PhD Thesis

Presented by

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European Banking Industry: Sources of Income and Profitability

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Declaration

Abstract

THE EU banking systems are facing major changes in the form of increased competition, concentration and restructuring. These changes are triggered by a number of factors including technological change, financial liberalisation and internationalisation. The circulation of the single currency is expected to reinforce these trends.

Although the banking industry is in a state of flux, it is possible to discern some overall patterns in the actions and strategies of individual banks. The effects of these responses are mainly reflected in changes in the structure of bank income and, in particular, in the increasing incidence of non-interest income. The analysis of the shift towards non-interest income provides key information for evaluating the extent to which this process could affect banks' profitability.

Profits have become the driving force in market economies. Many banks are keenly interested in earning maximum profits to provide the highest possible return to their shareholders and secure additional funds to support long-term growth. As the EU banking industry continuously evolves, changes in industry composition and the macroeconomic environment have a direct impact on the aggregate performance of the industry.

If banks' profitability becomes more volatile, banking is more risky unless the level of profitability raises substantially. So, there is a clear connection between profitability volatility and banking stability; a high level of profitability volatility is a source of instability in the banking system, augmenting the possibility of bank failures. A move to more interest rate sensitive assets like securities and to off-balance sheet instruments, along with more prone to default assets, like consumption credit, may increase the profitability's volatility and so the stability and soundness of the banking system. The changes in the banks' income structure and the determinants of profitability deriving from developments in the banking business will have clear implications on the activity of banking supervision.

Chapter 1

"Introduction and Research Motivation"

Chapter 1: Introduction and Research Motivation

1.1. Introduction

During the past few decades major changes are transforming the global banking industry. The major drivers of change are globalisation and customisation, deregulation, information technology (IT), and increased customer sophistication. The globalisation of retail markets has resulted, in general, in a greater homogenisation of customer tastes and preferences across national boundaries. IT creates new possibilities for disintermediation and provides an almost infinite amount of information at very low cost to customers who are now more sophisticated than in the past. Although new regulations have been introduced into banking, in general, the trend over the past twenty years has been towards deregulation that creates opportunities for new entrants into bank markets from both financial and non-financial companies, and intensifies international competition.

Despite these fundamental factors which are changing the nature of the financial service business, the single currency should function as a catalyst. The introduction of the single currency will alter the sources of competitive advantage of European banks. The euro circulation will not only make the creation of a single market irreversible, but it will, besides the obvious fall in revenue from intra-European currencies trading, change fundamentally the nature of several businesses. A more predictable environment will facilitate the exploitation of economies of scale and the optimal location of processing units. Finally, the transition to a more stable monetary environment should bring positive effects to the European Union (EU) banking systems (especially to banking systems previously operating in a high inflation environment). Price stability has already contributed to financial market stability, although the EU has not been by any means fully insulated against the global asset price movements.

From the nature of their operations, the credit institutions are at the centre of every process that is related to the reformation of the credit and monetary system. Indeed, the EU banks found themselves in the centre of the procedure for the financial integration.

In a more developed stage, nowadays, the banks constitute the cornerstone of the monetary integration process. The advent of the single European currency has accelerated the need for the industry to restructure. *This has clear implications not only for the composition of bank income but also for the sustainability and variability of the profit levels.*

1.2. The Performance of Commercial Banks

Banks are financial institutions that accept deposits and make loans. On the microeconomic level, they represent the primary source of credit to most small businesses and many individuals. In market economies, they serve the key purposes of providing financial intermediation[1] and transaction services. They raise funds primarily by issuing checkable deposits (deposits on which checks can be written), savings deposits (deposits that are payable on demand but do not allow their owner to write checks), and time deposits (deposits with fixed terms to maturity). They use these funds to make commercial, consumer, and mortgage loans and to buy government securities and municipal bonds. Transaction services facilitate payments for goods, services, and financial investments, and thereby support the medium of exchange.

The banking industry is changing rapidly. An old characterisation pictured bank managers as retired from the 'hustle and bustle' of the real world (Miller and Noulas, 1997). They accumulated deposits at low rates and loaned the money out at higher fixed rates. The interest rate spread provided a consistent and reliable profit stream. In what was traditionally a stable industry in which most banks enjoyed relatively high levels of profitability, instability and diverging returns are now the norms. A range of factors has created an unstable business environment in which the old rules of competition are being eroded. Price and geographic deregulation, advances in technology, capitalisation of financial markets, and increased competition from non-bank institutions (dis-intermediation) have dramatically changed the environment within which banks must operate.

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[1] Intermediation is the process of selling financial claims to savers, and investing the proceeds in claims on businesses, households and government. This process can reduce the degree of risk and uncertainty in an economic system, thereby lowering the real rate of interest and the cost of capital, which in turn leads to higher investment and a better standard of living.

Measuring bank performance is a difficult task because of the multidimensional and intangible nature of banking products and the lack of explicit prices for some of the output. Not so long ago the main objective of banks and most financial institutions was growth and, consequently, the size of the balance sheet total. But, modern economies are based on production and consumption of increasingly differentiated goods and services. In the case of banking, this increased variety leads to the fragmentation and changing nature of the banking services. Banks that systematically manage for shareholder value stand the best chance of competing successfully in the new economy. Optimising risk growth and return trade-offs successfully creates greater market confidence, which in turn has the beneficial effect of raising share prices. Financial institutions increase their focus on profitability management. Profits have become the driving force in market economies. Generally speaking, Dr. Peter Drucker and Dr. Milton Friedman, each from his own viewpoint, convincingly argue that it is socially irresponsible and economically damaging for business to be concerned with anything but results. That is maximising profits.

In 1990 the concept of shareholder value creation was not high on the agenda of most bankers. However, the topic is gradually increasing in popularity; for example, the 1990 Chief Executive's Report of Lloyds Bank opens with the heading 'Creating Shareholder Value'. Brian Pitman, the CEO, goes on to write: "*...our objective is to produce for shareholders long-term, superior total returns, comprising progressive dividend growth and appreciation in the share price*".

Many banks are keenly interested in earning maximum profits in order to provide the highest possible returns to their shareholders and secure additional funds to support long-term growth. They realise that higher profits may enhance the confidence among depositors and investors, making it easier to raise capital in the future. Market confidence also enables executives to invest in the technology and product development that is required for further business and profit growth. This renewed concern over higher profits was especially evident among larger U.S. banks in the late 1960s and 1970s, when many institutions paid closer attention to daily bank stock price movements. These banks saw rising profits, leading to higher stock prices, as an avenue permitting them to acquire more bank and non-bank affiliated firms and thereby expand into new markets.

Evaluating the banks' overall performance and monitoring their financial condition is important to depositors, owners, potential investors, managers, and regulators. Currently, financial ratios are often used to measure the overall financial soundness of a bank and the quality of its management. Bank regulators, for example, use financial ratios to help evaluate a bank's performance as part of the CAMEL system[2]. Many financial ratios have been designed to measure various dimensions of bank performance. The performance measures employed in the literature are generally based on accounting profitability since hundreds of banks lack market data. Commonly, comparisons of profitability are made using accounting return on assets (ROA), and accounting return on equity (ROE). For profitability comparison between European countries, net income, assets, and book value of equity are aggregated to the state level by summing across all banks operating in a given country. The profitability variable equals the total profits before tax (or net income) of all banks in a country divided by the total assets (or total equity) of all banks in that country.

1.3. Sources of Income

Banks generate income in two ways: (i) interest income from loans, securities, and other funds sold, and (ii) fees and services charges, called non-interest income, related to such products and services as loan originations, loan servicing, deposit-account activity, credit card annual fees and other activities.

The difference between a bank's total interest income and total interest expense is called net interest income. For a traditional bank engaged in funding loans with deposits, net interest income represents the "bread and butter" of the business (Sinkey, 1998). It has the major task to covering the bank's loan-loss provision, net non-interest

[2] Many agencies (e.g. the Federal deposit Insurance Corporation (FDIC) and the Office of the Comptroller of the Currency (OCC)) assess the overall quality of a bank's condition according to the CAMEL system. The letters in CAMEL refer to capital adequacy, asset quality, management quality, earnings ability, and liquidity. Regulators assign ratings from 1 (best) to 5 (worst) for each category and an overall rating for all features combined.

income, securities losses, taxes, extraordinary items, and dividends. Except for dividends, deducting these items leads to a bank's bottom line, or net income (accounting net profits).

Despite its recent decline as a share of total assets, net interest income continues to be the most important source of bank income with at least two-thirds of banks' gross income coming from this source of income in most countries. Interest on loans and investments comprises the bulk of revenue. Interest payments on borrowings similarly represent the primary expense. Understanding the trends of net interest income is therefore central to monitoring and predicting bank performance.

