to provide both empirical and theoretical justification for the choice of the market share measure used in SCP type studies. However, the use of total assets is far from ideal, either for measuring concentration or for acting as a denominator of various other ratios (Goddard, 2001). Another measure of size is total deposits but its shortcoming is that it includes both domestic and international deposits. The term total deposits can be defined in a number of ways; including or excluding inter-bank, foreign currency and non-resident deposits. Size can also be measured using the shares of demand deposits in differing size categories, for example, segregating customers according to size of accounts. Yet another measure for size is in terms of the total credits of the banking firm. However, this measure is seldom used empirically.

In the context of different concentration indices, Jacquemin and de Jong (1977) in a study of European manufacturing industries estimated rank correlation coefficients for different concentration measures. They found a high correlation between rankings using the four and eight-firm concentration ratios. Correlation between the H-index and the entropy coefficient were much lower. George and Ward (1975) have also shown that changes in the measure of concentration can effect empirical results. In a study of the change in concentration among the top European Community companies between 1962 and 1972, they found that the Herfindahl and entropy measures showed that concentration had declined, whereas the variance of logs method recorded an increase in concentration. Other studies by Bailey and Boyle et al. (1971), Aaronovich and Sawyer (1975) and Vanlommel (1977) have found various concentration measures to be highly correlated with one another. However, in this context, mention should also be given to the Honohan and Kinsella (1982) study which provides a critique of cross-country comparisons of traditional measures of concentration. This study notes that when one compares concentration across countries one must take into account the effects of market size on the, "minimum practicable degree of concentration having regard to the desirability of an efficient scale of production". (P.262). They develop, with the help of a theoretical model, a measure which takes account of market size – essentially Herfindahl indices scaled-up by an amount proportionate to the level, or the square root of GDP. Their study, using data obtained from Short (1979) for 1973, shows that if their measures are used, Japan which had the least concentrated market as measured by the Herfindahl index would have almost the highest degree of concentration of any country if either of their measure were chosen. Belgium and Sweden which appeared among the most concentrated according to the Herfindahl index would seem to have the 'minimum feasible level' of concentration across countries if the Herfindahl multiplied by GDP measure was used.

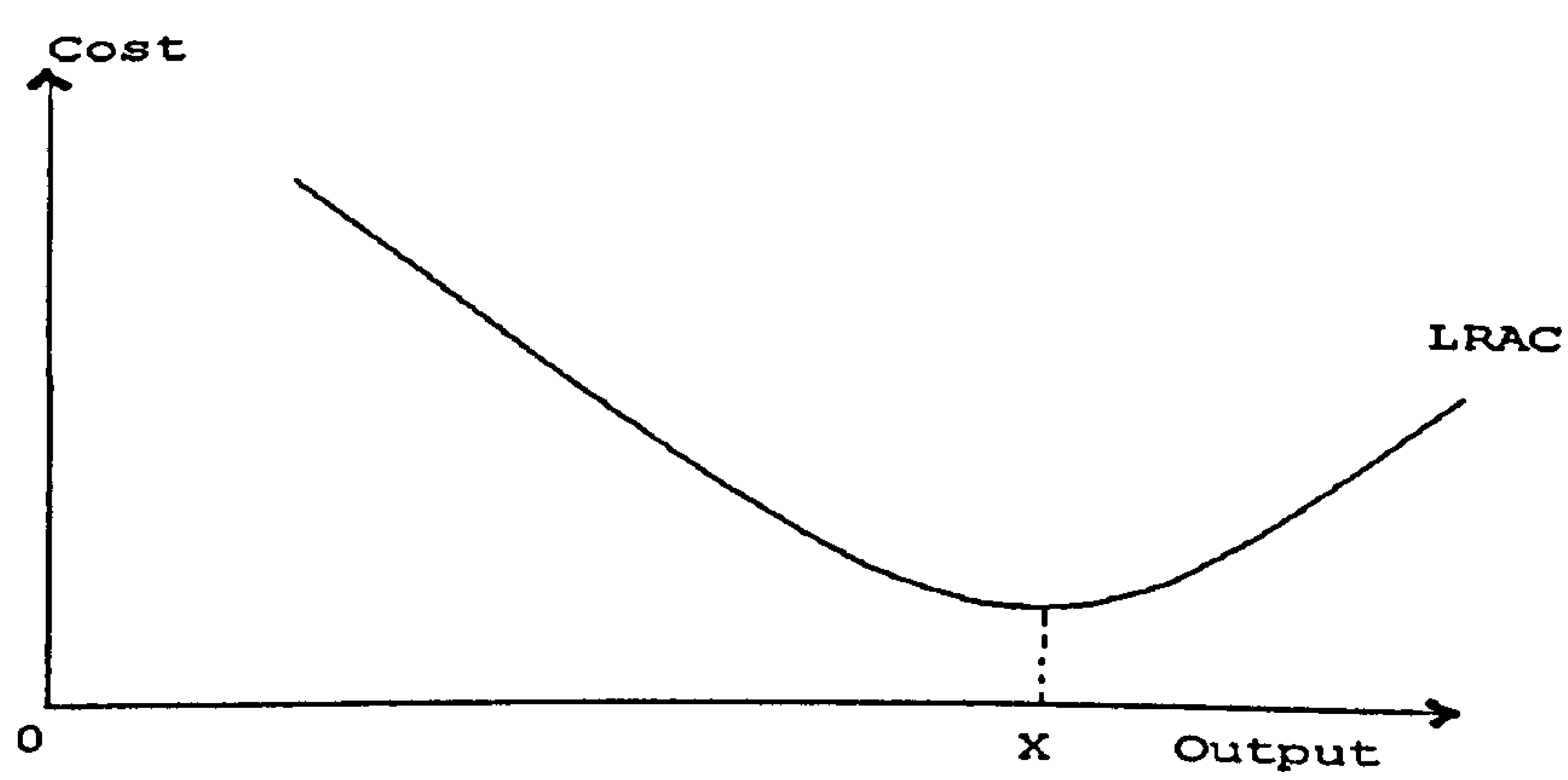
All in all, from this latter literature, it appears that four- and eight-firm concentration ratios, the H-index and entropy measures are all highly correlated, and thus provide similar concentration ratings. Inequality measures of concentration, such as the Gini coefficient, variance of logs method appear to be less closely correlated and also are more likely to provide conflicting rankings to the aforementioned concentration measures Molyneux et al (2001).

4.6 Determinants of the Level of Concentration

4.6.1 Economies of scale

In general, the link between economies of scale and concentration is non-contentious, however, this area has probably received the most attention from industrial economists as a determinant of the level of industry concentration. Market concentration is expected to increase as economies of scale increase. If market concentration reaches a level dictated by available economies of scale, then it would be futile for policy makers to influence the level of market concentration because, in the long-run, market concentration will move towards the level as dictated by the cost function. In analysing the structure of a market, it is important to know how large the minimum optimal size of firm is in relation to the size of the market. Figure 4.5 illustrates a long-run average cost curve and economies of scale are shown on the downward sloping part of the curve.

Figure 4.5: The long-run average cost curve and economies of scale



Economies of scale are present along the output range OX, where long-run average cost is falling. OX represents the minimum optimal size of the firm in the particular industry because it is the smallest size of firm that can benefit from all the economies of scale and thus minimise long-run average cost. The rationale behind measuring the minimum optimal size of firm in relation to the size of the market is to see whether the size of market is large enough to support the firm scale economies. In addition, the steepness of the cost curve is also of interest because this can indicate the cost disadvantages suffered by firms which are of suboptimal size.

There is an enormous industrial organisations literature on economies of scale which is well beyond the scope of this thesis to tackle in detail. However, Scherer (1975) and (1980, chp.4) provides a good review of the early literature. In his 1980 study he discusses five main types of scale economies that could impact on the level of concentration:

1- product-specific economies- cost economies generated by the specialisation of production relating to individual products.

2- plant-specific economies- cost economies coming from the expansion in size of individual processing units.

3- Multi-plant economies–the multi-plant enterprise can employ a more richly specialised array of accounting, licence, marketing, production process, research and legal talent than a single plant firm, all these being equal. This may be reflected in lower administration costs and/or higher productivity (Scherer, p.84).

4- Capital raising and other pecuniary economies-cost economies encountered when firms raise capital through common stock issues, borrowing and such like-based on the view that the larger the amount raised, the lower those costs are per dollar of capital raised.

5- Economies of large-scale promotion-cost economies generated through large scale promotion and marketing campaigns, for example, one possible source of scale economies is the need to attain a certain minimum level of TV advertising before reaching maximum effectiveness (see Scherer, p.108).

Various studies, such as Scherer (1975), have sought to estimate various industries minimum efficient scale (OX in figure 4.6) and compare this with the observed levels of market concentration. In his study for United States, he finds that the four-firm concentration ratios are much larger than the operation of minimum efficient scale plants would suggest. A similar study reported by silberston (1972) on economies of scale across 25 UK manufacturing industries found that the minimum efficient scale of production of aircraft, diesel engines and certain types of machine tools was greater than the size of the whole UK market.

Overall, the literature suggests that, in the case of the United States, "national market concentration in most industries appears to be much higher that it needs to be for leading firms to take advantage of all but slight residual scale economies" (Scherer [1975, p.54]). The case is not clear-cut for industries in other contries.

In relation to the SCP framework, this result is not so surprising (Molyneux, 1996); one might expect that leading firms will maintain positions of market power (through entry deterring tactics), even if market shares are much larger than those necessary for efficient operation. Some economists, referred to in the industrial organisations literature as the Chicago School, argue that, estimates of scale economies and minimum efficient scale are irrelevant, because the market structure observed in the real world is efficient:

> I see little reason to spend much more time estimating optimum plant or firm size except, perhaps, in a completely centralized and governmentally controlled economy in which the State tries hard to keep markets from working and consumers from expressing preferences. When property and

> markets are at work, and consumers are permitted to choose what and from whom to buy, it is, as far as I am concerned, a trivial matter what the facts of technical economies are, or what economists and engineers have to say about them. Consumers will choose products and firms will offer what is, to their tastes, the best deal. Consumers will make the trade-off between prices and product qualities. The prices they pay for the qualities they buy are signals to anyone who would do better by them. Such economies as there are will assert themselves, and no-one need be concerned how large or small they are. (MacGee, 1974b, p. 84)

4.6.2 Barriers to Entry

Another factor classified in the literature as a determinant of market concentration is the level of entry barriers. The concept of entry barriers was extended in Bain (1956) where he defined barriers to entry as any constraint which puts potential entrants at a competitive disadvantage compared with established firms and which enables established firms to generate abnormal profits in the long-run. He argued that concentration is preserved by various types of entry barriers, in other words where industrial concentration is higher than can be justified by superior performance or economies of scale. The level of entry barriers therefore can determine the level market concentration and industry profitability. Bain (1956) identified four main types of entry barriers: absolute unit cost differences; product differentiation; capital cost requirements; and economies of scale.

The first type of barrier identified by Bain (1956) relates to absolute cost advantages of established firms: that is, for any given level of output, incumbent firms can produce and market their product at a lower cost per unit than newcomers. This situation may arise because new entrants may have to pay more for scarce raw material, use inferior production technologies, the cost of capital may be higher, or they may not be able to have access to relevant marketing outlets.

A second type of barrier relates to product differentiation and, in particular, differentiation supported by heavy sales promotion. Bain (1956) concluded that product differentiation was: 'of at least the same general order of importance...as economies of large-scale production and distribution' (pp. 142-43) in providing the largest firms a price or cost advantage over rivals and specially over new entrants. A later study by Scherer et al. (1975) found that, although product differentiation was important, firms with only a single plant of efficient scale could promote their products on equal terms by directing their promotional campaigns at specific market segments.

The reason for the interest in advertising and product differentiation in general is typified by the findings of Mueller and Rogers (1980) who noted that consumer goods industries that spent especially large sums on TV and radio advertising have also experienced high increases in concentration over the period 1947 to 1977. Consumer goods industries that spent heavily on newspaper advertisements or did not advertise at all and producer goods industries experienced either falls or no increase in their respective industry concentration levels. The role of advertising and product differentiation as forming a barriers to market entry is discussed in substantial detail in Bain (1968), Ferguson (1988, chapter 4) and Hay and Morris (1991, chapter 5).

A third type of entry barrier relates to capital cost requirements. Potential entrants may find the capital needed to enter an industry may be a considerable barrier, but for existing firms in the market, this may not be a constraint. For example, if the industry is identified as having a large minimum efficient scale of operations, this may necessitate a large capital cost outlay. The deterrence of this barrier, however, depends on the nature of the potential entrant as well as the type of industry being entered. If a major potential entrant is already a large firm, then capital costs may not pose a serious problem.

The final barrier to entry as identified by Bain (1956), are economies of scale which we have already discussed in the previous section.

To restate the main issue-

If the minimum efficient scale of firm is large in relation to the size of the whole market, and if operating at suboptimal costs yields significant cost disadvantages, then there will be a major barrier to entry for new firms.

4.6.3 Other Determinants of Concentration

There are a wide range of other causes that are believed to have an impact on the type of market structure and hence the level of concentration. These are shown below:

4.6.3.1 Size of the Market

The size of the market can have an impact on the level of market concentration because smaller markets would tend to support a smaller number of firms and thus the likelihood of collusion and anti-competitive practices may be more likely. In addition, many studies of concentration have focused on national markets, yet this may tend to understate the degree of concentration. Weiss (1972), for example, noted that the average four-firm concentration ratio for a variety of thirteen industries (ranging from cigarette producers to cement manufacturers) increased from 19.6 per cent when viewed in a national context to 35.7 per cent after adjustment for regional markets.

4.6.3.2 Market Growth Rate

When economies of scale are tending to increase concentration, this effect will be weakened by an increase in the size of the market. It is likely that slow growth industries become monopolised more easily.

4.6.3.3 Government Policy

Government policies such as: antitrust legislation; regulations governing patents, licences, tariffs and quotas; procurement policies; and other regulations specific to various industries, such as public utility regulation and banking regulation have an impact on concentration. With regard to antitrust legislation, governments have created various laws to limit or prohibit excessive concentration of market power. On the other hand, Greer (1984, p. 120) notes that various anti-competitive government policies such as: licences – restrict the entry of firms into particular markets; franchises- grant monopoly rights to bus companies, water companies and other business; tariffs and quotas- inhibit the flow of imports; and patents – award x-year monopolies over the use of new inventions and processes.

In the case of public procurement programmes, governments may show a bias in favour of large firms, mainly because of the nature of the products that they purchase, e.g. defence equipment, transport, etc. All the above policies could lead to increased concentration in the market place.

4.6.3.4. Business Policies

Business policies such as mergers, restrictive practices and product differentiation (which we have already discussed) are all deemed to have an impact on market concentration. As George and Joll (1988, p.132) state:

> The single most important cause of increases in concentration is undoubtedly merger activity ...It need not be the case that all, or even the majority of, mergers are the results of attempts to monopolise industry. But whatever the precise cause of merger there can be no doubt that they have contributed massively to increases in concentration.

The first systematic study examining the impact of mergers on industry concentration was undertaken by Weiss (1966) who traced the effects of mergers on four-firm and eight-firm concentration ratios in six US manufacturing sectors between 1930 and 1960. Changes in concentration were categorised according to merger, internal growth, entry and exit of firms and a value described as displacement, which allowed for changes in the identity of the major firms in each time period. Weiss found that mergers contributed the largest component to increased concentration.

Various similar studies of mergers and concentration for the United Kingdom undertaken by Hart and Walsh (1973), George (1975) and Hannah and Kay (1977) arrived at similar findings. Restrictive practices, which include such things as collective rebates, predatory price discrimination, exclusive dealing, and barrier pricing have no immediate effect on concentration although, over a long period of time, they might help consolidate market power.

4.6.3.5. Stochastic Processes or 'Luck'

The extreme alternative to the view that concentration is determined by economies of scale, barriers to entry and so on is based on the assertion that it is brought about by pure (statistical) chance. A casual inspection of data on firm size across countries reveals that in many industries the data exhibit a similar pattern, 'the size distribution of firms is highly skewed, with a few large firms, rather more medium-sized firms, and a large 'tail' of small firms' (Hay and Morris (1991, p.537) . Such distributions can be approximated by a number of related skew distributions- of which the most widely used is the lognormal. These distributions can be generated by a stochastic process in which the variable (in the case above, the size of firms) can be subjected to cumulative random shocks over time. The size distribution of firms in an industry, therefore, may be related to a series of random growth patterns in the history of the particular market. This process of random growth which generates a log-normal distribution was first identified by Gibrat (1931) and his formulation is known as Gibrat's Law of Proportionate Effect (LPE).

Various researchers, such as Hart and Prais (1956) and Simon and Bonini (1958), identified that such stochastic processes could be used to explain concentration. This is clearly illustrated using a simulation experiment reported in Scherer (1980, p. 146). Scherer simulated sixteen separate histories of a market under the following assumptions:

In the first period the market consists of fifty firms each with $100,000 in sales and a 2 per cent market share. The four-firm concentration ratio is then at 8 per cent.

The chance for growth of each firm is identical. The chances are specified by each firm annually drawing a year's growth from an identical probability distribution.

The probability distribution from which the annual growth rates are obtained provides for an average annual growth rate of 6 per cent, but a variance of growth rates around this average, such that the distribution is normal with standard deviation of 16 per cent.

These assumptions also conform to Gibrat's Law of Proportionate Growth. Scherer's (1980) simulation exercise shows that concentration rises dramatically over the first twenty years and more slowly thereafter. Why is this, the case? Well, as Scherer (1980,P.146) states:

> The answer: in a word, is luck. Some firms will inevitably enjoy a run of luck, experiencing several years of rapid growth in close succession. Once the most fortunate firms climb well ahead of the pack, it is difficult for laggards to rally and rectify the imbalance for, by definition, each firm – large or small – has an equal chance of growing by a given percentage amount.

If a firm has managed to become one of the market leaders, its position will be enhanced if it continues to be luckier than average (as in fact it will be in roughly half the cases). However, a number of studies have sought to compare the actual distribution of firms with that predicted by similar forms of stochastic process, found that the distribution generated by stochastic processes were generally a rather poor fit.

4.7 Performance measures:

As mentioned earlier performance measurement is the quantitative assessment of efficient progress towards achieving a specific goal. However, a question of interest perhaps is 'how do we measure performance?' are firms that make large profits considered to be performing well or vice versa? In the following pages we will review the most commonly used performance measures.

Competition theory states that in a perfectly competitive market price equals marginal cost, in contrast, the larger the margin between price and marginal cost, the greater the firm's degree of monopoly power. This could be illustrated as follows. The profit maximising margin of firm I, can be shown as: mI = (Price-Marginal Cost)/Price. This can be used to illustrate different competitive environments and it has been used as the main firm performance measure in the industrial economies literature. This measure, known as the Lerner index, equals zero under perfect competition (because price equals marginal cost) and under monopoly it is large and positive. The Lerner index is also equivalent to the inverse of elasticity of demand, so as elasticity of demand tends towards infinity (the competitive case) monopoly power tends to zero. This measure, however, is subject to three criticisms. Firstly, the index depends on the level of costs, yet high marginal cost may produce a low index even if monopoly power is significant. Secondly, the index takes no account of the size of the market. Finally, the index depends on price elasticity which is only partially determined by industry structure because it is also influenced by the type of goods being sold. It is, however, difficult to obtain data on firms' marginal costs or the ratio of marginal costs to prices (especially in the banking sector), so researchers have chosen proxy measures. By assuming marginal costs could be approximated by average variable cost, we arrive at what is sometimes referred to as the profits-revenue ratio:

Profits-revenue ratio or/return on sales = (Profits attributable to shareholders/sales revenue)

There are two main other measures of performance: return on shareholders equity and return on capital assets employed and these are shown as:

Return on shareholder's equity = (Profits attributable to shareholders/Shareholders equity)

Return on capital assets employed = Profits attributable to shareholders/Total Assets)

The latter two ratios are ambiguously referred to in the industrial economics literature as return on capital ratios or the "accounting rate of return". All the above ratios are subject to criticisms relating to how firms arrive at their accounting profits, for example, how costs (such as operating costs and depreciation) are measured, (Molyneux, 1996). In the latter two ratios, the valuation of capital (however defined) is also important, Hay and Morris (1991).

In the banking literature studies on the relationship between market structure and bank performance have typically used two measures of performance: profitability, and the price of a particular product or services (Goddard, et al, 2000). The most commonly used profitability measures are return on assets and return on equity whereas the price measures include such variables as: the interest rates charged on business loans, the interest rates charged on residential mortgages, the average interest rates charged on all loans, the average interest rates paid on time and saving deposits, and the ratio of loans to total deposits or assets (Mester et al, 1998).

Fraser and Rose (1971) point out that bank operating performance is difficult to measure because of the diversity of bank output, ranging from trusts and corporate accounting to the underwriting of home construction and municipal expansion Thus, bank performance can not be adequately proxied by any simple production function with, for example, total loans or total deposits as the sole index of bank output. Accordingly, Rose and Fraser (1976) use profitability and price measures which include average loan rates, average saving rates and ratio of net current operating earnings to average total capital. Edwards (1964), Flechsig (1965) Kaufman (1966) use interest rates charged on business loans as the measure of bank performance. Short (1979), Kwast and Rose (1982), Rhoades (1985), Evanoff and Fortier (1988) and Berger (1991, 1995, 1998) use profitability measures such as return on assets and return on equity to measure the performance of banks.

In a review of 73 studies on bank structure and performance in the US, Molyneux et.al.(1996) find that there are three main categories of performance measures: Firstly, price measures, secondly, profitability measures, and thirdly, other measures. Table 4.5 presents a summary of the performance measures used in the literature of the banking industry.

Table 4.5: Summary of the performance measures used in the literature of the banking industry.		
performance measure	No. of times the respective performance measures have been used in the SCP literature	No. of studies finding the performance measure to be unambiguously significantly related to market structure
Loan interest rates		
Interest and fees on loans/Total loans	19	7
Interest rate on business loans	6	3
Interest rates on new car loans	3	2
Interest rates on residential mortgages	2	2
Total	**30**	**14**
Deposit interest rates		
Interest payment on time & savingdeposits/total time and saving deposits	16	5
Interest rates on money-market deposit accounts	2	
3,6, 12 and 30-month CD rates	2	
Interest rate on Super-NOW accounts	1	
Interest payment on time dep/Total. T.D	1	
Interest rate on passbook savings	1	
Interest rate on $1000 CD	1	
Total	**25**	**10**
Service Charges		
Revenue from service charges on demand deposits/Total demand deposits	14	3
Revenue from service charges on demand deposit	5	2
Monthly service charge on demand Dep.	1	1
Charges for returned cheques	1	0
Service charges on a standardised account	1	0
Total	**22**	**6**
Profitability Measures		
Return on Assets	24	12
Return on Equity	14	8
Total	**38**	**20**
Other Measures		
Lerner index	2	0
Elasticity of loan demand	2	1
Number of employees	1	0
Standard deviation of return on Equity	2	2
Concentration Measures	1	0
Market share stability indices	2	2
Portfolio selection	2	2
Senatorial votes	1	0
Service quality measures	1	1
Labour expenses	2	2
Other expenses	2	2
Total	**133**	**62**
Source: Molyneux et al (1996, pp. 98-99)		

Of the price measures, such as loan interest rates, deposit interest rates and service charges, the most commonly used were loan interest rates and fees on loans divided by total loans; interest payments on time and savings deposits divided by total time and saving deposits; and revenue from service charges on demand deposits divided by total demand deposits. However, the use of price measures has received many criticisms by authors such as Evanoff and Fortier (1988), who note that since banking is a multi-product industry, using individual prices may be misleading. This is because of the fact that banks may have different pricing strategies, thus perhaps charging low loan rates but also paying relatively low deposit rates. For example, Gilbert (1984) concludes that, using average interest rates and average service charge rates are poor measures of bank performance. One reason for this is the fact that average measures combine flow variables; the numerator measures annual flows and the denominator is a balance sheet item recorded at a point of time. These may be different from the average loan or deposit balance over the year. Bank profit rates are generally regarded as the most appropriate measure of bank performance. For instance, Gilbert (1984 p632) states:

> The average interest paid on time and saving deposits is more likely to be a function of the maturity distribution of a bank's deposits and their denomination than a function of market structure. The only measures of bank performance derived from the report of income and report of condition that do not have major measurement problem are bank profit rates. If banks in areas with higher market concentration charge higher interest rates on loans, set higher service charges on demand deposits, and pay lower interest rates on deposits, these effects will be reflected in the pattern of bank profit rate, even though it may not be possible to measure accurately the effects of market concentration on interest rates and service charges with data from the report and report of condition.

One of the main advantages of using profitability measures is the fact that they are simple and readily available. Moreover, as banking is a multi-product business, it consolidates information into one single figure (De Young et al. 1998).

On the other hand, its main disadvantage is that it combines a flow variable (i.e. profits) with a stock variable (i.e. assets or capital). The most commonly used performance measures in the banking literature were found to be return on assets (ROA) and return on equity (ROE) (Mester et al. 1998).

4.8 Theories Describing the Relationship between Market Structure and Performance.

Three main hypotheses aim to explain the relationship between Market Structure and firm Performance. These can be categorised as the following:

4.8.1 The SCP Hypothesis:

Mason (1939, 1949) and Bain (1951, 1956, 1959) were the originators of what has become known as the structure-conduct-performance (SCP) paradigm. Both of whom adopted a methodology that was primarily empirical rather than theoretical Goddard et al, (2001). In contrast to the deductive approach of standard microeconomic theory, the field of industrial organisation analyses empirical data and by a process of induction develops theories that attempt to explain the real-world behaviour of firms and industries (Schmalensee, 1988). The SCP model suggests that market structure is expected to influence the conduct of the firms that comprise the industry. Conduct variables include price setting, collusion and other forms of strategic behaviour, expenditure on advertising, research and development and innovation. Conduct, dictated or influenced by structure, in turn determines performance (Goddard, et al, 2000). According to the Structure-Conduct-Performance hypotheses, the degree of competition among firms in the market is influenced by the degree of concentration among a few relatively large firms, since a more highly concentrated market structure is assumed to be conducive to more effective collusion. At high levels of concentration, effective monopoly exists through the recognition of mutual interdependence, and market participants are able to achieve the monopoly price-output configuration that maximises industry profits. Prices, therefore, are unlikely to increase any further in response to further increases in concentration. A positive relationship between market concentration and performance is interpreted by SCP advocates as evidence that banks are able to extract monopolistic rents in concentrated markets through their ability to offer lower deposit rates and to charge higher loan rates. In summary, the SCP hypotheses is derived from the model of oligopolistic behaviour of firms which implies that collusive arrangements are less costly to maintain in concentrated markets (Stigler 1964). Most early empirical research based on the SCP paradigm focused on the relationship between concentration and performance measured by profitability. A positive correlation between concentration and profit was typically interpreted as evidence that firms act collusively in order to achieve high profits, (Molyneux, et al, 2001). As mentioned above, the earliest work on the relationship between market structure and performance was undertaken by Mason (1939, 1949) and Bain (1951, 1956, 1959 and is viewed as the foundation of modern empirical work in the industrial organisations literature. Bain (1951) tests the concentration hypotheses using data for US manufacturing industries covering the period 1936-40, and finds that in industries with eight-firm concentration ratios (CR_8) above 70%, profits were significantly higher than in those with CR_8 below 70%. These results have been interpreted as supporting the hypothesis that concentration facilitates collusion and limits rivalry. Bain's findings were confirmed by numerous other studies, which at the time were interpreted as providing empirical justification for government intervention aimed at increasing competition. Bain's (1956) study extended his analyses to include the effects of both concentration and entry barriers on industry performance. Weiss (1974) undertook a detailed literature review of SCP studies undertaken since Bain's seminal work up to the early 1970s. Overall, the majority of the studies analysed by Weiss confirmed the Structure-Performance relationship, that is, concentration is a statistically significant determinant of profitability. As Weiss (1974) concludes:

> The theory of the dominant firm unequivocally points to high prices and suggests high profit rates for dominant firms...our massive effort to test these predictions has, by and large, supported them for 'normal' years such as the period 1953-1967, though the concentration profits relationship is weakened or may even disappear completely in periods of accelerating inflation on directly following such periods. By and large the relationship holds up for Britain, Canada, and Japan, as well as in the United States...Altogether, there is still plenty of reason to believe on both theoretical and empirical grounds that high concentration facilitates tacit or explicit collusion . (Weiss, 1974, pp. 231-32).

In general, the early literature, therefore, supported the view that more concentrated industries earn monopoly profits. Proponents of the SCP paradigm therefore tend to view most existing markets as imperfect in terms of their competitive structure, and in need of some form of regulation in order to check the abuse of market power, (Wilson et, al. 2001).

4.8.2 The Efficient Structure Hypotheses:

A challenge to the SCP relationship in the form of an "Efficient Structure" hypotheses was made by Demsetz (1973) and later by Brozen (1982). Demsetz (1973) argued that the explanation for the relation between market structure and the performance of firms related to firm efficiency. If a firm enjoys a higher degree of efficiency than its competitors, that is, if it has a relatively low cost structure, it can adopt one of two strategies: it can maximise profits by maintaining the present level of prices and firm size; or it can maximise profits by reducing prices and expanding firm size. If a firm adopts the latter strategy, the most efficient firms will gain market share and firm efficiency will be the driving force behind the process of market concentration. In any event, given that industry profits are a size-weighted average of individual firm profits, concentrated industries will tend to be more profitable even if there is no causal link between concentration and profitability as a result of collusion. The debate between the two camps stimulated a large volume of empirical research, which attempted to resolve the matter using empirical criteria, (Goddard, et al, 2000). Demsetz (1973) tests the efficiency hypotheses using data from the US Internal Revenue Service for 95 industries. The data are classified by industry concentration and firm sizes. The profit rates of firms in the three smallest of four size classes do not rise with concentration. No association between collusion and concentration is evident in the profits data of firms in these three size classes. In the largest size class, however, profits do increase with concentration, lending support to the efficiency hypotheses. Subsequently, Smirlock et al. (1984) test the efficiency hypotheses using data on 132 US manufacturing firms covering the period 1961-69,and his findings in general, lend support to the efficiency hypotheses. Schmalensee (1985) uses US Federal Trade Commission line of business data for 456 firms in 261 industries for 1975 to investigate the relative importance of firms-specific and industry-specific determinants of profitability. Schmalensee finds that industry effects are very important, explaining 75% of the variations in profits, while firm effects are less important. This seems to lend credence to the traditional SCP hypotheses. Schmalensee's estimations can, however, be criticised for omitting relevant firm- and industry-level explanatory variables, possibly biasing the empirical results, (Wilson, et, al. 2000). Moreover, Eckard (1995) uses US data for five cohorts of firms (based on size) to examine the relationship between changes in profits (measured by the price-cost margin), arising from changes in market share between 1967-72 and 1972-77. If the efficiency hypotheses is valid, a positive relationship should hold between changes in profit and changes in market share. This is confirmed in the empirical results, suggesting "a market process in which firms become large and profitable through superior efficiency...." (Eckard, 1995, p. 223). Finally, Berger (1995) substantially refines this debate by differentiating various market power and efficient structure hypotheses. He identifies two market power hypotheses: the traditional SCP and the Relative Market Power (RMP) hypotheses. The RMP hypotheses asserts that only firms with large market shares and well-differentiated products are able to exercise market power in pricing these products and thus earn super normal profits. He also argues that there are two other explanations of the profit-concentration relationship in banking, relating to the efficient structure hypotheses. The first is what may be generalised as the Relative Efficiency (RE) version of the efficient structure hypotheses, which asserts that firms gain higher profits because they possess equally superior management and production technologies and therefore they can produce output at a lower cost. These firms also gain large market shares that result in higher concentration. (This is similar to the original efficient structure hypotheses described above). The second explanation is the Scale Efficiency (SE) version of the efficient structure hypotheses, where some firms can produce on a more efficient scale than others with equally good management and technology, i.e., produce at lower cost because of local circumstances and therefore gain higher profits. Again, these firms are assumed to have larger market shares which results in higher concentration. Berger's empirical results indicate some limited support for two of the four hypotheses, the relative market power hypotheses (RMP) and X-efficiency version of the ES hypotheses (ESX). The data do not support the scale-efficiency version of the ES hypotheses (ESS) and the traditional structure-conduct-performance hypotheses (SCP). As a general conclusion, however, the empirical evidence for and against the concentration and efficiency hypotheses is somewhat mixed and inconclusive, (Molyneux, et, al. 2000).

4.8.3 The Quiet Life Hypotheses

This hypotheses was developed by Hicks (1935). He suggests that a bank with greater market power will be more risk-averse, and thus will be able to achieve some combination of both higher returns and lower risks than firms possessing lesser power in the market. Hicks (1935, p. 8) notes:

> It seems not at all unlikely that people in monopolistic positions will very often be people with sharply rising subjective costs; if this is so, they are likely to exploit their advantage much more by not bothering to get very near the position of maximum profit, than by straining themselves to get very close to it. The best of all monopoly profits is a quiet life.

In this concept of a quite life, there is tendency to which firms will utilize the greater efficiency that they possess by way of expense preference behaviour, to relax the strict adherence to cost minimization, and thus weaken the relationship between firm profits and structure. With this, it implies that there will be a negative relationship between efficiency and market structure variables. Higher degrees of efficiency will be found in markets with low concentration and in firms with a smaller market share. Generally speaking, traditional concerns about concentration in product markets have centered on the social loss associated with the mispricing that occurs when market power is exercised. Harberger (1954) suggested that eliminating monopolistic resource misallocation in manufacturing during the 1924-1928 period would have increased social welfare by less than 0.1 % of gross national product (GNP). Rhoades (1982) applied the same methodology to the banking industry and concluded that the "deadweight welfare loss due to monopoly in banking is undeniably very small" (p. 385). As suggested by the quote from Hicks above, the reduction in competitive pressure in concentrated markets may result in lessened effort by managers to maximize operating efficiency. Thus, in addition to the traditionally recognized higher prices and reduced output from market power, there may also be higher cost per unit of output in concentrated markets because of slack management, (Hannan, et al, 1998). In addition to this "quiet life" effect, there are also several other related mechanisms (described below) through which market power may result in reduced operating efficiency and higher costs. According to Berger et al, (1998) numerous observations of this efficiency cost have been made over the years, however, the reasonableness of this educated guess has not been firmly established. Williamson (1963), Leibenstein (1966), and others found very substantial cost differences within industries owing to inefficiencies. Scherer (1970) speculated that the efficiency cost from concentration may be as high as 10% of costs-much above the social loss from mispricing as measured by the welfare triangle. Carlsson (1972) and Caves and Barton (1990) estimated the relationship between cost efficiency and market structure using interindustry data. According to Hannan et al, (1998) a potential problem encountered by previous interindustry studies stems from the fact that efficiencies are generally measured by how close units of production (plants or firms) are to the best-practice units of production observed in the industry, rather than by how close they are to the technological frontier. If concentration affects the performance of the best-practice units in each industry as well as the performance of other units, then the relationship between measured efficiency (the distance from the best-practice frontier) and market concentration may underestimate the true relationship between efficiency and concentration. For example, if the market power associated with concentration raises costs by 10% for every firm in a concentrated industry, there will be no effect on the measured efficiencies of these firms relative to those in an unconcentrated industry, since the frontier moves along with the other firms. Other comparability problems also arise in interindustry studies, such as differences in the availability of close substitutes for the products. Berger and Hannan (1998) seek to resolve these problems by measuring efficiencies against the *same* frontier for firms in the same industry with similar availability of close substitutes, but located in different local markets with different degrees of market concentration. Berger and Hannan's (1998) celebrated work suggests that a potentially greater loss from market power is a reduction in cost efficiency brought about by the lack of market discipline in concentrated markets. They employ data from the US commercial banking industry, arguing, that, this produces very homogeneous products in multiple markets with differing degrees of market concentration. They focus on commercial banking, an industry in which all firms have access to virtually the same technology and produce relatively homogeneous products in geographically limited markets with dramatically different market structures. According to Hannan et al (1998), bank prices are virtually unregulated, and banks can and do charge different prices for their deposit and loan products in different local markets. Thus the effects of concentration on efficiency can be well isolated from confounding influences of interindustry differences in products, technologies, and external competition. The main findings of this study is that banks in more concentrated markets exhibit poorer cost efficiency than do other banks, all other things being equal.

> Traditionally, research and public policy concerns about concentration in product markets have focused on the social loss associated with the exercise of market power at high levels of concentration. The higher prices in concentrated markets bring about a restriction of output relative to the competitive level and thereby misallocate resources. The social cost of this misallocation has been approximated by the familiar welfare triangle, which represents the difference between the loss in consumer surplus and the gain in producer surplus occasioned by noncompetitive pricing. Attempts to measure this loss have generally resulted in exceedingly low estimates. However, it seems quite plausible that the efficiency cost associated with market power would exceed the social losses measured by the welfare triangle. This is because the efficiency cost may apply to *every* unit of output , produced by firms in noncompetitive markets, whereas the loss measured by the welfare triangle applies only to the units of output that were foregone as a result of the higher prices charged by these firms. (Berger et al. 1998, p. 454).

4.9 Conclusion:

This chapter has discussed the theoretical concepts of market structure, conduct and performance. We have looked at the definitions of each and how they are interrelated. Theory suggests that a firm's market structure influences to some degree its behaviour and performance. External factors such as technology, regulation, pricing, and demographic factors influence the structure of banking markets and also the conduct of banks with regard to strategy and objectives, and these in turn influence performance in banking markets. The literature has sought to distinguish between two main hypotheses, and has increasingly focused on the role of firm market share and its relationship to market power, where the traditional SCP hypotheses suggests that the positive relationship between market structure and performance can be interpreted as the ability of banks to extract monopolistic rents in concentrated markets. The efficient structure hypotheses asserts that the positive relationship between firm profit and structure can be attributed to the gains made in market share by more efficient firms resulting in increased concentration. Berger (1995) refined and re-tested the theoretical underpinning of the positive statistical profit-structure relationship in banking by including direct measures of efficiency for the two versions of efficient-structure hypotheses. His study was unique, because not only did he consider the traditional SCP model, which suggested that the positive profit-structure relationship reflects the setting of prices that are less favourable to consumers (low deposit rates, high loan rates), in more concentrated markets, and the Relative Market Power model (RMP), which states that only large firms, with large market shares and well differentiated products, are able to exercise market power in pricing these products thereby earning supernormal profits. He also outlined the two efficiency explanations of the positive relationship between profits and either concentration or market share, these are the X-efficiency version of the efficient-structure hypotheses (ESX) and the scale-efficiency version of the efficient-structure hypotheses (ESS). Under the former, firms with superior management or production technologies have lower costs and higher profits than firms lacking these skills. These firms are also assumed to gain large market shares, which may result in high levels of concentration. The latter states that some firms produce at more efficient levels than others which result in lower unit costs and higher profit levels. Again, such firms are assumed to have large market shares resulting in high concentration ratios. However, under both efficient-structure hypotheses, the positive profit-structure relationship is spurious, rather than of direct origin, with efficiency driving both profits and market structure. The analysis in the following chapter aims to explore the theoretical concepts of efficiency, and emphasises the conceptual aspects of (X-efficiency), economies of scale, and economies of scope. The chapter explains why the concept of efficiency is important in understanding the performance of banks.