In recent years as market conditions have become tougher and more competitive, the focus of profitability management has tended to shift away from interest earnings towards fees and other income. The relative share of non-interest income (as a percentage of total operating income) increased in the EU throughout the last decade. This evolution was a result of both increasing non-interest income and the ongoing reduction in interest income. The composition of non-interest income is rather heterogeneous. Fees and commissions are the main components, with the other three components being net profit from financial operations, income from securities, and other operating income. There are important differences between countries and banks.

Non-interest income as a whole does not seem to be more volatile than net interest income. However, it does not help stabilising total income. The latter does not imply that non-traditional activities are unprofitable for the bank. It does not contradict the fact that loan selling might be desirable for a bank since it moves assets off-balance sheet, freeing up bank capital, while the loan purchases might be a way for a bank to diversify its portfolio. To the extent that the investment banking market is imperfectly competitive, commercial banks may find it profitable to move onto these types of activities even if they are not the most efficient producers.

As a result of the increased importance of activities generating non-interest income, banks' operational, reputation and strategic risks seem to be heightened.

1.4. Profitability Determinants

A chief executive officer (CEO) may not rest, however, once he or she understands what is performance and finds ways to measure it. The next challenge is to discover what drives performance so that appropriate managerial actions can be taken. This is not a simple issue. The drivers of performance are many and are tightly intervened, as their relationships can be quite complex.

The rate of return earned by a commercial bank, i.e. its profitability, is affected by numerous factors. These factors include elements internal to each financial institution and several important external forces shaping earnings performance. Internal determinants relate to management control variables, such as the level of risk included in bank balance sheets, expense management, the level of capital in the bank, the level of liquidity, and ownership characteristics. External determinants of bank profitability are those factors that are not influenced by specific bank decisions and policies, but by changes in the external economic environment. The most important of them is the market growth, the level of market interest rates, the level of inflation, or more generally monetary policy shifts. Evidence suggests that macroeconomic instability is an important cause of financial instability. In particular, inflation in either or both product prices and asset prices reduces the efficiency and endangers the survival of financial institutions. Environmental factors are indirectly controlled by the banks - through lobbying activities, marketing efforts, research and development- and hence, they can also be viewed as major factors in understanding performance. The literature review on bank performance studies suggests that bank profitability is determined by both kinds of factors.

1.5. Macroeconomic Conditions and Bank Performance

General macroeconomic conditions have substantial impact on the financial sector and the pace of financial development. Bank performance, monetary policy implementation, and bank examination are interrelated in various ways. Monetary policy may itself establish at least some performance criteria. It also determines many of the constraints under which banks must operate. Assessing performance and implementing monetary policy both require information on bank activities.

Although the instruments of monetary control are used primarily for stabilisation purposes, a monetary aggregate can be fixed with various settings of the instruments, and the banking profits are sensitive to the choice among combinations. The effects of monetary policy on profits should not be neutralised. Instead, these profit effects ought to be used to influence the structure of the banking industry with a view toward improving performance.

In recent years, many central banks have placed increased emphasis on price stability. Monetary policy, whether expressed in terms of interest rates or growth of monetary aggregates, has been geared increasingly toward the achievement of low and stable inflation. It seems reasonable to define this objective as a state of affairs in which inflation and inflation expectations are no longer a significant influence on economic decision-making. Inflation is a monetary phenomenon. Professor Lintner (see Jaffe, 2000), in his American association presidential address, states that "*few matters are of more serious concern to students of finance and to members of the financial community than the impact of inflation on our financial institutions and markets and its implication for investment policy*". Inflation is a process of continually rising prices, implying a continually falling value of money. Inflation is measured by a variety of price indexes that track the average price of different representative market baskets of goods and services. High and more volatile inflation has a major impact on bank earnings. Mainly it deteriorates the asset quality which surfaces as increased loan loss provisions and net loan losses. Maintaining loan losses have decreased the average profitability of banks while continued declines in loan loss provisions are many times the primary catalyst for increases in net interest margins. A reasonable degree of price stability is possibly the most critical prerequisite for effective and efficient domestic resource mobilisation and allocation through the financial sector.

The conduct of the monetary policy, the management of interest rates and the quantity of money, also referred to as the money supply (defined as anything that is generally accepted in payment for goods and services or in the repayment of debt), has an important impact on financial markets and institutions. The level of interest rates, the fluctuations and the unpredictability of future rates, have impinged on financial institutions in many ways, both directly and through the effects on their customers.

Existing levels of interest rates affect both inflows and outflows of the commercial banks' funds. The major source of revenue for such intermediaries is the interest return on their loans and investments, and the major expense category is interest payments for borrowed funds (including deposits). A rise in interest rates raises the cost of acquiring funds for commercial banks and raises the income on assets such as loans. In addition, changes in interest rates and interest rate expectations also affect the income and expenses of financial institutions. These changes affect the prices of securities such as stocks and bonds that are held by financial institutions. Changes in interest rates thus directly affect the profitability and value of commercial banks.

The argument is that rate variability reduces financial market stability, although some economist and policymakers argue that efforts to smooth interest rates increase the variability of money and income, and, over the long run, the variability of rates as well. Also, the degree of uncertainty introduced by financial deregulation was in a growing difficulty in forecasting interest rate term structure. For example, unanticipated increases in short term interest rates, when the trend for interest rates was downward slopping, affected negatively the profitability of banks' decisions about funding in money markets.

1.6. Research Motivation and Potential Contributions

While the efficiency of the financial markets has been studied and debated at length, much less has been done in understanding the performance and the income sources of the institutions that operate in these markets. Under intense competitive pressures, financial institutions are forced to take a careful look into their performance and its sustainability. It is my expectation that the better understanding of performance and its drivers will lead to managerial practices that improve the performance of this significant sector of economic activity.

Many studies of the determinants of bank profitability in several countries have been undertaken, including those which have focused on the relationship between concentration and profitability and those which have examined the possibility of expense preference behavior existing in regulated and concentrated industries such as banking. However, it appears to have covered less well the relationship between monetary conditions and bank profitability or its income sources i.e. net interest income and non-interest income. The identification of the relationship between bank performance and changes in the external macroeconomic environment is also useful. It will help all the people who are involved in banks' operations (shareholders, potential investors, bank management, depositors, bank staff, regulators, and supervisory authorities) in their estimations of the determinants of banks' profitability.

The motivation of this thesis is based on the fact that in the global banking environment is changing rapidly. Especially in Europe, the introduction of the single currency is altering the fabric of European banking industry. In what was traditionally a stable industry in which most of the banks enjoyed relative high levels of profitability, instability and diverging returns are now the norm. In this environment the importance, or the direction, of the influence of several determinants on bank profitability may have been vulnerable. We will look at the change in banks' performance, not only on its determinants but also on its components (interest versus non-interest income). The connection between profitability volatility and banking stability bridges micro with macroeconomic issues. A high level of profitability volatility is a source of instability in the banking system, augmenting the possibility of bank failures. The systematic issue is, without any doubt, in the macro economic field.

Both market participants and supervisors need information about the financial performance of a bank. Information about the performance of a bank, in particular about its profitability, and the variability of those profits over time, in necessary to access potential changes in financial position and future potential to repay deposits and liabilities, to make distributions to owners, and to contribute to capital growth. Information about profits and losses and their components over recent and earlier periods, helps from assessments of future financial performance and cash flows. It also helps assess the effectiveness with which a bank has employed its resources.

Initially we monitor and assess developments in European banking by describing the structure of the banking industry in Europe. Then, we examine profitability and performance of European banks, utilising the databases that are available. After that, we concentrate on the sources of income, the net interest income and the non-interest income. An econometric analysis is conducted on the determinants of net interest income, while the effects of the non-interest income on the stability of bank profitability is also presented. Then we examine the several determinants of bank profitability, both internal and external, by using accounting data for bank profits. In the last part of the thesis we review the main conclusions of the thesis and make policy recommendations at European level.

Summarising, we foresee the following possible contributions from this research:

i) Banks' performance measurement in Europe by using data on a recent period (1992-1999). In the provisional absence of harmonised bank statements in the EU, the most important sources of bank accounting data are a limited number of privately maintained annual account databases, like the Fitch-IBCA Bankscope database which is used in the thesis. Combined, they allow coverage of the vast majority of European credit institutions. Since bank accounting practices and publications customs differ markedly within the EU, a considerable effort has been put into the screening and functional regrouping of the published statements.

ii) Identify the possible factors that drive the profitability of EU banks (studies using international databases are limited) and cast some light on the debate of whether the external determinants are responsible for changes in bank performance. This study shows that it is possible to conduct a meaningful analysis in spite of the substantial differences in accounting practices and legal forms between banks in various EU countries.

iii) Use of data which cover both a recent period (1992-1999) [or the period 1994-1998 for the econometric analysis] and a wider, compared with previous research on these issues, time horizon (seven years).

iv) Examine the effects of interest rates, balance sheet structure and market competition on the net interest margins of the banks. Also, while the bulk of the literature suggests a tendency for increased concentration across European banking markets, there appears to have been no other studies [except these by Short (1979) and Bourke (1989) years ago], that attempt to examine the relationship of bank size, market concentration, and macroeconomic conditions with bank performance in Europe.

v) Introduce modern portfolio theory to identify the effect of non-interest income on income variations and examine interest and non-interest income variability.

vi) Compared with a recent report of the European Central Bank (April, 2000) which is based on aggregate country data presented on the OECD publication, we conduct an empirical search for the correlation between interest and non-interest income, both expressed as a percentage of the average balance sheet total, for individual banks in the period 1994-1998.

vii) Introduce in the analysis of bank performance and income sources not only the influence of the levels of interest rates, but also their variability.

viii) As well as analysing the universe of European banks in the traditional geographical groupings, we also 'cut' the sector by type of bank across Europe, in order to provide a better understanding of performance and valuation frameworks, and the impact of industry trends on the different institutions. Additionally, we segment the bank universe into two size brackets.

The reader must have noticed that while we talk about the performance of financial institutions, in general, most of the discussion focuses on banking institutions. By focusing on a single class of financial institutions, we have been able, collectively, to make substantial progress in understanding their performance and its drivers. While not all the findings are applicable to other institutions, commonalities do exist between financial service firms. We hope that the body of knowledge presented here can guide efforts in understanding the performance of other financial institutions as well.

1.7. Overview of the Thesis

Chapter 2 presents procedures for analysing bank performance. Many financial ratios have been designed to measure the various dimensions of bank performance. The performance measures employed in the literature are generally based on accounting measures of profitability, although recent innovation has led to new performance measures.

In Chapter 3 we describe the structure of the banking industry in Europe, discussing the variations in the importance of banks between countries. We also analyse the main features of credit institutions and other depository institutions in Europe and where there are still significant differences in institutional arrangements between member states. Moreover, we examine the various indicators of excess capacity in European banking. Finally, we discuss concentration in European banking, both at a national and pan-European level.

Chapter 4 provides an analysis of the profitability structure of the European banks by using Fitch-IBCA and OECD databases. Some descriptive statistics of the income composition and the profitability determination according to income statement and balance sheet analysis are presented. Between EU countries and across a short (Fitch-IBCA database) and long (OECD database) time period profitability and income statements analysis is provided. Fitch-IBCA database is a valuable source of information on bank income and costs, containing information on bank performance at the level of the individual institution. We use this database both to analyse recent trends in bank performance and to obtain further insight into the differences in bank performance between countries.

Chapter 5 presents an econometric analysis on the effects of competition, interest rate changes (level and variability), and the balance sheet structure on banks' net interest margins. Interest sensitivity or gap management is the popular concept for managing banks' net interest income and exposure to interest rate risk. The sensitivity or gap position, defined as the relationship between rate-sensitive assets and rate-sensitive liabilities, gauges a bank's exposure to interest rate risk.

Chapter 6 shows the effect of non-interest income on the stability of the bank profit levels. In the face of declining net interest margins, depository institutions have entered new product areas over the past two decades, moving from traditional lending to areas that generate non-interest revenues. The change is of importance for financial stability. The more unstable is a bank's earnings stream, the more risky the institution is. The aim of this chapter is to examine whether the gradual move into fee-earning activities has reduced the variability of banking system profits. The conventional wisdom in the banking industry is that earnings from fee-based products are more stable than loan-based earnings, and that fee-based activities reduce bank risk via diversification. Our results, generally, do not support that view.

Chapter 7 provides the literature review on the effect of several internal and external determinants on bank profitability. Several authors through their studies have analysed the differential effects of endogenous (e.g. staff expenses, capital and liquidity ratios, overhead expenses, the composition of loans and deposits etc.) and exogenous (concentration ratios, regulation, government ownership, interest rates, inflation, market growth) variables on bank profitability. These authors provide a mixture of findings on bank performance with samples of various banks' sizes and over different time periods.

Chapter 8 provides the econometric analysis on the effects of internal and external factors on bank profitability. We adopt a multiple regression framework to analyse the panel and the year-by-year cross-sectional data set that has been constructed. As argued above, the type of explanation would determine possible policy implications and ought to be taken seriously.

Chapter 9 provides the main conclusions of the thesis, with some policy implications. We discuss strategic and policy issues and present recommendations.

Finally, in Part II of the thesis we provide a number of annexes with detailed statistical tabulations supporting the arguments in the main text. These cover quantitative analysis of banking issues related to performance measures, concentration, capacity, and profitability, and additional tables relating to the econometric analysis that has been conducted.

Chapter 2

"Bank Performance"

Abstract

The purpose of this chapter is to give an overview of bank performance measurement. Bank performance is a multidimensional phenomenon. Many financial ratios have been designed to measure various dimensions of bank performance. Financial ratio analysis makes use of the bank's financial statements to gauge the financial health of the bank. Indeed financial ratios are among the most important tools available to commercial bank managers. All performance evaluators, regardless of their specific objectives, use accounting and market data to assess the financial condition of an institution at a point in time, as well as to determine how well it has been managed over a period of time. Profitability obtains increasing emphasis due to the fact that profits' level is the most important "line of defence" both for covering losses and strengthening capital adequacy. This chapter presents procedures for analysing bank profitability by using periodic balance sheet and income statement data. The profitability of a commercial bank can be measured in various ways; among them are the return on equity (ROE), and the return on assets (ROA).

Chapter 2: Bank Performance

2.1. Introduction

Clark (1994) states that: "*... a bank's overall performance depends on its ability to get the fundamentals of its business right. These fundamentals... are all about the clarity and focus of the bank's business vision and strategy, and the banks' effectiveness quality*". Measuring bank performance is a difficult task because of the multidimensional and intangible nature of banking products and the lack of explicit prices for some of the output. The interest rate charged is only one of several elements in the price vector which can be adjusted to clear the loan market. Other elements include maturity, loan size and collateral. Banks also provide commitments (formal and informal) for future funds, business counselling and other services that are a form of output but difficult to quantify. Additionally, it is difficult to account for quality in a banking service. Thus, evaluating the economic performance of banks is a complicated process.

Several people involved in bank's operations are interested in its performance: shareholders, potential investors, bank management, depositors, bank staff, regulators, and supervisory authorities[3]. The performance measurement systems have enabled banks to create internal capital markets, measure risks so as to facilitate their proper hedging and pricing, and create risk-based performance standards for lines of business. Such standards are particularly important in avoiding the misallocation of resources. Performance is measured by constructing the conventional standards of performance ranking and evaluation. Balance sheet and income statement variables relating to lending and investment behaviour, deposit and capital structure, liquidity and reserve positions, and revenues and expenses, are used. Figure 1 indicates the different stakeholder needs and relevant performance measures.

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[3] The Basle Committee has identified six broad categories of information, each of which should be addressed in clear terms and appropriate detail to help achieve a satisfactory level of bank transparency; among them is financial performance. The other categories are financial position (including capital, solvency and liquidity); risk management strategies and practices; risk exposures (including credit, market, liquidity, operational, legal and other risks); accounting policies; basic business, and corporate government information.

Figure 1: Bank stakeholders needs and performance measures

Customers	**Staff**
Satisfy customer needs	*Rewarding bank to work in*
- market share	- bank salaries vs market
- products per customer	- staff turnover rate
- closed accounts	- staff attendance rate
Value for money	*Help staff achieve potential*
- bank's price vs market	- training take up
- customer satisfaction index	- number of promotions
Efficiency/Services	*Process efficiency*
- queuing time	- unit cost per transaction
- transaction processing time	- transaction processing time
- complaints	- lead time for product lunch
	- systems downtime
Financial secure	- error rates
- capital adequacy	- transaction per teller
- liquidity	
Shareholders	**Regulators**
Financial performance	*Financial security*
- share price vs banking sector	- capital adequacy
- earnings per share	- liquidity
- bad debts %	- profitability
- profitability by	
* profit share	*Internal controls*
* product	- internal audit reports
* customer	*overall risk index
	*grading of outcomes
- risk adjusted return	- limit expectations
- cost/income ratio	- fraud cases
- fee income/total income	
- effective tax rates	
Business performance	*Treating customers fairly*
- market share	- complaints
- customer satisfaction index	- compliance exceptions
- business growth	
- income per staff head	

Source: Clark, M. (1994), Coopers and Lybrand Deloite Digest.

2.2. Measures of Bank Performance

Many financial ratios have been designed to measure the various dimensions of bank performance. Each financial ratio's numerator and denominator are drawn from either a financial institution's balance sheet or income statement. The denominator of a financial ratio often serves as a scale factor to standardise that ratio so that it can be compared with the same ratio for another financial institution, or so that comparisons can be made over time to capture any trends. Commonly used scale factors are total assets, total deposits, total equity capital (net worth), total loans, total revenue (operating income), total expenses, and number of employees.

It is convenient to analyse the results of a depository institution's operations using several performance dimensions: liquidity, credit risk exposure, financial leverage, efficiency or productivity, profitability etc. Ratios should be categorised according to the area of performance with which they are most closely connected. For each area of performance evaluation, many ratio measures are available. Most of the ratios for evaluating performance are provided in Annex 1.