Chapter Five: Efficiency, Economies of Scale, and Economies of Scope in Banking

5.1: Introduction:

"How banks will be affected by the increased competitive pressure depends in part on how efficiently they are run". Mester (1996, p.5)

The previous chapter has discussed the theoretical concepts of market structure, conduct and performance. Industrial economic theory suggests that there is a causal link between market structure and bank conduct and performance. More specifically it has been argued that, in concentrated markets, banks may earn collusive profits (Weiss, 1974; Heggestad and Mingo, 1977; Spellman, 1981; Rhoades, 1982). A substantial literature has burgeoned aimed at testing the theoretical SCP (structure-conduct-performance) relationship. It has been argued, however, that this literature contains too many inconsistencies and contradictions to provide a satisfactory description of the SCP relationship in banking (Gilbert, 1984; Osborne and Wendel, 1983). Contemporary approaches to the explanation of the link between market structure and performance have emphasized an alternative 'efficient structure' hypothesis. This postulates that an industry's structure arises as a result of superior operating efficiency by particular firms (Demzetz, 1973). As a result, a positive relationship between bank profits and structure can be attributed to gains made in market share by more efficient banks. The level of efficiency of a firm and its dynamics are therefore, important elements in understanding structure-performance relationships. Various studies undertaken on the US banking industry (Brozen, 1982; Smirlock, 1985; Evanoff and Fortier, 1988) suggest that firm-specific efficiency seems to be the dominant variable explaining bank profitability. Therefore, this chapter presents a theoretical overview on efficiency as this will support our empirical framework for analysing the market-power and efficient-structure hypotheses in GCC banking. The chapter explores the theoretical concepts of efficiency, and emphasises the conceptual aspects of (X-efficiency), economies of scale, and economies of scope. The chapter explains why the concept of efficiency is important in understanding the performance of banks. Section 5.2 discusses the reasons for the focus of attention on efficiency in the banking industry. Section 5.3 provides a definition of efficiency in general and section 5.4 discusses specific definitions of economies of scale, economies of scope and X-efficiency. Section 5.5 provides a brief survey of the empirical literature on X-efficiency and cost economies in banking. Section 5.6 discusses methods and techniques used to evaluate bank efficiency. Section 5.7 discusses the practical problems usually encountered when measuring financial institutions' efficiency and section 5.8 provides some conclusions.

5.2 Reasons for Examining Efficiency in the Banking Industry

The question that might be asked is why the concept of efficiency is important in understanding the performance of banks? The following may provide an answer to this question:

> For financial institutions, efficiency would imply improved profitability, greater amounts of funds intermediated, better prices and service quality for consumers, and greater safety and soundness if some of the efficiency savings are applied towards improving capital buffers that absorb risk. Of course, the opposite is the case if structural changes result in 'less efficient intermediaries, with the additional danger of taxpayer-financed bailouts if substantial losses are sustained (Berger et al. 1993, p. 221)

According to Kolari and Zardkoohi (1987), the study of the economic efficiency of the banking industry is important for three reasons: Firstly, an improvement in cost efficiency means achieving higher profits and increasing the chance of survival in deregulated and competitive markets. Secondly, customers are interested in knowing the prices and the quality of bank services as well as new services that banks could offer. Thirdly, an awareness of economic efficiency is important to help policy makers formulate policies that affect the banking industry as a whole.

Berger and Mester (1997, p. 14), note that

> for the purposes of public policy research and managerial performance, once the conceptual and measurement issues have been controlled for, it is important to explain the remaining differences in efficiency across banks,:. In a perfectly competitive or contestable market, efficient firms should drive out inefficient ones, so that there would be only a residual level of inefficiency across firms remaining at a given time. Therefore, an empirical finding of substantial inefficiencies raises the question as to whether inefficiencies will continue in a deregulated and more competitive context,

Moreover, for antitrust and mergers analysis it is important to know: 1- the effects of market concentration and past mergers on banking efficiency; 2- whether one type of organisational form is more efficient than another; and 3- whether inefficiency manifests itself in the form of poor production decisions, risk management decisions, or both (Akhavein, et al, 1998). From a public policy perspective, concern about the economic efficiency of banks is also rationalised on the grounds that the efficiency of individual banks may affect 'the stability of the banking industry and, in turn, the effectiveness of the whole monetary system' Kolari et al, (1987, p. 45). Furthermore, Berger and Humphrey (1997, p.175), observe that: The information obtained from the evaluation of bank performance can be used:

> To inform government policy by assessing the effects of deregulation, mergers or market structure on efficiency.
> To address research issues by describing the efficiency of an industry, ranking its firms, or checking how measured efficiency may be related to the different efficiency techniques employed; or
> To improve managerial performance by identifying 'best practices' and 'worst practices' associated with high and low measured efficiency, respectively, and encouraging the former practices while discouraging the latter.

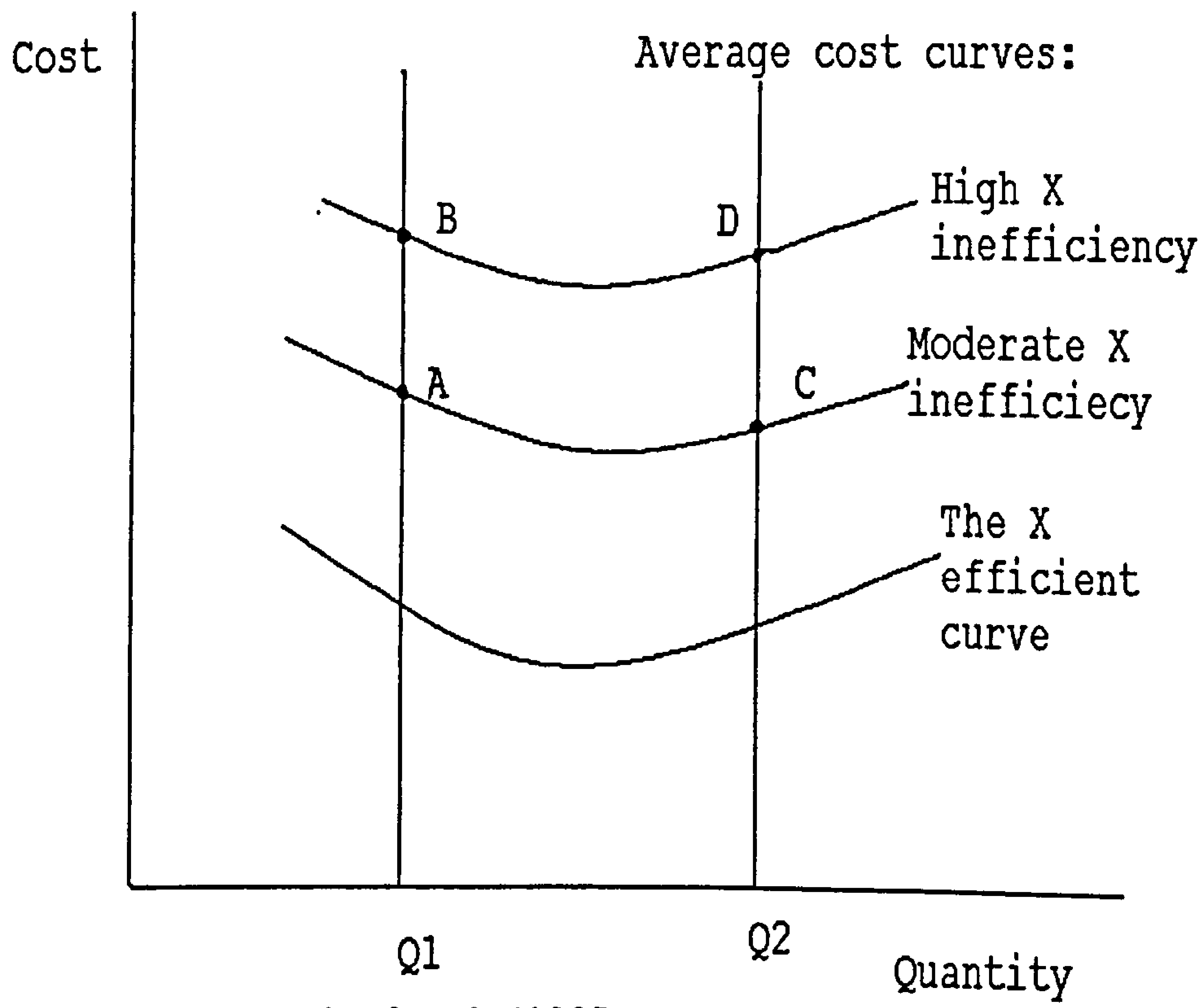
5.3 Definition of Efficiency:

In most of the empirical research on the topic of bank efficiency, firms are assumed to have a common production structure; what makes them different from each other is an invisible input, called "managerial ability" (Sungopta, 2000). To measure it, an efficient production frontier is estimated, from which, it is possible to infer the level of costs or profits that each firm could realize if it had the managerial ability of the best firm of the sample; in fact, the benchmark is the best practice firm, not the one that achieves in theory the best results. Hence, recent research has focused on this concept of efficiency otherwise known as "X-efficiency".

Generally speaking, productive efficiency has two components (Lovell, et al. 2000); *Technical efficiency* relates to the extent to which firms maximize outputs given inputs, or equivalently the extent to which they minimize inputs given a level of output. *Allocative efficiency* relates to the optimal combination of inputs and outputs given their prices. Another source of efficiency is *technical change* where efficiency is said to result when the maximum efficient output that can be produced from any given set of inputs increases over time due to such factors as experience, increased knowledge, new innovations, and better production techniques Battese, et al, (1998). That is; technical change arises when a given set of inputs are capable of producing a larger maximum output. Revell (1983) has argued that technical change in banking has mainly occurred on two fronts; (1) the development of electronic funds transfer systems and (2) advances in back-room computer operations. He argues that the early computer technologies were highly involved record-keepers of customer accounts. Furthermore, the effect of technological changes, i.e, the cheapening of computers and the development of new information networks, has led to a sharp reduction in the average cost of electronic information processing. Advances in new technologies, have also reduced the entry barriers to the financial marketplace. Shepherd (1985) pinpoints two categories: *Internal efficiency* and *Allocative efficiency*. Internal efficiency refers to effective management within the firm itself; for example, the ways in which management inspires the staff, controls costs and keeps operations lean. However, when a firm is large and profit flows are also large, management tends to become less than fully effective. Such shortcomings in management are known as "X-inefficiencies" and can be attributed to the excess costs divided by actual costs. The X-efficient and X-inefficient cost curves can be illustrated, as in Figure 5.1. The excess costs are shown by points A and B for output Q1 and C and D for output Q2. *Allocative efficiency*, on the other hand, refers to a set of general equilibrium conditions which occur when output is at the level where marginal cost equals price for each product of each firm. In the long run, in the absence of allocative inefficiency, price will also equal the minimum possible level of average cost. In this context, the consumers' surplus is maximised which means that consumers' surplus is achieved when consumers receive more value for consuming goods than the money value they must pay to the seller. In other words the lower the price, the larger the consumers' surplus and *vice versa*. However, A fundamental decision in measuring the efficiency of financial institutions is which concept of efficiency to use. The terminology used to define efficiency in economics is varied, and can give rise to confusion, Goddard,et.al (2001,p.105).

> Productive efficiency is defined as the sum of two components: the purely technical or physical component, and the economic component. The purely technical or physical component refers to the ability to avoid waste by producing as much output as input usage allows, or by using as little input as output production requires. The analysis of technical efficiency can have an output-augmenting orientation or an input-conserving orientation. Economic efficiency, however, refers to the ability to select the optimal set of inputs to obtain a given level of output in the light of prevailing input prices. It is important to distinguish productive efficiency from an alternative efficiency concept used by economists: allocative efficiency. Allocative efficiency refers to the social welfare gains that accrue if all production takes place under competitive market conditions, in which price is equal to marginal cost in long-run equilibrium. Allocative inefficiency arises when firms exploit monopoly power in order to restrict output, and to set price above marginal cost, creating welfare loss from a social perspective Goddard et.al (2001,p.106).

Figure 5.1 X-efficient and X-inefficient Cost Curves



Source:Shepherd (1985,P.19)

5.4 Cost Efficiency in Banking: Defining Economies of Scale, Economies of Scope and X-efficiency:

5.4-1: Introduction

Interest in the subject of scale and scope economies in banking has been stimulated in recent years by the wave of mergers and acquisitions that have occured in Europe, the USA and elsewhere. One of the reasons commonly put forward to justify merger and acquisition activity relates to the potential gains that may result through larger size (economies of scale) and the ability to diversify (economies of scope) (Berger, et al, 1998). Optimal firm size and product mix are also important issues for an industry undergoing a restructuring process. Technological change may also have important implications for the nature of scale and scope economies. For example, the application of new technologies often entails heavy expenditure which becomes profitable only if a sufficient number of transactions take place subsequently (Mester, et al 1997).

The general meaning of efficiency has been discussed in the previous section however, in the following section we will illustrate in more detail the specific meanings of the three concepts: scale economies, scope economies and X-efficiency.

5.4.2 Economies of Scale:

> Economies of scale exist if, over a given range of output, costs per unit decline as output increases. Increases in costs per unit correspond to decreasing returns to scale. It is of interest to investigate whether there is potential for average cost savings if a firm were to produce at a higher or lower scale than at present. In order to produce at the lowest attainable average cost, a firm must produce at the point or points of constant returns to scale, where any change in output results in an equiproportionate change in costs. Molyneux, et al.(2001 p.109)

Economies of scale or alternatively the returns to scale, refers to changes in output as factors of production change, Humphrey, et al, (1993). Economies of scale are based on the shape of the average cost curve, which shows average costs at each level of output (Molyneux et al.1996). Generally, economies of scale are achievable only in the long run, Altunbas et al, (1996). In other words, scale economies occur when the average cost of production in the long run declines as output increases. In order to isolate the effect of scale on costs, all other factors (such as technological improvements) have to be held constant. Costs can be divided into short-run costs and long-run cost. With short-run costs covering a period of time during which some factors of production are fixed whereas the long-run costs cover a period long enough to permit change in all factors of production. Therefore, in the long-run, all factors of production become variable (Molyneux, et al. 1996).The concept of long-run average costs is illustrated in Figure.5.2 below.

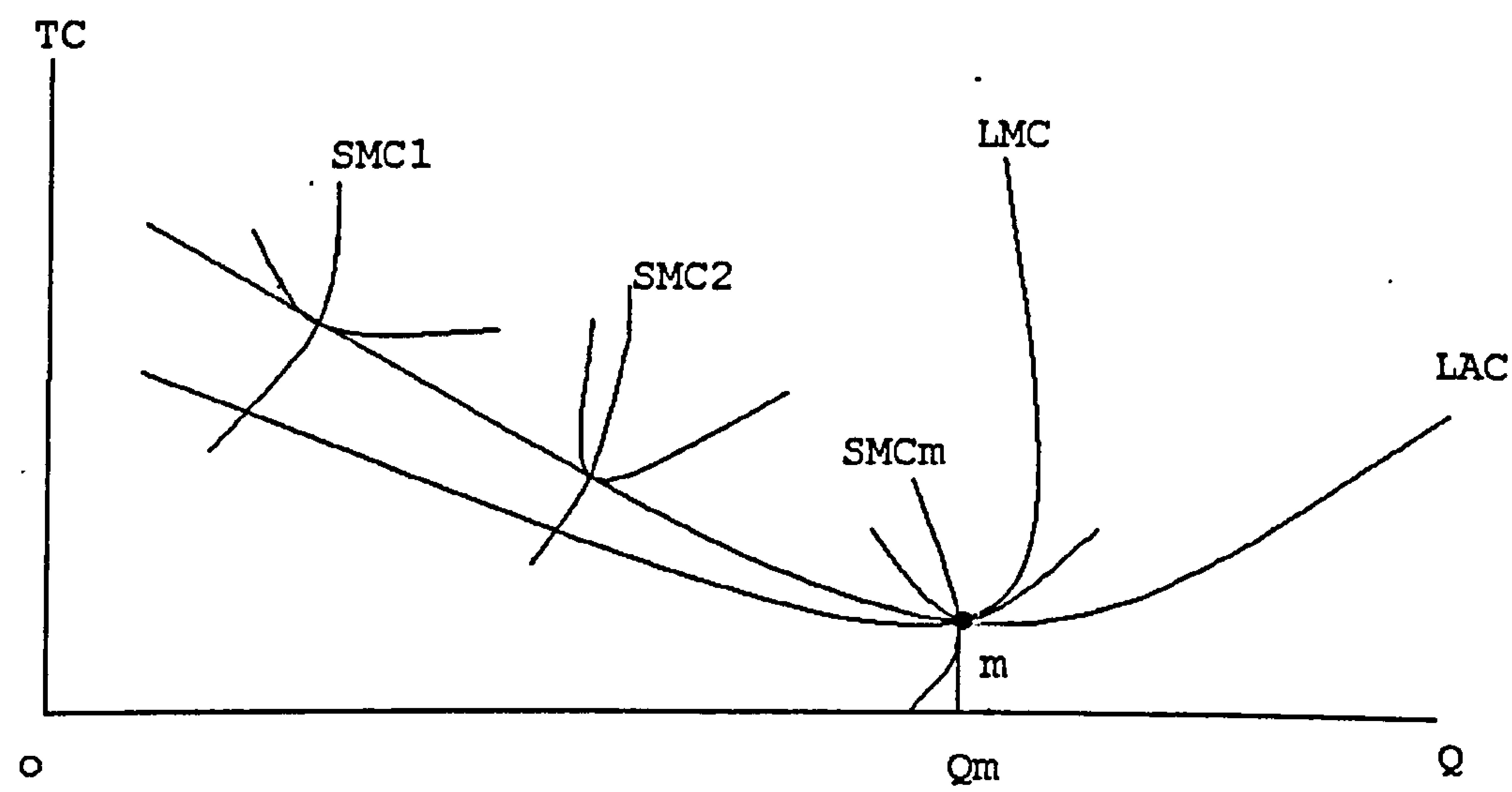


Figure 5.2: Economies of scale and the Average and Marginal Cost Curves Shapes. (Adopted from Koutsoyiannis, 1979, p.81)

The figure shows a series of short-run marginal costs curves, (SMC), long-run marginal cost curve (LMC) and long-run average cost curve (LAC). The average cost is simply the average cost per unit of output, whereas the marginal cost is the change in total costs resulting from producing an extra unit of output. The long-run average cost curve is derived from the short-run cost curves, where each point of the LAC corresponds to a point on the short-run cost curve tangential to the LAC. It can be seen from the figure that the

LAC curve declines to output level Q_m at the point m where the LMC intersects the LAC. Beyond point m, the LAC begins to rise and any increase in output will increase costs. Thus, at point m, $SAC_m = SMC_m = LAC = LMC$.

The U shape of the LAC reflects the law of returns to scale or, alternatively economies of scale in which, accordingly, the unit costs of production decrease as firm size increases. Economies of scale exist only up to a certain firm size also known as optimum firm size, beyond which diseconomies of scale exist. One of the several types of criticisms may be levelled against most of the recent scale economy literature as noted by Berger et al. (94-p.8) is that:

> Most studies measure only the scale economy effects of marginal changes in output near the point of evaluation. The commonly used definition of scale *economies* is the ratio of marginal cost to average cost, taken along a ray that holds output mix constant. Scale *efficiencies*, in contrast, take into account the full difference in ray average costs between the point of evaluation and the scale-efficient point (the bottom of the U if the average cost function is U-shaped), which may be quite a distance away from the point of evaluation.

However, referring back to the LAC curve, where LAC falls, the firms are not working to full capacity; where LAC rises, the firm's resources are overworked; only at the minimum point m are the (short-run) firm's resources optimally employed, Berger, (1994). Economies of scale are measured in terms of percentage changes in output. As a firm expands its scale of operations, economies of scale occur if the firm is able to reduce costs per unit of output, if all other factors are held constant. Economies of scale or increasing returns to scale arise, if proportionally, the level of output increases more than the increase in input factors; decreasing returns to scale occur if output increases less than proportionally with the increase in input factors; and constant returns to scale occur if output increases by the same proportion as the input. Given the following total cost function, TC=f (Q), Where TC is total cost and Q reflects output, then the average costs can be derived by $ATC = f(Q) / Q$ and marginal costs then can be shown as $MC = dTC / dQ$ which is simply derived by multiplying the elasticity formula by the TC / Q ratio. The long-run marginal cost curve of the firm will have a negative slope and, by definition, there will be economies of scale which are calculated as follows:

$$SE = ATC/MC = f(Q)/\, Q(dTC/dQ) \qquad 5.1$$

If SE > =1, we have increasing returns to scale; if SE = 1, the returns to scale are constant; and if SE is less than 1, decreasing return to scale prevail. The derivative of average cost with respect to output is negative, zero or positive, respectively. Economies of scale in banking are defined in terms of individual bank's production process. The cost of producing bank output (services) is dependant on the production process used by the individual bank. Thus, based on equation 5.1 above, each bank's output (Q) is a function of the productive factors (inputs), labour (L), managerial skills (M), natural resources (N) and real capital, in the form:

$$Q = f(L, M, N, C)$$

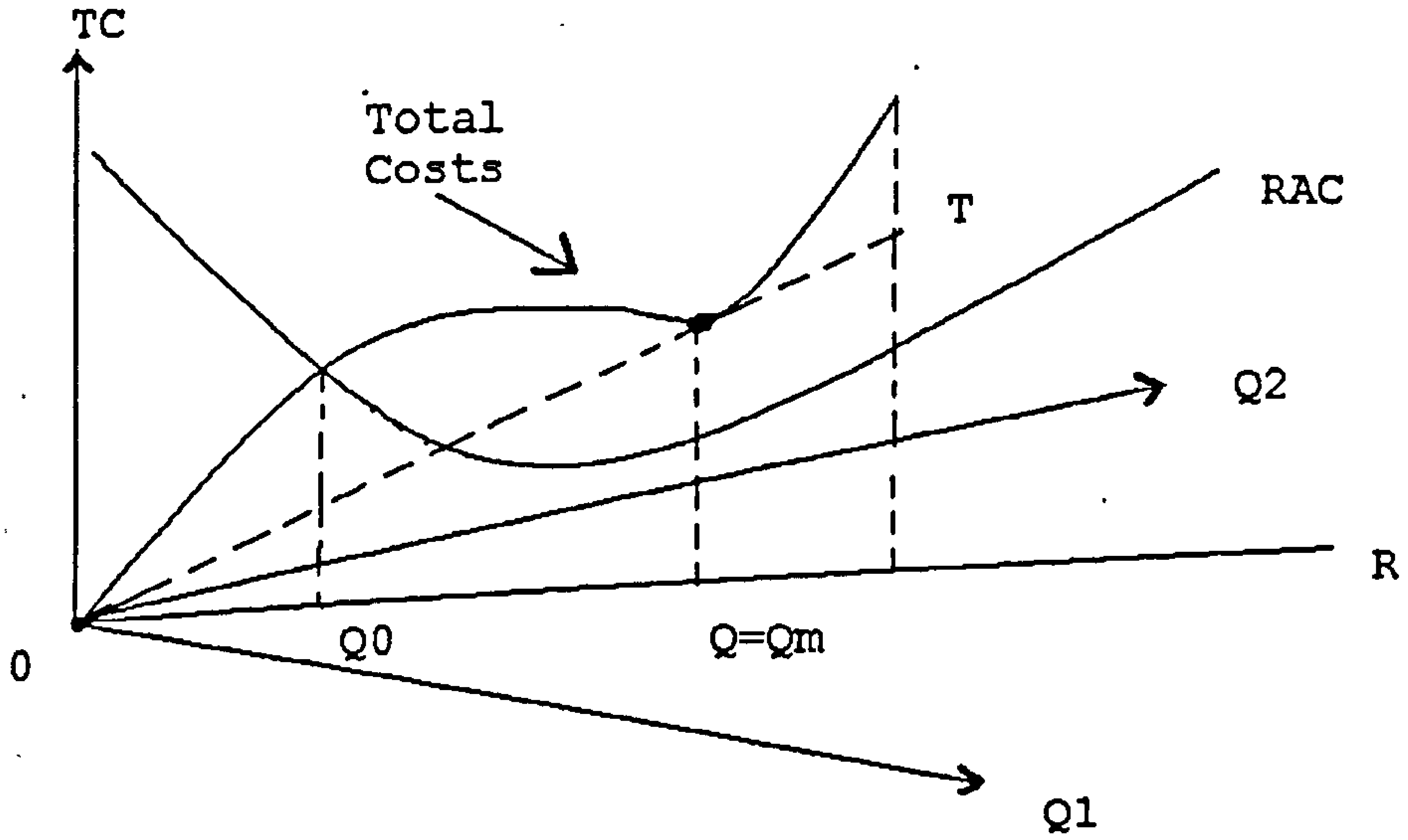
Economies of scale in banking arise when doubling the bank outputs requires less than the doubling of every productive factor.

While the concept of economies of scale in a single product firm applies to the behaviour of total costs as output increases (and economies of scale exist if total costs increase less proportionately than output), for multi-product firms the concept of average cost is more complicated (Panzar et al, (1988). Average cost is defined only for single-product firms, unless all products are aggregated into a single index (Sinkey 1992). Thus, in order to measure scale economies for financial services firms, it is necessary to refer to another notion of cost, Ray Average Cost (RAC) which was introduced by Baumol et al. in 1982. Ray Average Cost is an extension of the concept of single product scale economies and imply the behaviour of cost as the production levels of a given bundle, change proportionately (Altunbas, et al, 2000). It requires that firms expand all outputs at the same rate while mixing inputs optimally. In this case, economies of scale occur if the RAC of composite output decreases.

> For a single-product firm, the concept of scale economies (or returns to scale) refers to the rate at which output changes as all factor quantities are varied. Specifically, economies of scale are measured by the ratio of the proportionate change in output to a given proportionate change in all inputs. When a firm increases its output, there are economies of scale if the average cost per unit of output falls. Economies of scale can therefore be defined in terms of either the production function or the corresponding cost function. However, the multi-product nature of banks makes the analysis and interpretation of returns to scale more complex. When a firm is multi-product, global scale economies are defined relative to a proportionate increase in the production of all outputs, the productive mix being held constant. Economies of scale can be measured by employing Baumol's (1982) concept of ray average cost (RAC). Molyneux et al (2001, p.110).

As pointed out by Baumol et .al (1988), the term RAC refers to the geometry of the construct and it is essential that an arbitrary unit output along the ray is chosen. In this way, the average cost of a composite good can be defined as: RAC = $C(ty^0)/t$, where y^0 is the unit bundle for a particular mixture of outputs (the arbitrary bundle assigned the value 1) and t is the number of units in the bundle $y=ty$ Figure 5.3 illustrates the concept of RAC for a multi-product firm in a three-dimensional diagram (Baumol et al. 1988). The ray average cost of producing the output vector $Q \neq 0$, denoted RAC (Q) is as $TC(Q) / \sum_{i=1}^{N} Qi$. Ray Average Cost is said to be increasing (decreasing) at Q if RAC (tQ) is an increasing (decreasing) function of a scalar t, at t=1. Ray average cost is said to be minimised at Q if RAC (Q)<RAC(tQ), for all positive $t \neq 1$. It is important to note that the unit output along the ray is arbitrary. Geometrically, the concept of RAC is illustrated in Figure 5.3, which also shows the behaviour of total cost (TC) along the ray OR.

Figure 5.3 Economies of scale for multiproduct firms: the concept of RAC.



Source: Adapted from Baumol et al. (1988, p.50)

It is possible to see that RAC and TC intersect at the unit output level Q^0 and RAC reaches its minimum at the output $Q = Q^m$ at which the ray OT is tangent to the total cost surface in the hyperplane erected on OR. Therefore, if e is the elasticity of RAC(tq) with respect to t at the output point Q, then, at Q scale economies over the entire product set (SCALE) = 1/(1+e). It follows that it is possible to interpret SCALE as a measure of the percentage change of decline or increase of RAC with respect to output. Thus, returns to scale at the output point Q are increasing, decreasing or locally constant (SCALE > 1, SCALE < 1, SCALE = 1, respectively). Economies of scale can also relate to overall and product-specific scale economies whilst holding the other factors constant. Overall economies of scale relate to cost savings resulting from an increase in all of a firm's output and can be detected by declining average costs as the firm increases production while keeping the product mix constant. If average costs rise with output, diseconomies of scale are present. More specifically, economies of scale are measured by the ratio of the percentage change in costs relative to the percentage change in output: when the scale economies ratio is less than one, scale economies exist, as average cost is falling. When the ratio is equal to one, no scale economies exist, as average cost is constant and, finally, when the ratio is greater than one, decreasing returns to scale exist as average cost is rising. On the other hand, product-specific economies of scale refer to economies that rise from an increase in the production of individual products (Willig, et al 1988). For instance, they can be measured to determine whether the output of certain products should be increased, although it is difficult to change the output of one product while holding constant the output of other products.

In the banking context, Freixas and Rochet (1997) argue that the reason why borrowers do not engage in asset transformation is because there are economies in the intermediation process. These economies are brought about by the transaction costs associated with linking savers to borrowers. These include monetary transaction costs as well as search, monitoring and auditing costs. Moreover, if associated with a rational risk spreading, scale economies may result in lower loan rates, and may diminish the problems of information asymmetries and moral hazard with lenders (i.e. the so-called scale economies in the monitoring activity). However, scale economies do not continue indefinitely with the expansion of size because as the scale operations increase, there is a point where firm do not usually produce a level of output below a 'minimum efficient scale' (i.e., at point m in figure 5.3 above) because according to Shepherd (1985), this raises costs and squeezes profits. Kollari and Zardkoohi (1987) point out that scale economies do not continue indefinitely with the expansion of size, because, as the scale of operation increases, there comes appoint at which limitations to efficient management set in, and, long-run marginal costs tend to rise. This fact explains why many firms may find it necessary to decentralize operations in order to avoid the costs of organisational rigidity that largeness entails. Therefore, the firm (bank) may decide to decentralize functions by dividing its operations into separate branches to the point at which no cost gains are available from large-scale operations. Finally, it is useful to mention that it is possible to distinguish between branch and firm level scale economies. In particular, a number of studies separate scale economies at the single branch office or plant level from those for all offices together [Benston et al.(1982) and Humphrey(1985)]. The importance of these approaches, comes from the fact that banks can expand their operations or output by either increasing services to existing branch networks in a given market, or adding new branches, which attract new accounts and deposits, in new market areas [Molyneux et al. (1996)].

5.4.3 Potential Sources of Cost Economies in Banking:

Various authors (such as Scherer, 1980; Patten, 1971; and Bell and Murphy, 1968) have argued that there are many sources of cost reductions brought about through the expansion of banks output. Firstly, economies of scale are the effect of a more efficient use of some or all inputs with an increasing volume of output. Firms may have excess capacity of some inputs so that an increase in output cannot require a proportionate increase in all inputs over the entire production period. Specifically, some inputs might be, as a whole or partly, indivisible by output. The existence of indivisibility may help reduce costs per unit of output as the output level is increased. Secondly, increased size could allow a more efficient organization of resources. For instance, in small banks, where volume can not permit specialization, the same machines and workers must often be employed for a variety of tasks, say, tellers may also be assigned to sorting cheques and auditing accounts part-time. Large banks, however, may divide tasks so that employees and machines can be used in one facet of their operation. Thus, the productivity between both capital and labour arises with the scale of operations. Specialisation could also result in a more economical use of materials purchased by the bank. Thirdly, some types of technological innovations, such as computers, may be economically more feasible for large banks. Thus, according to asset size, banks could employ different compositions of inputs with varying efficiencies. Fourthly, Kolari and Zardkoohi (1987) state that the law of large numbers accounts for certain scale economies. Large banks do not need to hold cash balances in the same proportion as smaller banks. Since holding cash balances is costly, larger banks can lower cost of holding cash balances than their smaller counterparts, to the extent that the law of large numbers smooth transactions demands. Moreover, larger banks are seemingly better able to diversify their assets and reduce risk as well as to offer various services to customers. In more details, Kolari and Zardkoohi (1987) divide the causes of increasing returns to scale into the following four categories: I) indivisibility, or unavoidable excess capacity of some inputs: for example, the cost of inventing a new technique is indivisible with respect to the level of output produced by using the technique. That is, a bank may have excess capacity of some inputs for most of the year, so that an increase in all outputs may not require a proportionate increase in all inputs for the entire year; ii) the inverse relationship between the productivity of some inputs and their cost per unit of productivity: that is, many inputs cost less when they are purchased on a larger scale; iii) specialisation of the production process: greater specialisation and reduction in per unit cost is possible with increases in size; and iv) a statistical property of large numbers: as a firm expands sales, the appropriate quantity of inventory to be maintained need not to increased proportionately, because the demand of goods is spread across a greater number of customers. In this sense, larger banks can incur lower costs of holding cash balances than do small banks. Benston (1972) indicated that the sources of economies of scale are characteristic to the use of lower skilled labour, use of fewer processing and administrative officers, and shifts in new technology available to larger scale operations. Bell and Murphy (1968) examined the sources of economies of scale in the US banking industry, and suggested that for the processing of chequeing accounts economies of scale arise partly from the use of different kinds of equipment and party from the specialization of labour and machines. To summarise, potential sources of cost economies in banking are usually based on the following considerations:

- Information Technology [Revell (1984); Humphrey (1985); Hunter and Timme (1986); Evanoff et al. (1990); Landi (1990)]. As the firm's size increases, IT allows for a greater efficiency because of: imperfect divisibility of investments; ii) high professional skills necessary to integrate complex technologies; iii) a more flexible production process which may reduce scale barriers; iv) a more general effect on efficiency associated with technological innovation.
- Specialised labour [Bell and Murphy (1968); Clark (1988); Muldur (1991)]. A larger bank in terms of size is able to employ more technical and managerial labour, thereby achieving a more efficient organisational form, while favouring expansion into innovative business.
- Information [Arrow (1965); Williamson (1975); Berger et al. (1987); Shaffer (1991); Humphrey (1991)]. Financial intermediaries have a fundamental role in mitigating the asymmetric distribution of information between borrowers and lenders. Therefore, as they grow in size and intensify their diversification, they can lower delegation costs.
- Strategic and organisational flexibility [Mudlur (1990); Berger et al. (1987); Gilbert and Steinherr (1989); Litan (1987); Berger et al. (1998)]. The consequences of increased size may be: I) improved flexibility and greater cost minimisation; ii)

fixed costs can be managed more efficiently; iii) the diversification of assets and liabilities can reduce income variability. On the other hand, drawbacks which are likely to be incurred as the firm grows larger include an increase in organisational complexity and wider diversification may actually aggravate risk since it may result in an entry into a business area in which the financial institution has no experience.

- Demand side benefits [Herring and Santomero (1990)]. If consumers have a "package-acquisition behaviour", demand side benefits may favour output diversification, thereby benefiting consumers through cost savings or in terms of the perception of a quality advantage from entertaining a global relationship.

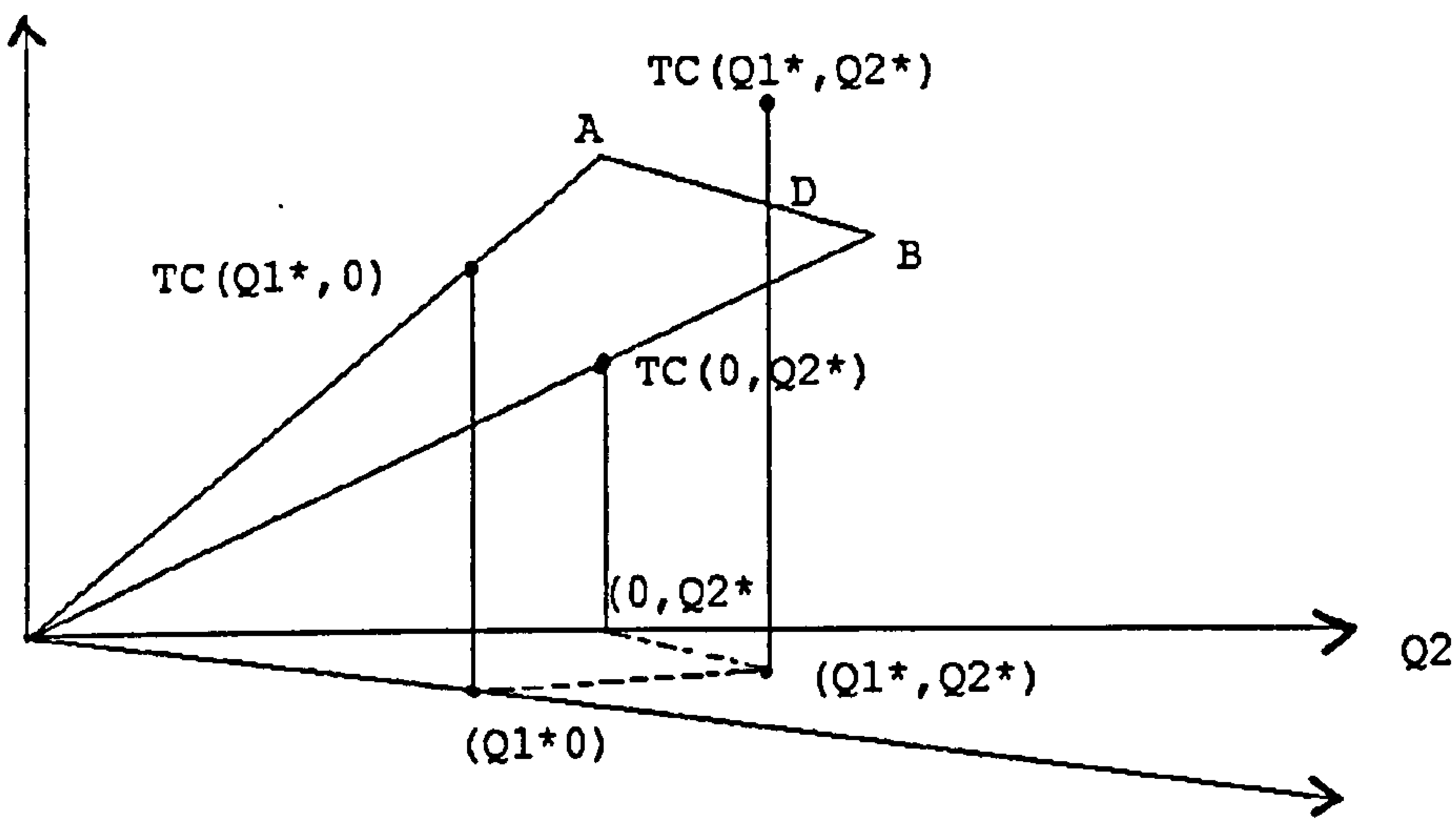
5.4.4 Scope Efficiency:

Economies of scope generate cost savings from delivering multiple goods or services jointly through the same organisation rather than through specialized providers. These potential cost savings are to be differentiated from economies of scale, which refers to lower costs per unit of a single good or service as total output of that good or service rises.