Ricketts and Stover (1978) used ratios which were classified into seven major categories: **liquidity, loan volume, loan quality, capital adequacy, efficiency, revenue sources, and profitability**. The various performance ratios that are used by Curry and Rose (1984) are representing **portfolio composition** [also Kaufman (1965), Fraser and Rose (1971), Mayne (1976)], **bank capital** e.g. Equity Capital/Total Assets [also Mingo (1975), Mayne (1976), Brimmer (1978), Wall (1985), Boyd and Runkle (1993)], **operating efficiency, prices of bank services** [several ratios are being used by Kaufman (1965), and Mayne (1976)], and **profitability**.

Along with increasing emphasis on asset-liability management, Arshadi and Lawrence (1987) mention that it becomes more important to embody the interactions between the various performance measures. These authors define the performance of a new bank as an **index of profitability, pricing of bank services** (average loans and deposits rates), and **loan market share in the trade area**. While high loan rates (service fees) and low deposit rates could contribute to short-term profitability, the critical growth of a new bank's market share in a given trade area could be negatively affected, thereby threatening the institution's survival. Banks could also 'bundle' their services by adopting pricing strategies which offer low loan rates and low deposit rates or high loan rates and high deposit rates with the same impact on profitability. Thus, the relationships between rates, market share, and profitability must be considered simultaneously.

In Brimmer's (1978) paper, banks are appraised against three general criteria: **the capital adequacy** as the ratio of capital to risk assets; **the asset quality** primarily in terms of the size of loan losses written off and the volume of loans that are somewhat of less than good quality (or in respect to which repayment is doubtful) compared with the bank's capital; and the **bank's management team** in terms of its effective control over banking operations as well as its ability to employ the bank's assets profitably. The management quality is assessed in terms of senior officers' awareness and control of a bank's policies and performance. Finally, the overall evaluation of the performance is the result of weighting each of the three separate criteria. It is summarised by assigning to the bank a composite rating, with the first group suggesting that the bank is in the top category with respect to each of the standards.

Generally speaking, it is difficult to monitor, evaluate, and reward executive decisions since many things must be taken into account e.g. the range of options available to executives, the programmability of their behaviour, and the uncertainty surrounding outcome. For Haslem (1975) management effects are the results of differences in bank management objectives, policies, decisions, and actions reflected in differences in bank operating relationships, including profitability.

Boorman (1974) and Haslem (1979) examine the **asset quality** as the ratios of net loan losses/average loans, loan loss provisions/average loans and loan loss reserves/loans. Fraser and Rose (1972) used a total of 26 measures of bank performance. Included were measures of **profitability, revenue, expenses, and the composition of assets, liabilities, and loans**. For them the two most frequently used measures of performance are the effective rate charged on loans and the average rate paid on time deposits.

Yeats (1974) uses five weighted measures of market performance. **Two profitability ratios, two price measures** [the same ratios as Kaufman (1965)] and **finally the loans/deposits ratio.** The last one was calculated for each market and is interpreted as an activity measure or indication of the aggressiveness of competing banks. Kaufman (1965) uses as activity measures the ratio of loans to total assets and the ratio of time to total deposits. In Elliott's (1972) paper the sample firms were measured by taking into account six financial performance categories; **liquidity, growth, owner's earnings, management profit performance, leverage, and capital investment.**

Meinster and Elyasiani (1988) used multiple indicators. The sixteen performance measures were grouped into four categories; **the asset management measures** (asset structure, measures of liquidity and portfolio risk), **the liability and capital management measures** (three sources of fund management), **the pricing measures** (service charges on deposit accounts, interest paid on deposits, and interest charged on loans) and **the expense and profitability measures** (indicators of management performance: total operating expenses over total assets, return on equity, dividend payout ratio, loan losses/total loans). Finally, Miller and Noulas (1997) consider the effect on bank performance of a number of financial ratios that measure asset (lending and investment) management, liability (funding) management, productivity and efficiency, and the quality of assets.

2.3. Profitability Measurement

Financial institutions are organisations focused on the level of profits, and we can define performance to mean economic performance as measured by a host of financial indicators. The performance measures employed in the literature are generally based on accounting costs or profitability. However, many times, market-based measures have been used: price-to-earnings ratios, the firm's stock beta and alpha, and Tobin's q ratios. Lloyd-Williams et.al. (1994) say that some measure of the price of certain banking products and services is not a good performance measure. It presents problems to the researcher, because banking is a multi-product industry and cross subsidisation among products and services often occurs. Prices can only be used if costs are directly associated with these prices and are explicitly accounted for as explanatory variables. Individual prices of products can be misleading. The use of profit measures should eliminate many of these potential problems. Profitability measures, where all product profits and losses are consolidated into one figure, are generally viewed as more suitable because they by-pass the problem of cross-subsidisation. *'Profitability can be used as a summary index of performance'* [Heggestad (1977)]. Adequacy of earnings is needed to provide bank shareholders a sufficient return, to generate sufficient cash flows in order to cover borrowers demand and to provide for future needs through the development of capital. A profitable performance can help banks in gaining and maintaining public confidence. At the same time, it is the criterion financiers use in order to evaluate an organisation's present and future trustworthiness and creditworthiness. Gilbert (1984) has 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 (1982, 1985) and Evanoff and Fortier (1988), provide also support for the use of profitability measures to account for the performance of banks. The most usually used profitability measures are listed in Annex 2.

A major concern with accounting performance measures is that they are calculated using the book values of assets, liabilities and equity. Book values fail to recognise changes in the value of assets, liabilities and equity between their initial placement on the books of the institution and their removal by sale, repayment, maturity or charge-off. In other words, book value is the historic, not market, value of an asset or liability. However, many financial institutions provide only accounting and not market data.

To assess the financial performance of a bank, it is essential to have a breakdown of income and expenses incurred. This information is necessary to assess the quality of earnings, to identify the reasons for changes in a given bank's profitability from year to year, and to compare the financial performance of different banks. The income statement usually includes items for interest income and expense, fees and commissions, other non-interest income, operating expenses, charge for credit losses, any extraordinary items, tax expenses, and net income. Key figures and ratios should include the return on average equity, return on average assets, net interest margin, and cost-to-income ratio.

2.4. The Return-on-Equity Model

A basic tool of financial statement analysis is the return-on-equity (ROE) model. This procedure, introduced by Cole (1971), enables an analyst to evaluate the source and magnitude of bank profits relative to selected risks taken.

Aggregate bank profitability is typically measured and compared in terms of return-on-equity (ROE) and return-on-assets (ROA) figures. The ROE model simply relates ROE to ROA and financial leverage [equity multiplier (EM)], and then decomposes ROA into its contributing elements. The advantage of this model stems from the fact that since the ratios ROE, ROA, and profit margin (PM) all have the same numerator by different denominators, they provide different prospective on the notion of profitability. Four pieces of accounting information are required to start ROE analysis: net income, total operating income, average assets and average equity. The first two pieces of information are flow variables that come from a bank's income statement, while the last two are stock variables that come from the balance sheets.

2.4.1. Return-on-Equity (ROE)

Many authors have used this measure of profitability. Among them are Emery (1971), Brimmer (1978), Opper (1981), Sinkey (1983), Curry & Rose (1984), Smirlock (1985), Clark (1986), Barry (1988), Meinster and Elyasiani (1988), Boyd and Runkle (1993), Woosley and Baer (1995), and Berger (1995) [see also Annex 3]. ROE equals net income divided by total equity (or average equity) and thus measures the percentage return on each pound of stockholders equity. So, by definition,

$$ROE = \frac{Net\ Income}{Total\ Equity}$$

Usually net income is synonymous with profits before taxes, and covers the sum of profits before taxes with net provisions (e.g. gross income less operating expenses)[4]. Pre-tax income rather than after-tax income is used many times because the tax figure reported on a firm's annual statements may include tax credits or carry-forwards that

[4] For Bond (1971) the figure of net profits differ from net earnings in that it reflects realised capital gains and losses on securities, and such factors as charge-offs and recoveries on loans and transfers to and from valuation reserves for loans and securities, etc.

do not pertain to the current year's performance. Difficulties of taking into account the full complexity of the tax-structure, the lagged nature of tax payments and offsets, and the occurrence of large tax changes affecting capital and income from capital, mean that tax paid in one year cannot be directly related to income earned on that year, or even less to income from a specific investment.

Net income before taxes differs from net operating income in that it reflects the results of a number of non-operating transactions and other arbitrary accounting decisions. Thus losses and write off (or recoveries) on loans, realised capital losses (or gains) on securities, and other losses (or profits) are deducted from (included in) net profit.

ROE is the aggregate return to stockholders before dividends. The higher the return the better, as banks can add more to retained earnings and pay more in cash dividends when profits are higher. The total equity capital[5] is used because of the emphasis on shareholders' return as a short-run proxy for long-run value maximisation.

It has been argued that ROE is more appropriate than alternative measures since this corresponds most closely to what owners seek to maximise. The Arthur Andersen survey (1993) found that bankers ranked ROE as likely to be the most important financial indicator by the year 2000. This measure not only, by definition, informs bank management about the amount that has been earned on the book value of common shareholders' investment in the bank, but also reflects revenue generation, operational efficiency, financial leverage and tax planning (Hempel et.al. 1994).

Emery (1971) uses capital market theory in order to provide tests for differences in performance among a sample of structurally diverse banks. He examines the difference between return on equity that would have been expected for the realised level of risk if the bank has been on the capital market line and the return actually obtained. Any remaining difference is already compensated for in both the risk premium and the price of time. What is needed for the derivation of the capital market line is an estimate of the pure rate of interest i.e. return that would be earned on a riskless asset and the risk-return characteristics of the market portfolio.

The major drawback of this measure of decomposition as a measure of bank profitability is that ROE can be high because a bank has inadequate equity capital[6]. ROE is strongly influenced by the capital structure of a financial institution - in particular, how much use it makes of equity financing versus debt financing. Banks that do not keep much of their own capital, for whatever reason, will have higher ROE, even if the overall scale of activity is the same. Management may be able to boost ROE simply by greater use of financial leverage, that is, increasing the ratio of debt to equity capital. Increased use of debt in place of equity capital will improve ROE, other factors held constant. Thus undercapitalised financial institutions i.e. those with high financial leverage through heavy use of debt, can increase their returns to equity. Consequently, banks in environments where capital is heavily regulated may be erroneously suggested to be less successful under this measure than those that are not.

Additionally, a bank with negative book equity but positive profits would show a negative ROE. Furthermore, the definition of equity suffered several substantial changes over the past decade that makes difficult the computation of ROE for the same country over time. Finally, international rules are permissive to some flexibility in what concerns tier-two[7] capital; that distorts any comparative analyses between

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[5] The equity capital includes common and perpetual preferred stock, surplus, undivided profits and capital reserves.

[6] Because ROE=ROA*EM. Alternatively, consider, a vary simple bank that generates only interest income and has all of its assets (A) in the form of loans earning an annual rate of r_l. The bank is financed solely with debt (D) paying r_D per year, and with equity (E). If we measure the profitability of the bank with the return on equity ratio, we have: $ROE = \frac{Net\ \text{Income}}{\text{Equity}} = \frac{r_l A - r_D D}{E}$. Recall that the equity multiplier is defined as EM=A/E=D/E+1. So: ROE=r_l + [($r_l - r_D$) D/E]. If the spread between lending and borrowing rates is positive, the higher debt-to-equity ratios lead to a higher ROE. Clearly, in this case, high leverage is desirable.

[7] Tier-two capital elements present a range of internationally accepted items for use as supplementary equity capital, subject to inclusion by national authorities at their discretion in light of their respective accounting and supervisory regulations. Tier-two capital could include

countries. The various legal requirements for equity levels make the amount of equity a number defined not by an autonomous management decision but determined externally. So, for Davis et.al. (1993), return-on-equity is not a good measure of performance. In that respect, ROA appears to be preferred measure of overall bank profitability.

2.4.2. Return-on-Assets (ROA)

ROA equals net income divided by total assets (or average assets) and thus measures net income per pound of assets (or average assets) owned during the examined period [Rhoades (1982), Kwast and Rose (1982), Rhoades and Rutz (1982), Barry (1988), Woosley and Baer (1995) etc.] (see also Annex 3). So,

$$ROA = \frac{Net\ Income}{Total\ Assets}$$

ROA reflects management ability to utilise the bank's financial and real resources in order to generate net income. For that reason it is used as the best measure of efficiency. Analysts looking to compare profitability (while ignoring differences in equity capital ratios) generally focus on ROA, while those wishing to focus on returns to shareholders look at ROE. Edwards and Heggestad (1973) used ROA since several measurement errors (e.g. in some cases the capital accounts included reserves for possible loan losses, while in others it did not) would have introduced a serious error in the dependent variable if rate of return on capital were used. Heggestad (1979) notes that it is actually ROA that has provided the strongest evidence on the concentration-profitability relationship in banking. ROA is preferred to other profit measures because (i) it measures the efficiency of banks with respect to banking operations and (ii) minimises differences resulting from differences in capital structure or manipulation of security accounts. Kwast and Rose (1982) employ this ratio since the statistical cost accounting model that is implemented and relates the firm's income to its asset and liability mix typically uses this measure as the dependent variable.

undisclosed reserves, revaluation reserves, general loan losses reserves, hybrid debt capital instruments, and subordinated term debt.

However, the problem with ROA is that it doesn't properly take into account the fact that much banking business is no longer on the balance sheet. The increasing importance of off-balance sheet activity has made return on assets as a measure of profitability less meaningful over time. Using capital gets round this problem, since capital can be defined as acting as a buffer against all unexpected losses (such as the potential loss arising from a foreign exchange position, or a derivatives trading book). However, interpreting trends by using this measure is complicated by the significant increases in capital-to-assets ratios in recent years in response, in part, to regulatory changes. Nevertheless, a large fraction of banking is still tied to traditional on-balance sheet items, and in interpreting changes in net income, assets remain a useful scaling factor for separating the effects of growth from those of improved profitability.

2.4.3. Equity Multiplier (EM)

ROE is linked to ROA by the equity multiplier (EM), which equals total assets divided by total equity, such that,

$$ROE = \frac{Net\ Income}{Total\ Assets} \cdot \frac{Total\ Assets}{Total\ Equity}$$

$$ROE = ROA \cdot EM$$

The inverse of the equity multiplier is the familiar capital to assets ratio. The capital to assets ratio measures capital adequacy –what decline in assets' value could be covered by a firm's equity. The smaller this measure is, the riskier is the firm (with other relevant factors held constant). A bank's equity multiplier compares assets with equity such that large values indicate a large amount of debt financing relative to equity[8]. EM thus measures financial leverage and represents a profit and a risk measure[9]. Hempel et.al. (1994) noted that since ROA is lower for financial intermediaries than for most non-financial businesses, most intermediaries must utilise financial leverage heavily in order to increase ROE to a competitive level.

[8] Because the relationship that always holds in a bank's balance sheet is *Assets = Liabilities + Equity* and the liabilities represent what the bank owes e.g. involve various debt instruments.

[9] EM represents a risk measure because it reflects how many assets can go into default before a bank becomes insolvent. A high EM raises ROE when the income is positive, but it also indicates high capital risk.

2.4.4. Second Decomposition Stage

The second stage of ROE decomposition shows ROA to be derived from the bank's profit margin (PM) and asset utilisation (AU). Thus:

$$ROA = PM \cdot AU$$

Profit margin (PM), which equals net income divided by total revenue, reflects profits per unit of total revenue. This measure is affected by interest margin -interest yields on assets and interest cost of funds- and by the burden. The burden reflects the difference between non-interest expense and non-interest income. PM measures a bank's ability to control expenses and reduce taxes. Interest expense and non-interest expense should be further examined by source. Interest expense may vary between banks for three reasons: rate, composition, and volume effects. Non-interest expense -or as it is commonly labeled overhead expense- can be similarly decomposed.

Asset utilisation (AU) equals total revenue divided by total assets and reflects how many assets are employed as earning assets and the yields earned on those earning assets.

The components of the third stage of the ROE decomposition framework usually are analysed with respect to a bank's total revenue or total assets. The objective of this stage of the analysis is to identify symptoms of good and bad performance by pinpointing trends and significant peer-group differences.

2.5. Other Measures

ROE and ROA do not exhaust the measures used by financial analysts to track the earnings records of banks and other financial institutions (see Annex 2 and Annex 3).

2.5.1. Return-on-Capital (ROC)

Another profit measure that is used extensively in the literature is the **return on total capital (ROC)**. ROC equals net income after taxes divided by the book value of capital (= equity plus debt capital) [Fraser et.al. (1974), Mingo (1975), Rhoades and Rutz (1981), Hannan (1991), etc.] (see also Annex 3). This measure is similar to the ROE in the case of a bank whose capital consists entirely of ownership accounts: common stock, preferred stock, surplus, undivided profits, and capital reserves.

ROA may be of more universal interest than ROC, but Mayne (1976) supports the view that in the case of bank holding companies[10] the parent holding company is interested only on the efficient utilisation of the scarce investment capital, so ROC is preferable as a measure of profitability. Haslem (1968) notes that ROC is the most inclusive measure of bank performance. Because his study is interested in the management variable, an important quality of the profitability criterion is the inclusion of all transactions influenced by management. According to this view, the numerator should cover all items influenced by management, including gains and losses on loans and securities, and the denominator should measure the ability to earn on invested capital. The return on capital ratio thus seems to be the appropriate measure. Molyneux and Thornton (1992) use the net income before tax as per cent of capital and reserves (alternatively and total borrowings). In this case government intervention, through fiscal policy, is independent of bank performance. Also, Brimmer (1978) uses the current operating income as percent of total assets or capital account.