> Economies of scope occur when it is more economical to produce two or more products jointly in a single production unit than to produce the products in separate specializing firms. Scope economies can arise from two sources: 1) the spreading of fixed costs over an expanded product mix; and 2) cost complementarities in producing the different products. Spreading fixed costs occurs, for example, when the fixed capital of a bank branch is more fully utilized by issuing many types of deposits to local residents than building separate offices to fulfil the separate demands for transactions account, savings accounts, consumer loans, and trust services. Such economical spreading of costs occurs to the extent that the production of different types of services require much the same type of computer, accounting system and other fixed inputs of a branch and there is insufficient local demand to justify a full specialized branch for each of the services. In contrast, cost complementarities between deposits and loans occur, for example, when the payment flow information developed in providing deposit services is used to reduce the costs of acquiring credit information about and monitoring loans to the same customers.
>
> Berger et al. (1994, p.10).

Two groups of potential economies of scope should be characterised. Firms can realise internal scope economies through joint production and marketing, whilst consumers can realise external scope economies through joint consumption. On the production side, scope economies seem to be available where facilities devoted to one objective or to serving a single market are not fully utilised and are capable of being deployed simultaneously to serve other targets and other markets. On the consumption side, whereas scope economies exist where providing multiple products or services at a single location or through a single firm saves consumers the time and expense of searching for and purchasing these items through specialised providers. Willig et al. (1988) states that there are two fundamental reasons to study multi-product firms. Firstly, casual empiricism indicates that there are virtually no single product firms. Secondly, the technological characteristic which is named economies of scope may force firms industry equilibrium to produce more than one good. Panzar, Baumol and Willig (1988) suggested that economies of scope are said to exist if the cost of producing outputs jointly is less than the total cost of producing the same outputs separately. That is, considering two outputs, Q_1 and Q_2, and their separate cost function, TC (Q_1) and TC (Q_2). If the joint cost of producing the two outputs is expressed by TC (Q_1, Q_2) then economies of scope are present if :TC (Q_1, Q_2) < TC (Q_1) + TC (Q_2). There are said to be diseconomies of scope if the inequality is reversed. The concept of scope economies can be explained geometrically in Figure 5.4. The figure illustrates that the scale economies concept involves a comparison of TC (Q_1,0) + TC (0,Q_2), the sum of the heights of the cost surface over the corresponding points on the axes, with TC (Q_1, Q_2), the height of the cost surface at point (Q_1, Q_2), which is the vector sum of (Q_1,0) and (0,Q_2). If TC (Q_1, Q_2) lies below the hyperplane OAB which goes through the origin and points TC (Q_1,0) and TC (0,Q_2), then the condition for scope economies is achieved. Thus, in Figure, 5.6 the height of D, the point on plane OAB above (Q_1, Q_2), must equal TC (Q_1,0) + TC (0,Q_2), since the hyperplane is defined by TC = $aQ_1 + bQ_2$ for some constants a, b. Hence TC (Q_1,0) = aQ_1 and TC (0,Q_2) = bQ_2, and TC (Q_1, Q_2), must be less than $aQ_1 + bQ_2$ for scope economies to hold.

Figure 5.4: The Concept of Economies of Scope



Source: Adapted from Baumol et al.(1988,p.72).

According to Panzar Baumol and Willig (1988 p.73) "it is clear that the presence of economies of scope will give rise to multi-product firms" and also "with economies of scope, joint production of two goods by one enterprise is less costly than the combined costs of production of two specially firms" (Willig 1979, p.346). The degree of economies of scope can be measured as follows:

$$SC = \frac{TC(Q_1) + TC(Q_2) - TC(Q_1, Q_2)}{TC(Q_1, Q_2)}$$

Baumol, Panzar, and Willig (1988, p. 72) indicated that:

> When the firm produces many products, even where ray average costs decline everywhere, the absence of economies of scope may prevent natural monopoly. For example if there are no economies of scope, a multi-product institution can be split up into several specialised firms without any increase in cost. Economies of scope, and the concepts related to it, play an important role in the analysis of the banking firm given its multi-product industry structure.

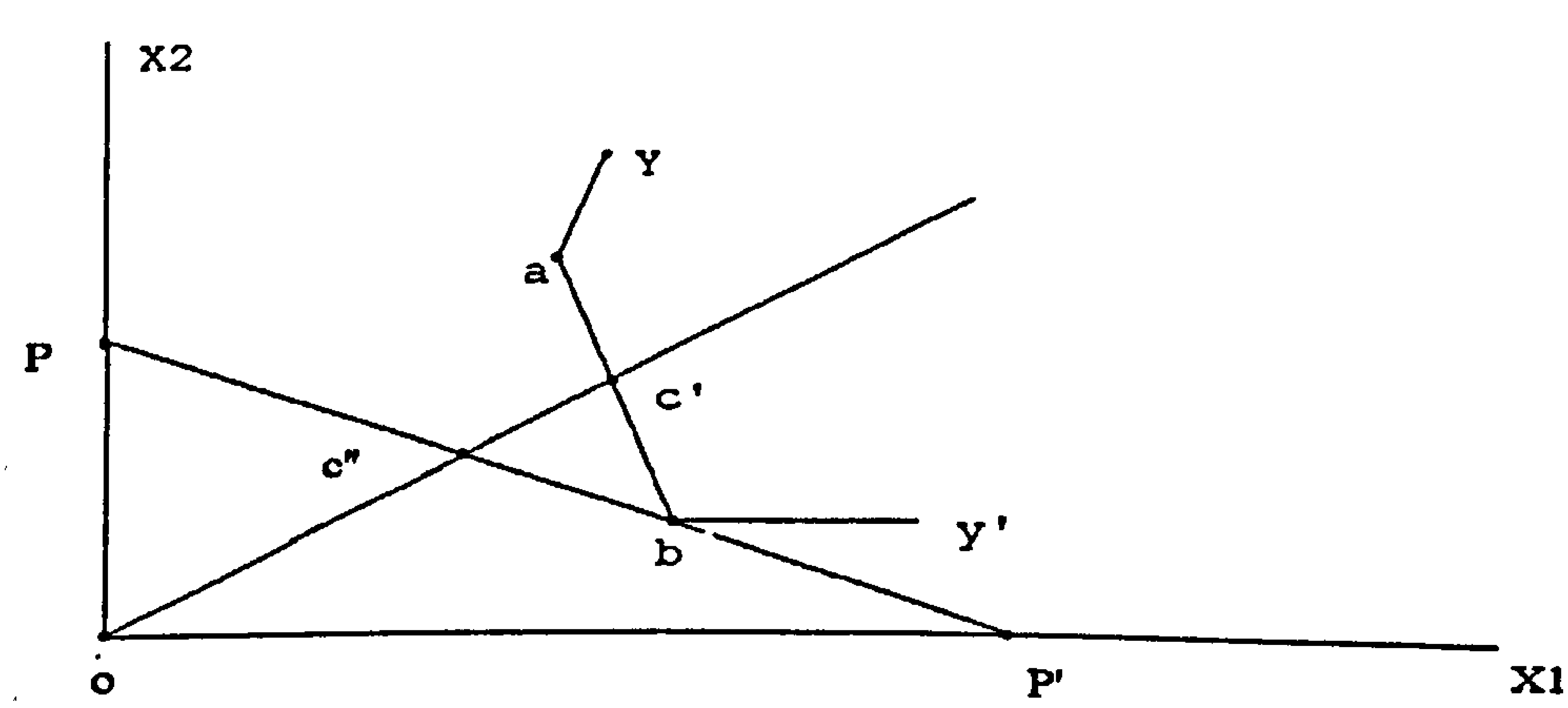
5.4.5 X-efficiency:

This concept is based upon the work of Farell (1957), and Leibenstein (1966) and indicates the effectiveness of the decisions and activities of management (Kumbhakar, et al, 2000). In general X-efficiency, relative efficiency and managerial efficiency, are all interchangeable definitions describing the differences between actual and minimum costs, reflecting differences in managerial ability to control costs (or maximise revenues) (Carmello, et al, 1999). A deficiency of external or market pressures from the firm's environment may give rise to such inefficiency. It is important to note that X-inefficiency appears to be greater than the cost effects of the choices of scale and scope of production, in this context, some US banking studies have found that X-inefficiencies were more significant in explaining cost differences between banks than scale or scope economies.

Bauer et al (1993, p. 286) mentioned that

> "Until recently, bank cost studies focused almost exclusively on scale and product mix (scope) economies. While this has been useful, a potentially more important dimension of bank cost economies appears to be differences in efficiency. Recent studies have estimated inefficiencies of 20 percent or more of costs, even for banks of similar scale and product mix. These inefficiencies appear to dominate scale and product mix effects, which usually average 5 percent or less".

Figure 5.5 Overall, Technical and Allocative Efficiency



Source: Adopted from Aly et.al. (1990, p.212).

Recent academic literature, such as Berger et al. (1993, 1995), Berger and Mester (1997), also have drawn attention to this important source of inefficiency: Berger et.al. (1993, page 222) note that:

> While scale and scope efficiencies have been extensively studied, primarily in the context of US financial institutions, relatively little attention has been paid to measuring what appears to be a much more important source of efficiency differences – X-inefficiencies, or deviations from the efficient frontier.

The term X-efficiency, as we have discussed earlier, covers all the technical and allocative efficiencies of individual firms which are distinguished from scale and scope economies (Mester, 1996). The essential ideas about allocative and technical efficiencies are illustrated in Figure 5.5. In this figure, it is assumed that a firm uses two inputs, X1 and X2 to produce output y. pp' is the isocost line whereas y and y' represent the production frontier. The production frontier is a set of all combinations of inputs which can produce the same level of output and any reduction of at least one input may cause output to fall. Firms a, b and c each produce a given level of output. Efficient operation in production (cost minimization) occurs at point b. All costs minimising firms are labelled as being overall efficient. In terms of Figure 5.5 the overall efficiency for firm c is measured by the ratio of distances Oc"/Oc which represents the potential of efficient input to actual input usage. The extent of technical efficiency of firm c is measured by the ratio of distances Oc'/Oc. By reducing the input quantities used by firm c by this amount, the firm could move to point c' and would be considered efficient. For firm c allocative efficiency is given by the ratio of distances Oc"/Oc'.

As mentioned earlier, allocative inefficiency arises from choosing the wrong input combinations given input prices, as opposed to technical inefficiency, which is a proportionate overuse of all inputs.

Berger and Mester (1997, p 3) emphasized the importance of cost, standard profit and alternative profit efficiency concepts in case of measuring financial institution X-efficiency. They stated that:

> A fundamental decision in measuring financial institution efficiency is which concepts to use. This of course, depends on the question being addressed. But we discuss here what we consider to be the three most important economic efficiency concepts – cost, standard profit, and alternative profit efficiencies. We believe these concepts have the best economic foundation for analysing the efficiency of financial institutions because they are based on economic optimisation in reaction to market prices and competition, rather than being based solely on the use of technology.

A major theme in recent work on efficiency is the close relationship between the concepts of efficiency and productivity. While efficiency has been discussed in the previous sections, firm productivity refers to total factor productivity, a measure incorporating all production factors (Battese et al, 1998). According to Grosskopf (1993), productivity growth is the net change in output due to change in efficiency and technical change, where efficiency is understood to be the change in how far an observation is from the frontier of technology the technical change is understood to be shifts in the production frontier. Thus, efficiency is a component of productivity.

> The terms productivity and efficiency, have been used frequently in the literature over the last ten years by a variety of commentators. They are often used interchangeably, but this is unfortunate because they are not precisely the same things. In fact when we refer to productivity, we are referring to total factor productivity, which is a productivity measure involving all factors of production. Other traditional measures of productivity, such as labour productivity in a factory, fuel productivity in power stations, and land productivity (yield) in farming, are what is known as partial measures of productivity. These partial productivity measures can provide a misleading indication of overall productivity when considered in isolation. Coelli,et.al.(1998, p.3).

Productivity change occurs when an index of outputs changes at a different rate than an index of inputs. Productivity change can be calculated using index number techniques to construct various indeces, such as the Fisher (1922) or Tornqvist (1936) productivity index. Both indexes require quantity and price information, as well as assumptions concerning the structure of technology and the behaviour of producers, but neither requires the estimation of anything (Brown, et al, 1996). In view of the existence of numerous index number formulae, Fisher (1922) proposed a number of intuitively meaningful criteria, called tests. Theses tests are used in the process of choosing a formula for purposes of constructing price and quantity index numbers. An alternative (yet closely related) framework is to state a number of properties, in the form of axioms, and then to find an index number that satisfies a given set of axioms. This approach is known as the axiomatic approach to index number construction. Eichorn and Voeller (1976) provide a summary of the axiomatic approach. Balk (1995) provides a recent summary of some of the axiomatic price index number theory. Diewert (1992) provides a range of axioms for consideration in productivity measurement and recommends the use of the Fisher index. However, productivity change can also be calculated using nonparametric techniques, or estimated using econometric techniques, to construct what has come to be known as Malmquist (1953) productivity index (MPI), which has been applied to banking and other sectors (even to whole economies), can be used to measure total factor productivity in a multiple input-output framework. Calculation of the MPI only requires data for quantities of inputs and outputs, not prices. This is especially useful in banking where definitions of price are problematic and sometimes difficult to operationalise. Thus information on the structure of the technology that generates the quantity data can serve as a substitute for price data and assumptions. A disadvantage of index number techniques is that they do not provide an answer about the sources of measured productivity change, whereas nonparametric techniques and econometric techniques can be informative in this respect. Although nonparametric techniques and econometric techniques are capable of providing answers to both questions, how can productivity change be measured? And what are the sources of measured productivity change? Only the econometric approach is capable of doing so in a stochastic environment.

5.5 The Measurement of Efficiency:

5.5.1 Introduction

Over the past several years, substantial research effort has gone into measuring the efficiency of financial institutions, particularly commercial banks. The focus has been on estimating an efficient frontier and measuring the average differences between observed banks and banks on the "best practice" frontier, (Berger, et al. 1997). This section outlines and compares the different econometric models used in estimation banks' efficiency and the assumptions that these models impose on the data.

The most common efficiency estimation techniques are data envelopment analysis (DEA), free disposal hull analysis (FDH), the stochastic frontier approach (SFA), the thick frontier approach (THA), and the distribution-free approach (DFA). The first two of these are non-parametric techniques and the latter three are parametric methods. Berger and Humphrey (1997) reported roughly an equal split between applications of non-parametric techniques (69 applications) and parametric methods (60 applications) to depository institutions data. The nonparametric methods generally ignore prices and can, therefore, account only for technical inefficiency in using too many inputs or producing too few outputs. Nor can they compare firms that tend to specialize in different inputs or outputs, because there is no way to compare one input or output with another without the benefit of relative prices. In addition, similar to the cost function, there is no way to determine whether the output being produced is optimal without value information on the outputs Mester et al, (1998). Thus, the nonparametric techniques typically focus on technological optimisation rather than economic optimisation, and do not correspond well to the cost and profit efficiency concepts. Another drawback of the nonparametric techniques is that they usually do not allow for random error in the data, assuming away measurement error and luck as factors affecting outcomes (although some progress is being made in this regard). In effect, they disentangle efficiency differences from random error by assuming that random error is zero. Studies of U.S. banks that use nonparametric techniques report lower efficiency means on average than those using parametric techniques (an average of 72% versus 84%) with much greater variation (a standard deviation of 17% versus 6%), Which could, in part, reflect some random error being counted as variations in measured efficiency in these studies (see Berger and Humphrey 1997, table 2). In the parametric methods, a bank is labelled inefficient if its costs are higher or profits are lower than the best-practice bank after removing random error term. Parametric models are characterised by the fact that an explicit functional form that presupposes the shape of the frontier for the production function, cost function or profit function is assumed. For example, parametric frontiers have often been specified in the form of: Constant Elasticity of Substitution (CES) [Arrow et al. (1961)]; transcendental logarithmic (translog) [Christensen, Jorgenson and Lau (1973)] and more recently the Fourier Flexible Function (Altunbas et al 2002).

To estimate an efficient frontier function, residuals from the cost or profit function must be analysed; they measure the difference between expected and observed costs or profits. Residuals are composed of two parts: a random one, due to measurement errors or idiosyncratic shocks and a systematic one that identifies every single firm. To separate the two components, it is necessary to make assumptions on their probability distributions. Usually, the random component is assumed to have a normal distribution with zero mean and finite variance; the systematic component is assumed to have a semi-normal or a truncated normal distribution with finite variance (Stevenson 1980). The two components are separated using the technique proposed by Jondrow, Lovell, Materov and Schmedt (1982); it is then possible to estimate the efficiency level of each firm and of the sample. The systematic part of the residual is an efficiency indicator that can be used to compare firms; the ratio between the residual of a firm and the highest residual for profit functions and the lowest for cost functions that identifies the best practice firm, is a measure of relative efficiency. Given the importance of the residuals for the measurement of efficiency, it is particularly important to minimize specification errors due to wrong functional forms that could bias the results. The translog function (Christensen and Greence 1976) is flexible in that it allows to estimate a large family of functional forms. Its high number of parameters, however, makes it difficult to adopt when estimating frontiers on a small sample. The translog is a second-order approximation around the mean values of the sample. Furthermore, the translog is a quadratic function; its symmetrical structure forces symmetry on the data; for example, if there are strong economies of scale in the sample for small firms, the translog, which tends to fit U-shaped curves, will erroneously find diseconomies of scale for the larger firms of the sample. McAllister and McManus (1993) were among the first to suggest that most of the previous empirical literature on bank X-efficiency might be biased because of problems related to the statistical techniques used. Wilson, et al. (2001, p.116), note that.

> The translog offered at least two important advantages over the Cobb-Douglas functional form. First, it allowed for a U-shaped average cost curve or, more generally, for a cost curve that is not uniform for all sizes. Second, it dispensed with the ancillary hypothesis of an input elasticity equal to one, which is implicit in the Cobb-Douglas functional form. It also imposed fewer constraints on the structure of costs than the CES production function. It is therefore possible to test for any non-monotonic trend in the cost function, and for the relationship between multiproduct operations and costs. In general, the translog functional form appeared to be more suitable to represent the true nature of the activity of financial institutions.

Meanwhile, Berger, Hunter and Timme (1993a, p.227) reckoned that the translog was: "insufficiently flexible to describe an industry with increasing returns to scale up to some point and constant returns thereafter, and seems to have difficulties when firms tend to change product mix significantly as they change scale". A semi-parametric flexible form, that overcomes the problems of a translog function, is in fact a translog with trigonometric factors added on, derived from a Fourier transform of the variables (Gallant 1981). The Fourier-flexible function is the best global approximation of an unknown function, such as a cost or profit function, but the number of parameters that have to be estimated is so high that it can be used only on very large samples (Berger et al. 1998). However, (Altunbas et al, 2000, p.2) note that

> "Although the Fourier flexible functional form better approximates the underlying cost function than the translog formulation, neither functional form is an appropriate descriptor of the cost function. As a consequence, it is concluded that even the use of more flexible functional forms such as FF may lead to misleading estimations of the inefficiency values"

Berger and Humphrey (1997) have also pointed out the limitations of the non-parametric approaches and they suggest that such approaches should consider using a re-sampling technique, such as *bootstrapping,* in order to accommodate random error in the efficiency estimates. This technique, [Simar (1992); Simar and Wilson (1995)] appears to be a way of obtaining an empirical approximation to the underlying sampling distribution of DEA and FDH efficiency estimates. However, these are not the only criticisms of previous research. In an important recent study, Bauer et al. (1997) argued that it is not necessary to have a consensus on what is the single best frontier approach for measuring efficiency for the efficiencies to be useful for regulatory analysis. Bauer et al. (1997, p 3) propose a set of " consistency conditions" that efficiency measures derived from various approaches should meet to be most useful for regulators or other decision-makers. These consistency conditions note that:

1. The efficiency scores generated by the different approaches should have comparable means, standard deviations and other distributional properties.
2. The different approaches should rank the institutions in approximately the same order.
3. The different approaches should identify mostly the same institutions as "best practice" and as "worst practice".
4. All of the useful approaches should demonstrate reasonable stability over time.
5. The efficiency scores generated by the different approaches should be reasonably consistent with competitive conditions in the market.

6. The measured efficiency from all of the useful approaches should be reasonably consistent with the standard non-frontier performance measures, such as return on assets or cost/revenue ratio.

Consistency conditions (1), (2) and (3) may be thought of as measuring the degree to which different approaches are mutually consistent, while conditions (4), (5) and (6) may be thought of as measuring the degree to which the efficiency generated by the different approaches are consistent with reality or are believable. The former are more helpful in determining whether the different approaches will give the same answers to regulatory policy questions or other queries, and the latter are more helpful in determining whether these answers are likely to be correct. Finally, it is important to note another criticism of bank cost studies- ignoring the profit side of the banks' operations. Recently, studies employing profit functions or investigating both banks' cost and profit efficiency have gradually acquired greater importance. The rationale for these studies is that banks that show the highest inefficiency and incur the highest costs might be able to generate more profits than the more cost-efficient ones. Of the 130 studies on financial institutions' efficiency reviewed by Berger and Humphrey (1997) only nine analysed profit efficiency although there have been some recent additions to the list, such as Rogers (1998); De Young and Hasan (1998); Dietch and Weill (1998) and Maudos et al. (1998). Thus in our study we provide measurement for cost and profit efficiency for the GCC six states banks. Here, we focus on the parametric techniques primarily because they correspond well with the cost and profit efficiency concepts (Mester, 1997). In particular we apply a parametric technique, that is, the stochastic frontier approach to calculate the cost and profit efficiency scores for the banks in the six GCC member states. In the following sections we discuss in more details the non-parametric and the parametric approaches.

5.5.2 The non-parametric approaches:

5.5.2.1 The Data Envelopment Analysis (DEA)

The main non-parametric approaches are the data envelopment analysis (DEA) and free disposal hull (FDH) methods.

> New efficiency theory known as "data envelopment analysis" (DEA) purports to measure the relative efficiency of a set of units that are similar. The units are often called 'decision making units' or DMUs and their similarity lies in their pattern of input and output processes. When data are available for input costs and revenues from sale of output, the DEA model can be applied to firms in an industry to analyse their *technical* (production) and *allocative* efficiency. *Technical efficiency* measures the DMU's success in producing the maximum possible output from a given set of inputs, while *allocative efficiency* measures the firm's success in choosing an optimal set of inputs with a given set output and /or output prices. Clearly the allocative efficiency concept is most suitable for profit-oriented firms facing competitive markets. Singupta (2000,p.1).

Development of DEA has followed three important phases. The first phase started with the engineering concept of efficiency as a ratio of weighted outputs to weighted inputs and this concept of performance efficiency was applied by Charnes, Cooper and Rhodes (1978) in a linear programming (LP) formulation to compare the relative efficiency of a set of DMUs. A similar approach was developed by Farrell (1957) to compare the relative efficiency of a cross-section sample of agricultural farms, but this was limited to one output for each firm. This approach required the empirical data on the input and output quantities only and no prices are required. Hence only technical efficiency can be estimated by this approach.

The second phase introduced the concept of allocative efficiency, which leads to the specification of a cost frontier instead of a production frontier. The econometric studies of cost frontier functions have frequently used the allocative efficiency criterion based on the observed price data.

The third phase extended the cost efficiency approach further, by using inputs and/or outputs as policy variables to be optimally chosen by each firm or DMU, when it faces market prices under perfect or imperfect competition. Two features of flexibility in this approach are to be noted. One is that the optimal input levels can be used for future by firms, who have to adjust their inputs accordingly. This permits a dynamic view of the optimal input paths over time, when market prices change in a predictable manner. Secondly, the stochastic aspects of learning and adjustment, when firms adjust their sub-optimal input levels to the optimum, can be directly introduced in this framework. However, the economists' view of the DEA approach is that it is a technical method of efficiency measurement that is unrelated to the economic environment under which firms or DMUs operate.

5.5.2.2 The Free Disposal Hull Approach:

The second non-parametric approach is the free disposal hull (FDH) approach, developed by Deprins et al. (1984), and this is a special case of DEA. Here, the hypothesis of convexity of the production possibility set (PPS) is abandoned, and the PPS is composed only of the DEA vertices and the FDH points interior to these vertices. Because the FDH frontier is either congruent or interior to the DEA frontier, FDH will typically generate larger efficiency estimates than DEA (Tulkens, 1993). The FDH approach allows for a better approximation or envelopment of the observed data. DEA is a more efficient estimator than FDH, but only if the assumption of convexity is correct. Both DEA and FDH permit efficiency to vary over time, and neither method requires prior assumptions regarding the form of the distribution of inefficiencies across observations, except that undominated observations are 100% efficient (Berger and Humphrey, 1997). A drawback of non-parametric approaches, however, is that they generally assume there is no random component affecting a firm's performance. There have been a number of attempts to generalise and extend the standard DEA non-parametric approach. These include the polyhedral cone-ratio DEA model (Charnes et al., 1990; Brockett et al., 1997; Resti, 1996); the assurance region DEA model (Thompson et al., 1997; Tylor et al., 1997); the non-parametric Malmquist Index method of productivity measurement (Griffell-Tatje' and

Lovell, 1994); and tests of the sensitivity of DEA and FDH efficiency models to different radial and non-radial measurement techniques (Ferrier et al., 1994; Pastor, 1995; DeBorger et al.,1995). Bergendahl (1995) has suggested the concept of a composite frontier: the DEA frontier should be composed of the most efficient parts of banks within the sample, forming a composite or representative firm, instead of being composed of separate and individual firms. The composite frontier would indicate the efficiency that had been achieved within the sample, though not necessarily within a single institution. In this way, the frontier would represent best practice, without confounding efficient results achieved in one specific area with inefficiencies elsewhere. The main difference between DEA and the parametric approaches (SFA, TFA, DFA) is that the DEA production frontier is not determined by a specific functional form; instead it is generated directly from the actual data for the evaluated firms. The DEA frontier is formed as the piecewise linear combination that connects the set of best-practice observations, yielding a convex production possibility set (PPS). As a consequence, the DEA efficiency score for a specific firm (or decision-making unit, DMU) is not defined by an absolute standard, but is defined relative to other firms. Extensive reviews of the relevant literature on applications of DEA to banking can be found in Seiford and Thrall (1990), Lovell (1993) and Berger and Humphrey (1997).

5.5.3 The parametric approaches:

5.5.3.1 The Stochastic Frontier Approach (SFA):

The SFA originated with two papers, published nearly simultaneously by two teams on two continents. Meeusen and van den Broeck (MB) (1977), and Aigner, Lovell, and Schmidt (ALS) (1977). The ALS paper was in fact a merged version of a pair of remarkably similar papers, one by Aigner and the other by Lovell and Schmidt. The ALS and MB papers are themselves very similar. Both papers appeared shortly before a third SFA paper by Battese and Corra (1977). These three original SFA models shared the composed error structure mentioned previously, and each was developed in a production frontier context. The model can be expressed as

$y = f(x; \beta). \exp\{v - u\}$, where y is scalar output, x is a vector of inputs, and β is a vector of technology parameters. The first error component $v \sim N(0; \sigma_v^2)$ is intended to capture the effects of statistical noise, and the second error component $u \geq 0$ is intended to capture the effects of technical inefficiency. Thus producers operate on or beneath their stochastic production frontier [f(x;β . exp{v}] according as $u = 0$ or $u > 0$. MB assigned an exponential distribution to u, Battese and Corra assigned a half normal distribution to u, and ALS considered both distributions for u. Parameters to be estimated include β, σ_v^2, and a variance parameter σ_u^2 associated with u. Either distributional assumption on u implies that the composed error (v - u) is negatively skewed, and statistical efficiency requires that the model be estimated by maximum likelihood. After estimation, an estimate of mean technical inefficiency in the sample was provided by

$E(-u) = E(v-u) = -(2/\pi)^{1/2}\,\sigma_u$ in the normal-half normal case and by $E(-u)=E(v-u)=-\sigma_u$ in the normal-exponential case. In an early survey of various approaches to frontier analysis and efficiency measurement, Forsund, Lovell, and Schmidt (1980) wrote that "the main weakness of the stochastic frontier model [is that] it is not possible to decompose individual residuals into their two components, and so it is not possible to estimate technical inefficiency by observation. The best that one can do is to obtain an estimate of mean inefficiency over the sample." Jondrow et al's (1982) paper, tackled this problem and provides a technique in which either the mean or the mode of the conditional distribution [*uilvi - ui*] was proposed to provide estimates of the technical inefficiency of each producer in the sample. The possibility of obtaining producer-specific estimates of efficiency has greatly enhanced the appeal of SFA. The half-normal and exponential distributions assigned to the one-sided inefficiency error component are single-parameter distributions, and researchers soon developed more flexible two-parameter distributions for the inefficiency error component. Afriat (1972) and Richmond, Greene (1980a, b) proposed a Gamma distribution, and Stevenson (1980) proposed both the Gamma and truncated normal distributions. Other, more flexible distributions have been proposed by Lee (1983). Nonetheless the two original single-parameter distributions remain the distributions of choice in the vast majority of empirical work.

> The distributional assumptions of the stochastic frontier approach are fairly arbitrary. Two prior studies found that when the inefficiencies were unconstrained, they behaved much more like symmetric normal distributions than half-normals, which would invalidate the identification of the inefficiencies. Berger et al. (1997, p. 12).

It is a simple matter to change the sign of the inefficiency error component u and convert the stochastic production frontier model to a stochastic cost frontier model

$E = c(y, w; /\beta).\ \exp\{v + u\}$, where E is expenditure, $[c(y, w; \beta).exp\{v\}]$ is a stochastic cost frontier, and u is intended to capture the cost of technical and allocative inefficiency.

The Jondrow et al. (1982) technique may be used to provide an estimate of overall cost inefficiency, but the difficult remaining problem is to decompose the estimate of u into estimates of the separate costs of technical and allocative inefficiency. Schmidt and Lovell (1979) accomplished the decomposition for the Cobb-Douglas case. Kopp and Diewert (1982) obtained the decomposition for the more general translog case, although econometric difficulties with their decomposition remain to this day. Cross-sectional data provide a snapshot of producers and their efficiency. Panel data provide more reliable evidence on their performance, because they enable us to track the performance of each producer through a sequence of time periods. Long and Hoch (1955, 1962) and Mundlak (1961) utilized panel data to purge agricultural production function parameter estimates of bias attributable to variation in what Hoch called technical efficiency and what Mundlak called management bias. Eventually Pitt and Lee (1981) extended cross-sectional maximum likelihood estimation techniques to panel data, and Schmidt and Sickles (1984) extended the work of Hoch and Mundlak by applying fixed-effects and random-effects methods to the efficiency measurement problem, where the effects are one-sided. The objective of these latter studies was not so much to eliminate bias from parameter estimates as to obtain producer- specific estimates of technical efficiency, or of the management effect. A significant advantage of (sufficiently long) panels is that they permit consistent estimation of the efficiency of individual producers, whereas the Jondrow et, al. technique does not generate consistent estimators in a cross-sectional context. Early panel data models were based on the assumption of time- invariant efficiency. The longer the panel, the less tenable this assumption becomes. Eventually this assumption was relaxed, in a series of papers by Cornwell, Schmidt, and Sickles (1990), Kumbhakar (1990), and Battese and Coelli (1992, 1995).

> If a number of firms are observed over a number of time periods, then the data obtained are known as panel data. Panel data have some advantages over cross-sectional data in the estimation of stochastic frontiers models. The availability of panel data generally implies that there are a larger number of degrees of freedom for estimation of parameters. More importantly, panel data permit the simultaneous investigation of both technical change and technical efficiency change over time, given that technical change is defined by an appropriate parametric model and the technical inefficiency effects in the stochastic frontier model are stochastic and have the specified distribution. Coelli, et al. (1998, p. 202).

If efficiency varies, across producers or through time, it is natural to seek determinants of efficiency variation. Early studies adopted a two-stage approach, in which efficiencies are estimated in the first stage, and estimated efficiencies are regressed against a vector of explanatory variables in a second stage. More recent studies, including those of Kumbhakar, Ghosh, and McGuckin (1991), Reifschneider and Stevenson (1991), Huang and Liu (1994), and Battese and Coelli (1995), have adopted a single-stage approach in which explanatory variables are incorporated directly into the inefficiency error component. In this approach either the mean or the variance of the inefficiency error component is hypothesized to be a function of the explanatory variables. However, if productive efficiency changes through time, then it must also contribute to productivity change. Bauer (1990a) incorporated efficiency change into models of productivity change. Griliches (1996) provides an illuminating survey of research into "the residual,". Nonetheless, in addition to the stochastic frontier approach, two other parametric approaches to the estimation of cost efficiency have recently been developed both can be based on a translog system consisting of a cost equation and its associated input cost share equation. However, neither approach attempts to decompose estimated cost inefficiency into its technical and allocative components. The first approach is dubbed a "distribution-free approach" DFA for short, because although it contains a one-sided error term representing cost inefficiency, it imposes no distributional assumption on it. DFA requires panel data. The second approach is an admittedly ad hoc approach named thick frontier analysis, (TFA) for short, Berger, et al (1998). TFA does not require a one-sided error term, and so is not really a frontier approach to the estimation of cost efficiency. However, in contrast to some of the more sophisticated approaches (SFA, DFA, DEA) TFA is easy to implement using either cross-sectional data or panel data, De Young et al, (1998). In the following are more details about the two approaches.

5.5.3.2 The Distribution-free approach:

The second parametric approach is the distribution-free approach, (DFA) due to Berger (1993) This method assumes that there is a core efficiency or average efficiency for each firm over time. The core inefficiency is distinguished from random error (including any temporary fluctuations in efficiency) by assuming that core inefficiency is persistent over time, while random errors tend to average out over time [see Berger (1993) and Deyoung

(1996) and Mester et al, (1997)]. In particular, a cost or profit function is estimated for each period of a panel data set. The residual in each separate regression is composed of both inefficiency, lnu, and random error, lnv, but the random component, lnv, is assumed to average out over time, so that the average of a bank's residuals from all of the regressions, $ln\hat{u}$ for each bank is used to compute its core efficiency. However, the reasonableness of these assumptions about the error term components depend on the length of period studied, (Mester, et al.1997). If too short a period is chosen, the random errors might not average out, in which case random error would be attributed to inefficiency (although truncation can help). If too long a period is chosen, the firm's core efficiency becomes less meaningful because of changes in management and other events, i.e., it might not be constant over time period. Despite the small number of studies comparing different cost frontier approaches, (Berger et al. 1997), DFA was found to be the most consistent with the non-frontier efficiency measures. Bauer et al. (1998) applied four approaches for the same data set. They found that DFA gives the highest mean of efficiency estimates combined with the lowest standard deviation.

5.5.3.3 The Thick Frontier Approach (TFA):

The thick frontier approach (TFA) [see Berger and Humphrey (1991) Bauer et al. (1993)] simply assumes that inefficiency is represented by deviations in predicted costs between the highest and lowest quartiles while deviation from the predicted costs within the highest and lowest average cost quartile of firms represent random error. It is reasonable to assume that the firms in the lowest cost group are greater than the average efficiency. Similarly, the firm in the highest cost group is considered to operate at lower than the average efficiency. Certainly, these assumptions do not hold and more importantly, do not yield a precise efficiency measurement for each bank, which is our primary focus of this study.

TFA gives an estimate of efficiency differences between the best and worst quartile to indicate the general level of overall efficiency, but does not provide point estimate for each individual firm. This study, however, implemented the stochastic frontier approach and adopted the Battese and Coelli (1995) model to estimate the cost and alternative profit efficiency scores for our sample of Six GCC countries.

5.6 Problems Arising when Studying Bank Efficiency:

Measuring bank efficiency creates several problems, these problems arise as a result of the nature and function of financial intermediaries, especially as banks are multi-product firms and they do not produce physical products (Goddard et al, 2000). One of the major problems in the study of bank efficiency is the specification of bank inputs and outputs. There has been long-standing disagreement among researchers over what banks produce. Debate centres around the issue of the role of deposits and, more specifically, whether they should be treated as inputs or outputs. However, according to contemporary banking theory, the process of resource allocation is improved by financial intermediaries through the following functions that banks perform [Freixas and Rochet 1997]: 1- offering access to a payment system 2- transforming assets; 3- managing risk; 4- processing information and monitoring borrowers. In this sense, banks are typically multi-product firms in that their activities include at least the supplying of deposits, loans and securities, which in turn can be divided into various classes and provided in geographically different markets. Moreover, many banking services are jointly produced so that certain kinds of costs are jointly related in the production of a variety of services. Thus, any efficiency measurement for the banking sector has to deal with the problem of the definition of inputs and outputs. In this context, two main alternative methods are used with depending on different assumptions. According to the first approach, banks gather liquidity and savings in order to produce loans and payment services (production approach). Hence, their outputs are measured by the number of deposits and loan accounts or by the operating costs used to produce these products. The underlying rationale is that depositors receive a service and banks employ resources to provide it: deposits are treated as outputs because in accepting deposits banks provide customers with value-added outputs in the form of clearing, record-keeping and security services. It follows that only physical inputs, such as labour and capital and their costs should be included in the analysis. [see for example, Bauer et al. (1993); Berger et al.(1997)]. Given that these are hard to measure, research has focused from the beginning on the lending function of banks (Benston 1965), defining loans as outputs and deposits, labour and physical capital as inputs (intermediation approach). Under this alternative approach [see for example, Mester(1993 and 1996); Allen and Rai (1996); Molyneux et al. (1996); Berger and Mester (1997)], banks are considered as intermediaries between liability holders and those who receive bank funds, rather than producers of loan and deposits accounts services. As a consequence, the values of loans and other assets are defined as bank outputs, while deposits and other liabilities (capital and labour) are inputs to the production process. It follows that operating costs and financial expenses (interest on deposits) are the relevant components of total costs. Originally, this was the view of Sealey and Lindley (1977) who developed a model consistent with the neoclassical theory of the firm within which they analysed the role of production and costs for depository financial institutions. Sealey and Lindley (1977) reckoned that the individual banking firm's decision-making process focused on the production of earning assets where "loanable funds" borrowed from depositors and serviced by the firm are inputs together with labour and capital. Berger et al. (1997) maintain that under most circumstances, the intermediation approach is to be preferred for bank analysis because it is more inclusive and it captures the essence of a bank as a financial intermediary. Despite this, they reckon that in analysis at the branch level, the production approach may be more appropriate because branches act primarily as producers of depositor services on behalf of the bank which then invests the funds in various assets. Thus, usually, each definition carries with it a particular set of banking concepts, relating to the production characteristics of the industry. In other words, when evaluating bank efficiency, the way output is defined and measured may influence considerably the results obtained, Berger and Humphrey (1997). Another problem that arises when dealing with production efficiency measurement is the distortion on prices induced by market power; firms operating in oligopolistic markets are not price takers; they face downward-sloping demand functions. But the price-taking assumption is essential when estimating cost functions, because the equivalence between cost and production function is guaranteed by duality theorems that rest on perfect competition assumptions. A proxy for market power, such as market share or a concentration index (the most widely used is the Herfindahl index) can be introduced as an independent variable. This way, the impact of market power is isolated and the omitted variable problem is dealt with. The other problem that a rises is the importance of output quality and management risk preferences when analysing cost and profit functions. If two firms produce similar goods of different quality, the one that produces higher quality goods will presumably have higher costs but also higher profits. If only cost efficiency is measured, this firm will be erroneously classified as inefficient. For the banking sector the problem is particularly relevant: the riskiness of loans can be proxied but there is no quality indicator for financial services. A measure of loan quality remains to be found. The traditional measure of riskiness, the ratio of bad loans to total loans, is correlated with managerial efficiency. Bad loans could be a consequence of sloppy monitoring; on the other hand, a downturn in the local economy could spur a growth in bad loans, which in turn cause a rise in costs and make the bank look inefficient of compared to banks located in booming regions. In principle, if bad loans are exogenous to bad management, they should be included in the estimated function, so as to isolate their effect; if they are not, a separate study of the relationship between efficiency and bad loans should be conducted.

5.7 A survey of the Empirical Literature on Bank Efficiency:

> The focus on bank efficiency has spawned a substantial literature examining scale (size), scope (product mix) and productive efficiency (technical and economic efficiency). Generally speaking, research using banking data for periods before the mid-1980s found that scale economies tended to be apparent at relatively low asset size levels, but, became exhausted as size increased. More recent US and European studies, however, have found stronger evidence of economies of scale for large banks. Empirical estimates of scope economies in banking tend to be mixed – and not necessarily very reliable. The main empirical regularity that does appear widely in the efficiency literature, however, is that productive inefficiencies are much larger than scale economies. This means that banks can improve their overall efficiency to a greater extent by emulating industry best practice (by improving managerial efficiency and their use of technology) than by increasing their size. Goddard et al. (2001, p.74).

This section reviews the results of some of the major studies investigating economies of scale, economies of scope, and X-efficiency in US and European banking industry.

Many studies have focused on the productivity and efficiency of banks, mostly based on American data, usually specifying translog cost function within an econometric framework. The first studies on production functions of banks were performed in the mid-sixties (Benston1965) and this line of research is ongoing. Usually, bank efficiency studies can be divided into those that examine scale and scope efficiency alone, and those that also examine X-efficiency. As Mester (1995, p. 3) notes:

> Bank efficiency studies can be divided into those that examine scale and scope efficiency alone, and those that also examine X-efficiency. The scale and scope studies estimate an *average practice cost function,* which relates bank cost to output levels and input prices. The technique implicitly assumes all banks in the sample are using their inputs efficiently – in other words-, there is no "X-inefficiency" an that the banks are using the same production technology. The studies concerned with X-efficiency estimate a *best practice cost function,* which represents the predicted cost function of banks that are X-efficient, and then measure the degree of inefficiency of banks in the sample relative to this best practice technology.

Results of these studies vary substantially; the majority of the US literature on economies of scale in banking markets has analysed the cost structures of relatively small banks and found that scale economies are usually exhausted somewhere around $100 million asset size. The survey articles by Gilbert (1984), Clark (1988) and the OECD (1992) support this overall finding. A handful of these studies (Gilligan and Smirlock, 1984; Gilligan et al., 1984; Kolari and Zardkoohi, 1987) have also found scope economies, again for relatively small banks (a summary of the main scale and scope studies in US banking market are presented in table 5.1). More recent studies, however, have examined cost economies for large bank (or other financial institutions) and these have found slight evidence of economies of scale and scope, (see Hunter and Timme, 1986, 1987; Shaffer, 1988; Evanoff and Israilivich, 1991; Hunter et al., 1990; Noulas et al.,1990, Mester, 1992, 1993, 1995, 1996, Berger et al. 1993). Large banks exhibit economies of scale if small banks are omitted from the sample, which is in accordance with the problems derived from the use of a translog function. Scope economies are controversial; they are particularly hard to measure and sometimes the economies of scope found between different pairs of products are inconsistent with each other; in this case the interpretation of results is not straightforward. All in all, economies of scale appear to be small (with a maximum value of 10 percent: see McAllister and McManus 1993), while the diseconomies found for large banks may well depend on the translog cost function specification. These results imply that "the functional form employed in these studies may not be capable of incorporating the technologies of both large and small banks together in a single model, or that some important factor that varies with bank size may be excluded from the model (Hannan, et al, 1998). In general, it appears that the criticism of the translog cost functional form, that it is not capable of incorporating the technologies of both large and small banks together in a single model, is partially based on the inability of previous US studies to find strong evidence of economies of scale for the largest banks, (Mester, 1996). Berger, Hancock et al. (1994) point out a major difficulty in the scale economies literature, namely that most studies did not use a frontier estimation method. In fact, they note that scale economies theoretically apply only to the efficient frontier, and the use of data from banks off the frontier could compound inefficiencies due to failure to achieve economies of scale with differences between firms in productive efficiency. However, since the mid-1980s, considerable attention has been devoted to the estimation of productive efficiency, (Bauer, et al. 1994).

> Several types of criticisms may be levelled against most of the recent scale economy literature. First, scale economies are usually measured using data on all of the banks in the sample rather than just using the data on the most efficient banks. Scale economies theoretically apply only to the production possibilities frontier—where firms are fully X-efficient and minimize costs for every scale of output. The use of data from banks other than those on the frontier could confound scale effects with differences in X-efficiency. Second, most studies measure only the scale economy effects of marginal changes in output near the point of evaluation. The commonly used definition of scale economies is the ratio of marginal cost to average cost, taken along a ray that holds output mix constant. Scale efficiencies, in contrast, take into account the full difference in ray average costs between the point of evaluation and the scale-efficient point (the bottom of the U if the average cost function us U-shaped), which may be quite a distance away from the point of evaluation. Third, the finding that large and small banks do not appear to fit on the same parametric cost function as each other suggests that nonparametric methods might be more appropriate for examining scale economies. The commonly-specified translog functional form forces large and small banks to lie on a U-shaped (or possibly flat) ray average cost curve and disallows other possibilities, such as an average cost curve that falls up to some output point and remains flat thereafter. Thus, if there are strong economies for the smallest banks and flat average costs for larger banks, the translog form would likely incorrectly find measured scale diseconomies for the largest banks. In addition, the translog approximation may behave poorly away from the mean product mix, which can create problems in measuring scale efficiencies because large banks tend to have very different product mixes from the average. Nonparametric estimation methods, such as Kernel regressions and Fourier Flexible forms allow the date more freedom to choose shapes for the average cost curve. Fourth, recent scale economy analyses generally do not take into account financial scale economies associated with risk reduction. As banks grow larger, their loan portfolios generally become more diversified, lowering the amount of equity capital which must be held t keep the risk exposure of the bank's creditors (including the deposit insurer) at a given level. Because equity is the most expensive marginal source of funding, this creates a financial scale economy by which banks can lower their average costs of funds as scale increases by holding a smaller proportion of capital (to the extent that this is allowed by regulators.). Berger et al. (94, p.9)

The literature on scope economies seems to be even more problematic. Berger et al. (1994) point out three major problems. First, the translog functional form, on which many studies have been based, is insufficiently flexible to describe an industry with increasing returns to scale up to some point and constant returns thereafter. It also has difficulties when firms tend to change product mix significantly as they change scale. The translog and the Box-Cox approximation perform poorly in estimating scope economies because they have trouble with estimations at or near zero. Second, there are often little or no data on firms that specialise. Third, it is difficult to evaluate scope to address these limitations. Berger et al (1994), proposed the concept of optimal scope economies, based on the profit function instead of the cost function. This incorporates the revenue effects of output choices as well as the cost effects of input choices, providing at least a partial solution to the above limitations.

Compared with the US literature, the much smaller number of cost studies on European banking appears to reveal greater evidence of scale and, to a lesser extent, scope economies for larger banks (see table 5.2 for a summary of the main scale and scope studies in European baks). Levy-Garboua and Renard (1977) examine scale economies in French banking using a sample of 94 banks for 1974. The methodology combined the production and intermediation approach and their results suggested evidence of increasing returns to scale. These results for French banking were later confirmed in two studies undertaken by Dietsch (1988 and 1993). Dietsch in 1988 adopted the intermediation approach for a cross-sectional analysis of 243 banks in 1986. Using the translog methodology this study concluded that as far as ray economies of scale were concerned, the elasticity of total costs with respect to bank output was close to unity (.97). This study seemed to indicate that overall scale economies were rather limited. However, further analysis of costs associated with individual bank outputs suggested that there are significant potential scale economies to be had (that is, the partial elasticities of cost with respect to credits and deposits were equal to 0.56 and 0.23 respectively). Dietsch (1993) extended his previous analysis and examined both economies of scale and scope in the French banking markets. Using a sample of 343 banks for 1987, he found strong evidence of economies of scope in the banking industry across all output ranges, whereas economies of scope were not observed at a high level for all combinations of outputs (that is, the cost complementarity coefficient for loans and investments was 0.093). Dietsch (p.17) stated that "For the French banking industry, our results tend to demonstrate that universal banking gives an advantage compared to specialisation and that competition between banks in the future must be analysed on the ground of the imperfect competition theory". Cost economies studies in the UK have focused on the building society sector mainly because of the limited number of domestic commercial banks with similar business profiles. Hardwick (1990), using a two—output model, indicates that there are statistically significant scale economies for societies with assets under £500 million yet there is no evidence of scope economies. Drake and Weyman-Jones (1992), using the same methodology but a different data sample (76 building societies in 1988), indicate mild economies of scale for societies in the £120 million to £500 million assets size range but finds no evidence of economies of scope. Glass and McKillop (1992) use the data from one of the largest Irish banks, the Bank of Ireland, for the period 1972-90 to estimate a hybrid translog model. They investigate the process of natural and non-natural technical change, overall scale economies, product-specific scale economies, and scope economies. Their results show that, apart from the sub-period 1975-8, the bank was characterised by overall diseconomies of scale, whereas product-specific scale economies were reported to be decreasing for investments and increasing for loans. Also, the estimated cost function showed diseconomies of scope over the production of two outputs. The estimated parameters reflected technical change in the Bank of Ireland, which was both natural and non-natural in character (the average annual overall rate being 4.96 percent). Additionally, a positive interaction between scale economies and technical change is indicated. Casu and Girardone (1998) found that slight scale economies existed in the Italian banking market, and that banking groups realised greater scope economies compared with non-group banks. These findings are in line with other studies that found strong evidence of scope economies for large banks in many European banking sectors (European Commission, 1997).

Several studies have investigated scale and scope economies across European banking markets. Molyneux et al. (1996) used the hyprid translog cost function to examine economies of scale and scope in France, Germany, Italy and Spain. There were noticeable differences in cost characteristics between countries. Scope and scale economies appeared to be evident in each country, however, over a wide range of bank output levels. The European Commission (1997) also investigated the cost characteristics of various European banking sectors, while assessing the potential gains brought about by the 1992 Single Market Programme (SMP). In all countries, there was evidence of both economies and diseconomies of scale. The preponderance of increasing returns to scale was found mainly for small banks, particularly in Germany and France. The existence of diseconomies of scale in several size bands suggested that, with the existing distribution of banks and current technology, the opportunities from exploiting economies of scale might be quite limited. There was clear potential for an SMP effect in that substantial economies of scale existed.

Strong evidence of large economies of scope was also found for Europe's largest banks. Vander Vennet (1998), however, found that scale economies existed only for the smallest banks, with assets under ECU 10 billion, with constant returns thereafter and diseconomies for the largest bank, with assets exceeding ECU 100 billion. Vander Vennet suggests that the bank sizes for which no diseconomies are found are higher than in the 1980s, a result that was also reported for US banks by Berger and Mester (1997). Altunbas, Gardener et al. (2001) estimate scale economies, efficiency and rates of technical change for a large sample of European banks between 1989 and 1997 (a summary of the main scale and scope studies in European banks are presented in table 5.2). The results reveal that scale economies are widespread across different countries, and that they increase with bank size. Cost elasticities with respect to output range between 90% and 95%, suggesting that cost penalties of between 5% and 10% are incurred through failing to realise economies of scale. In any case, beside the problems of heterogeneity of the samples used, the specification issues, and the disputes on estimation methods, it remains true that the results depend on the assumption that all firms are on the efficient frontier; otherwise, the omitted variable (efficiency) introduces a bias in the results because it is correlated with other variables, for example banks'size.

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So far, the above brief literature review focuses on the empirical literature on bank scale and scope economies in US and EU markets, yet recent academic literature, such as Berger et al. (1993, 94, 1995, 1997), has drawn attention to what appears to be more important source of inefficiency, that is "X-inefficiency".

> There is virtual consensus in the literature that X-efficiency across banks are relatively large and dominate both scale and scope efficiency differences. The X-inefficiencies are usually found to be primarily technical in nature, meaning that inputs are simply overused, rather than allocative, meaning that the choice of inputs was a poor reaction to the prices faced. However, there is no consensus on the best method for estimating X-efficiency or on the average level of X-efficiency of the banking industry. Berger et al. (1997, p.11).

Research on banking efficiency has grown substantially over the last decade. For instance, Berger and Humphrey (1997) review more than 130 studies on efficiency in the financial sector for 21 countries. In general, the results are sensitive to the method of estimation, the distributional assumptions for the residuals and in the course of parametric estimation the functional form adopted. Pooling all results, Berger and Humphrey find that the average level of efficiency is 79 percent, (median 83 percent), with standard error of 13 percent. Usually, non-parametric results show lower efficiency levels and a higher dispersion than results derived from studies that estimate stochastic frontiers, because non-parametric techniques do not incorporate any form of randomness into the inefficiency measure. More specifically, Berger and Humphrey (1997) found that for the US studies that used DEA and other non-parametric methods, the average efficiency score was 0.72 overall. The standard deviation of efficiencies in these studies was 0.17, and the efficiencies ranged between 0.31 and 0.97. The average efficiency scores for the non-US studies that used non-parametric methods was 0.71. Studies that employed parametric methods reported an overall mean efficiency of 0.84 for the US banking, with a standard deviation of 0.06, and efficiency estimates ranging between 0.61 and 0.95. As Berger and Humphrey (1997) pointed out, however, the similarity in average efficiency values across different methods does not carry over strongly into similarities in the efficiency of rankings of individual firms. This suggests that the confidence intervals surrounding individual firm or branch efficiency estimates are substantial (a summary of the main X-efficiency studies in US banking are presented in table 5.3).

Application of efficiency analysis seek not only to provide information for policy makers (identifying the efficiency implications of deregulation, financial institution failure, mergers, and so on) but also to investigate a host of other issues, such as those relating to corporate control and the impact of risk on efficiency (Altunbas et al., 2000; Altunbas, Evans et al., 2001).

Some studies have investigated the stability of bank efficiency over time, while others have suggested ways to help managers improve performance. Any classification of the studies according to the specific issues they raise is to some extent arbitrary, since the conclusions drawn are often of interest to more than a single party (Goddard et al., 2001, p.127). Moreover, the distinction between studies that employ parametric and non-parametric approaches has recently started to become blurred, as increasing attention has been devoted to comparisons between different methods (Ferrier and Lovell, 1990; Giokas, 1991; Ferrier et al., 1994; DeBorger et al., 1995; Resti, 1997; Eisenbeis et al., 1996; Casu and Girardone, 1998). Applying parametric and non-parametric methods to the same sample, Ferrier and Lovell (1990) find a rank correlation of 0.02, while Eisenbeis, Ferrier and Kwan find the highest value of the Spearman index at 0.59. The different ranking of banks according to different estimation techniques implies that for policy purposes only the average data, that seem to converge, can be of any relevance; and research based on individual levels of efficiency will be flawed by the instability of these levels. Furthermore, international comparisons are difficult. If the frontier is estimated separately for each country, the inefficiency measure obtained is a national one, not directly comparable across countries. If a joint frontier is estimated, noise is introduced because of the different economic and regulatory environments that hold for each country of the sample. Pastor et al. (1997) carried out international comparisons by defining a common frontier that incorporated various country-specific environmental conditions. The common frontier is built under the assumption that the environment is likely to differ across countries more than banking technology. To test this hypothesis, DEA efficiency scores for each European country were obtained from a common frontier with and without environmental variables. With environmental variables omitted, the average efficiency scores were lower than then these variables were included. Overall, the results indicated that there were three groups: Denmark, Spain, Germany, Luxembourg and France had the highest average efficiency scores between 1.00 and 0.88; the Netherlands, Belgium, the UK and Portugal had average efficiency scores between 0.69 and 0.56; and Italy had the lowest average efficiency score (0.35). Dietsch and Weill (1998) used unconsolidated accounting data of 661 commercial, mutual and savings banks from 11 EU countries covering the period 1992-96 to estimate changes in efficiency and productivity. Overall, the results suggested an increase in efficiency when measured using both a cost and a profit frontier. This trend, however, was not observed in all countries: France, Italy, Luxembourg and the UK experienced decreasing efficiency measured in terms of costs. Productivity results showed an increase in total productivity, mainly due to technological change. Overall, European integration appeared to have had a small but positive effect on efficiency in banking prior to 1996.

Vander Vennet (1998), compared the efficiencies of European universal and specialist banks measured in both cost and revenue terms. Using a sample of 2375 European Union banks from 17 countries for the years 1995 and 1996, Vander Vennet finds that in terms of revenues, financial conglomerates are more efficient than their specialised competitors, and universal banks are more efficient than non-universal banks. In estimates based on traditional intermediation outputs (loans and securities), the average bank incurred costs 30% higher than the most efficient bank. In estimates based on non-traditional outputs (interest and non-interest revenue), the corresponding average inefficiency score was 20%. For diversified banks, inefficiency is uncorrelated with size; however, small specialised banks appear to be relatively inefficient. Vander Vennet's results are broadly in accordance with Allen and Rai's (1996) cross-country comparison of universal versus specialist banking systems. Maudos et al. (1999) examined efficiency for a sample of banks from 11 EU countries with data covering the period 1993-96 using cluster analysis to group banks according to specialisation, efficiency estimates increased when separate frontiers were estimated for each cluster, instead of estimating a common frontier for all bank. Using the cost frontier, the average efficiency score for the whole sample was 0.44, compared with 0.74 when estimation of separate frontiers was carried out. Differences in product mix therefore seem to be important in explaining efficiency. Altunbas, Gardener et al. (2001) used a Fourier-flexible functional form to estimate a stochastic cost frontier from which estimates of scale economies, productive inefficiencies and technical change were obtained for a sample of European banks covering the period 1988-95. The country estimates revealed that the relative inefficiency of various banking sectors (Austria, Denmark, Finland, Italy and the UK) increased over time. On average, inefficiencies appeared to be around 25%. Inefficiency was more variable across countries and bank size bands and over time than the scale economy estimates. Molyneux (2002) examines the impact of technical change on European bank costs and profits between 1992 and 2000. The estimate suggest that technological change reduced the total costs of European banks at an average rate of 3.8% per annum. However, technical change reduced profits by 0.45% annually over the same period. As found in an earlier study by Altunbas et al (1999) pure and non-neutral components of technical change appear to have contributed most to the reduction in total cost and the fall in profits. Large banks and commercial banks are found to experience the smallest cost reductions but the largest profit gains from technical change. Banking systems that experienced the smallest cost reductions seem to have experienced the biggest profit gains. In general, the results indicate that technical change can have a differential effect on bank costs and profits. While technology can reduce costs as well as increase the revenue earning capacity of banks it seems that some banks focus on the former and others the latter. Large cost reductions may feed through into poorer service quality and lower earning capacity and this is presumably why those banks that gained the most on the cost side seem to suffer in terms of profitability. Those banks that appear to have small reductions (or increases) in cost as a result of technical change see to gain most in terms of profits. The results suggest that there may be a clear trade-off between how technology is implemented in terms of whether the focus is primarily on cost reduction or revenue (and therefore profits) growth. These findings confirm the recent findings on US banking of Berger and Mester (2002) who show that reductions in cost productivity between 1991 and 1997 resulted in increases in profit productivity. They argue that banks increased their cost productivity to improve service quality that was reflected in greater profits. Finally, Altunbas, Carbo, Gardener and Molyneux extend the approach suggested by Altunbas, Evans and Molyneux (2001) to investigate ownership and efficiency issues in banking. They estimate cost and alternative profit efficiencies for a large sample of commercial, co-operative and savings banks operating in Europe and the US. Overall they find that commercial banks tend to be less cost efficient but more profit efficient than their mutual sector competitors. The higher costs incurred by the commercial bank sector appear to be reflected in higher revenues. Large banks also appear to be more profit efficient than smaller banks from the same ownership category. (A summary of the main European X-efficiency Studies are presented in table 5.4).

While scale, scope and X-efficiency have been studied extensively, specially in the context of US and recently EU financial institutions, however, more recently, attention has been paid to measuring efficiency in other banking markets. For example Fukuyama used non-parametric analysis (DEA) to estimate efficiency in Japanese banks for the years 1989-1991. The main finding was that average annual efficiency was 46%. Schaffinit, Rosen and Paradi use DEA analysis and data on 291 Ontario based branches of a large Canadian bank, subdivided into four groups according to size for 1993. Main finding was that overall average efficiency was 0.72 %. Aljarrah, (2002) investigate efficiency in Arabian banking markets used a Fourier-flexible functional form to estimate a stochastic cost frontier from which estimates of productive inefficiencies were obtained for a sample of 82 banks of four Arabian countries (Bahrain, Saudi Arabia, Egypt and Jordan) covering the period 1992-2000. The estimate revealed that on average, inefficiencies estimates appeared to be around 5%. Recently Lui, Molyneux, Sith and Altunbas investigate the impact of risk and quality factors on banks' cost by using stochastic cost frontier methodology to evaluate scale and X-inefficiencies, as well as technical change for a sample of Japanese commercial banks between 1993 and 1996. The main findings are that optimal bank size is considerably smaller when risk and quality factors are taken into account when modelling the cost characteristics of Japanese banks. (a summary of the main X-efficiency studies in other banking markets are presented in table 5.5).

All in all, Berger and Humphrey (1997) suggest that there is a clear need for more work in the area of international comparisons. In Europe, it is a topic of growing interest in view of the trend towards closer integration of national markets in financial services as a result of the SMP and European Monetary Union (EMU)

5.8 Conclusion:

In this chapter we presented a theoretical overview of the banking efficiency literature. Reasons for examining efficiency in the banking industry are highlighted. We also provide definitions for the concepts of X-efficiency, scale and scope economies and draw attention to the significance of empirical efficiency studies in US and European banking markets. We show how overall productive efficiency can be decomposed into technical and allocative efficiency. Concerning the empirical findings of the bank efficiency literature, the chapter shows that X-efficiency dominates scale and scope economies. The chapter also reviews both the parametric and non-parametric approaches utilised in the banking literature to measure efficiency. The main differences between parametric and non-parametric are discussed and the advantages of parametric efficiency approaches highlighted. The chapter also outlined the theoretical underpinnings of the empirical economies of scale and scope studies. Moreover, it shows that banks are defined as multi-product, multi-plant and multi-input firms, since they engage in the production of various services utilising factors of production as diverse as labour, capital equipment and deposits. Empirical studies face various problems when they examine the cost structure of these firms. Such problems relate to; the definition of output and bank total cost; the cost concept of multiproduct firms; and the functional form of the cost (or profit) functions that are used to derive efficiency measures. The chapter also shows that there is still no agreement as to the definition and measurement of bank inputs and outputs. In general, two main approaches labelled the "intermediation approach" and the "production approach" have been adopted to define financial firm input and output relationships.

The following chapter presents the statistical methodology and the general framework adopted in this thesis to analyse the influence of market-power and efficient-structure variables on GCC banks' profitability.

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Chapter Six: The Modelling Framework

6.1 Introduction:

The Structure-Conduct-Performance (SCP) relationship has been extensively researched in the industrial organization literature and in the financial area for several decades. Most of these studies have centred on the US banking industry. In recent years the SCP relationship has been investigated in the European banking industry. Most of this literature has focused on how the market structure influences bank performance within one single financial market structure. However, there are very few studies that analyse the SCP model across banking markets. This study attempts to remedy this imbalance by extending the current SCP literature by examining the banking industries of six member states of the Gulf Co-operation Council, (GCC) these include: Saudi Arabia, Qatar, Bahrain, United Arab Emirates (UAE), Oman, and Kuwait. Following Berger (1995) the study also analyses two market power hypotheses and two versions of the efficient–structure hypotheses, across these six banking markets. As far as we are aware there has been no previous structure-performance studies on the banking industry of the GCC states. Further, in addition to the standard accounting profitability measures which are widely used in the structure-performance literature, this study utilize a parametric profitability measure [this is the alternative profitability estimates (APX)]. As far as we are aware this is the first study to use parametric measures of profit efficiency in the structure-performance literature.

This chapter describes the methodology that will be used to examine SCP relationships in GCC member states banking markets. The next section describes the general modelling framework. Section 6.3 will investigate the variables used in the study. Section 6.4 details the model specification and the variables employed in the empirical analysis. The final section 6.5 is the conclusion

6.2The General Model:

Berger (1995) refined and re-tested the theoretical underpinning of the positive statistical profit-structure relationship in banking by including direct measures of efficiency for the two versions of the efficient-structure hypotheses. His study was unique, because not only did he consider the traditional SCP model, which suggested that the positive profit-structure relationship reflects the setting of prices that are less favourable to consumers (low deposit rates, high loan rates), in more concentrated markets, and the Relative Market Power model (RMP), which states that only large firms, with large market shares and well differentiated products, are able to exercise market power in pricing these products thereby earning supernormal profits. He also outlined the two efficiency explanations of the positive relationship between profits and either concentration or market share, these are the X-efficiency version of the efficient-structure hypotheses (ESX) and the scale-efficiency version of the efficient-structure hypotheses (ESS). Under the former, firms with superior management or production technologies have lower costs and higher profits than firms lacking these skills. These firms are also assumed to gain large market shares, which may result in higher levels of concentration. The latter states that some firms produce at more efficient levels than others which result in lower unit costs and higher profit levels. Again, such firms are assumed to gain larger market shares resulting in higher concentration ratios. However, under both efficient-structure hypotheses, the positive profit-structure relationship is spurious, rather than of direct origin, with efficiency driving both profits and market structure. This study builds upon the work undertaken by Berger (1995), who created and implemented tests that distinguish among these hypotheses as they apply to the banking industry.

> Many studies in the banking literature and in the more general industrial organization literature find a positive statistical relationship between profitability and measures of market structure—either concentration or market share. The traditional structure-conduct-performance hypothesis (SCP) asserts that this finding reflects the setting of prices that are less favourable to consumers (lower deposit rates, higher loan rates) in more concentrated markets as a result of competitive imperfection in these markets. A related theory is the relative-market-power hypothesis (RMP), which asserts that only firms with large market shares and well-differentiated products are able to exercise market power in pricing these products and earn supernormal profits. In contrast to these two market-power theories, there are also two efficiency explanations of the positive relationship between profits and either concentration or market share, that is, of the positive profit-structure relationship. Under the X-efficiency version of the efficient-structure hypothesis (ESX), firms with superior management or production technologies have lower costs and therefore higher profits. These firms are also assumed to gain large market shares that may result in high levels of concentration. Here, the positive profit-structure relationship is spurious, rather than of direct origin, with efficiency driving both profits and market structure. Under the scale-efficiency version of the efficient-structure hypothesis (ESS), firms simply produce at more efficient scales than others, and therefore have lower unit costs and higher unit profits. These firms are assumed to have large market shares that may result in high levels of concentration, again yielding a positive profit-structure relationship as a spurious outcome. The purpose of this paper is to create and implement tests that distinguish among these hypothesis as they apply to banking. These theories have been tested in numerous previous studies using both banking and inter-industry data without a consensus arising, the results have been difficult to interpret because efficiency variables, particularly X-efficiency or managerial efficiency measures, have generally been excluded from the analyses, we attempt to distinguish among all four hypothesis by using direct measures of both market structure and efficiency, the tests are flexible in the sense that all four hypothesis, SCP, RMP, ESX, and ESS represented by different variables, so that any or all of them may be found to be consistent with data. Berger (1995, p. 404 -5).

The results, presented later, will concentrate on the four hypotheses within Berger's structure, using a multiple regression analysis to test the effects of concentration, market share, bank X-efficiency, and scale-efficiency on bank profitability in GCC banking markets. Furthermore, our study will adopt the stochastic frontier analysis technique and specify a translog functional form which is commonly used in banking literature to capture GCC bank's cost and profit X-efficiency scores and scale efficiencies. The profit X-efficiency estimates (APX) derived from stochastic and translog functional form will be used as a dependent variable in addition to the standard accounting profitability measures these are the return on equity (ROE) and the return on Assets (ROA) to test for the efficiency determinants in GCC banking systems. Moreover, the panel data used in the study covers six separate countries, this allows for an assessment of estimates of the hypothesised relationships after taking into account country differences.

Following Berger (1995) the reduced form equation that explain the profitability per unit of output is as follows:

$$\pi_i = f(CONC_m, MS_i, X\text{-}EFF_i, S\text{-}EFF_i, Z_{im}) + \varepsilon_i \quad \ldots\ldots\ldots\ldots 6.1$$

Where π is a profit measure, usually a standard profit measure (ROE, and ROA) (our study also will utilise the alternative profit X-efficiency measure (APX) as a profitability measure). CONC is some market concentration measure, MS is an individual bank market share measure, X-EFF relates to the bank X-efficiency measure, S-EFF is a scale-efficiency measure, and Z are a vector of control variables, capturing other firm and market-specific differences, ε is random error, m indexes the market, and *i* indexes the banks in market *m*.

This may be viewed as the reduced form for π of all four hypotheses, the traditional structure-conduct-performance hypothesis (SCP), the relative-market-power hypothesis (RMP), the X-efficiency hypothesis (ESX), and the scale-efficiency hypothesis (ESS), with some of the explanatory variables irrelevant for some of the hypotheses (Berger, 1995). Under the efficient-structure (ES) hypothesis, the coefficient of the appropriate (EFF) variable is positive, and the coefficients of all the other key variables are either relatively small or zero. CONC and MS, although endogenous in the ES model, may be included but should be found to have no explanatory power. Their irrelevance stems from their logical ordering in the model, since they are correlated with π only because they reflect the effects of EFF and Z, which are controlled for in this equation. Similarly, under the MP hypothesis, the appropriate market structure variables, CONC or MS, have positive coefficients. For instance, if only RMP holds, CONC has zero coefficient because *CONC* is only spuriously related to π through its correlation with MS. Under MP, the EFF are appropriate exogenous variables, but are just viewed as relatively unimportant, (Berger, 1995). Note that the reduced form in equation (6.1) allows all four hypotheses to be valid simultaneously. To the extent that any of the key variables have positive estimated coefficients, this may be taken as evidence of the marginal contribution of the corresponding hypothesis.

An important limitation of the reduced-form profit equation is that it tests only one of the two necessary conditions of the ES hypotheses. "In order to explain the profit-structure relationship spuriously, *both* profits and the market structure variables must be positively related to efficiency" Berger (1995, p 412).

This requires estimates of the reduced forms for CONC and MS from the ES model:

$$CONC_m = f(\text{X-EFF}_i, \text{S-EFF}_i, Z_{im}) + e_{i,\ \text{for all } i \text{ in } m} \quad 6.2$$

$$MS_i, = f(\text{X-EFF}_i, \text{S-EFF}_i, Z_i,) + e_i, \quad 6.3$$

And test whether the EFF coefficients are positive.

Several variations on the above model specification have been used in the study of the relationship between market structure and performance [see among others, Smirlock (1985); Evanoff et al. (1988); Hannan, et al, (1991)] . Particularly in the US market and to some extent in UK and other countries of EU. Many of these studies regress profitability on concentration and market share and find similar results, but interpret them very differently. Some argue that the common findings of a positive, dominating coefficient estimate for market share and insignificant coefficient for concentration justifies acceptance of the RMP, which for example relates market share to market power (Shepherd 1986a. Kurts and Rhoades 1991). Others argue that these findings support ESX, since market share may be positively related to X-efficiency under (ESX) in the absence of any direct measure of x-efficiency in the equation. For instance, leading researchers such as Smirlock (1985), Evanoff and Fortier (1988) and

Molyneux and Thoronton (1992) included proxies measures of efficiency, where the market share variable is assumed to capture firm specific characteristics, rather than using a direct measure. Other studies (Berger and Hannan 1989, Hannan1991) have tested the market-power (MP) hypotheses alone by examining the price-concentration relationship without the benefit of efficiency variables. Prices are regressed against concentration and/or market share, and a finding of less favourable prices for consumers of firms in more concentrated markets or with larger market shares is taken as support for the appropriate MP hypotheses.In this study, direct efficiency measures obtained from a stochastic frontier analysis are incorporated into the model. Berger (1995, p. 406), identified two reasons that are used to justify the inclusion of direct measures of both x-efficiencies and scale efficiencies in the SCP framework.

> Firstly because indirect measures of scale efficiencies have often been specified that do not allow for U-shaped average cost curves;
>
> Secondly the implications of the ES hypotheses regarding the effects of efficiency on market structure have *never been tested.* A necessary condition for the ES hypotheses to be true is that efficiency be positively related to concentration and/or market share. Again, direct measures of efficiency are needed for this task.

6.3 Variable Selection:

In order to investigate the relationship between profits, concentration, market share and efficiency we follow an approach similar to Berger (1995). The choice of variables used in our estimation depends on data available on Bank Scope, the International Bank Credit Analysis Ltd (IBCA), a London-based bank credit-rating agency and data published by GCC central banks, the IMF, and the other financial institutions of the six states under study. A sample of balance sheet and income statement data of GCC member states banks was taken over the period from 1995 to 1999. Standardised year-end accounting data for the banks were obtained from International Bank Credit Analysis Ltd (IBCA), and the variables chosen were classified into groups according to the specification of the general model discussed above (see chapter 7 for a detailed discussion of the data).

6.3.1 Performance Measures:

> Most SCP studies also experience difficulties in measuring structure and performance variables adequately. Using the price of a single banking product as a measure of performance may be misleading because most large banks are multi-product firms. Profit measures may be more informative in this respect, but may also be more difficult to interpret because of the complexity of the accounting procedures involves. Goddard et al. (2001,p. 73).

The three main performance measures used for our analysis are pre-tax return on assets (ROA), Pre-tax return on equity (ROE), and the alternative profit efficiency estimates derived from the alternative profit function. ROA and ROE are standard accounting performance measures widely used in the empirical banking literature (Hannan et al, 1998). These accounting measures are used in favour of market-value measures for two main reasons. First, many of the banks in our sample do not have publicly quoted equity on which market-based estimates could be made. Secondly, ROA and ROE are generally regarded as the most appropriate overall bank performance measures (Sinkey1992). Gilbert (1984) identified that the only measures of bank performance obtained from bank financial accounts that do not have major measurement problems are bank profit rates. Others, such as Rhoades (1981, 1985a, 1985b) and Evanoff and Fortier (1988), provide support for the use of profitability measures to account for the performance of banks. In addition to use these "standard" performance measures we also use alternative profit efficiency measures as another indicator of bank performance. These we derive from estimates of a stochastic profit frontier that uses the same independent variables as the cost frontier but replaces total cost with profit, as authored in Berger and Mester (1998) this provides us with a parametric estimate of profit efficiency which can be compound to the results derived from standard profit measures. However, as far as we are aware, this is the first study used alternative profit efficiency estimates as profitability measures in structure-performance studies.

SCP studies generally can be divided into two groups according to the measure of performance that they use (Wilson, et al, 2001). The first group uses some measure of the price of certain banking products and services in order to capture the performance of the firm, while the second group uses some kind of profitability measure, such as return on assets or return on equity. Evanoff and Fortier (1988) suggest a number of reasons why the ROA measure is preferable to other profit measures. Firstly, although some studies have used bank product prices as the dependent variable, banking is a multi-product business and individual prices may be misleading. Prices can only be used if costs directly associated with these prices are explicitly accounted for as explanatory variables, 'even then, given the regulatory constraints on the industry, the expected structure-price relationship may not be realised for a particular service because of differing pricing strategies among banks' (Evanoff and Fortier, 1988, p.281). Secondly, the potential for significant cross-subsidisation between products obviously exist and pricing strategy would differ across markets. As a result, the use of profit measures should eliminate many of these potential problems. Recent studies, for example, by Molyneux and Thoronton(1992), Molyneux and Forbes (1995), Berger (1995), Goldberg and Rai (1996), provide support for the use of these profitability measures as opposed to other product price measures.

> Profitability measures, where all product profit and losses are consolidated into one figure, are generally viewed as more suitable because they by-pass the problem of cross-subsidization. Molyneux and Forbes (1995,p 156).

ROA is generally regarded as a more satisfactory measure because of the significant discretion that individual banks in different countries have in dividing capital between debt and equity.

Equity values may not be comparable across countries between banks, therefore bank assets is a more common denominator. However, difficulty in identifying the objectives of bank owners and managers may also tend to make SCP relationships tenuous (Molyneux, et al. 2001). For example, if banks are sacrificing potential profits in order to reduce risk by investing in more secure activities, then researchers should be more interested in variability in profit and not in profit per se (Neuberger, 1998). Alternatively, if managers are maximizing utility through expense preference behaviour, then large banks in concentrated markets will not necessarily make abnormal profit (Berger and Hannan, (1998). Indeed Berger (1995) argues that many of the regression models used to test SCP relationship may be mis-specified due to omitted variables. Berger et al. 1997.p. 23 notes that:

> The dependent variable in the profit functions is *essentially* the return on equity, or ROE, achieved by the bank (normalized by prices and with a constant added). Or a measure of how well the bank is using its scarce financial capital. This measure may be closer to the goal of the bank than maximizing the level of profits, particularly in banking, which is one of the most highly financially levered industries. Shareholders are interested in their rate of return on equity, which is approximated by ROE, and most debtholders do not put much pressure on banks to earn profits because their return are guaranteed by deposit insurance.

Of course, neither of the above measures is ideal (Goddard, et al. 2001). For example, if banks with monopoly power have higher capital-to-asset ratios, because they are more conservative or they have generated larger absolute profits over time and have retained these funds, their ratios of profits to capital may be low, even though their net return on assets is high.

6.3.2 Concentration Measures:

> Theoretical market structures have a multidimentional array of defining characteristics, including the number and size distribution of firms, the extent of product differentiation, and the size of entry barriers. Nevertheless, much empirical research into the link between market structure and the behaviour and performance of firms tends to rely heavily on a number of alternative measures of the first of these characteristics, the number and size distribution of firms. No doubt the emphasis on this aspect of structure is influenced strongly by the relative ease with which firm size distributions can be observed and quantified, in comparison with some of the other structural characteristics.
>
> Moluneux et al. (2001, p.30).