But Haslem also mentions that ROC has disadvantages for the examination of management efficiency. Because management has considerable leeway in affecting net income through the 'non-operating' transactions (i.e., gains, losses, recoveries, charge-offs, and transfers to and from valuation reserves for loans, securities and all other), it can be dangerous to judge management efficiency in this area by short-run results. Net income can be (i) relatively low, (ii) quite variable, and (iii) both of these, for reasons such as conservative reserve accounting, tax switching, liquidity needs, and loan demand. In fact, low short-run profits may actually result in higher long-run profits e.g.

[10] Any organisation that owns controlling interest in one or more commercial banks is a bank holding company. Control is defined as ownership or indirect control via the power to vote more than 25 percent of the voting shares in a bank (Koch, 1995). The holding company is labelled the ***parent*** organisation, and the operating entities are the ***subsidiaries***. The phenomenon of bank holding companies emerged in the 1950s and 1960s as a response to restrictions on the scale and scope of banking activities. By holding banks as affiliates a holding company can expand the geographic scale of its banking operations and broaden the scope of its nonbank activities to certain permissible lines of financial series. One-bank holding companies (OBHCs) control only one bank and typically arise when the owners of an existing bank exchange their shares for stock in the holding company. The holding company then acquires the original bank stock. Multibank holding companies (MBHCs) control at least two commercial banks. Over the last two decades, multibank holding companies have become an increasingly important element in American banking structure.

from tax switching. For Davies et.al. (1993) the problem for ROC drives from the fact that if we are assessing competitive advantage, we should look at the value of outputs derived from each unit of input. Any measure of capital is only one input among the total that the bank uses, and no measure of capital is a good measure of all inputs.

ROC became the logical measurement benchmark of profit centre (i.e. branch) performance. This use of ROC becomes difficult when banks start to engage in multiple, heterogeneous activities. Firstly, these activities may not be directly comparable with each other, unless some method is found to allocate capital in a truly risk-adjusted way. If capital is driven mainly by the size of the balance sheet, then any off-balance sheet activities (such as guarantees -or under some accounting standards- derivatives) will appear to be using no capital at all, giving rise to an infinite ROC.

2.5.2. Net Interest Margin

Revell (1980) uses the net interest margin which is the ratio of interest margin (the difference between interest income and interest expenses) to average total assets (or average earning assets)[11]. Changes in a bank's net interest margin depend on a complex interaction between resource availability, asset-liability composition and interest rate movements. If bank manages its assets and liabilities such that the bank earns substantial income on its assets and has low costs on its liabilities, profits will be high. In this case, the management's success is affected by the spread between the interest earned on the bank's assets and the interest costs on its liabilities. If the bank is able to acquire assets with high interest income, the net interest margin will be high, and the bank is likely to be highly profitable. If the interest cost of its liabilities rises relative to the interest earned on its assets, the net interest margin will fall, and bank profitability will suffer.

[11] Barry (1988) defines the net interest margin as the difference between interest income and interest expense as a percentage of average earning assets. Earning assets include: loans (net of unearned income) in domestic and foreign offices; lease-financing receivables; obligations of the U.S. government, states and political subdivisions and other securities; assets held in trading accounts; interest-bearing balances due from depository institutions; federal funds and securities purchased under agreements to resell.

Woosley and Baer (1995) present also the adjusted net interest margin. It is simply the difference between a bank's interest income (adjusted for tax-exempt securities earnings and loan-loss provisions) and interest expenses, divided by average interest-earning assets. This measure is similar to a business's gross profit margin except that sales of fee-based [12] services by banks are not included. As the authors explain, interest revenue from tax-exempt securities is adjusted upward by the bank's marginal tax rate to avoid penalising institutions with substantial state and local securities portfolios, which earn less interest but reduce tax burdens. Loan-loss expenses are substituted as a rough measure of risk to place banks that make lower-risk loans at lower interest rates on a more equal basis with institutions whose higher-risk loans earn higher rates. This measure could be improved by adjusting the operating profits to reflect changes in reserves.

Finally, another measure that is used in some studies is the net non-interest margin (Barry, 1988). The net non-interest margin is an indicator of the efficiency of a bank's operations and its pricing and marketing decisions. The net non-interest margin is the difference between non-interest income and non-interest expenses as a percentage of average assets.

2.5.3. Value Added Measures

For many authors, the best method for assessing the performance of any institution is the value added method, which calculates the amount by which a production process increases the value of a good or a service. It is computed by sales revenue less the cost of inputs used to produce the good/service. Many authors use as a value added measure for financial institutions the difference between total receipts, including interest received, and interest paid. The netting of interest received and paid greatly reduces but does not eliminate the enormous variation in bank revenues stemming from changes in the level of market interest rates.

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[12] Fee based (non-interest) income is derived from deposit service charges, charges for letters of credit, and other bank-related activities. It is more stable than other revenue sources because it

Heffernan (1996) lists some of the efforts that have been taken in the direction of the definition of the value added method in the banking sector. Initially she mentions the LBS and First Consulting attempt in a study of 25 European Community (EC) banks. Operating profits were adjusted to reflect changes in reserves not otherwise caught in reported profits. Then a notional charge for shareholder's equity (the home country's bond yield plus a 10% risk premium) was subtracted from the adjusted operating profits. The value added figure was then divided by factor inputs used in the bank. Boyd and Gentler (1994) defined the value added as the sum of payments to all factor inputs, that is, the sum of wages, salaries, profits, interest expense and depreciation. The value added was expressed as a percentage of the total value added of the financial intermediary sector.

Davis et.al. (1993) provide the added value to input calculation. It is the profit before tax with the reserve changes excluding the cost of expenses including premium divided by all operating costs including the cost of equity (with premium). This measures the extent to which management has created value from the funds provided by shareholders, and it does so accurately. It can be compared from bank to bank, and country to country. A bank that creates comparatively large amounts of value in relation to its equity can be said to be performing well given the initial capital is raised. The measure proposed in this study does not always generate results very different from those of return on equity.

Bourke (1989) and Molyneux and Thornton (1992) use also as a proxy of the bank profitability the value added return on total assets. It is defined in two ways: either as the ratio of net income before taxes plus the staff expenses to total assets or the ratio of net income before taxes plus the staff expenses and the loan losses to total assets. Davis et.al. (1993) propose the proportion of rents (or added value) to all the inputs; this measure provides neutrality in numerous different dimensions.

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is less likely to rise and fall with the general level of interest rates or with shifts in the term structure.

Value added has several advantages over the other profitability indicators. It is a better reflection of competitive advantage and it provides a much clearer degree to which a bank, and hence its management, is under-performing. This measure is not affected by bank size, variable interest rates, or differences in regulatory regimes. Nor is it based in favour of capital intensive banks. But the measure is not without its problems. It focuses on operating activities, rather than on return to shareholders. For this reason, value added statements are usually computed for operating units within a firm, rather than for the firm as a whole. Thus, it is often not possible to obtain the required data from published accounts. Computing value added for banking services is so difficult that many countries with value added tax systems do not attempt to tax financial services.

2.5.4. The Price-Earnings Ratio

The price-earnings ratio equals the ratio of market price per share to earnings per share (EPS), commonly referred to as the price-earnings or P/E ratio. The researcher share the view that earnings per share is not a good measure of bank profitability because dividend pay-out ratios may differ. This means that the percentage growth in earnings for a bank with a high dividend pay-out ratio -ceteris paribus- would not be as great as one with a low dividend pay-out ratio due to the smaller increase in the first bank's capital base in the previous years[13]. Another weakness of this measure is evident in the case of a rapidly growing bank that must add outside equity capital to maintain an adequate equity base. The new share will dilute EPS, so in the years after the new share issue EPS will not be a fair indicator of bank performance.

[13] The constant-growth model provides valuable insight for interpreting P/E ratios. The simple model says that the present value (P_0) of a share of common stock equals the expected (constant) dividend, D_1, divided by the difference between investors' required rate of return, r, and the expected rate of dividend growth, g. For r>g, the constant-growth model is as follows: $P_0=D_1/(r-g)$. If we divide the equation by expected earnings per share for the next period, EPS_1, this generates the basic determinants of a firm's P/E ratio: $P_0/EPS_1=[D_1/EPS_1]*[1/(r-g)]$. The first term on the right-hand side of the equation is the firm's expected dividend-payout ratio. All other things being equal, the higher the payout ratio is, the more valuable the firm is.

In banking EPS gives managers latitude to 'manage' earnings by manipulating the loan loss provision and other reserves. And perhaps more important, the use of EPS fails almost completely to hold managers accountable for their use of capital.