Following Berger (1995) we choose to use a three-firm assets concentration ratio as a measure of market structure. Berger also used the Herfindahl index and the three-firm Herfindahl index and obtained similar results to these given by the three-firm deposits concentration ratio. However, while theory suggests that there may be a link between the level of output controlled by the largest firms and profitability there is no agreement as to the exact number of firms needed for this relationship to be established. In previous SCP studies, the majority of authors appear to have chosen arbitrarily a three-firm concentration ratio (Goddard, et al, 2001). This implies equal impact by the three leading firms, although nothing in theory suggests that the behaviour of the largest three firms is all-important to market performance or that their relative impact is uniform (Hannan, et al, 1998).

> Among the most important characteristics that define the four main theoretical market structures are the number of firms, the degree of product differentiation, and the height of barriers to entry. The number and size distribution of firms are usually the most easily quantified aspects of market structure. Defining what constitutes the "market" is, of course, problematic in banking, in view of the multiproduct nature of the modern-day financial services firm. Nevertheless, the most commonly used measures are the three-firm or five-firm deposits or assets concentration ratio (Molyneux et al., 1996, p. 93),

6.3.3 Market Power Variables:

In this study market share is used as a proxy for market power. Two measures for market share are calculated. The first measure is the ratio of individual bank's loans to the market total loans calculated as, the individual bank's total loans divided by the market total loans. The second measure is the ratio of individual bank's deposits to the total market deposits calculated as that individual bank's deposits divided by the total market deposits. Following Berger (1995), the positive findings of these measures will support the relative market power hypotheses, (RMP).

6.3.4. Derivation of the X-Efficiency and Scale Efficiency Measures:

6.3.4.1 Derivation of the Cost X-Efficiency

As discussed in detail in the previous chapter, a large number of studies have measured firm-specific x-efficiency in banking, yielding a wide variety of estimates (see Berger and Humphrey 1997). The most important difference among the methods used in these studies has been the handling of the difficult problem of disentangling inefficiencies from short-term differences in luck or measurement error that temporarily give banks relatively high or low costs or input requirements. The most common efficiency estimation techniques are data envelopment analysis (DEA), free disposable hull analysis (FDH), the stochastic frontier analysis (SFA), the thick frontier approach (TFA), and the distribution-free approach (DFA). The first two of these are nonparametric techniques and the latter three are parametric methods. Data envelopment analysis (DEA) assumes that there is no random error, so that all unexplained variation in costs reflects inefficiency [Aly, Grabowski, Pasurka, Rangan, (1990), Elyasiani and Mehdian (1990), Ferrier and Lovell (1990), Fare, Grosskoff, and Lovell (1994), Sengupta (2000)]. The econometric (Stochastic) Frontier Approach (SFA) assumes that inefficiencies typically follow an asymmetric half-normal distribution, while random errors follow a symmetric normal distribution [Ferrier and Lovel (1990), Bauer, Berger, and Humphrey (1992), Cebenoyan et al. (1993), Mester (1996), Allen and Rai (1996), Altunbas, Liu, Molyneux and Seth (2000), Kumbhakar and Lovell (2000)]. The Thick Frontier Approach (TFA) assumes that cost differences within the highest and lowest average cost quartiles of banks primarily represents random error, while differences between these quartiles primarily reflect efficiency differences [Berger and Humphrey (1991 a,b), Bauer, Berger, and Humphrey(1992)].

The nonparametric methods generally ignore prices and can, therefore, account only for technical inefficiency in using too many inputs or producing too few outputs. They cannot account for allocative inefficiency in misresponding to relative prices in choosing inputs and outputs. Nor can they compare firms that tend to specialize in different inputs or outputs, because there is no way to compare one input or output with another without the benefit of relative prices. In addition, similar to the cost function, there is no way to determine whether the output being produced is optimal without value information on the outputs. Thus, the nonparametric techniques typically focus on technological optimisation rather than economic optimisation, and do not correspond to the cost and profit efficiency concept.

Mester, et .al, (1997, p.11).

Following Mester (1996), and Allen and Rai (1996), Altunbas, Molyneux, Liu, and Seth (2000), this study uses the stochastic cost frontier methodology specifying a translog functional form to estimate cost and profit X-efficiencies and Scale-efficiencies for the GCC member states banking markets. This stochastic frontier approach that is used follows the lines suggested by Aigner, Lovell and Schmidt (1977) and Meeusen and van den Boerck (1977). This approach labels a bank as inefficient if its costs (profits) are higher (lower) than those predicted for an efficient bank producing the same combination of input and output and if the difference can not be explained away by statistical noise.

The possibility remains that a producer will end up above the deterministic kernel of an estimated production, revenue, or profit frontier, or beneath an estimated cost frontier due to an unusually favourable operating environment. Thus an unfavourable operating environment is just as likely to occur as is a favourable operating environment, and this causes a producer to end up beneath, or above each of the previous senses. but it is considerably more likely that failure to optimise in each of the senses discussed previously also causes a producer to end up beneath an estimated, production, revenues, or profit frontier or above an estimated cost frontier.

Kumbhakar and Lovell (2000, p.3).

For the ith firm, the single equation cost function model is represented in natural logs by:

$$\mathit{InTC}_i\ , = \mathit{InTC}(Qi, P_i, K, B) + e_i\ , \qquad 6.4$$

Where TC_i is the observed total cost of production for bank **i**, Q_i, is the vector of banking output for bank i, ***Pi***, is the vector of input prices for bank i, ***K*** is the level of equity included as a control variable for risk, and ***B*** is a vector of parameters need to be estimated. ***InTC(Qi ,P$_i$K ,B)*** is the predicted log cost function of a cost-minimising bank operating at ***(Qi ,P$_i$K ,B)*** and e_i is a two-component error term. As mentioned above the stochastic cost frontier model used in this empirical study implies that a banking firm's observed total cost will *deviate* from the cost-efficient frontier because of random noise v and possible inefficiency, u, the composite error term for the ith firm is presented by this equation.

$$e_i = v_i + u_i \qquad 6.5$$

Where v_i is a two-sided error term representing statistical noise which is assumed to be independently and identically distributed;(i.i.d) and u_i is a non-negative one-sided random variable representing inefficiency and assumed to be distributed independently of the v_i.

The inefficiency factor, u_i, incorporates both allocative inefficiencies, from failing to react optimally to relative prices of inputs, ***Pi***, and technical inefficiencies, from employing excessive (or extra) inputs to produce the outputs ***Qi***,. it is also assumed that the v_i are normally distributed with mean zero and variance σ^2_v, which capture the effects of the statistical noise and the U_i are the absolute values of a random variables are assumed to account for technical inefficiency in cost, and assumed to be independently distributed as truncation at zero of the normal distribution, see for example, (Coelli, et. al.1995). A common criticism of the stochastic frontier method is that there is no a priori justification for the selection of any particular distributional form for the technical inefficiency effects, ***u***. The half-normal and the exponential distributions are arbitrary selections, (Kumbhakar, et al,2000). Since both of these distributions have a mode at zero, it implies that there is the highest probability that the inefficiency effects are in the neighbourhood of zero (Battese et al, 1998). This, in turn, implies relatively high technical efficiency. In practice, it may be possible to have a few very efficient firms, but a lot of quite inefficient firms (Lovell, et al, 2000). A few researchers attempted to address this criticism by specifying more general distributional forms, such as the truncated-normal (Stevenson, 1980) and the two-parameter gamma (Greene, 1990) distributions for the technical inefficiency effects. These two distributions allow for a wider range of distributional shapes (including ones with non-zero modes), but this comes at the cost of computational complexity (Battese, et al. 1998). The truncated-normal model appears to suffer from fewer computational problems than the gamma distribution.The truncated-normal distribution is a generalisation of the half-normal distribution. It is obtained by the truncation at zero of the normal distribution with mean, μ and variance, σ^2. If μ is pre-assigned to be zero, then the distribution is the half-normal. The distribution may take a variety of shapes, depending upon the size and sign of μ. Estimation of the truncated-normal stochastic frontier involves the estimation of the parameter, μ , together with the other parameters of the model. The log-likelihood function required for the ML estimation of the parameters of the model was first given by Stevenson (1980). Expressions for appropriate predictors of the technical efficiencies of firms were given in Battese and Coelli (1988, 1993, 1995, 1998). A number of empirical studies (e.g., Pitt and Lee, 1981; and Kalirajan, 1981) have investigated the determinants of technical inefficiencies among firms in an industry by regressing the predicted inefficiency effects, obtained from an estimated stochastic frontier, upon a vector of firm-specific factors, such as firm size, age and education of the manager, etc., in a second-stage analysis. There is, however, a significant problem with this two-stage approach,[see among others Coelli, et al. (1998); Gardener & Williams (2000); Lovell et al, (2000); In the first stage, the inefficiency effects are assumed to be independently and identically distributed in order to use the approach of Jondrow, et al. (1982) to predict the values of the technical inefficiency effects. However, in the second stage, the predicted inefficiency effects are assumed to be a function of a number of firm-specific factors, which implies that they are not identically distributed, unless all the coefficients of the factors are simultaneously equal to zero. Kumbhakar, Ghosh and McGuckin (1991) and Reifschneider and Stevenson (1991) noted this inconsistency and specified stochastic frontier models in which the inefficiency effects were defined to be explicit functions of some firm-specific factors, and all parameters were estimated in a single-stage ML procedure. Huang and Liu (1994) also presented a model for a stochastic frontier production function, in which the technical inefficiency effects were specified to be a function of some firm-specific factors, together with their interactions with the input variables of the frontier function. Battese and Coelli (1995) extended these approaches to accommodate panel data, which permits the estimation of the parameters of the factors believed to influence the levels of the technical inefficiency effects, together with the separate components of technical inefficiency change and technical change over time.

This study adopts the model proposed by Battese and Coelli (1995), that specifies technical inefficiency effects in the stochastic frontier model that are assumed to be independently distributed non-negative random variables. For the i-th firm in the t-th period, the technical inefficiency effect, u_{it}, is obtained by truncation of the $N(\mu_{it}, \sigma^2)$ distribution, where

$$\mu_{it} = z_{it}\delta, \qquad 6.6$$

where z_{it} is a (lxM) vector of observable explanatory variables, whose values are fixed constants; and δ is an (Mxl) vector of unknown scalar parameters to be estimated (which would generally be expected to include an intercept parameter). The log-likelihood function for this stochastic frontier and inefficiency model is presented in the Appendix in Battese and Coelli (1993, 1995, 1998), together with the first partial derivatives of the log-likelihood function with respect to the different parameters of the model. These expressions are given in terms of the variance parameters,

$$\sigma_s^2 = \sigma_v^2 + \sigma^2 \text{ and } \gamma = \sigma^2 / \sigma_s^2 \qquad 6.7$$

Where the γ-parameter has value between zero and one, and the technical efficiency of cost for the i-th firm at the t-th observation is defined by the following equation:

$$TE_{it} = exp(-U_{it}) = exp(Z_{it}\delta + W_{it}) \qquad 6.8$$

In this study the sample data from GCC banks and financial institutions for the period 1995-1999 are organised in a panel. Specifically, we employ the above, Battese and Coelli model (1995) of a stochastic frontier function for panel data with firm effects which are assumed to be distributed as truncated-normal random variables (that is, N(μ_{it},σ^2)

> Panel data have some advantages over cross-sectional data in the estimation of stochastic frontier models. The availability of panel data generally implies that there are a larger number of degrees of freedom for estimation of parameters. More importantly, panel data permit the simultaneous investigation of both *technical change* and *technical efficiency change* over time, given that technical change is defined by an appropriate parametric model and the technical inefficiency effects in the stochastic frontier model are stochastic and have the specified distribution. Battese and Coelli (1998, p202).

Therefore it is possible to express this model as follows:

$$TC_{it} = x_{it}\beta + v_{it} + u_{it}, \quad [\text{with } i = (1,2,\ldots,N) \text{ and } t = (1,2,\ldots,T)] \qquad 6.9$$

Where TC_{it} is the logarithm of the total costs for the i-th firm on the t-th time period; x_{it} is a kx1 vector of (transformations of the) input prices and output quantities, and other explanatory variables associated with the i-th firm in the t-th time period; β is the vector of unknown parameters; and the v_{it} and the u_{it} are defined as above. Moreover, the parameterisation of

Battese and Corra (1977) is employed. They replaced σ^2_v and σ^2_u with $\sigma^2 = \sigma^2_v + \sigma^2_u$ and $\gamma = \sigma^2_u / (= \sigma^2_v + \sigma^2_u)$. As recently emphasised by Coelli and Battese (1998,p208)

> The γ parameterisation has an advantage in seeking to obtain the maximum likelihood estimates because the parameter space for γ can be searched for a suitable starting value for the iterative maximisation algorithm involved.

In particular, a value of γ of zero indicates that the deviations from the frontier are due entirely to statistical noise, while a value of one would indicate that all deviations are due to inefficiency.

6.3.4.2: Specification of the Functional Form:

To estimate an efficient frontier function, residuals from the cost or profit function must be analysed; they measure the difference between expected and observed costs or profits. Residuals are composed of two parts: a random one, due to measurement errors of idiosyncratic shocks and a systematic one that identifies every single firm. To separate the two components, it is necessary to make assumptions about their probability distributions. Usually, the random component is assumed to have a normal distribution with zero mean and finite variance; the systematic component is assumed to have a semi-normal or a truncated normal distribution with finite variance (Stevenson 1980). The two components are separated using the technique first proposed by Jondrow, Lovell, Materov and Schmidt (1982); it is then possible to estimate the efficiency level of each firm and of the sample. The systematic part of the residual is an efficiency indicator that can be used to compare firms; the ratio between the residual of a firm and the highest residual (for profit functions, the lowest for cost functions), that identifies the best practice firm, is a measure of relative efficiency. Given the importance of the residuals for the measurement of efficiency, it is particularly important to minimize specification errors due to wrong functional forms that could bias the results. The translog function (Christensen and Greene 1976) is flexible in that it allows to estimate a large family of functional forms. Its high number of parameters, however, makes it difficult to adopt when estimating frontiers on a small sample. The translog is a second-order approximation around the mean values of the sample, therefore measures for data points far away from it are necessarily imprecise. Furthermore, the translog is a quadratic function; its symmetrical structure forces symmetry on the data; for example, if there are strong economies of scale in the sample for small firms, the translog which tends to fit U-shaped curves, will erroneously find diseconomies of scale for the larger firms of the sample.

> Translog functional form has been widely used in the empirical investigations of the cost economies of financial institutions, it is the most popular form in the literature, however, it doesn't necessarily very well fit data that are far from the mean in terms of output size or mix,

Berger, et,al.(1997,p13).

Furthermore, Wilson, et al. (2001, p.116), note that.

> The translog offered at least two important advantages over the Cobb-Douglas functional form. First, it allowed for a U-shaped average cost curve or, more generally, for a cost curve that is not uniform for all sizes. Second, it dispensed with the ancillary hypothesis of an input elasticity equal to one, which is implicit in the Cobb-Douglas functional form. It also imposed fewer constraints on the structure of costs than the CES production function. It is therefore possible to test for any non-monotonic trend in the cost function, and for the relationship between multiproduct operations and costs. In general, the translog functional form appeared to be more suitable to represent the true nature of the activity of financial institutions.

A semi-parametric flexible form, that overcomes the problems of a translog function, is in fact a translog with trigonometric factors added on, derived from a Fourier transform of the variables (Gallant 1981). The Fourier-flexible function is the best global approximation of an unknown function, such as a cost or profit function (Mester et al, 1998), but the number of parameters that have to be estimated is so high that it can be used only on very large data samples. Moreover, (Altunbas et al, 1998, p.2) note that:

> Although the Fourier flexible functional form better approximates the underlying cost function than the translog formulation, neither functional form is an appropriate descriptor of the cost function. As a consequence, it is concluded that even the use of more flexible functional forms such as FF may lead to misleading estimations of the inefficiency values.

Due to the limited size of our sample, we use a translog functional form specification to estimate the cost and profit efficiencies as well as cost scale elasticities and scale-efficiencies across the GCC member states banks. The translog cost function we intend to estimate is as follows:

$$
\begin{aligned}
\ln\left(\frac{TC}{p_3}\right) &= \alpha_0 + \sum_{l=1}^{2}\alpha_l \ln Q_l + \sum_{j=1}^{3}\beta_j \ln p_j + \tau_k \ln K + \tau_S \ln S + \\
&+ 1/2\Big[\sum_{l=1}^{2}\sum_{j=3}^{3}\delta_{ij}\ln Q_l \ln Q_t + \sum_{i=1}^{3}\sum_{j=1}^{3}\gamma_{ij}\ln p_i \ln p_j + \tau_{kk}\ln K \ln K + \tau_{ss}\ln S \ln S\Big] + \\
&+ \sum_{l=1}^{2}\sum_{j=1}^{3}\rho_{ij}\ln Q_l \ln p_j + \sum_{l=1}^{2}\alpha_{ik}\ln Q_l \ln K + \sum_{j=1}^{3}\beta_{jk}\ln p_j \ln K + \sum_{i=1}^{2}\alpha_{is}\ln Q_l \ln S + \\
&+ \sum_{j=1}^{3}\beta_{js}\ln p_j \ln S + \tau_{ks}\ln K \ln S + \varepsilon_i
\end{aligned}
\qquad 6.10
$$

Where TC is a measure of the costs of production, comprising operating costs and financial costs (interest paid on deposits); the Q_i, (i= 1,2,......,m) are output quantities, P_j (j=1,2,.......,n) are input prices. Moreover, standard symmetry has to be imposed on the translog function that is:

$\delta ij = \delta ji$ *and* $\gamma ij = \gamma ji$, where (i=1,2) and (j=1,2,3), and the following linear restrictions are necessary and sufficient for linear homogeneity in factor prices:

$$\sum_{j=1}^{n}\beta j = 1;\ \sum_{i=1}^{n}\gamma ij = 0 \text{ and } \sum_{j=1}^{n}\rho ij = 0.$$

In this study the parameters of the stochastic frontier cost function, defined by (6.10) are estimated using the Maximum-likelihood (ML) approach. For instance, the ML estimates of β, σ_s^2 and γ are obtained by finding the maximum of the log-likelihood function as specifie in Coelli et. al (1995).The nature of the log-likelihood function of the model given the distributionl assumptions on v and u can be also found in Battese and Coelli (1995, 1998).

For the purpose of our efficiency measurement, we use the intermediation approach which defined total costs as the financial and operating costs. We use two output measures: total loans ($Q1$); and total other earning assets ($Q2$); and three input prices these are:

$P1$ the price of funds defined as the ratio of(trading expenses+ interest paid to purchased funds (customer and short term funds plus other funding), to total customer deposits (we included trading expenses as a fund price for Islamic banks, because deposits are interest free at these banks as they following the islamic law which prohibited the interest), $P2$ is the price of labour defined as the ratio of personnel expenses to total assets and $P3$ the price of capital defined as the ratio of non-interest expenses to total fixed assets. Moreover, the level of equity is included to control for differences in risk incurred by banks. The specification of equity in the cost and profit functions goes part of the way toward accounting for different risk preferences, if some banks are more risk-averse than others, they may hold a higher level of financial capital than maximize profits or minimize costs (De Young, et al, 1998). If financial capital is ignored, the efficiency of these banks could be mis-measured, even though they are behaving optimally given their risk preferences. Hughes, et al(1998,p.7),noted that

> Since capital is a cushion against losses and , hence, protection against financial distress, its level influences the probability of financial distress and is a critical consideration in dealing with liquidity risk. Moreover, since capital represents the bank's own bet on the quality of its assets and on its efforts at maintaining asset quality, the level of capital can function as a credit signal of the bank's exposure to risk.

However, larger banks usually depend more on debt financing to finance their portfolios than smaller banks do. Thus failure to control for equity could yield a scale bias. Furthermore, Berger,et al (1998), p.8).stated that

> Given their asset sizes, lower-risk banks may choose to hold higher levels of capital as a signal to outsiders that their exposure to risk is lower. A higher-risk bank cannot afford to mimic a lower-risk bank's signal because the opportunity cost of holding this extra capital is greater for them. These banks, by definition, hold riskier assets than lower-risk banks, and, in an informationally efficient loan market, they expect a higher return on their assets than do lower-risk banks to compensate them for their assets' greater expected losses and variance.

Nonetheless, Mester (1996, p. 2) emphesized that:

> Financial capital should be accounted for in the cost function and the *level* rather than the *price* of financial capital should be included, since there is good reason to believe that cost-minimization doesn't fully explain a bank's capital level-e.g., regulations set minimum capital-to-asset ratios, and bank managers may be risk-averse.

The cost model we use is similar to that used in previous efficiency studies[Mester (1996); Berger et al (1997, 1998); Altunbas et al, (2000); and Casu (2001); in that it explicitly accounts for the quality of bank's assets and the probability of failure, which can influence banks' costs in a number of ways. For example, a large proportion of non-performing loans may signal that a bank used fewer resources than usual in the initial credit evaluation and monitoring of its loans. Unless quality and risk are controlled for, one might easily miscalculate a bank's level of inefficiency; e.g. banks scrimping on credit evaluations or producing excessively risky loans might be labelled as efficient when compared to banks spending resources to ensure their loans are of higher quality, (Mester, 1996). Table 6.1 summarise the descriptive statistics of the bank's inputs and outputs variables for GCC countries over 1995-1999 (Cost and Alternative Profit

Efficiency) and other control and environmental variables included in the cost and profit function.

Table 6.1: Descriptive statistics of the bank's inputs and outputs variables for GCC countries over 1995-1999 (Cost and Alternative Profit Efficiency)					
Variables	**Description**	**Mean**	**St.Dev**	**Min**	**Max**
TC	Total cost= (Interest expense, Personnel expense, trading expense, other operating expense) (US$,Millions).	175	1345	76	1865
Π*	Net Income =Total Revenues – Total Cost (we add the absolute value of the minimum value of the sample to all observations in order to have only positive values; (see Berger et al. 1998).	380	1471	87	2345
P1	Price of funds (%)= (total interest expense + trading expense/ total customer deposits)**	0.06	0.11	0.04	0.35
P2	Price of labour(%)=(total personnel expense/ total assets)	0.05	0.06	0.02	0.19
P3	Price of physical capital=(other operating expense/total assets	0.02	0.03	0.01	0.14
Y1	The US$ value of total aggregate loans(Millions)	1547	2862	30	14760
Y2	The US$ value of total aggregate other earning assets	1344	2652	40	11290
Descriptive statistics of the banks' control and environmental variables included in the cost and profit function, for GCC countries over 1995-1999.					
K	Capital Adequacy(book value of equity)	467	4780	140	12645
S	Asset quality (Loan Los Reserves/Total Loans) (%)	0.18	0.40	0.13	0.78
BA	Dummy variable for Bahrain	-	-	0.00	1
SA	Dummy variable for Saudi Arabia	-	-	0.00	1
Ku	Dummy variable for Kuwait	-	-	0.00	1
OM	Dummy variable for Oman	-	-	0.00	1
QA	Dummy variable for Qatar	-	-	0.00	1
Com	Dummy variable for commercial	-	-	0.00	1
Inv	Dummy variable for investment bank	-	-	0.00	1

Source: Bankscope (Jan, 2002).
* this is the dependent variable in the alternative profit efficiency model(substituting TC variable)
** Islamic banks have zero interest expense, there price of funds is trading expense/total depsosits

The single equation model used to estimate the cost efficiency scores is :

$$InTC_i = InTC(Q_i, p_i, K_i, B) + u_i + v_i \qquad 6.11$$

we impose a linear homogeneity in the input prices by dividing the cost and input prices by the third input price, P_3. To estimate the stochastic X-efficiency scores, we use the Frontier 4.1 software statistical package developed by Battese and Coelli (1992).

6.3.4.3 Prediction of Firm-Level X-efficiencies:

Once the model is estimated, bank level measures of X-efficiencies can be calculated using the residuals and are usually given by the mean of the conditional distribution of u_i given e_i, which can be written as $\hat{e} = (u_i/e_i)$. The mean of the density function for u_i given e_i can be found in Battese and Coelli (1995). For the half-normal stochastic model this $\hat{e} = (u_i/e_i)$ is a consistent estimator for the individual efficiency measure [see Jondrow et al.(1982)].

These individual bank X-efficiency measures (netting out the stochastic disturbance) are generally defined as the estimated cost needed to produce a bank i's output vector if the bank were as efficient as the best-practice bank in the sample, divided by the actual cost of bank i, adjusted for random error [for example, Coelli and Battese (1998)].This ratio between the minimum and the actual cost of bank i can be expressed in the form:

$$Cost\ EFF_i = TC_{min} / TC_i \qquad 6.12$$

Where TC_i is the actual cost of the ith firm, TC_{min} is the minimum cost estimated from the fitted cost frontier, and $Cost\ EFF_i$ is defined as $\exp(-u_i)$. This expression relies upon the value of the unobservable u_i being predicted and is achieved by deriving expressions for the conditional expectation of these functions of the u_i conditional upon the observed value of

$$e_i = (v_i + u_i). \qquad 6.13$$

The cost efficiency ratio may be thought of as the proportion of costs or resource that are used efficiently. For example, a bank with Cost EFF of 0.85 is 85 per cent efficient or equivalently wastes 15% of its costs relative to a best practice firm facing the same conditions.

6.3.4.4 Calculation of Scale-Economies and Scale efficiencies:

To account for differences in scale efficiencies we utilise two measures of scale efficiency to test for the efficient-structure hypothesis (ESS), which asserts that "firms have essentially equally good management and technology, but some firms simply produce at more efficient scales than others, and therefore, have lower unit costs and higher unit profits. These firms are assumed to have large market shares that may result in high levels of concentration", (Berger, 1995, p. 405).

The first measure of scale efficiency we use is a standard scale economy (or scale elasticity) measure. Typically the scale-economies studies estimate an average practice cost function, which relates bank cost to output levels and input prices (Mester, 1996). The technique implicitly assumes all banks in the sample are using their inputs efficiently- in other words, there is no x-inefficiency- and that the banks are using the same production technology.

> Under the scale-efficiency version of the efficient-structure hypotheses(ESS), firms have essentially equally good management and technology, but some firms simply produce at more efficient scales than others, and therefore have lower unit costs and higher unit profit. Berger (1995,p405)

In the early bank cost literature many of the studies found scale elasticities significantly different from unity, [see among others Berger (1993); Hannan et al (1993)];. As a result, the authors suggested that changes in industry structure could produce cost savings through increased efficiency. Recent bank cost studies improved upon previous methodologies by utilizing flexible functional forms, accounting for multiproduct production processes, estimating scale measures at both the branch and firm level, distinguishing between branch and unit bank technologies resulting from regulatory restrictions, etc. The typical finding from the recent studies is that relatively minor scale economies exist in banking since the scale elasticity measure differs little from a value of unity [Berger and Mester (1998); Hannan et al, (1998)]. The scale economies measure considers the effect on cost of a proportional variation in the levels of all outputs, financial capital, and quality. A natural way to express the extent of scale economies is the proportional increase in cost resulting from a small proportional increase in the level of output: that is the elasticity of total cost with respect to output.

The degree of scale economies (SCALE) used her is given by:

$$\text{SCALE} = \sum_{i=1}^{m} \frac{\partial InTC}{\partial In Q_i}$$

Where $\sum_{i=1}^{m} \frac{\partial InTC}{\partial In Q_1}$ represents the sum of individual cost elasticities and can be rewritten as

$$\text{SCALE} = \sum_{i=1}^{m} \alpha_i + \sum_{i}^{m} \sum_{j=1}^{m} \delta_{ij} In Q_j + \sum_{i=1}^{m} \sum_{j=1}^{n} \rho_{ij} In\, p_j +$$

Where there are economies of scale if SCALE < 1, constant returns to scale if SCALE=1 And diseconomies of scale if SCALE > 1.

However, a relatively recent development in the literature differentiates between two concepts, that is, the scale-efficiency, and the scale-economy concept. Evanoff and Israilevich (1995), strongly, criticized the previous literature for what they call, the common confusion in the literature between two relatively straightforward concepts Scale-elasticity and Scale-efficiency

> The implication from the conclusions drawn by the authors of numerous studies is that scale elasticity and scale efficieny are essentially synonymous; the derivation of one automatically provides an accurate or approximate value for the other, until recently, however, studies have not typically evaluated scale efficiency. Instead, scale elasticity estimates have been used as a proxy for efficiency, and elasticity measures close to 1.0 are taken to imply that scale inefficiency is trivial. Scale inefficiency is typically assumed to be linearly related to the scale elasticity measure; i.e. equal to one minus the elasticity measure. Empirically, it is also

> assumed that scale elasticities which are found to be insignificantly different from one in a statistical sense imply scale efficiency. Both statements are incorrect. Yet, failure to distinguish between the two concepts is common in the banking literature. Intuitively, the two concepts differ because they measure different things: elasticity is related to incremental changes in output, and inefficiency to the change in output required to produce at the minimum efficient scale. The cost savings realized by an incremental increase in output by a scale inefficient firm is irrelevant for measuring inefficiency since this is not the savings realized by producing at the efficient scale. (Israelivich, et, al. 1995, p. 1037)

As noted above, the scale elasticity measure, is $\varepsilon = \partial \ln C / \partial \ln Q$, where C is cost and Q output, is a point elasticity associated with a particular output level and indicates the relative change in cost associated with an incremental change from this output level. Scale inefficiency, I, can be measured as the aggregate cost of F inefficient firms ($\varepsilon \neq 1.0$) relative to the cost of a single efficient firm ($\varepsilon = 1.0$), where F = the size of the efficient relative to the inefficient one. That is, $I=[F.C_I/C_E] - 1.0$, where C_I and C_E are the cost of production at the inefficient and efficient firms, respectively.

Furthermore, as with the scale elasticity measure, the inefficiency measure is functional form specific, for example, for the quadratic form, $C = \alpha + bQ + .5cQ^2$, the inefficiency measure will equal$[(b+c.Q_I)/(b+c.Q_E)]$ $[1/\varepsilon_I]$, where, Q_I and Q_E are the output of inefficient and efficient firms, respectively, and it also can similarly derived for alternative forms (Evanoff et al. 1995). Thus, the two concepts are different because they measure different things: elasticity is related to incremental changes in output, and inefficiency to the change in output required to produce at the minimum efficient scale (see Israilevich and Evanoff 1995 for more details).

For our purposes, we follow (Berger, 1995), scale efficiencies are computed from the same stochastic cost frontier model and the translog cost functional specification used to estimate cost x-efficiency scores. For each bank's output mix and input prices, a U-shaped multiproduct average cost curve was traced out and the scale-efficient output vector Y^{se} at the bottom of the U shape was determined. Scale efficiency was determined as the ratio of predicted costs for Y^{se} to predicted costs for the bank's actual output Y, multiplied by the ratio of outputs to correct for absolute size differences:

$$\text{S-EFF} = \exp[\ln\hat{C}(Y^{se},w)-\ln\hat{C}(Y,w)]*[(\sum_{j=1}^{3} Y_j)/(\sum_{k=1}^{3} Y_k^{se})] \qquad 6.13$$

Where the $\ln\hat{C}$s are predicted cost values. It may be seen that this is an estimate of $\hat{AC}^{se}/\hat{AC}_i$, the ratio of minimum predicted average costs to the actual predicted average costs for bank i's output mix and input prices. As with any efficiency measure, S-EFF ranges over (0,1).

6.3.4.5 Derivation of the Alternative Profit Frontiers:

An interesting recent development in efficiency analysis is the concept of alternative profit efficiency, which may be helpful when some of the assumptions underlying cost and standard profit efficiency are not met (De Young et al, 1998). Efficiency here is measured by how close a bank comes to earning maximum profits given its output levels rather than its output prices. Underlying the profit frontier π(P, w,,β) [and the variable profit frontier π(P, w,z,β) as well, z being a vector of quasi-fixed inputs] is the assumption that prices are exogenous and that producers seek to maximize profit (or variable profit) by selecting outputs and inputs under their control. One justification for exogeneity of prices is that producers operate in competitive markets. Suppose, to the contrary, that producers have some degree of monopoly power in their product markets. Under monopoly, the demands would be exploited to determine output prices and quantities jointly, and only input prices would be exogenous. In this context neither a traditional cost frontier (which treats outputs as being exogenous) nor a traditional profit frontier (which treats output prices as being exogenous) would provide an appropriate framework within which to evaluate producer performance. Recently Humphrey and Pulley

(1997) and others have introduced the notion of an 'alternative' profit frontier to bridge the gap between a cost frontier and a profit frontier.

An alternative profit frontier is defined as :

$$\Pi^{A}(y,w;\beta,\delta) = \max_{p,x}\{p^{T}y - w^{T}x : g(p,y,w;\,\delta) = 0,\ D_{o}(x,y;\beta)\leq 1\} \qquad 6.15$$

Where the endogenous variables are (p,x) and the exogenous variables are (y,w), $D_o(x,y;\beta)$ is the output distance function characterizing the structure of production technology, and $g(p,y,w;\ \delta)$ represents what Humphrey and Pulley refer to as the producer's 'pricing opportunity set', which captures the producer's ability to transform exogenous (y,w) into endogenous product prices p. Thus, $\Pi^{A}(y,w;\beta,\delta)$ has the same dependent variable as the standard profit frontier and the same independent variables as the standard cost frontier. However, $\Pi^{A}(y,w;\beta,\delta)$ is not dual to $D_o(x,y;\beta)$, because it incorporates both the structure of production technology (incorporated in the parameter vector β) and the structure of the pricing opportunity set (incorporated in the parameter vector δ). Moreover, without specifying the properties satisfied by the fuction, $g(p,y,w;\ \delta)$ it is not possible to specify the properties satisfied by $\Pi^{A}(y,w;\beta,\delta)$, although it is reasonable to assume that $\Pi^{A}(y,w;\beta,\delta)$ is nondecreasing in the elements of y and nonincreasing in the elements of w. (Lovell, et, al. p.213, 2000), noted that:

> In the absence of Shephard-Hotelling derivative properties, it is not possible to specify a system of equations on which estimation can be based, as would be the case with standard cost or profit frontiers. Consequently the alternative profit frontier must be estimated as a single-equation model, once a functional form is assigned to $\Pi^{A}(y,w;\beta,\delta)$ and an assumption is made concerning error structure.

Alternative profit frontiers have been formulated and estimated by Berger, Cummins, and Weiss (1996), Hasan and Hunter (1996), Akhavein, Berger, and Humphrey (1997), Berger and

Mester (1997), Humphrey and Pulley (1997), and Lozano Vivas (1997). Each has used a single-equation model, although a variety of functional forms have been specified, and a variety of estimation techniques has been employed. Each has estimated technical inefficiency, and its impact on alternative profit, under an assumption of allocative efficiency. Berger, et.al (1997,p.7) notes that

> Alternative profit efficiency may provide useful information when one or more of the following conditions hold:
>
> i. There are substantial unmeasured differences in the quality of banking services;
> ii. Outputs are not completely variable, so that a bank cannot achieve every output scale and product mix;
> iii. Output markets are not perfectly competitve, so that banks have some market power over the prices they charge; and
> iv. Output prices are not accurately measured, so they do not provide accurate guides to opportunities to earn revenues and profits in the standard profit function

In this study, we estimated the alternative profit efficiency socores, for our sample, by applying the same independent variables in our cost function and the dependent variable is $\pi = R - C$ where, R is total reveneus, and C is total costs, respectively, as it is usually estimated, in the standard profit function.Thus, instead of counting deviations from optimal output as inefficiency, as in the standard profit function, variable output is held constant as in the cost function while output prices are free to vary and affect profits. The alternative profit function in log form is:

$$ln\,(\pi + \theta) = f(p,y,z,) + ln u_{a\pi} + ln v_{a\pi} \qquad 6.16$$

where π is the variable profits of the firm, which includes all the interest and fee income earned on the variable outputs,(interest income in total loans +trading income + income from securities portfolio + all other non-interest incom) minus variable costs, C, used in the cost function; θ is a constant added to every firm's profit so that the natural log is taken of a positive number; other variables are as defined as in the cost function specification.

Furthermore, as in the cost function specification, here, profit price and input prices are normalized by the last input price, that is, P_3 in order to impose linear homogenieity on the model (see Mester and Berger (1998). Hence, re-arrange for π, to become $In[(\pi/P3)+/(\pi/P3)_{min}/+1]$, where / $(\pi/P3)_{min}$ / indicate the absolute value of the minimum value of $(\pi/P3)$ over all banks for the same year. Thus, the constant $\theta= [/(\pi/P3)_{min}/+1]$ is added to every firm's dependent variable in the profit function so that the natural log is taken of a positive number, since the minimum profits are typically negative. Thus, for the firm with the lowest value of $(\pi/P3)$ for the year, the dependent variable will be $In(1)=0$, and relabelling the composite error term as $(Inu_{\pi}+Inv_{\pi})$. The translog functional form with two output(total loans and total other earning assets) and three input prices, p1,is price of fund, p2 is price of labour and, p3 is price of capital (the same independent variables in cost function applied here) is specified also here for the alternative profit function, moreover, the truncated-normal model proposed by Coelli et.al 1995 was also adopted to disintangle profit inefficiency scores from random errors. Again we use the Frontier 4.1 statistical software progamme, developed by Coelli and others, to estimate the maximum-likelihood function and to compute our profit-efficiency scores for the sample of GCC banks.

6.4 The Performance-Structure Model:

The results, presented later, will concentrate on the four hypotheses within Berger's structure-performance model, using a multiple regression analysis to test the effects of concentration, market share, bank X-efficiency, and scale efficiency on profitability of GCC banks.

6.4.1: Model Specification:

In order to investigate the SCP relationship in GCC banking we follow Berger's (1995) modelling approach. The model, as set out in equation (6.1), associates firm profit variability to market structure and efficient structure measures, and other control variables. One has to introduce other independent variables to account for forces other than market structure and efficiency and thus increase the explanatory power of the model. Therefore, our full model to test for the four competing hypotheses in the GCC banking industry is shown as follows:

$$\pi_i = \alpha_1 + \alpha_2 CONC + \alpha_3 MS + \alpha_4 X-EFF + \alpha_5 S-EFF + \alpha_6 GDPPC + \alpha_7 DUM + \varepsilon \qquad 6.17$$

vhere:

π_i = bank i's profits measured as the return on Assets (ROA) or return on equity (ROE), in addition to the mentioned standard accounting profit measures this study also utilizes the alternative profit efficiency(APX) measure as a performance indicator.

$CONC_j$ = concentration ratio in market j (we use the three-firm assets concentration ratio).

MS_{ij} = market share measure, we use two market share measures to capture the RMP hypotheses, these are bank deposits (BDMS) and loans (BLMS) market shares.

GDPPC = Per Capita Gross Domestic Product is included as a measure aimed at capturing specific market demand conditions.

DUM = Binary variables included to take account of different bank types (commercial banks, investment banks, and Islamic banks).

ε = error term.