2.5.5. The Market-to-Book Ratio

The market to book ratio (sometimes referred to as the q ratio)[14] relates the market value of the firm (or of its shares) to its book value (or the book value of its shares). For financial institutions where the majority of investments are publicly traded financial assets, the market to book ratio measures the market capitalisation of a firm's franchise value or goodwill. Part, if not all, of this franchise value will be lost in the event of insolvency or substantial increase in financial distress. It is therefore in the best interest of the financial institutions to protect its franchise value. Increases in the q ratio might reflect increases in anticipated profitability or reduction in the cost of capital. Aliber (1984) (reported in Heffernan's book, 1996) reported q ratios for the national banks of the United States and eight other industrial countries for the period 1974-1982 and compared them with the performance of the industrial sector. A market to book ratio greater than one implies that the firm is creating value, whereas a ratio less than one suggests the firm is destroying value. He showed that q ratios for international banks had fallen relative to the q ratios for all other firms listed. Also McCormick (1987) (reported in Heffernan's book, 1996) compared bank q ratios in 1984 with those of other US industries.

Smirlock et.al. (1984) use the Tobin's q (the ratio of market value to replacement cost of the firms) to measure the firm rents. Tobin's q bounds total rents that accrue from either efficiency or monopoly. By relying on market valuation, these authors avoid some of the shortcomings of accounting rates of return. Loan losses, in particular, may not show up in the accounting data for years. For that reason, they used market-based estimates of rates of return. In so doing, they took advantage of the fact that most measurement errors in banking accounting data are in the assets. Bank liabilities are relatively homogeneous and short-term, except for small amounts of subordinated debt.

Thus, for liabilities, book values should be reasonable proxies for replacement cost. Among its advantages, capital market valuation appropriately incorporate firm risk, corresponds to an equilibrium valuation of rents, and minimises any distortions introduced by tax laws and accounting conventions. Its measurement combines financial market data with accounting data.

But this measure is troublesome, for several reasons. Calculation of Tobin's q is an intricate procedure that may itself introduce errors. The researcher questions the conceptual appropriateness of the use of book value as a proxy of replacement cost. As Heffernan (1996) also notes, the book value of a firm is retrospective, based on the historic value of physical assets, adjusted for depreciation and inflation. Market value is a prospective estimate of the firm's net present value, that is, its discounted dividend stream. Computing the market to book ratio for banks is even more problematic because much of their book value is based on goodwill and the intangible assets they possess, meaning cross-industry market to book ratios are not strictly comparable.

2.6. Recent Trends and Approaches

The main problems with many of the above figures are that (a) many of the performance measures were based on retrospective balance sheet data, which may not be good indicators of future performance, and (b) they ignore off-balance sheet operations. Off-balance sheet (OBS) instruments are contingent commitments or contracts which generate income for a bank but do not appear as assets or liabilities on the traditional balance sheet. They can range from stand-by letters of credit to complex derivatives. Banks enter OBS business because they believe it will enhance their profitability for different reasons. First, OBS instruments generate fee-income. Second, these instruments may improve a bank's risk management techniques, thereby enhancing profitability and shareholder value added. Third, to the extent that regulators focus on bank balance sheets, OBS instruments, in some cases, may take it easier for a bank to meet capital standards. These instruments may also assist the bank in avoiding regulatory taxes that stem from reserve requirements. As banks diversify into fee-based

[14] The market to book ratio, sometimes referred to as the q ratio, should not be confused with Tobin's q, which measures the total market value of a firm's assets (debt plus equity) relative to

financial products, their performance may be less sensitive to interest rate fluctuations. The increased use of off-balance sheet instruments in recent years is to be welcomed, since these instruments allow both greater diversification of risk and the closer tailoring of risk borne to risk preference; but they may place a greater burden on management control systems.

Moreover, banks now originate billions of dollars (or pounds) of loans which are sold in the secondary market and don't appear on their balance sheets. That activity covers a wide spectrum of loans, including residential mortgages, credit card and other consumer, and commercial loans. Although banks may not be the ultimate holders of these loans, they are key players in originating and servicing them, and they earn substantial fee income in the process.

As an even larger portion of banks' activities moves off the balance sheet, bank management is becoming more sensitive to the shortcomings of conventional measures of operating performance like ROA and ROE. At many of the largest banks, such accounting-based measures are giving way to economic performance measures like risk-adjusted return on capital (RAROC) and economic value added (EVA) that do a better job of reflecting the new reality of where banks are putting their capital at risk, and whether the rates or return they are earning on their different activities are high enough to reward their shareholders.

Boyd and Gentler (1994) used two indirect estimates of off-balance sheet activities. The first was the credit risk equivalents computed to satisfy the requirements of the Basle[15] risk assets ratio; the second was the credit equivalent of off-balance activities that would be required to generate the observed level of non-interest income. The

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the estimated replacement cost of its assets.

[15] The Basle framework, i.e. the regulatory issues formated by the Basle Committee (consisting of the central bank governors of the G-10 countries plus Luxembourg and Switzerland), carries five-weighted categories at which all claims (including off-balance items and credit equivalent amounts of off-balance items) are allocated. The immediate and most direct impact of Basle has been to increase the capital demands of international banks.

authors then recomputed the banks' share in total intermediated assets and bank credit relative to GDP.

The above conditions have increased the need for additional profitability information. Information on business unit profitability is needed to help identify and possibly eliminate products and business units. In a recent paper, Kimball (1997) discusses the evolution of commercial banks into semiautonomous lines of business over the past 20 years. The retail business began to fragment as specialised distribution channels began to emerge for products such as credit cards, residential mortgages, auto loans, and for high-net-worth customers. While this innovation permits greater management focus and specialisation, it also gives rise to new issues concerning performance measurement, risk management, and resource allocation. He concludes that "*new approach to profitability measurement based on products, customers, or distribution channels were needed if the profitability dynamics of the new lines of business were to be understood and exploited*". In that respect, Leempute and Kearney (1990) have developed the concept of "Break-Up Value Analysis" in order to identify value creators and value destroyers in banks' retail business, and this way to assist in the efficient operation of bank businesses. This approach uses CAPM and market-based pricing techniques to evaluate the risk-return characteristics of various businesses. For Kimball (1997) the solution is the development of a **funds transfer pricing system** [also Uyemura et.al. (1996) and Matten (1996)] in combination with the implementation of an **activity-based accounting methodology**.

The funds transfer pricing system manages to disaggregate the net interest margin and identify the bank exposure to interest rate risk, by dividing the organisation in funds-generating businesses which were seen as origination funds to be sold in an internal capital market to funds-using businesses[16]. The transfer prices used to value the transferred funds were the rates at which the bank could acquire or sell funds in the external capital market. For the funds-using business, the balance sheet would consist of the loans it generated on the asset size and funds purchased from the transfer "pool"

[16] For example, branches typically generate far more deposits than assets, while lending units such as corporate banking or consumer lending do the opposite.

on the liability side. On its income statement, the net interest revenue of a funds-using business would consist of the spread between the rates it earned on the loans it generated and the transfer rate paid to acquire funds from the transfer pool. For funds-generating businesses, the balance sheet would show funds sold to the transfer pool as the principal asset, while deposits would be the principal liabilities. The net interest revenue of such a business would consist of the spread between the transfer pool rate received on funds sold to the pool and the rates paid on deposits. Thus, the transfer rate served to divide the overall net interest margin of the bank into two sub-margins, one from asset origination and one from liability origination. The transfer rate is either single rate or multiple rate, where the maturities of the funds are matched.

The innovation of **activity-based costing (ABC)** is to build cost allocation systems around business processes. A business process consists of all the activities associated with a particular customer interaction. By focusing on complete business processes, activity-based costing has highlighted opportunities by substantial expense reductions that occur through the reengineering of the entire business process rather than incremental improvements to its constituent parts. This method permits banks both to better understand the forces driving their costs and to allocate those costs to their sources. It makes possible for the banks to reduce the proportion of shared costs treated as overhead and instead allocate such costs to the products or customers responsible for generating them.

Also, the **Functional Cost Analysis** is an exceptional useful management tool for participating banks. They can compare their costs for each function from year to year with averages of banks of similar size and deposit structure. The distribution of all costs (plus the overhead costs) provides a total cost for each function. This total is then divided by the size of each function to yield a percentage cost which is useful for comparative analysis.

If a bank is organised in such a way that different units are designated profit centres, then the return on economic capital (ROEC) of the unit is important. The return on economic capital, in this case, is the earnings of the bank or a unit of a bank divided by the capital allocated to it. Provided capital allocation reflects the risks undertaken, ROEC recognises the risk attributes of the activity. It is only when each shows a positive shareholder value added that the bank is compensated for the risks it undertakes, which in turn ensures shareholders earn a compensating return.