A number of studies analyse whether market growth impacts on bank performance. Bourke (1989) and Molyneux (1993), for example, use money supply growth to account for demand conditions impact on bank performance while Short (1979) uses asset growth. Goldberg and Rai (1996) use per capita income to proxy for demand conditions and their study finds a negative and significant coefficient for PCI. Our model, however, account for different demand characteristics across markets. We will assume that greater levels of income lead to increasing demand for loans and increasing supply of deposits from consumers. In other words, one would expect that banks operating in high per capita income markets will face higher demand for their services than banks operating in low per capita income markets, other things remaining equal. Hence, we incorporate into the model a GDP Per Capita income variable to account for demand factors in different national markets. The increased demand is expected to positively affect bank profits. Finally, we also include a binary variable to account for differences in banks type. This distinguishes between Islamic, investment, and commercial, banks so as to capture differences in profitability between institutions with varying organisational forms.The reduced form equation noted above allows all four hypotheses to be valid simultaneously. To the extent that any of the key variables have positive estimated coefficients, this may be taken as evidence of the marginal contribution of the corresponding hypotheses (Berger, 1995). However, according to the structural model of the efficient-structure hypotheses presented by Berger (1995) the profit-structure relationship is conditional on the fact that the efficient-structure (ES) coefficients must be positively correlated with the market structure measures. Specifically, bank profitability is a function of its efficiency, and efficient firms gain market share and this market share may lead to market concentration. Thus, in order to ensure that, EFF is positively related to market-structure measures as well as to profitability measures (π) noted above, this necessary condition of the ES hypotheses, (that efficiency affects market structure) the following equations regression are tested for.

$$MS_i = f(X\text{-}EFF_i, S\text{-}EFF_i, Z_{im}) + \varepsilon_i \text{ for all } i \text{ in } m \quad \text{......} 6.18$$

$$CONCm = f(X\text{-}FF_i, S\text{-}FF, Z_{im},) + \varepsilon_i \quad \text{......} 6.19$$

The following section outlines the broad estimation procedures used.

6.4.2. Estimation Procedure to Test the Relationship between Market Structure and Bank's Performance in the GCC Member States:

In this study we use the simple ordinary least-squares multiple regression analysis to test the relationship between market structure and bank profitability for GCC banks[1]. Regression analysis is concerned with the study of the relationship between one variable called the explained or dependent variable and one or more other variables called independent or explanatory variables. A regression model with more than one explanatory variable is known as a multiple regression model (Gojarati, 1996, p. 182). It is multiple because multiple influences (i.e, variables) affect the dependent variable. We can write the multiple regression model in the stochastic form as

$$E(Y_t) = \beta_1+\beta_2X_{2t}+\beta_3X_{3t}+\ldots+\beta_kX_{kt}+U_t; \quad t=1\ldots n$$

Where X_{2t}, X_{3t}, ...X_{kt}, are a set of independent(explanatory) variables, each of which influences the dependent variable Y_t . β_1.....β_k is unknown (population) parameters; i.e., unknown constant partial regression coefficients or partial slope coefficients. The meaning of the partial regression coefficient is as follows: B_2 measures the *change* in the mean value of Y, E(Y), per unit change in X_2, holding the value of X_3 constant. Likewise , β_3 measures the change in the mean value of Y per unit change in X_3, holding the value of X_2 constant. This is the unique feasure of a multiple regression, since in the multiple regression model we want to find out what part of the change in the average value of Y can be directly attributable to X_2 and what part to X_3, and likewise the other explanatory variables. To ensure the desirable properties of the ordinary least squares estimators β_1....β_k and to ensure the validity of the standard hypothesis test procedure, the following assumptions about the components of this model have been made :

1- X_1.....X_k are nonstochastic; that is, their values are fixed in repeated sampling.

2- The error term u has a zero mean value; that is, $E(u_i)=0$

3- Homoscedasticity, that is, the variance of u, is constant $var(u_i)=\sigma^2$

4- No autocorrelation exists between the error terms u_i, and u_j, $cov(u_i,u_j)$ $i \neq j$

5- No exact collinearity exists between X_i and X_j; that is, there is no exact linear relationship between the two explanatory variables.

6- For hypothesis testing, the error term u follows the normal distribution with mean zero and (homoscedastic) variance σ^2 . That is, $u_i \supseteq N(0,\sigma^2)$

7- The underlying relationship between X_t and Y_t is linear;

[1] The models were re-estimated using the fixed effects panel data approach using STATA and similar results maintained (see Appendix 2).

To estimate the parameters of the model, we use the Ordinary Least Squares method (OLS). The OLS principle chooses the values of the unknown parameters in such a way that the residual sum of squares (RSS) Σe_t^2 is as small as possible. This RSS is simply the sum of the squared difference between actual Y_t and estimated Y_t. Having obtained the OLS estimators of the intercept and partial regression coefficients, we can derive the variances and standard errors of these estimators. These variances or standard errors give us some idea about the variability of the estimators from sample to sample. We need the standard errors for two main purposes: (1) to establish confidence intervals for the true parameter values and (2) to test statistical hypotheses. Under assumed conditions the OLS estimators are *BLUE*, that is, they are best linear unbiased estimators. Thus, each regression coefficient estimated by OLS is linear and unbiased on the average it coincides with the true value. Among all such linear unbiased estimators, the OLS estimators have the least possible variance so that the true parameter can be estimated more accurately than by competing linear unbiased estimators. We have noted above that the betas (B_i) allows us to estimate each coefficient independently and that the t-test is used for testing hypotheses about individual coefficients. All these tests will require assumptions 1 to 7 above .The goodness of fit of estimated multiple regression analysis is measured by calculating the coefficient of determination. It gives the proportion or percentage of the total variation in the dependent variable Y explained jointly by the independents (explanatory) variables. It is the quantity that gives this information is known as the multiple coefficient of determination and denoted by the symbol R^2. Where:

TSS = the total sum of squares of the dependent variable Y($=\Sigma y_t^2$).

ESS = the explained sum of squares (i.e. explained by all the X variables)

RSS = the residual sum of squares.

$R^2 = \frac{ESS}{TSS}$ That is, it is the ratio of the explained sum of squares to the total sum of squares.

The following chapter presents the empirical results of our analysis and our interpretations.

6.5 Conclusion:

This chapter outlines the methodology used in this thesis to examine structure-performance relationships in GCC banking markets. The first part of the chapter describes the different tests that have to be undertaken in order to distinguish between four competing hypotheses, the traditional SCP paradigm, the relative market power hypothesis and two versions (X-efficiency and Scale efficiency) of the Efficient Structure hypothesis. In order to specifically test for the efficiency hypothesis one need to obtain bank-specific estimates of efficiency. We therefore outline how cost and alternative profit efficiency estimates are derived, as well as scale efficiency estimates, and show how these are incorporated into the modelling framework.

Once these efficiency estimates are derived they can be included into our reduced form profit equations.

The following chapter reports the findings of our analysis.

Chapter V11
Empirical Results and Interpretations

7.1 Introduction

> Analysis of the SCP relationship in banking is used to help evaluate the main policy issue of which type of banking structure best serves the public in terms both of cost and the availability of banking services. In general two main objectives have been sought; firstly, the attainment of an 'efficient' banking system which in some way, secondly, minimizes the likelihood of bank failure. Molyneux et al. (1996, p. 93)

Market structure and performance are two important features of industrial organization analysis that are employed in an effort to understand how markets operate and what is the influence of various economic determinants on the development and evolution of different market characteristics. Do changes in market structure (more or less competitive environments) affect the profits of banking institutions and by how much? Do banks operating in more highly concentrated markets charge higher prices for their products and services (higher interest rates on loans and lower interest rates on deposits) than banks operating in less concentrated markets? Within this area two main theories have emerged in the banking literature to describe the relationship between structure and performance, namely the market-power hypothesis and efficient structure hypothesis. In the traditional SCP model, markets served by a few firms with significant disparities in size are more likely to be characterized by coordination of policies and collusive agreements (Scherer, 1982).This results in inferior performance in terms of the quality and quantity of goods and services produced higher prices, and profits that exceed a normal return. On the other hand, the efficient structure hypothesis posits that the positive relationship observed between market structure and performance can be attributed to the gains made in market share by more efficient firms, and this may lead to increased market concentration. These two theories, however, have radically contrasting implications from mergers and antitrust policies. To the extent that the SCP paradigm is evident in a particular market, then altering the market structure to be more competitive and allocating resources more effectively are likely to be socially beneficial. However, in the eventuality that the efficient structure hypothesis holds in that particular market, any restrictions on increasing concentration in the market is not warranted. There have been numerous studies that have aimed to test the structure-conduct-performance(s-c-p) relationship in the banking industry, and the majority of these investigations have concerned US banking where the structure of the market is quite different from other countries. The main difference lies in the fact that, in the US, many of the financial products such as retail deposits and small loans are offered on a local or regional basis, and prices can differ quite significantly among these local markets. Therefore, the research emphasis tends to be on the relationship between local market concentration and performance measures. Moreover, the US banking market is relatively unconcentrated, as Berger and Humphrey (1997, page 195) have noted:

> Although some financial products such as large certificates of deposit and large wholesale loans are competed on a nationwide basis, the US national market is extremely unconcentrated by world standards. For example, it would take over 2000 banking organizations to account for 90% of deposits in the US, while in most other developed countries 90% of deposits would be accounted for by fewer than 10 organizations.

Molyneux et al. (1996) have noted that the analysis of the SCP relationship in banking is mainly used to evaluate which type of banking structure best serves the public in terms both of the cost and the availability of banking services. Thus, in view of the conflicting implications of the above two theories, further investigation of the evidence comparing market power and efficiency effects on profit-structure relationship seems advisable, particularly in banking markets outside the US. Thus, in order to provide an insight into the structure of GCC member states banking markets and to ascertain whether this has any effect on the performance of banks operating in these markets, this chapter outlines the empirical results of tests of the market-power and efficient-structure hypotheses in the six GCC member states banking markets, these are, Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and United Arab Emirates. The empirical investigation investigates the effects of concentration, market share (included to test for the market-power hypothesis), X-efficiency, and Scale-efficiency (for tests of the efficient-structure hypotheses) on bank performance. The empirical analysis has been carried out using the methodology and variables discussed in chapter six.

Alternative profit X-efficiency scores (APX) as well as standard profit measures (ROA, and ROE) are regressed against measures of local market concentration, individual bank's market share in its national market (loans and deposits), the individual bank's cost X-efficiency scores, and scale-efficiency indicators, and, other control variables included to capture firm-specific and market-specific differences similar to those used in previous studies. We pool accounting data for banks from the six GCC member states for the five year period 1995-1999. The data were obtained from the Bankscope database and were available for 72 banks across all five years. According to Bankscope the accounting data provided is standardized according to international accounting conventions for cross-country comparison purposes.

As far as we are aware, this is the first study using alternative profit x-efficiency scores in addition to conventional profitability measures (ROE, ROA) to investigate the profit-structure relationship in the GCC member states banking sector. The assumption that banks enjoy a degree of market power is one of the features assumed in calculating alternative profit efficiency measures compared with standard profit efficiency. It can be employed instead of standard profit efficiency measures when certain conditions are not met. This includes such things as when there are differences in the quality of banking services, or when output markets are not fully competitive. Alternative profit efficiency measures in banking are estimated when it is assumed that it is not possible for a bank to achieve every output scale and product mix, and the output price data necessary for calculating the standard profit measures are not available (see Berger and Mester, 1997).

Following Berger (1995) we test the market-power and efficient–structure hypotheses by estimating single reduced form profits (π) regressions that include direct measures of efficiency and nest four hypotheses that help explain the market-power and efficient structure hypotheses. In particular, the analysis presented in this chapter allows us to test for whether the positive relationship between profits and structure (if it exists) is spurious (that is, efficiency drives both profitability and market structure) rather than of direct origin, this is a necessary condition for the validity of the efficient structure (ES) hypothesis in its interpretation of the profit-structure relationship. The ES hypothesis assumes that both efficiency variables (X-Eff or S-Eff) are positively related to both market structure measures (concentration or market share), as well as to the profitability measures. Thus, we conduct the test for the relationship between the market structure measures (CONC, and MS) and the efficiency variables to see if there is any direct relationship between bank level efficiency and industry structure by regressing both market structure measures (CONC, and MS) on the respective efficiency measures (X-efficiency and scale-efficiency.

The chapter proceeds as follows. Section7.2 recall the model specification previously outlined in chapter six, namely the single reduced form profit (π) equations as well as the market structure (CONC and MS) reduced form models. Sources of sample data and variables included in our specified model are also outlined. Section 7.3 presents estimates for bank cost, and alternative profit efficiency derived from our stochastic frontier model as well as scale economies and scale efficiencies. Moreover, it discusses the empirical findings from the pooled cross-country estimates of the relationship between market-structure and efficiency variables on profitability in GCC banking. Section 7.4 concludes.

7.2 The Model Specification

7.2.1 The Theoretical Framework:

Berger (1995) attempts to resolve what he called the "observational equivalence problem" relating to the structure performance relationship by estimating single reduced form profits equations to see how performance in US banking was related to market-power and firm-level efficiency measures. Specifically, he included direct measures of both efficiency hypotheses (X-efficiency and Scale-efficiency), into the conventional S-C-P paradigm, arguing that "The way in which the ES and MP hypotheses are usually tested employs a model that nests, but cannot distinguish among most of the hypotheses", (Berger, 1995, p. 406). He introduced the following structural forms for the efficient-structure (ES) and market-power (MP) hypothesis and then derived a single reduced form that nests and distinguishes the four hypotheses. The structural model underlying the ES hypothesis, [X-efficiency version (ESX) and scale-efficiency version (ESS)] to explain the profit –structure positive relationship is:

$$\pi_i = f_1 (EFF_i, Z_{im}) + \varepsilon_{im} \quad \ldots\ldots\ldots\ldots\ldots(1)$$

$$MS_i = f_2 (EFF_i, Z_{im}) + \varepsilon_{im} \quad \ldots\ldots\ldots\ldots(2)$$

$$CONC_m = f_3 (MS_{i \text{ for all } i \text{ in } m}) \ldots\ldots\ldots\ldots(3)$$

Where, π measures profitability per unit of output, EFF reflects whichever efficiency concept is being modelled (X-EFF or S-EFF), the Z vectors represent control variables, the ε is random error, m indexes the market, and *i* indexes the banks in market *m*.

This model creates a positive profit-structure relationship as a spurious outcome because both profits and structure are related to efficiency. In equation (1), profits are primarily determined by differences in cost efficiency. That is, revenues less costs per unit of output principally differ because of cost variations created by either X-efficiency or scale efficiency, depending on whether the exact hypothesis is ESX or ESS. In equation (2), more efficient firms have greater market shares. This could occur for a number of different reasons. If bank products within a local market are undifferentiated, each market may be in competitive equilibrium with a common price equal to every banks' marginal cost. More efficient firms are larger and have greater shares if they have lower marginal cost at every level of scale. Another possibility occurs if bank products are differentiated by location. Under special competition, more efficient banks may set prices more favourable to consumers and attract customers from further distances. Finally, more efficient banks may have larger market shares in equilibrium because of past out-of-equilibrium behaviour in which more efficient banks gained share through price competition or through acquisition of less efficient banks. In identity (3), the concentration measure is a deterministic transformation f3 of the market shares into one of the concentration concepts that economists use, and this function is the same across all markets. Profitability and market structure are spuriously positively related in this model because, π, CONC, and MS are all positively related to EFF- more efficient firms are more profitable in (1); more efficient firms have higher MS in (2); and MS is positively related to CONC in (3). The structural model underlying the market-power (MP) hypotheses, these are [the conventional structure-conduct-performance (SCP) and relative market power hypothesis (RMP), is

$$\pi_i = f(Pi, Z_{im}) + \varepsilon_{im} \ldots\ldots\ldots\ldots\ldots(4)$$

$$Pi = f(STRUC_i, Z_{im}) + \varepsilon_{im} \ldots\ldots\ldots(5)$$

$$CONC_m = f_3\,(MS_{i \text{ for all } i \text{ in } m}) \ldots\ldots(3)$$

Where P is a vector of output prices and STRUC is a measure of market structure, either CONC or MS, depending on the exact hypothesis being modelled.

In equation (4), unit profits are primarily determined by differences in prices charged to consumers, as opposed to cost differences in the ES model above. This does not rule out efficiency as affecting profits under the MP hypotheses-it is just viewed as less important than the exogenous effects of market power acting through prices. Thus, the EFF variables may appear in the Z vector. In equation (5), prices are primarily determined by market structure. Under SCP, CONC is the key exogenous variable represented by STRUC all firms in concentrated markets set prices that are relatively unfavourable to consumers (that is, lower rates on deposits, higher rates on loans). Under RMP, by contrast, MS is the key exogenous variable in (5) firms with large market shares have well-differentiated products because of advertising, location, or other advantages and are able to exercise market power in pricing these products. Again, the EFF variables could affect P by being included in Z, but their effects are assumed to be relatively small. The CONC definition (3) is the same as in the ES model above. Under SCP, the positive profit-concentration relationship comes about because CONC affects P in (5) and P affects π in (4). Similarly, under RMP, the positive profit-market share relationship occurs because MS affects P in (5) and P affects π in (4). Under either of these hypotheses, profits are positively correlated with the "other" market structure variable spuriously because CONC and MS are positively correlated in (3).

Furthermore, Berger (1995) introduced the following reduced forms, or main equation that include direct measures of efficiency that nests the four hypotheses

$$\pi_i = f(CONC_m, MS_i, X\text{-}EFF_i, S\text{-}EFF_i, Z_{im}) + \varepsilon_i \quad \ldots\ldots\ldots\ldots\ldots 7.1$$

Where π is a profit measure, usually a standard profit measure (ROE, and ROA), our study also will utilise the alternative profit X-efficiency measure (APX) as a profitability measure. CONC is some market concentration measure, MS is an individual bank market share measure, X-EFF relates to bank X-efficiency measure, S-EFF is a scale-efficiency measure, and Z a vector of control variables, capturing other firm and market-specific differences, ε is random error, m indexes the market, and *i* indexes the banks in market *m*. This equation can be viewed as the reduced form profits equation for four hypotheses: the traditional structure-conduct-performance paradigm (SCP), the relative market-power hypotheses (RMP), the X-efficiency hypotheses (ESX), and the Scale-efficiency hypotheses (ESS). For the traditional SCP relationship one would expect to see a positive relationship between concentration and bank profits, all other things being equal, concentration lowers the cost of collusion for market participants, and increases industry profits. Under the efficient-structure hypotheses (ES), the coefficient of the appropriate efficiency variable is expected to be positive (banks with greater efficiency are more profitable) and the coefficients on other key variables (CONC and MS) are statistically insignificant. Similarly under the market-power (MP) hypotheses, the appropriate market structure variable, MS is expected to be positive and the others should be insignificant. That is, individual firm size determines profitability. For instance, if only RMP holds, CONC has a zero coefficient because CONC is only spuriously related to π through its correlation with MS. Under MP, the EFF are appropriate exogenous variables but are viewed as unimportant in explaining variations in bank profits.

7.2.2 Our Specified Model:

The empirical analysis presented in this chapter follows Berger's (1995) model to investigate the profit-structure relationship in the banking markets of the six GCC member states. The model as set out in equation (7.1) associates firm profit variability to market structure and bank efficiency measures, and other control variables. One has to introduce other independent variables to account for forces other than market structure and efficiency and thus increase the explanatory power of the model. Therefore, our full model to test for the four competing hypotheses in the GCC banking industry is as follows

$$\pi_t = \alpha_1 + \alpha_2 CONC + \alpha_3 MS + \alpha_4 X-EFF + \alpha_5 S-EFF + \alpha_6 GDPPC + \alpha_7 DUM + \varepsilon \quad .7.2$$

where:

π_i = bank i's profits measured as the return on Assets (ROA) or return on equity (ROE) in addition to the mentioned standard accounting profit measures this study also utilized the alternative profit efficiency(APX) as a profitability measure.

$CONC_j$ = concentration ratio in market j (we use the three-firm assets concentration ratio)

MS_{ij} = market share measure, we use two market share measures to capture the RMP Hypotheses, these are bank deposits (BDMS) and bank loans (BLMS).

GDPPC = Per Capita Gross Domestic Product is included as a measure aimed at capturing specific market demand conditions.

DUM = Binary variables included to take account of different bank types (commercial banks, investment banks, and Islamic banks).

ε = error term.

This reduced form equation allows all four hypotheses to be valid simultaneously. To the extent that any of the key variables have positive and statistically significant estimated coefficients, this may be taken as evidence of the marginal contribution of the corresponding hypotheses (Berger, 1995). This will solve what Berger (1995) refers to as "the observational equivalence problem". For example, many previous studies regressed profitability on concentration and market share and found similar results, but interpreted them differently. Some argue that the common finding of a positive, dominating coefficient estimate for market share and an insignificant coefficient for concentration justifies acceptance of RMP, which relates market share to market power (for example, Shepherd 1982, 1986a; b; Rhoades 1985; Kurtz and Rhoades 1991). Others argue that this finding supports ESX, since market share may be positively related to X-efficiency in the absence of any direct measure of X-efficiency in the equation (for example, Smirlock, Gilligan, and Marshall 1984, 1986; Smirlock 1985; Evanoff and Fortier 1988). That is, these authors argue that efficiency is the driving variable, but do not specify it in their equations, they instead, specify market share and assume that it will be correlated with the excluded X-efficiency variable. Moreover, in some studies, no variable is included to control for scale effects (for example, Gale and Branch 1982; Smirlock, Gilligan and Marshall 1984; Stevens 1990), so that market share may pick up correlation with excluded scale efficiencies. In these studies, the positive profit-market share relationship may support scale-efficiency version (ESS) under the efficient-structure hypothesis (ES), under which scale efficiencies are positively related to both variables. Even in some of the studies that do control for scale, scale efficiency (ESS) could be the underlying explanation of the data. This is because indirect measures of scale efficiencies have often been specified that do not allow for U-shaped average cost curves (Berger, 1995). Furthermore, many studies have tested the MP hypotheses alone by examining the price-concentration relationship, again without the benefit of efficiency variables. Prices are regressed against concentration and/or market share, and a finding of less favourable prices for consumers of firms in more concentrated markets or with larger market shares is taken as support for the appropriate MP hypothesis (for example, Berger and Hannan 1989; Hannan 1991). However, such tests are also problematic because the excluded efficiency variables may be correlated with both prices and market structure (Hannan, et al. 1998). Under the ES hypotheses, prices may be relatively favourable for consumers in concentrated markets or with large shares because of the excluded efficiency variables, so that the coefficients of concentration and share in such a price equation may represent a net effect of the different hypotheses. Nevertheless, according to Berger (1995) a potentially more serious problem is present if efficiency is negatively correlated with concentration or market share, this may occur in banking because the highest concentration and largest shares are usually in rural markets where firms may be of less-than-efficient scale or where management or other factors of production may be of relatively poor quality. In such cases, concentration and market share are negatively related to scale efficiencies or X-efficiencies and regressions that do not control for these efficiencies are biased toward finding less favourable prices associated with concentration and market share, incorrectly supporting the MP hypothesis. Thus, direct efficiency measures must be included in the conventional SCP paradigm to avoid this observational equivalence problem.

An important limitation of this single reduced form equation, however, is that it tests only for one condition of the two necessary conditions of the validity of efficient structure (ES) hypotheses. According to Berger (1995) the implications of the ES hypotheses regarding the effects of efficiency on market structure must be tested. A necessary condition for the efficient structure (ES) hypothesis be true is that efficiency be positively related to concentration and/or market share. Again, direct measures of efficiency are needed for this task. This is because the structural model of the efficiency hypotheses creates a positive profit-structure relationship as a spurious outcome because both profits and structure are related positively to efficiency. That means efficiency is driving both profits and market structure.

Following Berger (1995), the tests employed in this thesis, however, attempt to distinguish among all four hypotheses using direct measures of both market structure and efficiency. The tests are flexible in the sense that all four hypotheses, SCP, RMP, ESX, and ESS, are represented by different variables, so that any or all of them may be found to be consistent with the data. In the above single reduced form equation (7.2), measures of bank profitability are regressed on variables measuring concentration (CONC), market share (MS), X-efficiency (X-EFF), and scale efficiency (S-EFF), and other control variables. This equation is shown to be a valid reduced form for all hypothesis with different coefficient structures for different hypotheses. Moreover, the implications of the ES hypotheses regarding the effects of efficiency on market structure are then tested by regressing the ES variables onto the market structure measures, as in equations 7.3 and 7.4, in order to ensure that, EFF is positively related to market-structure measures as well as to profitability measures (π) noted above, this is a necessary condition for the efficient structure ES hypotheses to hold.

$$MS_i = f(X\text{-}EFF_i, S\text{-}EFF_i, Z_{im}) + \varepsilon_i \text{ for all i in m} \quad \ldots\ldots 7.3$$

$$CONCm = f(X\text{-}FF_i, S\text{-}FF, Z_{im,}) + \varepsilon_i \quad \ldots\ldots 7.4$$

7.2.3 Data description and Variables included in our Model:

72.3.1 Data Sources:

We pool accounting data for banks from the six GCC member states for the five year period 1995-1999. We examine information on 72 banks over the five year period (360 observations) in order to provide a comprehensive treatment of the GCC banking industry and to determine whether the results are stable over time and across competitive environments. These data are collected from the Bankscope database for each of the five years from1995 to 1999. We also identify three types of banks that operate in the GCC, commercial, investment, and Islamic banks. According to Bankscope the accounting data provided is standardized according to international accounting conventions for cross-country comparison purposes.

The following institutions are excluded from the sample:

- The government-related specialized banks (development banks, industrial banks, real estates bank).
- Central and Monetary Agency banks
- Off-Shore Banking Units

- Foreign exchange offices
- Other non-banking credit institutions (excluded because there is no sufficient data available and their numbers are very small, and most of them are sole proprietorships).

In order to assure homogeneity within each environment, we include only banks that were in existence for all five years, and therefore we use a balanced sample of banks. CONC and MS were computed based on all banks in the local markets, not just those in the regression sample, although our sample banks accounted for over 70 percent of all bank assets in the respective countries because most large banks are included in the sample.

Table 7.1 Sample number of banks.

Year/Country	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	U.A.E	GCC
1995	17	12	7	6	10	20	72
1996	17	12	7	6	10	20	72
1997	17	12	7	6	10	20	72
1998	17	12	7	6	10	20	72
1999	17	12	7	6	10	20	72
Total	85	60	35	30	50	100	360

7.2.3.2 Variables Included:

X-Efficiency Measures:

For our measure of firm-specific efficiency we use estimates of bank cost X-efficiency so as to be able to test for the X-efficiency version of the efficient-structure hypotheses (ESX) which asserts that firms with superior management or production technologies have lower costs and therefore higher profits. These firms are also assumed to gain large market shares that may result in higher levels of concentration (see Demsetz (1973, 1974); Peltzman (1977), Smirlock (1985), Evanoff and Fortier (1988), Kurtz and Rhoades (1991), Molyneux and Thoronton (1992), Molyneux and Forbes (1995), Berger (1995), Hannan, et, al (1998); Mester et, al. (1998); Altunbas et, al, (2000). Generally speaking X-efficiency (allocative efficiency and technical efficiency) or differences in managerial ability to control costs or maximize revenues provide a measure of how effectively banks are using their inputs to produce a given level of outputs. To measure this invisible input, efficient cost frontiers must be estimated, however, this frontier may vary for banks in different countries. However, due to data limitations we estimate a stochastic cost function to derive X-inefficiencies for our whole sample of GCC banks. This approach labels a bank as inefficient if it's costs are higher than those predicted for an efficient bank producing the same combination of input and output and if the differences cannot be explained away by statistical noise. For this purpose, we estimate cost X-efficiency using a stochastic cost frontier technique and translog functional form specification[1].

As indicated in the previous chapter, the bank efficiency literature considers the estimation of both cost and profit efficiencies to reveal more accurate information about firm-level performance (Wilson, et al, 2000). We therefore also use alternative profit efficiency estimates (as well as standard accounting profitability measure) to examine SCP relationships in Gulf banking.

Dietsch and Lozano-Vives (2000) emphasise the importance of including country and other specific information in common frontier estimations of bank efficiency. They mentioned that the inclusion of environmental variables into a common frontier can neutralise environmental differences between countries. In order to derive the bank cost and alternative profit X-efficiency models that include firm-specific variables, we employ the control and environmental variables detailed in table 7.2. The control variables include the loan loss reserves as a percent of total loans and capital strength. The loan loss reserve as a percent of gross loans is included to control for asset quality. To take into account the effects of different

[1] As outlined in the previous chapter.

levels of equity on costs and earnings (for example, a bank with more equity will have, all else being equal, lower interest expenses than one with more debt), we included as an independent variable the book value of equity Mester (1996,p1) noted that:

> The cost model we used differs from that used in previous efficiency studies in that it explicitly accounts for the quality of bank's assets and the probability of failure, which can influence banks' costs in a number of ways. For example, a large proportion of non-performing loans may signal that a bank used fewer resources than usual in the initial credit evaluation and monitoring of its loans. Unless quality and risk are controlled for, one might easily miscalculate a bank's level of inefficiency; e.g. banks scrimping on credit evaluations or producing excessively risky loans might be labelled as efficient when compared to banks spending resources to ensure their loans are of higher quality.

Dummies are also included to account for geographical location (Saudi Arabia, Bahrain, Qatar, Oman, UAE, and Kuwait). Finally, to control for product diversity as efficiency might be associated with firm's strength in carefully targeting its market niches, dummy variables for bank specialisation are also included in the model. The banks in each country are divided into three categories; commercial banks, investment banks, and Islamic banks. It has been argued that the cost of producing various products might be lower when specialised banks produce them rather than when a single bank produces all the products due to diseconomies of scope. There are number of studies that have examined the impact of product diversity and cost efficiency. Aly et al. (1990) found a negative relationship between product diversity and cost efficiency. Ferrier, Grosskopf, Hayes and Yaisawarng (1993) found that banks with greater product diversity tend to have lower cost efficiency. Chaffai and Dietsch (1995) compared the efficiency of universal versus non-universal (more specialised) banks in Europe and found the former to be less cost efficient. We distinguish between these three main banks types as they typically focus on different market segments. We conducted our analysis using the approach suggested by Battese and Coelli's (1995) who use a technical inefficiency effects model that allows us to include firm-specific (and country-specific) variables directly into the model as these might explain some of the efficiency differences between banks as well as the variation in bank inefficiency overtime. Battese and Coelli's (1995) model defines the inefficiency term u_{it} as non-negative variables that account for technical inefficiency and are assumed to be independently and identically distributed (iid) as truncations at zero of the N $(\delta_{it}d, \sigma^2_{uit})$ distribution. According to Coelli (1998), this specification proves to be better than that of Pitt and Lee (1981) two-stage model, who have estimated stochastic frontiers and predicted firm-level efficiencies using these estimated functions, and then regressed the predicted efficiencies upon firm-specific variables (such as managerial experience, ownership characteristics, etc.) in an attempt to identify some of the reasons for differences in predicted efficiencies between firms. Furthermore, the two-stage procedure utilised by Pitt and Lee (1981) has been recognised as one which is inconsistent in its assumptions regarding the independence of the inefficiency effects in the two estimation stages (Lovell et al, 2000).

Williams and Gardener (2000, p.11) mentioned the superiority of Battese and Coelli (1995) model to the two stage-model.

> The common frontier is estimated using the technical inefficiency effects model of Battese and Coelli (1995) and includes country-specific and firm-specific variables, which are said to neutralise cross-country environmental differences that can distort common frontier efficiency estimates. This model is superior to the "two-stage" method of deriving efficiency estimates from a cost function and regressing them against a set of explanatory variables, because it alleviates several of the theoretical anomalies present in the two-stage approach.

Moreover, the computer programme, FRONTIER Version 4.1 developed by Coelli has been used to obtain maximum likelihood estimates of parameters of our specified models to estimate cost and alternative profit efficiency. In fact, FRONTIER Version4.1 can be used to estimate a subset of the stochastic frontier production and cost functions which have been proposed in the literature (see Coelli et al, 1998 for more details). The programme can accommodate panel data; time-varying and invariant efficiencies; cost and production functions; half-normal and truncated normal distributions; and functional forms which have a dependent variable in logged or original units. These features of what Frontier 4.1 can and cannot do are not exhaustive, but provide an indication of the program's capabilities. FRONTIER Version 4.1 is used to estimate the model specifications detailed above and in Battese and Coelli (1988, 1992 and 1995) and Battese, Coelli and Colby (1989) to estimate the cost and profit efficiencies that are used in our SCP analysis.

<u>Scale efficiency Measure</u>

To account for differences in scale efficiencies we utilise two measures of scale efficiency to test for the efficient-structure hypothesis (ESS), which asserts that "firms have essentially equally good management and technology, but some firms simply produce at more efficient scales than others, and therefore, have lower unit costs and higher unit profits. These firms are assumed to have large market shares that may result in high levels of concentration", (Berger, 1995, p. 410).

The first measure of scale efficiency we use is a standard scale economy (or scale elasticity) measure. Typically the scale-economies studies estimate an *average practice cost function,* which relates bank cost to output levels and input prices (Mester, 1996). The technique implicitly assumes all banks in the sample are using their inputs efficiently- in other words, there is no x-inefficiency- and that the banks are using the same production technology.

> Under the scale-efficiency version of the efficient-structure hypotheses (ESS), firms have essentially equally good management and technology, but some firms simply produce at more efficient scales than others, and therefore have lower unit costs and higher unit profit. Berger (1995, p409)

However, productive efficiency requires optimising behaviour with respect to outputs as well as inputs. Regarding outputs, optimal behaviour relates to producing the level of outputs that correspond to the lowest cost per unit. For the cost function, the optimal output level is possible if economies and diseconomies exist at different output levels; that is at some point, there will be constant returns defining the optimal level of production. Economies of scale exist if, over a given range of output, per unit costs decline as output increases. Increases in per unit cost correspond to decreasing returns to scale. A scale efficient firm will produce where there are constant returns to scale; that is, changes in output result in proportional changes in costs (Evanoff and Israilevich, 1995).

Given the cost function specification, the scale economy measure is cost elasticity; the percent change in cost with respect to a percent change in output. The scale elasticity measure, is an elasticity associated with a particular output level and indicates the relative change in cost associated with an increment change from this output level. The degree of scale economies (SCALE) is given by:

$$\text{SCALE} = \sum_{i=1}^{m} \frac{\partial \ln TC}{\partial \ln Q_i}$$

Where $\sum_{i=1}^{m} \frac{\partial InTC}{\partial InQ_1}$ represents the sum of individual cost elasticities and can be rewritten as

$$SCALE = \sum_{i=1}^{m} \alpha_i + \sum_{i}^{m} \sum_{j=1}^{m} \delta_{ij} InQ_j + \sum_{i=1}^{m} \sum_{j=1}^{n} \rho_{ij} In\, p_j$$

Where there are economies of scale if SCALE < 1, constant returns to scale *if SCALE=1*

And diseconomies of scale if SCALE > 1.

Economies of scale and Scale-efficiency

However, a relatively recent development in the literature differentiates between two concepts, that is, the scale-efficiency, and scale-economy concept. Evanoff and Israilevich, 1995, strongly, criticized the previous literature for what they call, the common confusion in the literature between two relatively straightforward concepts Scale-elasticity and Scale-efficiency

> The implication from the conclusions drawn by the authors of numerous studies is that scale elasticity and scale efficieny are essentially synonymous; the derivation of one automatically provides an accurate or approximate value for the other, until recently, however, studies have not typically evaluated scale efficiency. Instead, scale elasticity estimates have been used as a proxy for efficiency, and elasticity measures close to 1.0 are taken to imply that scale inefficiency is trivial. Scale inefficiency is typically assumed to be linearly related to the scale elasticity measure; i.e. equal to one minus the elasticity measure. Empirically, it is also assumed that scale elasticities which are found to be insignificantly different from one in a statistical sense imply scale efficiency. Both statements are incorrect. Yet, failure to distinguish between the two concepts is common in the banking literature. Intuitively, the two concepts differ because they measure different things: elasticity is related to incremental changes in output, and inefficiency to the change in output required to produce at the minimum efficient scale. The cost savings realized by an incremental increase in output by a scale inefficient firm is irrelevant for measuring inefficiency since this is not the savings realized by producing at the efficient scale. (Israelivich, et, al. 1995, p. 1037)

As noted above, the scale elasticity measure, is $\varepsilon = \partial \ln C / \partial \ln Q$, where C is cost and Q output, is a point elasticity associated with a particular output level and indicates the relative change in cost associated with an incremental change from this output level. Scale inefficiency, *I*, can be measured as the aggregate cost of F inefficient firms ($\varepsilon \neq 1.0$) relative to the cost of a single efficient firm ($\varepsilon = 1.0$), where F = the size of the efficient relative to the inefficient one. That is, $I=[F.C_I/C_E] - 1.0$, where C_I and C_E are the cost of production at the inefficient and efficient firms, respectively.

Furthermore, as with the scale elasticity measure, the inefficiency measure is functional form specific, for example, for the quadratic form, $C = \alpha + bQ + .5cQ^2$, the inefficiency measure will equal$[(b+c.Q_I)/(b+c.Q_E)]\ [1/\varepsilon_I]$, where, Q_I and Q_E are the output of inefficient and efficient firms, respectively, and it also can similarly derived for alternative forms (Evanoff et al. 1995). Thus, the two concepts are different because they measure different things: elasticity is related to incremental changes in output, and inefficiency to the change in output required to produce at the minimum efficient scale (see Israilevich and Evanoff 1995 for more details).

For our purposes, we follow (Berger, 1995), scale efficiencies are computed from the same stochastic cost frontier model and the translog cost functional specification used to estimate cost x-efficiency scores. For each bank's output mix and input prices, a U-shaped multiproduct average cost curve was traced out and the scale-efficient output vector Y^{se} at the bottom of the U shape was determined. Scale efficiency was determined as the ratio of predicted costs for Y^{se} to predicted costs for the bank's actual output Y, multiplied by the ratio of outputs to correct for absolute size differences:

$$\textbf{S-EFF} = \exp[\ln\hat{C}(Y^{se},w) - \ln\hat{C}(Y,w)]*[(\sum_{j=1}^{3} Y_j)/(\sum_{k=1}^{3} Y_k^{se})]$$

Where the $\ln\hat{C}$s are predicted cost values. It may be seen that this is an estimate of $\hat{AC}^{se}/\hat{AC}_i$, the ratio of minimum predicted average costs to the actual predicted average costs for bank i's output mix and input prices. As with any efficiency measure, S-EFF ranges over (0,1). Overall, therefore, we test for two different measures of scale in our efficient structure hypothesis tests by including both a scale elasticity and scale efficiency variable in our estimates of structure-performance relationships in GCC banking.

Performance Measures:

Although many structure-performance studies use bank product prices as the dependent variable, banking is a multi product business, and individual prices may be misleading. Prices can be utilised only if costs are explicitly accounted for as an explanatory variable. Even then, given the regulatory constraints on the industry, the expected structure-price relationship may not be realised for a particular service because of differing pricing strategies among banks. The potential for substantial cross-subsidization between products obviously exists as marketing strategies in certain markets may differ leading banks to charge low loan rates but simultaneously to pay relatively low deposit rates. Pricing strategy, therefore, could obviously differ across markets [see among others,(Evanoff and Fortier,1988) and (Goldberg and Rai 1996)] and this may create problems if one uses price as a performance measure:

> Most SCP studies also experience difficulties in measuring structure and performance variables adequately. Using the price of a single banking product as a measure of performance may be misleading because most large banks are multiproduct firms. Profit measures may be more informative in this respect, but may also be more difficult to interpret because of the complexity of the accounting procedures involved. (Goddard, et al, 2001, p.73).

Given the problems associated with using price as a performance measure, we use pre-tax ROA, pre-tax ROE and alternative profit efficiency scores (APX) as bank performance measures. The profitability measures, pre-tax ROA and pre-tax ROE, are standard accounting measures of performance widely used in the empirical banking literature. In addition to these "standard" performance measures we also use alternative profit efficiency measures as another indicator of bank performance. These we derived from estimates of a stochastic profit frontier that uses the same independent variables as the cost frontier but replaces total cost with profit, as noted in Berger and Mester (1998) this provides us with parametric estimates of profit efficiency that can be compared to the results derived from standard profit measures. As far as we are aware, this is the first study to use alternative profit efficiency scores as performance measures in a structure-performance framework.

Concentration Measures:

> Among the most important characteristics that define the four main theoretical market structures are the number of firms, the degree of product differentiation, and the height of barriers to entry. The number and size distribution of firms are usually the most easily quantified aspects of market structure. Defining what constitutes the "market" is, of course, problematic in banking, in view of the multiproduct nature of the modern-day financial services firm. Nevertheless, the most commonly used measures are the three-firm or five-firm deposits or assets concentration ratio (Molyneux et al., 1996, p. 93),

For computation of the concentration measure, we use the 3-firm assets concentration ratio. Molyneux and Thornton (1992) and Molyneux and Forbes (1995) in their studies of European banking, both use ten-bank assets concentration ratios. While SCP theory indicates that there seems to be a link between the level of output controlled by the largest firms there is no consensus, however, as to the exact number of firms needed for this relationship to be established. Berger (1995) uses the three-firm loans and deposits concentration ratios and the Herfindahl index to test profits-markets structure relationships and found similar results irrespective of the concentration ratio measure used. While all market structure measures are subject to their own idio-syncracies and limitations, they do usually tend to correlate highly with one another (Curry and George, 1983; Scherer and Ross, 1990; Goddard et al., 2001). For our analysis we use only the three-firm assets concentration ratios.

Market Share Measures:

In order to test the Relative Market-Power hypotheses that asserts that "only firms with large market shares and well-differentiated products, are able to exercise market power in pricing these products and earn supernormal profits" (Berger, 1995, p. 411), we use bank's individual market share in terms of deposits and loans as a percentage of the total banking sector deposits and loans (in the respective national markets). These measures are standard measures of market share in the banking literature. These account for differences in loan demand and deposit supply functions that are faced by banks and represent the absolute volumes of each bank's participation in various asset and liability categories. While it is difficult to accurately define a multi-product banks overall market share (as market share may differ across product segments) for banks whose business is mainly national, these are reasonable indicators of market share (Berger, 1995).

Market Demand and other Variables:

Previous empirical studies, see among others (Smirlock (1985), Evanoff and Fortier (1988), Kurtz and Rhoades (1991), Molyneux and Thoronton (1992), Molyneux and Forbes (1995), and Berger (1995) have used a wide variety of independent variables to account for market demand conditions, depending on the author's intuition. Our model, however, account for different demand characteristics across markets. We will assume that greater levels of income lead to increasing demand for loans and increasing supply of deposits from consumers. In other words, one would expect that banks operating in high per capita income markets will face higher demand for their services than banks operating in low per capita income markets, other things remaining equal. Hence, we incorporate into the model a GDP Per Capita income variable to account for demand factors in different national markets. The increased demand is expected to positively affect bank profits.

Finally, we also include a binary variable to account for differences in banks type. This distinguishing between Islamic, investment, and commercial, banks so as to capture differences in profitability between institutions with varying organisational forms.

7.3 Empirical findings

7.3.1 Estimated Levels of Efficiency in GCC Banking Systems.

The cost efficiency estimates, derived from our stochastic frontier model, are summarised in tables 7.3-7.5 below. Cost efficiency estimates for banks in the countries under study averaged 88% and these estimates have improved over time from 84% in 1995 to 91% in 1999. This suggests that the same level of output could be produced with approximately 88% of current inputs if banks under study were operating at the most efficient level. This level of technical inefficiency is similar to the range of 10-15% found in survey of 130 studies undertaken by Berger and Humphrey (1997).These results appear slightly lower than the levels of inefficiency found in European studies including Gardener, et al. (2000) whose findings for a sample of banks, from twelve countries, show mean cost inefficiency of around 22 % for the period 1989 to 1996.

Table 7.3 GCC countries banks' Cost X-efficiency Scores (%) over 5 years

Year	Bahrain		Kuwait		Oman		Qatar		Saudi.A		U.A.E		GCC	
	Cost.X -Eff	No .of Banks	C.X-eff	No. of banks	C.X -Eff	No. of banks	C.X -Eff	No. of banks	C.X-Eff	No. of banks	Cost. X-Eff	No. of banks	C.X-Eff	No. of banks
1995	82	17	84	12	83	7	81	6	88	10	83	20	84	72
1996	82	17	84	12	85	7	83	6	91	10	85	20	86	72
1997	83	17	85	12	85	7	84	6	90	10	87	20	87	72
1998	84	17	88	12	86	7	84	6	92	10	90	20	89	72
1999	86	17	90	12	89	7	85	6	93	10	91	20	91	72
Ave.	84	85	87	60	86	35	83	30	92	50	90	100	88	72

The efficiency scores based on geographical location, ranged from 83% in Qatar to 92% in Saudi Arabia. Referring to table 7.4, the average cost efficiency based on bank specialisation ranged from 84% for investment banks to 91% for Islamic banks. It seems that Islamic banks have higher cost efficiency because of their general lower cost of funds compared to commercial and investment banks. Finally, cost efficiency scores are similar among different banks' sizes (table 7.5). This finding conflicts with US and European literature that tends to find that large banks are more cost efficient (See Goddard et al 2001.

table 7.4 Cost X-efficiency (%) and Bank Type organizational form, Commercial, Investment and Islamic						
Year	**Islamic Banks**		**Commercial Banks**		**Investment Banks**	
	Cost x-efficiency	**N. of observations**	**Cost X-EFF**	**No of Obs**	**Cost X-EFF**	**No of Obs**
1995	90	10	84	47	83	15
1996	91	10	86	47	84	15
1997	91	10	86	47	84	15
1998	92	10	87	47	85	15
1999	92	10	88	47	86	15
Average	91	50	86	235	84	75
Source: Author's own estimation						

Table 7.5 Cost X-efficiency by bank Asset Size						
Bank Size (assets US$ Million)	**1995**	**1996**	**1997**	**1998**	**1999**	**All**
1-199	84	86	86	88	90	87
200-299	84	84	87	89	90	87
300-499	84	85	88	89	91	88
500-999	85	84	87	89	91	88
1000-2499	84	86	88	90	92	87
2500-4999	84	85	87	87	92	88
5000-9999	84	86	87	89	91	88
10000+	84	85	87	80	92	88
Average	84	85	87	89	91	88
Source: Author's own estimation						

As mentioned earlier in the previous section, the bank efficiency literature considers the estimation of both cost and profit efficiencies to reveal more accurate information about firm-level performance. Profit inefficiency depends both on the production structure and on the composition of the product portfolio, which has to be updated by banks at the pace required by general macroeconomic and other trends in the economy. In addition, profit efficiency incorporates both the cost and revenue side of a bank's operations and so therefore can be considered a more encompassing measure of firm performance. For instance just looking at cost efficiency may be misleading as one may find cost efficient banks that are highly efficient but they earn low revenues. Profit efficiency estimates therefore encompass bank cost and revenue features in the optimisation process.

Referring to table 7.6 the alternative profit efficiency results show that the average technical efficiency estimates are around 68% over the period 1995-1999. It should be noted that this level of profit inefficiency is similar to the typical range of profit inefficiency results found in US studies, that is about 30% to 40% of the industry's potential profits, according to Berger and Humphrey (1997). However, these profit efficiencies in GCC banking seem to be lower than those found in European banking. For instance, William and Gardener (2000) estimate profit efficiency to be 79.7% in European banking during the 1990s. The mean profit efficiency in GCC banking suggests that banks under study lose around 32% of profits that could be earned by a best practice institution.

Based on bank's specialisation, the results show that the profit efficiency scores ranged from 64% for investment banks to 73% for the Islamic banks (see table 7.6 for details) these results similar to Aljarrah (2002). According to Aljarrah (2002) this result might explain the increase in Islamic banking activities especially in Bahrain over the past few years; as the cost of funds for Islamic banks is relatively cheaper than the cost of funds for other financial institutions. The Islamic banks, in general, do not pay interest but rather a mark-up which is a profit margin based on the way in which the funds are utilised; as indicated in chapter 3.

In the case of geographical location, profit efficiency ranged from around 64 % in Oman to 72% in Saudi Arabia. Omani banking are relatively less profit efficient compared to Saudi Arabian and Kuwaiti institutions. Based on the size of assets, profit efficiency measures seems to be similar across all banks sizes, so these results do not support the view that large banks enjoy profit efficiency advantages compared to small banks.

To summarise the main findings, cost efficiency levels averaged around 88 percent over the period 1995-1999. On the other hand, alternative profit efficiency averaged around 68% over the same period. It seems that, cost as well as alternative profit efficiency of GCC banking systems have not dramatically altered over the period 1995-1999. Furthermore, the size of the cost and profit efficiency estimates for the GCC banks under study are not noticeably different from those observed in previous studies on US and European banking. Islamic banks are found to be the most cost and profit efficient while investment banks are the least efficient. This result may partially explain the motives behind the increase in Islamic banking activities over the past few years; as the cost of funds for Islamic banks is relatively cheaper than the cost of funds for other financial institution. Based on assets size, there seems to be no substantial differences between large and small banks in terms of their cost and profit efficiency levels. However, geographically, Saudi Arabia seems to have the most cost and profit efficient banking system, while Bahrain is the least cost efficient and Oman is the least profit efficient respectively. This may relate to the fact that Saudi Arabia has by far the largest banking system in the region. Finally, while the countries under study have implemented many economic and financial reforms over the last twenty years or so as indicated earlier, these reforms appear to have had little impact on banking sector efficiency in the second half of the 1990s. Given our findings, it seems that more reform may be needed to improve (especially) their profit efficiency. Perhaps the move to create a single GCC market may help to facilitate these developments as the creation of a similar European Single market appears to have had a positive impact on European bank efficiency (see European Commission (1997).

Table 7.6 : Alternative profit efficiency in GCC member states over 1995-1999

Based on geographical location

Country/Year	1995	1996	1997	1998	1999	All
Bahrain	63	66	69	70	71	69
Kuwait	64	68	69	71	72	70
Oman	62	66	66	67	67	64
Saudi Arabia	68	70	70	72	74	72
Qatar	63	67	68	69	70	67
United Emirates	64	67	69	71	72	69
All	64	68	69	70	72	68
According to bank's organisational form						
Commercial	64	67	68	68	70	69
Investment	62	64	65	66	66	64
Islamic	68	72	73	74	75	73
All	64	68	69	70	72	68
According to bank's Asset Size(US$ million						
1-199	63	67	68	69	70	67
200-299	65	67	67	69	70	68
300-499	64	70	70	70	71	68
500-999	65	70	70	70	71	68
1000-2499	66	70	69	71	70	67
2500-4999	64	67	69	70	72	68
5000-9999	63	67	68	70	71	68
10000+	62	65	67	69	72	69
All	64	68	69	70	72	68

Source: Author's own estimation

7.3.2 Estimated Levels of Cost Economies and Cost Efficiencies

7.3.2.1 Estimated Levels of Cost Economies

It is possible to obtain a measure of economies of scale (scale elasticity) from the cost function by differentiating the cost function with respect to output and summing up the coefficients of the exogenous variables (as shown earlier in this chapter); if the sum is significantly lower than one, there are scale economies, if it is equal to one there are constant returns to scale and if it is larger than one there are diseconomies of scale. Table 7.7 shows the cost scale elasticities of GCC banking markets. Geographically, the United Arab Emirates banks seem to be benefit from potential economies of scale whereas in the other countries diseconomies appear to be prevalent. For instance, the Saudi Arabian banking market shows diseconomies of scale, and this may be consistent with the fact that Saudi Arabian banks are the largest in the GCC countries in terms of total assets size (see chapter 3). (This result is also consistent with other results in the literature [see among others (Mester et al. 1998); Hannan et al. (1998); who find substantial diseconomies for large banks]. Overall, our results suggest that optimal banks' assets size is in the range of US$ 3-5 billion. Organisational form seems to have no effect on bank's economies of scale, this result may suggest that, small, medium and large-sized banks are found throughout all organisational forms. Taken together, the results suggest that there are little opportunities, apart for the smallest GCC banks to realize scale economies. Even when they are found, they appear to be small.

Table 7.7 : Cost Scale elasticities in the banking sectors of GCC member states over 1995-1999

Country/Year	1995	1996	1997	1998	1999	All
Saudi Arabia	1.05	1.04	1.06	1.08	1.09	1.08
Kuwait	.99	1.04	1.03	1.05	1.03	1.03
Qatar	1.02	0.99	1.03	1.01	1.02	1.02
U.A.E	0.99	0.98	0.97	0.99	0.96	0.96
Oman	0.95	1.02	0.98	0.99	1.01	0.98
Bahrain	1.02	1.03	1.01	0.99	1.03	1.02
All	103	1.03	1.02	1.03	1.03	1.03
According to bank's organisational form						
Commercial	1.01	1.04	1.02	1.03	1.03	1.03
Investment	1.03	1.01	1.03	1.01	1.02	1.02
Islamic	1.02	1.02	1.02	1.03	1.03	1.03
All	1.03	1.03	1.02	1.03	1.03	1.03
According to Bank's Asset Size(US$ million						
1-199	0.90	0.91	0.92	0.91	0.92	0.91
200-299	0.93	0.94	0.95	0.94	.94	0.94
300-499	0.95	0.94	.094	0.95	0.95	0.95
500-999	0.95	0.95	0.95	0.94	0.94	0.94
1000-2499	1.01	1.01	1.01	.99	1.01	1.01
2500-4999	1.01	1.01	0.99	1.01	.99	1.01
5000-9999	1.04	1.03	1.12	1.12	1.09	1.08
10000+	1.19	1.15	1.16	1.19	1.16	1.15
All	1.03	1.03	1.02	1.03	1.03	1.03

Source: Author's own estimation

Note : Volumes below 1 represent scale economies, =1 represent constant returns to scale and >1 represent diseconomies of scale

7.3.2.2 Scale Efficiency Scores

As noted earlier, an alternative to the scale elasticity measure is the scale inefficiency indicators as suggested by Evanoff and Israelivich (1995). Whereas scale elasticity is related to incremental changes in output, scale inefficiency is related to the change in output required to produce at the minimum efficient scale. Given the cost function specification of the stochastic frontier, scale efficiency averaged around 67% for banks under study over 1995-2000 (see table 7.8). According to geographical location, scale efficiency scores ranged from 74% for Saudi Arabia and United Arab Emirates banks to 62% for Qatari banks. Moreover, commercial banks are the most efficient with scale efficiencies around 70% while the least efficient are the Islamic banks (table 7.8).

Table 7.8 : Cost Scale inefficiency in the banking sectors of GCC member states over 1995-1999

Country/Year	1995	1996	1997	1998	1999	All
Bahrain	34	32	37	33	31	33
Kuwait	37	38	34	32	34	32
Oman	31	35	32	30	29	31
Saudi Arabia	27	26	25	26	25	26
Qatar	35	38	37	37	37	38
United Emirates	30	29	29	29	27	28
All	32	30	29	32	33	33
According to bank's organisational form						
Commercial	29	29	31	31	31	31
Investment	32	31	33	31	31	31
Islamic	34	33	34	34	35	33
All	31	32	32	32	32	33
According to bank's Asset Size(US$ million						
1-199	29	30	26	27	32	29
200-299	30	28	28	28	28	28
300-499	30	29	30	30	33	30
500-999	25	27	27	26	26	26
1000-2499	26	25	25	25	22	24
2500-4999	20	22	15	19	19	18
5000-9999	22	17	14	14	17	15
10000+	22	19	23	21	18	21
All	32	30	29	32	33	33

Source: Author's own estimation

The results generally show that some categories of small and large banks are scale efficient while other ranges do have similar efficiency levels. Our findings for scale efficiency suggest that, on average, many GCC banks lie a distance from their optimal efficient size. So whereas scale elasticities are negligible (i.e. the slope of the cost function is flat) the difference between average bank size and their most efficient size appears to be considerable. In fact scale inefficiency appears to be larger than cost inefficiency, but similar in magnitude to profit efficiency.

To conclude we find that, cost inefficiency levels of GCC are around 15% and profit inefficiencies are around 30 percent, these results are generally consistent with the findings in US and European banking. Islamic banks are found to be the most cost and profit efficient. Banks in Saudi Arabia seem to be slightly more cost and profit efficient, compared to those in other GCC countries, however, and this may be because they can benefit from access to a larger banking market. The hypotheses that there are significant economies of scale to be exploited in the banking industry, does not appear to hold with the exception of very small banks. Diseconomies of scale appear to predominate throughout the region's banks although there are noticeable differences in scale inefficiency. Taken together, the results suggest that banks should focus on improving their revenue performance (improving profit efficiency) as well as on trying to operate at optimal scale (scale efficiency).

7.4 SCP in the GCC Countries:

Pooled Cross-Country Data and Empirical Results

This section focuses on the empirical evidence concerning the effects of concentration (CONC), market share (MS) and the bank efficiency variables (X-EFF and S-EFF), on bank performance in the GCC banking markets. Tests will be carried out using the methodology and the variables as outlined in the previous sections of this chapter as well as in Chapter 6. First of all, we test for the effect of each hypothesis (traditional SCP, RMP, X-EFF and S-EFF) on profitability by estimating the complete reduced form π regressions with CONC, MS, and the EFF measures. As noted by Berger (1995) this will provide more definitive results because they incorporate the reduced forms for all four hypotheses, and their marginal effect simultaneously.

We pooled our sample data for all the GCC member states (Saudi Arabia, Kuwait, Oman, Qatar, United Arab Emirates and Bahrain) from 1995 to 1999 and regressed the performance measures [either return on assets (ROA) return on equity (ROE) or Alternative Profit X-efficiency indicators (APX)] on the concentration measure (CONC), the market share [either, individual bank loan (BLMS) or deposits market share (BDMS)]. We used MINITAB 12 statistical software programme to estimate all the regression equations.[2]

Table 7.9 reports the results of the six complete reduced form π (ROE, ROA, APX), regressions with CONC, MS, and the EFF measures, with other control and environmental variables for the pooled sample of GCC member states banks between 1995 and 1999. The results from the six models strongly support the X-efficiency version of the efficient–structure hypotheses (X-EFF), that is, that the x-efficiency variable is positive and statistically significant in all six models. The results reject the traditional SCP hypothesis, as in the first five models the concentration ratio variable (CONC) is negative and statistically insignificant and in model six it is negative and statistically significant at the 10% level of significance. The results also show no strong support for the relative market power hypotheses, as the MS variable measured by loan market share (BLMS) is positive and statistically insignificant in models (2, 3 and 5), and the deposits market share variable (BDMS) is statistically

[2] The models were re-estimated using the fixed effects panel data approach using STATA and similar results maintained (see Appendix 2).

insignificant in models (1, and 4), (however, it is found to be positive and statistically significant in model six where we use alternative profit efficiency (APX) as our profitability measure). Moreover, the results also show no support for the scale efficiency version of the efficient-structure hypothesis, as in model 1 and model 2 the scale efficiency measure is negative and statistically insignificant when profitability is measured by return on equity (ROE) and negative and statistically significant in the four other models. These results suggest some consistency with the literature that finds mostly a negative and statistically insignificant concentration coefficient in SCP type estimates on various banking markets (see Lucy (1995), Berger, 1995, and Goldberg and Rai (1996). Regarding other explanatory variables, we found that, the market-specific demand conditions variable (GDPPC) is positive but statistically insignificant in models (1, 2, 3 and 4), and positive and statistically significant in models 5 and 6. This may support the argument that, greater levels of income lead to increasing demand for loans and increasing supply of deposits from consumers. In other words, banks operating in high per capita income markets will charge higher prices for their services than banks operating in low per capita income markets, other things remaining equal. Nevertheless, our empirical findings also suggest that Islamic banks are significantly more profitable, than investment and commercial banks. The variable for Islamic banks is positive and statistically significant in all the models estimated (see table 7.9). As noted before, this may be explained by the fact that, for all Islamic banks deposits are interest-free. Moreover, this result may partially explain the motives behind the increase in Islamic banking activities over the past few years; as the cost of funds for Islamic banks is relatively cheaper than the cost of funds for other financial institutions. In addition, intense competition between investment and commercial banks might explain the low profits of investment banks. Overall, these findings are consistent with our previous results on cost and (alternative) profit efficiency (that show Islamic banks to be more efficient institutions).

Finally, the explanatory power of our models (the adjusted R^2 values) are between 12% to 20%, these are higher than the average found in previous SCP studies which average between 3% to 10% [see Gilbert (1984), Smirlock (1985), Evanoff and Fortier (1988), Timme and Yung (1991), Lucy (1995), Molyneux and Forbes (1995), Berger (1995), Golberg and Rai (1996)]. This suggests that the ability of banks to improve profits through efficiency increases in GCC countries may be higher than in US and European markets. Nevertheless, apparently most of the variation in profit is still is due to factors other than efficiency and market structure variables. Although, the main findings run strongly counter to the traditional SCP paradigm we can not yet distinguish among the other three hypotheses since MS may be correlated with the EFF variables. As noted above the results so far strongly support the x-efficiency version of the efficient structure (ES) hypotheses. The x-efficiency variable is positive and statistically significant when regressed against all profitability variables. However, there is some (albeit limited) evidence that the RMP may hold as market share is found to be positive and statistically significant in one model (the APX estimate).

Table 7.9 Models from 1-6 investigate the influence of market-power and efficiency on GCC bank's profitability(ROE, ROA and APX).

Model (1) The dependent variable is (ROE) and the market share variable is (BDMS)

Predictor	Coef	StDev	T	P
Constant	2.25850	0.76920	2.94	0.004
GDPPC	0.06236	0.08191	0.76	0.447
CONC	-0.28270	0.22121	-1.28	0.202
BDMS	0.04817	0.03784	1.27	0.204
X-EFF	0.58431	0.22308	2.62	0.009
S-EFF	-0.77910	0.56496	-1.38	0.169
Commercial banks	0.33177	0.11207	2.96	0.003
Investment banks	0.33980	0.12307	2.76	0.006
R-Sq = 10.1%	**R-Sq(adj) = 8.2%**			

Model (2) The dependent variable is (ROE) and market share variable is (BLMS)

Predictor	Coef	StDev	T	P
Constant	2.34206	0.76660	3.06	0.002
GDPPC	0.06944	0.08219	0.84	0.399
CONC	-0.31244	0.22810	-1.37	0.172
BLMS	0.05251	0.03843	1.37	0.173
X-EFF	0.51653	0.21870	2.36	0.019
S-EFF	-0.82136	0.51750	-1.59	0.113
Commercial banks	0.30909	0.11360	2.72	0.007
Investment banks	0.29441	0.13480	2.18	0.030
R-Sq = 10.2%	**R-Sq(adj) =8.4%**			

Model (3) The dependent variable is (ROA) and market share variable is (BLMS)

Predictor	Coef	StDev	T	P
Constant	0.06487	0.01983	3.27	0.001
GDPPC	0.00005	0.00023	0.22	0.825
CONC	-0.01313	0.01009	-1.30	0.194
BLMS	0.00297	0.01311	0.23	0.821
X-EFF	0.03791	0.01138	3.33	0.001
S-EFF	-0.06176	0.01353	-4.57	0.000
Commercial banks	0.01103	0.00406	2.71	0.007
Investment banks	-0.00579	0.00387	-1.50	0.136
R-Sq = 19.3%	**R-Sq(adj) = 17.9**			

Model (4) The dependent variable is (ROA) and market share variable is (BDMS)

Predictor	Coef	StDev	T	P
Constant	0.06669	0.01821	3.66	0.000
GDPPC	0.11443	0.08944	1.28	0.202
CONC	-0.01349	0.09276	-1.45	0.147
BDMS	0.00778	0.01217	0.64	0.523
X-Eff	0.03827	0.01136	3.37	0.001
S-EFF	-0.06469	0.01396	-4.63	0.000
Commercial banks	0.011099	0.04014	2.76	0.006
Investment banks	-0.05979	0.03871	-1.54	0.125
R-Sq = 19.2%	**R-Sq(adj) = 17.6%**			

Table 7.9 (Continued)				
Model(5) The dependent variable is (AXP) and market share variable is (BLMS)				
Predictor	Coef	StDev	T	P
Constant	0.42770	0.17885	2.39	0.017
GDPPC	0.00834	0.00208	4.01	0.000
CONC	-0.11656	0.09092	-1.28	0.201
BLMS	0.16228	0.11824	1.37	0.171
X-Eff	0.00456	0.00102	4.45	0.000
S-EFF	-0.20665	0.12195	-1.69	0.091
Commercial banks	0.01041	0.03494	0.30	0.766
Investment banks	-0.04218	0.03664	-1.15	0.250
R-Sq =13.7%	R-Sq(adj) = 12.0%			

Model(6) The dependent variable is (AXP) and market share variable is (BDMS)				
Predictor	Coef	StDev	T	P
Constant	0.55861	0.18021	3.10	0.002
GDPPC	0.00802	0.00020	3.89	0.000
CONC	-0.15665	0.08935	-1.75	0.080
BDMS	0.31511	0.10934	2.88	0.004
X-Eff	0.00474	0.00107	4.66	0.000
S-EFF	-0.32860	0.12742	-2.58	0.010
Commercial banks	0.02073	0.03486	0.59	0.552
Investment banks	-0.04568	0.03619	-1.26	0.208
R-Sq = 15.3%	R-Sq(adj) = 13.6%			

Note: Commercial= binary variable for commercial banks where commercial banks=1 and other banks 0
Investment= binary variable for investment banks where investment banks=1 and other banks 0
The constant picks up the term for Islamic banks.

As such, and following Berger (1995), our analysis proceeds to test to see whether it is the market-power or efficiency effects associated with market share (MS) included in the profit equation that impact on the CONC coefficient. This is a key point in the debate between MP and ES advocates in the literature. We test for this condition empirically, in two stages. First of all, we exclude the market structure measures from the full models [in this case the concentration ratio (CONC) and the market share measures (MS) [both the deposit (BDMS) and loan market share (BLMS)] from the full model and regress only efficiency measures with other control variables on the profitability measures (ROE, and ROA and APX), however, in the second stage we replicate the same regressions by including separately the two MS measures in the regression equations to test for the individual marginal effect of each of the two variables in the model, to see to what extent this will effect the regressions explanatory power.

Table 7.10 testing for the influence of efficiency and market share variables on bank profits excluding concentration

Model7: Dependent variable is(APX) [market share variables excluded]

Predictor	Coef	StDev	T	P
Constant	0.2488321	0.136100	1.83	0.068
GDPPC	0.0091478	0.019398	4.73	0.000
X-Eff	0.0045391	0.001024	4.43	0.000
S-EFF	-0.1151125	0.106812	-1.08	0.282
Commercial banks	-0.0016687	0.033979	-0.05	0.961
Investment banks	0.0405715	0.035915	1.13	0.259

S = 0.1792 R-Sq = 13.1% R-Sq(adj) = 11.9%

Model8:Dependent variable is (APX) and market share variable is(BLMS)

Predictor	Coef	StDev	T	P
Constant	0.2877568	0.141700	2.03	0.043
GDPPC	0.0009300	0.000194	4.79	0.000
BLMS	0.1097764	0.110213	0.99	0.323
X-Eff	0.0044959	0.001025	4.39	0.000
S-EFF	-0.1623167	0.117016	-1.39	0.166
Commercial banks	0.0000000	0.034010	0.00	1.000
Investment banks	-0.0353542	0.036288	-0.97	0.331

R-Sq = 13.3% R-Sq(adj) = 11.9%

Model9:Dependent variable is (ROE) [market share variables excluded]

Predictor	Coef	StDev	T	P
Constant	-2.5206563	0.731965	-3.44	0.001
GDPPC	0.0823486	0.076604	1.07	0.283
X-Eff	0.5180469	0.218331	2.37	0.018
S-Eff	-1.3826096	0.342578	-4.04	0.000
C	-0.3142331	0.108855	-2.89	0.004
In	-0.3672452	0.116531	-3.15	0.002

R-Sq = 9.6% R-Sq(adj) = 8.3%

Model10:Dependent variable is (ROE) [market share variable is (BLMS]

Predictor	Coef	StDev	T	P
Constant	2.6135254	0.741446	3.52	0.000
GDPC	0.0989633	0.079415	1.25	0.214
BLMS	0.0268489	0.033599	0.80	0.425
X-Eff	0.5066116	0.218932	2.31	0.021
S-Eff	-1.1296342	0.466263	-2.42	0.016
Commercial banks	0.2904785	0.112975	2.57	0.011
Investment banks	-0.3141143	0.134284	-2.34	0.020

R-Sq = 9.9% R-Sq(adj) = 8.5%

Model (11) Dependent variable is (ROE) [market share variable is (BDMS]

Predictor	Coef	StDev	T	P
Constant	2.5566245	0.733711	3.48	0.001
GDPC	-0.0942535	0.078092	-1.21	0.228
BDMS	0.0271667	0.034114	0.80	0.426
X-Eff	0.5448171	0.221032	2.47	0.014
S-Eff	-1.0762985	0.515384	-2.09	0.037
Commercial banks	-0.3029437	0.109826	-2.76	0.006
Investment banks	-0.3358659	0.123056	-2.73	0.007

Table 7.10 (Continued)				
Model (12) Dependent variable is ROA [market share variables are excluded from the model]				
Predictor	**Coef**	**StDev**	**T**	**P**
Constant	0.0501530	0.0150819	3.32	0.001
GDPPC	0.0000006	0.0000021	0.28	0.776
X-Eff	0.0003698	0.0001134	3.26	0.001
S-EFF	-0.0580454	0.0118300	-4.90	0.000
Commercial banks	-0.0045781	0.0037641	-1.22	0.225
Investment banks	0.0119365	0.0039786	3.00	0.003
R-Sq = 18.8%	**R-Sq(adj) = 17.6%**			
Model (13)Dependent variable is ROA and market share variable is (BDMS)				
Predictor	**Coef**	**StDev**	**T**	**P**
Constant	0.0512214	0.01604	3.19	0.002
GDPPC	0.0006357	0.00021	0.29	0.770
BDMS	0.0023100	0.01159	0.20	0.842
X-Eff	0.0370456	0.01136	3.26	0.001
S-EFF	-0.0593978	0.01365	-4.35	0.000
Commercial banks	-0.0046081	0.00377	-1.22	0.223
Investment banks	0.0119909	0.00399	3.00	0.003
R-Sq = 18.8%	**R-Sq(adj) = 17.4%**			
Model (14) Dependent variable is ROA and market share variable is (BLMS)				
Predictor	**Coef**	**StDev**	**T**	**P**
Constant	0.0648712	0.01983	3.27	0.001
GDPPC	0.0000005	0.0000023	0.22	0.825
BLMS	0.0029747	0.01311	0.23	0.821
X-EFF	0.0003791	0.0001138	3.33	0.001
S-EFF	-0.0617611	0.01353	-4.57	0.000
Commercial banks	0.0057952	0.003876	1.50	0.136
Investment banks	0.0110301	0.004064	2.71	0.007
R-Sq = 19.3%	**R-Sq(adj) = 17.9%**			

In fact, the inclusion of MS variables do not help in explaining profit variability, and do not increase the regressions explanatory power. Thus, results of models 7 to 14 shown in table 7. 10 suggest that it is the efficiency effects associated with the MS variable included in the profit regression and not the market power effects through MS. Overall, the values of R^2 changed very slightly and X-eff coefficients did not change in a meaningful way when the MS variables were added to the regressions.

Since MP is controlled for in these regressions, these results suggest that ES hypotheses (X-EFF) again, explain part of the profit-structure relationship. However, we cannot formally confirm that efficiency is the determinant of the profit-structure relationship, unless the efficiency variables positively correlates with market structure measures (concentration and market share). According to the structural model of the efficient-structure hypotheses presented by Berger (1995) the profit-structure relationship is conditional on the fact that the efficient-structure (ES) coefficients must be positively correlated with the market structure measures. Specifically, bank profitability is a function of its efficiency, and efficient firms gain market share and this market share may lead to market concentration. To examine this necessary condition of the ES hypotheses, (that efficiency affects market structure), we regressed the CONC and MS measures on the efficiency measures as outlined in the reduced forms for CONC and MS in equations (7.3) and (7.4). The results of these models are shown in table 7.11. When CONC and MS are regressed on the EFF measures and other control variables, all of the X-Eff and S-Eff coefficients are positive, quantitatively large and statistically significant, consistent with the efficient-structure hypotheses. This reinforces the results found earlier that the X-efficiency version of ES hypotheses strongly supports the profit-structure relationship in GCC banking markets. Or to put it another way, more efficient banks have higher levels of profitability, this results is them growing market share, leading to greater levels of concentration. The main factor influencing GCC bank profitability (ROA, ROE or alternative profit efficiency) is bank cost X-efficiency. (The table 7.11 also shows that bank scale efficiency is related to market concentration and market share but we have already shown that scale efficiency is not important in explaining bank profitability).

Table 7.11 Models (15, 16, and 17) Test for relationship between market-power and efficient-structure. Finding that a positive and statistically significant relationship between market-structure and efficient-structure measures can be taken as evidence that supports the efficient structure (ES) hypotheses.				
Model (15) Dependent variable is concentration (CONC)				
Predictor	**Coef**	**StDev**	**T**	**P**
Constant	1.0410923	0.0847422	12.29	0.000
GDPPC	0.0000886	0.0000120	7.36	0.000
X-EFF	0.1859712	0.0665010	2.80	0.005
S-Eff	0.0960634	0.0211556	4.54	0.000
Commercial banks	0.0795998	0.0223514	3.56	0.000
Investment banks	-0.0008004	0.0006373	-1.26	0.210
R-Sq = 18.6%	**R-Sq(adj) = 17.5%**			
Model (16) Dependent variable is bank's deposits market share (BDMS)				
Predictor	**Coef**	**StDev**	**T**	**P**
Constant	0.0002606	0.0005210	0.50	0.617
GDPPC	0.0000084	0.0000098	0.85	0.395
X-EFF	0.4654909	0.0692754	6.72	0.000
S-EFF	0.5850775	0.0543623	10.76	0.000
Commercial banks	0.0127634	0.0172945	0.74	0.461
Investment banks	-0.0233423	0.0182723	-1.28	0.202
R-Sq = 32.7%	**R-Sq(adj) = 31.8%**			
Model (17) Dependent variable is bank's loans market share (BLMS)				
Predictor	**Coef**	**StDev**	**T**	**P**
Constant	0.35512	0.06519	5.45	0.000
GDPPC	0.00000142	0.00000093	1.54	0.125
X-EFF	0.04670	0.01720	2.72	0.007
S-EFF	0.43092	0.05115	8.42	0.000
Commercial banks	0.01493	0.01627	0.92	0.359
Investment banks	0.0004027	0.0004903	0.82	0.412
R-Sq = 25.5%	**R-Sq(adj) = 24.5%**			

To summarise our results are in some way similar to those of Timme and Yang (1991). They regressed π on measures of MS and X-EFF, but included the level of total assets in place of a direct measures of S-EFF. Similar to our results they found that X-EFF has a positive, statistically significant effects on π, and CONC has mostly negative effects. They also found a positive and statistically significant MS coefficient in contrast to our findings. Our results are also in contrast to those of Molyneux and Forbes (1995) who found support for the traditional interpretation of the SCP paradigm and Berger (1995), where his empirical results indicate that market share appears to represent evidence of the relative market power hypothesis in US banking. Overall, our analysis suggests that the X-efficiency version of the efficient-structure hypotheses explains the profit-structure relationship in GCC banking.

7.5 Conclusion

In this chapter we tested for evidence of the market-power and efficient-structure hypotheses in six GCC's banking sectors, including Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and United Arab Emirates. Following Berger (1995) we distinguish among the four hypotheses [the two market power (MP) hypotheses (traditional SCP, and RMP) and the two efficient-structure hypotheses (X-efficiency and Scale-efficiency)] by incorporating into our performance models direct measures of X-efficiency and scale-efficiency. This provides more definitive results because the model specification can incorporate the reduced forms for all four hypotheses, and tests of the four hypotheses were performed by regressing measures of concentration, market share, X-efficiency and scale-efficiency against profitability (ROE, ROA and Alternative profit efficiency (APX). Our empirical findings strongly support the X-efficiency version of the efficient -structure hypotheses that cost X-efficiency helps in explaining the variability of bank profits. X-efficiency or superior management of resources is consistently associated with higher profits when controlling for the effects of the other three hypotheses. The results show no support for the Scale-efficiency version of the ES hypotheses which assumes that banks are equally X-efficient (the differences in the quality of management and in production technologies are negligible), but some banks simply operate at greater efficient scale than others and therefore, these banks are assumed to enjoy higher profits and increased market shares. Support for the other necessary conditions of the ESX that X-efficiency hypotheses is positively related to concentration or market share so that it can explain the positive profit-structure relationship, is relatively strong. Moreover, both market structure variables (market share and concentration) are statistically insignificant and mostly negatively associated with bank profits. Our findings are in contrast with Berger's (1995) findings in one way and consistent with Berger's (1995) in other. Our findings strongly support the X-efficiency version of the efficient-structure hypotheses, however, Berger found a strong statistically significant positive relationship between profits and market shares but only very little limited support for the x-efficiency hypotheses. However, our findings are consistent with Berger's (1995) in that the results show no support at all for the scale efficiency hypotheses and the traditional structure-conduct–performance paradigm.

Chapter VIII
Conclusion and Limitations

8.1 Conclusion

This thesis enters the debate between market-power (MP) and efficient-structure (ES) explanations of the profit-structure relationship in GCC banking industry by adding direct measures of both X-efficiency and scale efficiency into an empirical analysis of the SCP relationship in Gulf banking. As far as we are aware, this is first study applying the SCP paradigm to the GCC member states (these are Saudi Arabia, Kuwait, Qatar, Bahrain, Oman and United Arab Emirates) banking markets.

Structure-Conduct-Performance (SCP) modelling forms a substantial part of industrial organisations literature and has been widely tested on the US banking system, although recent interest has focussed on European banking systems, particularly in view of the implementation of the EU's single market programme. This thesis extends the established literature by investigating the relationship between structure and performance in GCC banking markets as well as providing an analysis of bank cost and profit efficiency in the region. The general findings of our research are as follows.

The first part of this thesis (chapters 2, and 3) examined the main features of GCC member states economies and their economic and financial development processes over the last two decades. It can be seen that these countries can be classified economically as oil exporting countries. Revenue for oil exports played a key role in their economic development process over the last two decades. Although GCC governments have realised the importance of diversifying their revenue sources, the oil income still dominates the economic environment. During the 1980s and first half of the 1990s the economic growth of these countries(as measured by real GDP) slowed averaging 1.5 percent compared to 4 percent for other developing countries over the same period. Slow economic growth led to low levels of investment and high levels of unemployment, also associated with rising levels of external indebtedness in some countries (Saudi Arabia and Kuwait) and fiscal deficits in all countries except UAE. As a result, many of GCC countries have undertaken various reforms in order to promote economic growth. Over the last decade, the economic performance indicators of those countries have generally improved compared to the 1980s, despite the difficult situation faced by various individual economies. Annual GDP growth averaged 5.5 percent between 1990-2000 compared to 5 percent for the world's developing countries over the same period. The other main economic performance indicators including those on trade, investment levels, rates of inflations, external indebtedness and external reserves have all witnessed improvements over the same period.

The financial sectors of GCC countries have witnessed improvements, although, these systems are characterized by a lack of innovative financial investment instruments and the dominance of commercial banks in these markets. For example, market share of commercial banks ranges from 50% in Saudi Arabia to 80% in Qatar. In addition, the banking systems of these countries are concentrated (for instance, the share of the largest three banks ranged from about 55% of the banking sectors in Saudi Arabia to about 75% in Qatar). During the 1990s the financial performance of banks operating in the countries under study have shown significant improvements in terms of their asset quality, capital strength and profitability. Moreover, the financial sectors of these countries have become deeper according to various financial sector indicators. Finally, although, stock markets in GCC countries are still at early stages of development there has been a recent opening of new stock exchange floors in various countries (Qatar, Dubai, Abu Dhabi, and the electronic system in Saudi Arabia) and a slowly increasing number of publicly traded companies. Ongoing reforms aim to further promote the capital markets, helping to provide local and foreign investors (individuals and institutions) with a broader range of investment opportunities.

The second part of this thesis presents a theoretical overview (chapters 4, 5 and 6) and empirical evidence (chapter 7) of the structure-conduct-performance and banking efficiency literature and how such issues are important for GCC countries. Our analysis builds on the previous work of Berger (1995) in order to examine SCP relationships in Gulf banking. In particular we test for evidence of the traditional SCP paradigm, the Relative Market Power hypothesis; the X-Efficiency hypothesis and the Scale Efficiency hypothesis across the Gulf banking systems. We investigate the efficient structure hypothesis in an attempt to determine whether efficiency or market power factors are the main explanatory feature determining banking performance in GCC member states. The efficient structure hypothesis is tested by using a stochastic cost frontier technique to derive measures of cost and profit efficiency and scale efficiency and then these are incorporated in SCP regression models. The advantage of adopting this approach is that the relationship between performance and market structure will become clearer once the issue of efficiency has been adequately addressed (Berger (1995).

The general findings of our research are as follows. Firstly, when we test for evidence of the four competing hypotheses–the traditional structure–conduct-performance (SCP) hypotheses, the relative market-power hypotheses (RMP), the X-efficiency version of efficient structure hypotheses (ES) and the scale-efficiency version of efficient-structure hypotheses- across GCC banking markets, we found that, the link between market concentration and performance that is assumed within the traditional SCP paradigm is not present amongst GCC systems. However, the pooled estimates show strong evidence that bank efficiency (the X-efficiency version of efficient-structure hypotheses) is an important determinant of bank performance. In other words, x-efficiency explains the performance of GCC banks. These findings indicate that; firstly, there is no evidence that market concentration enables banks to earn higher profits due to collusion. Secondly, market share appears to reflect bank's efficiency and not relative market power. The most important implications of these findings for GCC's policymakers is that, they should not be widely concerned about increasing concentration levels in banking markets from a competition standpoint. In other words, mergers and consolidations across the financial institutions should not be restricted by policymakers as there is no evidence that higher levels of concentration leads to uncompetitive pricing on profits performance in the banking sector. In fact, our results may suggest that merger policies should be encouraged by the authorities in the GCC markets as this may lead to stronger and more efficient financial institutions. In particular, it follows from the findings in this thesis that it would be in the interests of the relevant authorities in GCC member states to focus their attention on mergers encouraging between smaller banks in order to improve their scale-efficiency and also to benefit from scale economies that exist within the small banks sector.

8.2 Limitations of the study

Overall, the above analysis provides an informative and new insight, employing a hitherto infrequently used and substantial dataset to the SCP relationship across GCC banking markets, from which certain tentative policy prescriptions can be drawn. The analysis, however, is not without its limitations. In a study of this nature a major problem relates to accounting for country-specific differences and definition of the banking markets. The country-specific variables used in the analysis may not take account of all country-specific characteristics thus, average industry profitability levels may vary from one country to another for reasons not accounted for in the model. One of the ways to avoid this problem is to examine the structure-performance relationship in a particular country, thereby avoiding cross-country differences. This, however, creates further difficulties because detailed regional data are not widely available (as far as we are aware) for many GCC countries banking markets. Data on specific products or services are also mainly unavailable. Given this data problem, it is very difficult to obtain anything but market structure variables on a national and yearly basis.

Our empirical analysis uses sub-market total banking sector assets, total banking sector deposits and total banking sector loans as the definition of the market. We recognise that this definition is adequate but not ideal. Given that various organisational forms, different ownership structures and specialisations within the banking sector make it difficult to precisely define the market. Further research should therefore focus on defining regional or sub-market structural variables that account for all these differences within individual banking systems, so that more representative, cross-sectional estimates of the SCP relationship can be evaluated. Detailed regional and sub-market breakdowns for various products and services could also facilitate further research testing for cooperative and rivalrous behaviour in individual banking markets. This could be of particular interest to national authorities banking regulators and merger policymakers.

Other limitations relate to the nature of the data used in the empirical study. The various bank-specific and country-specific variables used in the analysis are very broad and only crudely proxy for the features they purport to measure. The SCP methodology also models the relationship in a linear multiple regression model when there is no strong reason to believe why such relationships are non-linear.

Finally, despite strong support for the X-efficiency version of the Efficiency hypothesis, it does not appear that any of the efficient-structure (ES) hypotheses or market-power hypotheses (MP) are of major importance in explaining bank profits. The small value of the coefficient of determination (that is the adjusted R^2 which is mostly between 10% and 20% in the literature) raises the question about the importance and the validity of market-power and efficient-structure hypotheses in explaining bank profits. However, no doctoral thesis can hope to cover all of this related ground on even a fairly specialised area of research. This thesis started with specific aims, which have been broadly achieved, but with an awareness of their inherent limitations and constraints. Given that, as far as we are aware, no study of this kind has to date been undertaken on GCC banking. We hope the findings open a fruitful avenue for future research in the area of bank structure and performance in these countries.

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(Appendix 1)

CHARTER OF THE CO-OPERATION COUNCIL FOR THE ARAB STATES OF THE GULF

THE STATES OF THE UNITED ARAB EMIRATES
THE STATE OF BAHRAIN
THE KINGDOM OF SAUDI ARABIA
THE SULTANATE OF OMAN
THE STATE OF QATAR
THE STATE OF KUWAIT

Being fully aware of their mutual bonds of special relations, common characteristics and similar systems founded on the Creed of Islam which binds them; and based on their faith in the common destiny and destination that link their peoples; and in view of their desire to effect co-ordination, integration and interconnection between them in all fields; and based on their conviction that co-ordination, co- operation and integration between them serves the higher goals of the Arab Nation; and in order to strengthen their co-operation and reinforce their common links; and in an endeavour to complement efforts already begun in all vital scopes that concern their peoples and realise their hopes for a better future on the path to unity of their States; and in conformity with the Charter of the League of Arab States which calls for the realisation of closer relations and stronger bonds; and in order to channel their efforts to reinforce and serve Arab and Islamic causes, have agreed as follows:

ARTICLE ONE :THE ESTABLISHMENT OF THE COUNCIL

A council shall be established hereby to be named The Co-operation Council for the Arab States, hereinafter referred to as the Co-operation Council G.C.C).

ARTICLE TWO: HEADQUARTERS :

The Co-operation Council shall have its headquarters in Riyadh, Kingdom of Saudi Arabia.

ARTICLE THREE: CO-OPERATION COUNCIL MEETINGS:

The Council shall hold its meetings in the state where it has its headquarters, and may convene in any member state.

ARTICLE FOUR: OBJECTIVES:

1. The basic objectives of the Co-operation Council are:
2. To effect co-ordination, integration and interconnection between member states in all fields in order to achieve unity between them.
3. To deepen and strengthen the relations, links and scopes of co-operation now : prevailing between their peoples in various fields.
4. To stimulate scientific and technological progress in the fields of industry, mineralogy, agriculture, water and animal resources; to establish scientific research centres, implement of common projects, and encourage co-operation by the private sector for the good of their peoples.
5. To formulate similar regulations in various fields, including the following: Economic and financial affairs, Commerce, customs and communications, Education, culture, social, health affairs, Information, tourism , legislation and administrative affairs.

ARTICLE FIVE : COUNCIL MEMBERSHIP

The Co-operation Council shall be formed of the six states that participated in the Foreign Ministers' meeting held at Riyadh on 4 February 1981.

ARTICLE SIX : ORGANIZATION OF THE CO-OPERATION COUNCIL

1. The Co-operation council shall have the following main organizations:
2. The Supreme Council to which shall be attached the 1. Commission for the Settlement of Disputes. 2. The Ministerial Council. 3. The Secretariat General.
3. Each of these organizations may establish branch organizations as necessary.

ARTICLE SEVEN: SUPREME COUNCIL

1. The Supreme council is the highest authority of the Co-operation Council and shall be formed of heads of member states. Its presidency shall be rotating based on the alphabetical order of the names of the member states.
2. The Supreme Council shall hold one regular session every year. Extraordinary sessions may be convened at the request of any member seconded by another member.
3. The Supreme Council shall hold its sessions in the territories of member states.
4. A Supreme Council shall be considered valid if attended by two thirds of the member states.

ARTICLE EIGHT :THE FUNCTIONS OF THE SUPREME COUNCIL

1. The Supreme Council shall endeavour to achieve the objectives of the Co- operation Council, particularly as concerns the following:
2. Review matters of interest to the member states.
3. Lay down the higher policy for the Co-operation Council and the basic lines it should follow.
4. Review the recommendations, reports, studies and common projects submitted by the Ministerial Council for approval.
5. Review reports and studies which the Secretary General is charged to prepare.

6. Approve the bases for dealing with other states and international organizations.
7. Approve the rules of procedures of the Commission for Settlement of Disputes and nominate its members.
8. Appoint the Secretary General.
9. Amend the Charter of the Co-operation Council.
10. Approve the Council's internal Rules.
11. Approve the budget of the Secretariat General.

ARTICLE NINE :VOTING IN THE SUPREME COUNCIL

1. Each member of the Supreme Council shall have one vote.
2. Resolutions of the Supreme Council in substantive matters shall be carried by unanimous approval of the member states participating in the voting, while resolutions on procedural matters shall be carried by majority vote.

ARTICLE TEN : COMMISSION FOR SETTLEMENT OF DISPUTES

1. The Co-operation Council I shall have a commission called "Commission for Settlement of Disputes" which shall be attached to the Supreme Council.
2. The Supreme Council shall form the Commission for every case separately based on the nature of the dispute.
3. If a dispute arises over interpretation of the implementation of the Charter and such dispute is not resolved within the Ministerial Council the Supreme Council, the Supreme Council may refer such dispute to the Commission for Settlement of Disputes.
4. The Commission shall submit its recommendations or opinion, as applicable, to the Supreme Council for appropriate action.

ARTICLE ELEVEN : MINISTERIAL COUNCIL

1. The Ministerial Council shall be formed of the Foreign Ministers of the member states of other delegated Ministers. The Council's presidency shall rotate among members every three months by alphabetical order of the states.
2. The Ministerial Council shall convene every three months and may hold extraordinary sessions at the invitation of any member seconded by another member.
3. The Ministerial Council shall decide the venue of its next session.
4. A Council's meeting shall be deemed valid if attended by two thirds of the memberstates.

ARTICLE TWELVE : FUNCTIONS OF THE MINISTERIAL COUNCIL

The Ministerial Council's functions shall include the following:

1. Propose policies, prepare recommendations, studies and projects aimed at developing co-operation and co-ordination between member states in the various fields and adopt required resolutions or recommendations concerning thereof.
2. Endeavour to encourage the development and the co-ordination *of* activities existing between member states in all fields. Resolutions adopted in such matters shall be referred to the Ministerial Council for further submission with recommendations, to the Supreme Council for appropriate action.
3. Submit recommendations to the Ministers concerned to formulate policies whereby the Co-operation Council's resolutions may be put into action.
4. Encourage co-operation and co-ordination between the various private sector activities, develop existing co-operation between the member states' chambers of commerce and industry and encourage the flow of working citizens of the member states among them.

5. Refer any of the various facets of co-operation to one or more technical or specialized committees for study and presentation of relevant proposals.
6. Review proposals related to amendments to this Charter and submit appropriate recommendations to the Supreme Council.
7. Approve the Ministerial Council's Rules of Procedures as well as the Rules of Procedures of the Secretariat Genera[
8. Appoint the Assistant Secretaries General as nominated by the Secretary General, for a renewable period of three years.
9. Approve periodic reports as well as internal rules and regulations related to administrative and financial affairs proposed by the Secretary General and submit recommendations to the Supreme Council for approval of the budget of the Secretariat General.
10. Make arrangements for the Supreme Council's meetings and prepare its agenda.
11. Review matters referred to it by Supreme Council.

ARTICLE THIRTEEN : VOTING AT THE MINISTERIAL COUNCIL

1. Every member of the Ministerial Council has one vote.
2. Resolutions of the Ministerial Council in substantive matters shall be carried by unanimous vote of the member states present and participating in the vote, and in procedural matters by majority vote.

ARTICLE FOURTEEN :THE SECRETARIAT GENERAL

1. The Secretariat General shall be composed of a Secretary General who shall be assisted by assistants and a number of staff as required.

2. The Supreme Council shall appoint the Secretary General, who shall be a citizen of one of the Co-operation Council states, for a period of three years which may be renewed for one time only.
3. The Secretary General shall nominate the Assistant Secretaries General.
4. The Secretary General shall appoint the Secretariat General's staff from among the citizens of member states, and may not make exceptions without the approval of the Ministerial Council.
5. The Secretary General shall be directly responsible for the work of the Secretariat General and the smooth flow of work in its various organisations. He shall represent the Co-operation Council with other parties within the powers vested in

ARTICLE FIFTEEN: FUNCTIONS OF THE SECRETARIAT GENERAL

The Secretariat General shall undertake the following functions:

1. Prepare studies related to co-operation and co-ordination, and to integrated plans and programmes for member states' common action.
2. Prepare periodic reports on the Co-operation Council's work.
3. Follow up the execution by the member states of the resolutions and recommendations of the Supreme Council and Ministerial Council.
4. Prepare reports and studies ordered by the Supreme Council for Ministerial Council.
5. Prepare the draft of administrative and financial regulations commensurate with the growth of the Co-operation Council and its expanding responsibilities.
6. Prepare the Co-operation Council's budget and closing accounts.
7. Make preparations for meetings and prepare agendas and draft resolutions for the Ministerial Council.

8. Recommend to the Chairman of the Ministerial Council the convocation of an extraordinary session of the Council whenever necessary.
9. Any other tasks entrusted to it by the Supreme Council or Ministerial Council.

ARTICLE SIXTEEN

The Secretary General and the Assistant Secretaries General and all the Secretariat General's staff shall carry out their duties in complete independence and for the common interest of the member states. They shall refrain from any action or behaviour that is incompatible with their duties and from divulging confidential matters relating to their appointments either during or after their tenure of office.

ARTICLESEVENTEEN : PRIVILEGES AND IMMUNITIES

1. The Co-operation Council and its organizations shall enjoy on the territories of all member states such legal competence, privileges and immunities as required to realize their objectives and carry out their functions.
2. Representatives of the member states of the Council and Council's employees shall enjoy such privileges and immunities as are specified in agreements to be concluded for this purpose between the member states. A special agreement shall organise the relation between the Council and the state in which it has its headquarters.
3. Until such time as the two agreements mentioned in item 2 above are prepared and put into effect, the representatives of the member states in the Co-operation Council and its staff shall enjoy the diplomatic privileges and immunities established for similar organizations.

ARTICLE EITHTEEN : BUDGET OF THE SECRETARIAT GENERAL

The Secretariat General shall have a budget to which the member states shall contribute equal amounts.

ARTICLE NINETEEN : THE IMPLEMENTATION OF CHARTER

1. This Charter shall go into effect as of the date it is signed by the heads of state of the six member states named in this Charter's preamble.
2. The original copy of this Charter shall be deposited with Saudi Arabia's Ministry of Foreign Affairs which shall act as custodian and shall deliver a true copy there of to every member state, pending the establishment of the Secretariat General at which time the latter shall become depository.

ARTICLE TWENTY : AMENDMENTS TO CHARTER

1. Any member state may request an amendment of this Charter.
2. Requests for Charter amendments shall be submitted to the Secretary General who shall refer them to the member states at least four months prior to submission to the Ministerial Council.
3. An amendment shall become effective if unanimously approved by the Supreme Council.

ARTICLE TWENTY ONE : CLOSING PROVISIONS

No reservations may be voiced in respect of the provisions of this Charter.

ARTICLE TWENTY TWO

The Secretariat General shall arrange to deposit and register copies of the Charter with the League of Arab States and the United Nations, by resolution of the Ministerial Council.

This Charter is signed on one copy in Arabic language at Abu Dhabi City, United Arab Emirates, on 21 Rajab 1401 corresponding to 25 May 1981.

The United Arab Emirates; The State of Bahrain; The Kingdom of Saudi Arabia The Sultanate of Oman; The State of Qatar ; The State of Kuwait.

(APPENDIX 1)

THE UNIFIED ECONOMIC AGREEMENT OF THE CO-OPERATION COUNCIL FOR THE ARAB STATES OF THE GULF

With the help of God the almighty; The Governments of the Member States of the Arab Gulf Co-operation Council; In accordance with the Charter thereof, which calls for closer relations and stronger links; and Desiring to promote, expand and enhance their economic ties on solid foundations, in the best interest of their peoples; and Intending to co-ordinate[and unify their economic, financial and monetary policies, as well as their commercial and industrial legislation, and customs regulations; have agreed as follows:

CHAPTER ONE: TRADE EXCHANGE

ARTICLE 1

1. 1. The Member States shall permit the importation and exportation of agricultural, animal, industrial and natural resource products that are of national origin. Also, they shall permit exportation thereof to other Member States.
2. All agricultural, animal, industrial and natural resource products that are from
3. Member States shall receive the same treatment as national products.

ARTICLE 2

1. All agricultural, animal industrial and natural resource products that are of national origin shall be exempted from customs duties and other charges having equivalent effect.
2. Fees charged for specific services such as demurrage, storage, transportation, haulage or unloading shall not be considered as customs duties when they are levied on domestic products.

ARTICLE 3

1. For products of national origin to qualify as national manufactured products, the value added ensuring from their production in Member States shall not be less than 40 percent of their final value. In addition, the share of the Member States citizens in the ownership of the producing plant shall not be less than 51 percent.
2. Every item to be exempted hereby shall be accompanied by a certificate of origin duly authenticated by the government agency concerned.

ARTICLE 4

1. Member States shall establish a uniform minimum customs tariff applicable to the products of countries other than GCC Member States.
2. One of the objectives of the uniform customs tariff shall be the protection of national products from foreign competition.
3. The uniform customs tariff shall be applied gradually within five years from the date on which this agreement becomes effective. Arrangements for its gradual implementation shall be agreed upon within one year from the said date.

ARTICLE 5

Member States shall grant all facilities for the transit of any Member State's goods to other Member States, exempting them from any duties and taxes whatsoever, without prejudice to the provisions of Paragraph 2 of Article 2.

ARTICLE 6

Transit shall be denied to any goods that are barred from entry into the territory of a Member State by its local regulations. Lists of such goods shall be exchanged between the customs authorities of the Member States.

ARTICLE 7

Member States shall co-ordinate their commercial policies and relations with other States and regional economic groupings and blocs with a view to creating balanced trade relations and favourable circumstances and terms of trade therewith. To achieve this goal, the Member States shall make the following arrangements:

1. Co-ordination of import/export policies and regulations. 2. Co-ordination of policies for building up strategic food stocks. 3. Conclusion of collective economic agreements in cases where joint benefits to 4. Member States would be realised taking of action for the creation of collective negotiating power to strengthen their negotiating position vis-a-vis foreign parties in the field of importation of basic needs and exportation of major products.

CHAPTER TWO: THE MOVEMENT OF CAPITAL, CITIZENS AND THE EXERCISE OF ECONOMIC ACTIVIES:

ARTICLE 8

The Member States shall agree on the executive rules which would insure that each Member State shall grant the citizens of all other Member States the same treatment granted to its own citizens without any discriminations or differentiation in the following fields:

1. Freedom of movement, work and residence. 2. Right of ownership, inheritance and bequest. 3. Freedom to exercise economic activity. 4. Free movement of capital.

ARTICLE 9

The Member States shall encourage their respective private sectors to establish joint ventures in order to link their citizens' economic interest in the various spheres of activity.

CHAPTER THREE: CO-ORDINATION OF DEVELOPMENT

ARTICLE 10

The Member States shall endeavour to achieve co-ordination and harmony among their respective development plans with a view to achieving integration in economic affairs.

ARTICLE 11

1. The Member States shall endeavour to co-ordinate their polices with regard to all aspects of the oil industry including extraction, refining, marketing, processing, pricing, exploitation of natural gas and development of energy sources.
2. The Member States shall endeavour to formulate unified oil policies and adopt common positions vis-a-vis the outside world, and in the international and specialised organisations.

ARTICLE 12

To achieve the objectives specified in this agreement, the Member States shall perform the following:

1. Co-ordinate industrial activities, formulate policies and mechanisms aimed at the industrial development and the diversification of their productive bases on an integrated basis.
2. Standardise their industrial legislation and regulations and guide their local production units to meet their needs.
3. Allocate industries between Member States according to relative advantages and economic feasibility, and encourage thé establishment of basic as well as ancillary industries.

ARTICLE 13

Within the framework of their co-ordination activities, the Member States shall pay special attention to the establishment of joint ventures in the fields of industry, agriculture and services, and shall support them with public, private or mixed capital in order to achieve economic integration, productive interface and common development on sound economic bases.

CHAPTER FOUR : TECHNICAL CO-OPERATION

ARTICLE 14

The Member States shall collaborate in finding spheres for common technical co operation aimed at building a genuine local base founded on encouragement and support of research and applied sciences and technology as well as adapting imported technology to meet needs of the region and to achieve the objectives of progress and development.

ARTICLE 15

The Member States shall establish procedures make arrangements and lay down terms for the transfer of technology, selecting the most suitable or introducing such changes thereto as would serve their various needs. Member States shall also, whenever feasible, conclude uniform arrangements with foreign governments and scientific or commercial firms to achieve these objectives.

ARTICLE 16

The Member States shall formulate policies and implement coordinated programmes for technical, vocational and professional training and qualification at all levels and stages. They shall also upgrade educational curricula at all levels to link education and technology with the development needs of the Member States.

ARTICLE 17

The Member States shall co-ordinate their manpower policies and shall formulate uniform and standardised criteria and classifications for the various categories of occupations and crafts in different sectors in order to avoid harmful competition among themselves and to optimise the utilisation of available human resources.

CHAPTER FIYE. : TRANSPORT AND COMMUNICATION

ARTICLE 18

The Member States shall accord means of passenger and cargo transportation belonging to citizens of the other Member States, when transiting or entering their territory, the same treatment they accord to the means of passenger and cargo transportation belonging to their own citizens, including exemptions from all duties and taxes whatsoever. However, local means of transportation are excluded.

ARTICLE 19

1. The Member States shall co-operate in the fields of land and sea transportation and communication. They shall also co-ordinate and establish infrastructure projects such as seaports, airports, water and power stations and roads, with a view to realising common economic development and linking their economic activities with each other.
2. The contracting States shall co-ordinate aviation and air transport policies among them and promote all spheres of joint activities at various levels.

ARTICLE 20

The Member States shall allow steamers, ships and boats and their cargoes, belonging to any Member State freely to use the various port facilities and grant them the same treatment and privileges granted to their own in docking or calling at the ports as concerns fees, pilotage, and docking services, haulage, loading and unloading, maintenance, repair, storage of goods and other similar services.

CHAPTER SIX: FINANCIAL AND MONETARY CO-OPERATION

ARTICLE 21

The Member States shall seek to unify investment in order to achieve a common investment policy 'aimed at directing their internal and external investments towards serving their interest, and realising their peoples' aspirations in development and progress.

ARTICLE 22

The Member States shall seek to co-ordinate their financial, monetary and banking policies and enhance co-operation between monetary agencies and central banks, including an endeavour to establish a common currency in order to further their desired economic integration.

ARTICLE 23

Member States shall seek to co-ordinate their external polices in the sphere of international and regional development aid.

CHAPTEER SEVEN: CLOSING PROVISIONS

ARTICLE 24

In the execution of the Agreement and determination of the procedures resulting there from consideration shall be given to differences in the levels of development between the Member States and the local development priorities of each. Any Member State may be temporarily exempted from applying such provisions of this Agreement as may be necessitated by temporary local situations in that State or specific circumstances faced by it. Such exemption shall be for a specified period and shall be decided by the Supreme Council of the Gulf Arab States Co-operation Council.

ARTICLE 25

No Member State shall give to any non-member state any preferential privilege exceeding that given herein.

ARTICLE 26

a. This Agreement shall enter into force four months after its approval by the Supreme Council.

b. This Agreement may be amended by consent from the Supreme Council.

ARTICLE 27

In case of conflict with local laws and regulations of Member States, execution of the provisions of this Agreement shall prevail.

ARTICLE 28

Provisions herein shall supersede any similar provisions contained in bilateral agreement.

Drawn up at Riyadh on 15 Muharram 1402, corresponding to 11 November 1982.

Appendix 2

Estimations of Panel Data

The Fixed Effects Approach:

One way to take into account the " individuality" of each company or each cross-sectional unit is to let the intercept vary for each company but still assume that the slope coefficients are constant across firms. In the literature, this is known as the fixed effects (regression) model (FEM), it is also known as the Least –Square Dummy Variable (LSDV) regression model (Gujarati, 2002). The term "fixed effects" is due to the fact that, although the intercept may differ across individual observations, each individual's intercept does not vary over time; that is; it is time invariant.

Although easy to use, the LSDV model has some problems that need to be borne in mind. First, if too many dummy variables introduced this may will run up against the degrees of freedom problem, specifically in the case of small samples. Second, if the model has a large number of variables there is always the possibility of multicollinearity, which might make precise estimation of one or more parameters difficult. We re-estimated our six full models using a fixed effects panel data approach to take into account the individuality of each company or each cross-sectional unit. As noted earlier we run the complete reduced form π regressions with CONC, MS, and the EFF measures. We find that the fixed effects results are very similar to those maintained from simple ordinary least squares estimates. These results are shown in the following tables:

Table 1 The following Models are tests for the influence of market-structure and efficiency measures on bank's profitability other control and environmental variables as included to increase the model predictions.

Model1: Return On Equity(ROE) is the profitability measure and bank loan's (blms) is the market share measure, with other control and environmental variables

Predictor	Coef.	Std. Err.	t	P>|t|
constant	.0070823	.0039008	1.82	0.070
gdppc	.0003125	.0801546	0.00	0.997
conc	-.0255704	.1096128	-0.23	0.816
blms	.0422653	.0812181	0.52	0.603
xeff	.0015712	.0006851	2.29	0.022
seff	-.1292225	.0898964	-1.44	0.151
Commercial banks	.0345579	.0233931	1.48	0.141
Investment banks	-.0165455	.0244813	-0.68	0.500
Adjusted R-sq:=0.027				

Model 2 Return On Equity(ROE) is the profitability measure and bank's deposits (bdms) is the market share measure, with other control variables

Pridictor	Coef.	Std. Err.	t	P>|t|
constant	.0076093	.0039236	1.94	0.053
gdppc	.0093565	.0036133	0.09	0.927
conc	-.0275596	.1094833	-0.25	0.801
bdms	.0422505	.0812052	0.52	0.603
xeff	.0015706	.0006853	2.29	0.022
seff	-.1291924	.0898811	-1.44	0.152
Commercial banks	-.0345477	.0233924	-1.48	0.141
Investment banks	-.0165447	.0244809	-0.68	0.500
Adjusted R-sq: = 0.0273				

Mode3 Return on Assets (ROA) is the profitability measure and bank's deposits (bdms) is the market share measure, with other control variables.

Predictor	Coef.	Std. Err.	t	P>|t|
constant	.0526157	.0267478	1.97	0.050
gdppc	.0088262	.0133445	0.66	0.509
conc	-.0242261	.0182240	-1.33	0.185
bdms	.0149667	.0127146	1.18	0.240
xeff	.0003938	.0001140	3.45	0.001
seff	-.0732223	.0157597	-4.65	0.000
Commercial banks	.0077117	.0040683	1.90	0.059
Investment banks	-.0848627	.1604506	-0.53	0.597
Adjusted R-sq: =0.1803				

Model4: Return on Assets (ROA) is the profitability measure and bank's loans (blms) is the market share measure, with other control variables.

Pridictor	Coef.	Std. Err.	T	P>|t|
constant	.0080078	.0040823	1.96	0.051
gdppc	.0090437	.0133658	0.68	0.499
conc	-.0241261	.0182779	-1.32	0.188
blms	.0067002	.0135431	0.49	0.621
xeff	.0003853	.0001142	3.37	0.001
seff	-.0664816	.0149902	-4.44	0.000
Commercial banks	.0372558	.7805461	0.05	0.962
Investment banks	.1277079	.1303286	0.98	0.328
Adjusted R-sq: = 0.1776				

Table 1: (Continued)				
Model 5 Alternative profit efficiency scores (APX) is the profitability measure and the bank's loan (blms) is the market share measure with other control variables.				
Pridictor	Coef.	Std. Eror	t	P>|t|
constant	.2322567	.1133839	2.05	0.041
gdppc	.1154148	.1118992	1.03	0.303
conc	-.0271415	.1530241	-0.18	0.859
blms	.5833354	1.0911218	0.53	0.593
xeff	.0047059	.0009564	4.92	0.000
seff	-.2864792	.1254991	-2.28	0.023
Commercial banks	-.0322576	.0326577	-0.99	0.324
Investment banks	-.0037021	.0341769	-0.11	0.914
Adjusted R-sq: 0.1548				

Model 6 Alternative profit efficiency scores (APX) is the profitability measure and the bank's deposits (bdms) is the market share measure with other control variables				
Pridictor	Coef.	Std. Err.	t	P>|t|
constant	.0016722	.0007051	2.30	0.022
gdppc	.1191032	.1108322	1.07	0.283
conc	-.0349285	.1513576	-0.23	0.818
bdms	.3508361	.1055986	3.32	0.001
xeff	.0049116	.0009471	5.19	0.000
seff	-.4040942	.1308891	-3.09	0.002
Commercial banks	.0441055	.0325864	1.35	0.177
Investment banks	-.0047864	.0337882	-0.14	0.887
Adjusted R-s: = 0.1787				

Table 2: Validity of efficient-structure hypothesis require that efficiency measures must be positively related to both profitability measures as well as market structure measures. The following models are test for this condition.

Model 1: The Dependent variable is market concentration measure (CONC)

Pridictors	Coef.	Std. Err.	t	P>|t|
constant	.0001172	.0003347	0.35	0.726
gdppc	.1559981	.0382949	4.07	0.000
xeff	2.2425823	.3625723	6.19	0.000
seff	.0433298	.0383668	1.13	0.260
c	.0037859	.0114357	0.33	0.741
inv	-.0012686	.0119447	-0.11	0.915

Adjusted R-sq: = 0.1903

Model 2 The Dependent variable is Bank Loan Market share measure (BLMS)

Pridictors	Coef.	Std. Err.	t	P>|t|
constant	-.2262572	.4893316	-0.46	0.644
gdppc	-.0285181	.0516832	-0.55	0.581
xeff	.5341598	.0517802	10.32	0.000
seff	.000344	.0004517	0.76	0.447
c	.0070258	.0154338	0.46	0.649
inv	-.0206762	.0161208	-1.28	0.200

Adjusted R-sq: = 0.3150

Model 3 The Dependent variable is the Bank Deposits Market share measure (BDMS)

Pridictors	Coef.	Std. Err.	t	P>|t|
constant	-.3554025	.5196857	-0.68	0.495
gdppc	.0259298	.0548892	0.47	0.637
xeff	.6898213	.0549923	12.54	0.000
seff	.0383361	.0163912	2.34	0.020
c	-.0003585	.0004797	-0.75	0.455
inv	.0105354	.0171208	0.62	0.539

Adjusted R-sq: = 0.3890

Appendix 2

The Translog Specification of Cost and Alternative Profit Efficiency

In most of the research on the banking cost efficiency topic, banks are assumed to have a common production structure; what makes them different from each other is an invisible input, called "managerial ability". To measure it, an efficient production frontier is estimated, from which it is possible to infer the level of costs or profits that each bank could realize if it had the managerial ability of the best bank of the sample; in fact, the benchmark is the best practice bank, not the one that achieves in theory the best results.

To estimate an efficient frontier function, residuals from the cost or profit function must be analyzed; they measure the difference between expected and observed costs or profits. Residuals are composed of two parts: a random one, due to measurement errors or idiosyncratic shocks and a systematic one that identifies every single firm. To separate the two components, it is necessary to make assumptions on their probability distributions. Usually, the random component is assumed to have a normal distribution with zero mean and finite variance; the systematic component is assumed to have a semi-normal or a truncated normal distribution with finite variance (Stevenson 1980). The two components are separated using the technique first proposed by Jondrow, Lovell, Materov and Schmidt (1982); it is then possible to estimate the efficiency level of each firm and of the sample. The systematic part of the residual is an efficiency indicator that can be used to compare firms; the ratio between the residual of a firm and the highest residual (for profit functions, the lowest for cost functions}, that identifies the best practice firm, is a measure of relative efficiency. Given the importance of the residuals for the measurement of efficiency, it is particularly important to minimize specification errors due to wrong functional forms that could bias the results. The translog function (Christensen and Greene 1976) is flexible in that it allows to estimate a large family of functional forms. Its high number of parameters makes it difficult to adopt when estimating frontiers on a small sample. The translog is a second-order approximation around the mean values of the sample therefore measures for data points far away from it are necessarily imprecise. Furthermore, the translog is a quadratic function; its symmetrical structure forces symmetry on the data; for example, if there are strong economies of scale in the sample for small firms, the translog, which tends to fit U-shaped curves, will erroneously find diseconomies of scale for the larger firms of the sample.

A semi-parametric flexible form, that overcomes the problems of a translog function, is in fact a translog with trigonometric factors added on, derived from a Fourier transform of the variables (Gallant 1981). The Fourier-flexible function is the best global approximation of an unknown function, such as a cost or profit function, but the number of parameters that have to be estimated is so high that it can be used only on very large samples. Due to the limited size of our sample, we use a translog to estimate the cost and profit functions. The cost functional form is:

$$
\begin{aligned}
\ln(\frac{TC}{p_3}) &= \alpha_0 + \sum_{l=1}^{2}\alpha_l \ln Q_l + \sum_{j=1}^{3}\beta_j \ln p_j + \tau_k \ln K + \tau_s \ln S + \\
&+ 1/2[\sum_{l=1}^{2}\sum_{j=3}^{3}\delta_{ij}\ln Q_l \ln Q_i + \sum_{i=1}^{3}\ \sum_{j=1}^{3}\gamma_{ij}\ln p_i \ln p_j + \tau_{kk}\ln K \ln K + \tau_{ss}\ln S \ln S] + \\
&+ \sum_{l=1}^{2}\sum_{j=1}^{3}\rho_{ij}\ln Q_l \ln p_j + \sum_{l=1}^{2}\alpha_{ik}\ln Q_l \ln K + \sum_{j=1}^{3}\beta_{jk}\ln p_j \ln K + \sum_{i=1}^{2}\alpha_{is}\ln Q_l \ln S + \\
&+ \sum_{j=1}^{3}\beta_{js}\ln p_j \ln S + \tau_{ks}\ln K \ln S + \varepsilon_i
\end{aligned}
$$

Where *TC* is a measure of the costs of production, comprising operating costs and financial costs (interest paid on deposits); the Q_i, (i= 1,2,......,m) are output quantities, P_j (j=1,2,.......,n) are input prices. Moreover, standard symmetry has to be imposed on the translog function that is:

$\delta ij = \delta ji$ *and* $\gamma ij = \gamma ji$, where (i=1,2) and (j=1,2,3), and the following linear restrictions are necessary and sufficient for linear homogeneity in factor prices:

$$\sum_{j=1}^{n}\beta j = 1; \sum_{i=1}^{n}\gamma ij = 0 \text{ and } \sum_{j=1}^{n}\rho ij = 0.$$

In this study the parameters of the stochastic frontier cost function, are estimated using the Maximum-likelihood (ML) approach. For instance, the ML estimates of β, σ_s^2 and γ are obtained by finding the maximum of the log-likelihood function as specified in Coelli et. al (1995).The nature of the log-likelihood function of the model given the distributionl assumptions on v and u can be also found in Battese and Coelli (1995, 1998).

Derivation of the Alternative Profit Frontiers:

An interesting recent development in efficiency analysis is the concept of alternative profit efficiency, which may be helpful when some of the assumptions underlying cost and standard profit efficiency are not met. Efficiency here is measured by how close a bank comes to earning maximum profits given its output levels rather than its output prices. For our analysis purposes, the alternative profit efficiency estimates are derived from the following translog functional form :

$$\begin{aligned}\ln(\frac{\pi}{p_3}) &= \alpha_0 + \sum_{l=1}^{2}\alpha_l \ln Q_l + \sum_{j=1}^{3}\beta_j \ln p_j + \tau_k \ln K + \tau_S \ln S + \\ &+ 1/2[\sum_{l=1}^{2}\sum_{j=3}^{3}\delta_{ij}\ln Q_l \ln Q_i + \sum_{i=1}^{3}\sum_{j=1}^{3}\gamma_{ij}\ln p_i \ln p_j + \tau_{kk}\ln K \ln K + \tau_{ss}\ln S \ln S] + \\ &+ \sum_{l=1}^{2}\sum_{j=1}^{3}\rho_{ij}\ln Q_l \ln p_j + \sum_{l=1}^{2}\alpha_{ik}\ln Q_l \ln K + \sum_{j=1}^{3}\beta_{jk}\ln p_j \ln K + \sum_{l=1}^{2}\alpha_{ls}\ln Q_l \ln S + \\ &+ \sum_{j=1}^{3}\beta_{js}\ln p_j \ln S + \tau_{ks}\ln K \ln S + \varepsilon_i\end{aligned}$$

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