2.6.1. Economic Value Added (EVA) Performance Measure

Uyemura et.al. (1996) and Kimball (1998) analyse the use of economic profit for measuring the performance of banks[17]. They describe in detail one performance measurement, known as the economic value added (EVA). The EVA system is built on the concept of economic value added, defined as the excess of adjusted earnings over the opportunity cost of the capital involved. The measure assumes that it is possible to allocate earnings and equity capital to lines of business, products, and customers in a way that isolates the economic revenues and costs of each activity. However, if lines of business are related, either in the production of output or in their use of capital, then the isolation may not be possible, and these methods of measuring performance may mislead managers. The conclusion argues that banks need to recognise the ambiguities inherent in the calculation of economic profit and be prepared to create and apply multiple specialised performance measures. The principle contribution of EVA, however, is the emphasis on economic as opposed to accounting profits. By establishing the weighted average costs of capital as the hurdle rate, EVA correctly recognises that the projects to add value they must generate enough cash not only to service debt, but to provide shareholders with their required rate of return. For Uyemura et.al. (1996) EMA is the best performance measure for financial institutions since it offers a top-down comprehensive evaluation of the risk dynamics of the organisation, it can unify all financial management activities, and provides a capital allocation methodology that is manageable.

[17] To the accountant, profit is the excess of revenues over expenses and taxes and is best measured by earnings. To the economist, earnings fail to include an important expense item, the opportunity cost of the equity capital contributed by the shareholders of the firm. Earnings always exceed economic profits (a firm earns economic profits only to the extent that its earnings exceed the returns it might earn on other investments), and a firm can be profitable in an accounting sense yet unprofitable in an economic sense.

2.6.2. Risk-adjusted Performance Measures (RAPM)

Risk-adjusted performance measurement (RAPM) has been one of the buzzwords of banking over the last five years or so. The term actually embraces a whole bundle of concepts –indeed, just about every institution which has introduced or is toying with RAPM will give a different definition of what it means. However, among many different flavours and labels one may encounter, all RAPM techniques have one thing in common: they compare return against capital invested by adopting some form of risk-adjustment, based on internal assessments of how risky something (an assets, a transaction, a business etc.) may be.

In all cases, this riskiness is judged by a statistical analysis of the potential volatility of outcomes (for example, the potential change in value of a particular asset). This is usually based on a technique called 'value-at-risk' (VAR).

The four more commonly cited RAPM models are RORAA, RAROA, RORAC, RAROC. These come in two pairs; the first pair are asset-based, and are a derivation of ROA. The second pair uses a broader definition: ROC than ROA.

- Return on Risk-Adjusted Assets (RORAA). This takes the ROA ratio, but instead of ranking all assets equally as in the ROA, the assets are adjusted to factors in their relative riskiness. This is essentially the approach taken in the Basle Accord of 1988.
- Risk-Adjusted Return on Assets (RAROA). This also uses the ROA ratio as its base, but the risk adjustment is made by deducting a risk factor from return. Thus if there were a 1% chance of a default occurring on a loan to a corporate in any one year, then 1% of the amount of the loan would be deducted from the return generated.
- Return on Risk-Adjusted Capital (RORAC). This measure starts off with the usual ROC measure, and replaces the regulatory capital in the denominator with the internal measure of the capital at risk.

- Risk-Adjusted Return on Capital (RAROC). This uses the same basis as the RAROC measure -the starting point is return on capital- but instead of adjusting the denominator, the numerator is adjusted.

As noted above, different products, customers, or transactions will absorb different amounts of equity capital, with larger and more risky transactions requiring more equity than smaller, less risky ones. To ensure that a transaction is profitable, managers must assign the appropriate amount of capital and a required contribution to equity must be calculated and incorporated in the price applied to the transaction. This use of allocative capital to ensure adequate pricing was first implemented by Banker's Trust in its RAROC system, which adequately has been adopted since then by many other commercial banks. It is the net income from an activity –with a few adjustments for interbank charges and expected losses- divided by the amount of supporting economic capital. The great contribution of the RAROC system was to include explicit charges for both the credit risk premium and the use of capital. By doing this, it ensures that banks price individual loans to cover credit risk and generate an adequate return to shareholders. However, an exclusive focus on RAROC can lead to corporate underinvestment, otherwise to the rejection of positive NPV projects. This is why RAROC is not a useful objective but a tool that enables the measurement of economic profit.

2.7. Concluding Remarks

The purpose of this chapter was to give a theoretical and simple empirical exploration of bank performance measurement. The profitability indicators that are used extensively are the return on assets (ROA) and return on equity (ROE). Recently, at many of the largest banks, such accounting-based measures are giving way to economic performance measures like risk-adjusted return on capital (RAROC) and economic value added (EVA). However, since we want to make comparisons at the European banking level, we will concentrate on the traditional profitability measures.

Chapter 3

"Bank Structure in Europe"

Abstract

Widespread deregulation and liberalisation, accompanied by technological development, have changed the environment in which banks are operating. In addition, globalisation and the increased and transformed wealth of individuals have affected the operations of financial institutions, in general, and of banks, in particular. Within Europe these changes are especially fast and far-reaching, accelerated by the integration of the euro area financial markets and possibly by the circulation of the single currency. Financial systems in the euro area could be departing from a bank-dominated structure, becoming more market-oriented or even securitised. The changes in the structure of financial system and the role of banks are also illustrated by the emergence of new types of players in the financial system and the disintermediation process in the assets side. In this chapter we review some of the prominent structural features of the banking sector in Europe.

Chapter 3: Bank Structure in Europe

3.1. The Evolving Position of European Banks

In obvious contrast with the highly securitised financial system in the United States banks have been the dominant intermediaries between savers and borrowers in most countries of the European Union area. Before the introduction of the euro, for instance, corporate bonds had not been very widely issued in the euro area, and stock market capitalisation – relative to the size of the economy – was much lower in the European Union than in the United States. At the same time the proportion of bank deposits and banks assets to national income had been much higher in Europe.

A number of global and EU factors are now affecting the position of banks within the European financial system. These include the rapid pace of developments in information technology, the reduced economic role of the state, changing demographic structure, the promotion of a single European market in banking and other financial services, the introduction of the euro, and the continuing processes of globalisation, deregulation, and product/service innovation in financial markets. These developments are promoting alternatives to bank intermediation, threatening the prominence of 'relationship' banking said to be characteristic of bank-customer interactions in continental Europe, and increasing both international and domestic competition within the banking industry.

First of all, technology has already been shaping the structure of the financial system. It has reshaped the relative costs of different banking and financial services and facilitated the provision of new types of services. The costs of collecting, processing and using information has decreased dramatically. The second factor underlying the structural changes in the financial system and banking sector is the process of financial liberalisation which has been ongoing for some time already. It has allowed an increase in the overall level of competition in financial systems. In the EU, financial liberalisation gained momentum with the Single Market programme. The single most influential act for banks was the introduction of the Second Banking Co-ordination

Directive, which provided a passport for banks to offer services across the European Union (Noyer, 2000[18]). Globalisation is expected to increase competition in most areas of financial services, and it may also be able to realise economies of scale and scope. At the same time, globalisation has opened up new markets for banks, particularly in trading, asset management and investment banking activities. Finally, the wealth of individuals has increased, and a larger proportion of the population is making portfolio investments. This is partly a result of the ageing of the population, which has, in itself, increased the average wealth of people. At the same time, it is also due to changes in pension systems in a number of countries from the "pay-as-you-go" to a funded basis. In addition, the composition of wealth has shifted towards a greater emphasis on wealth in the form of financial assets. This is manifest in the increase of the relative market value of stock exchanges, which is clearly visible in most euro area countries. The increase in financial wealth relates closely to the shift towards a market-oriented financial system and also to the increased importance of institutional investors.

The single currency may create a much wider range of choice for retail savers and, combined with the rapid pace of development in telephone and internet banking, there will be considerable growth in cross-border provision of time deposits and retail investment vehicles such as mutual funds.

3.2. The Structure and Importance of Banking in Europe

Competition between banks and non-bank intermediaries, and between banks and securities markets, has increased considerably over the past years. Nevertheless banks still account for a much greater share of total financial intermediation in Europe than in the United States.

There are considerable differences in the relative role of banks and non-banks across the various European countries. Non-deposit intermediaries play a major role in countries such as the UK and the Netherlands and are becoming increasingly important elsewhere. Non-bank depository institutions (money market funds) also account for an

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[18] Noyer, C. (2000). The euro and the banking sector. Speech delivered at the Duisburger Banking Symposium, 27 September 2000.

important share of the market for deposits in France and Spain. These changes have blurred what were once marked differences in financial structure. While contrast is often drawn between "bank-" and "market-" orientated financial systems, within Europe only Germany can still be accurately described as a "bank-orientated" financial system.

Prior to the introduction of the euro, competition in the European countries banking sector has been mostly national or sub-national. There was relatively little penetration by foreign banks (except in the international banking markets of London and Luxembourg). In most countries institutional separation between commercial banks, savings banks, and other types of depository intermediary continued to prevail. There have also been considerable differences in the ownership and governance. In Germany, commercial banks owned by the state have increased in importance over the past 50 years, and now they account for almost half the business of all commercial banks. State ownership until recently remained an important factor in France and Italy. In the last decade, substantial privatisation steps have been undertaken in many countries. The largest banks in Europe are now all privately owned.

The measurement of concentration in European markets has to rely on national indicators, which are rather unsatisfactory since they do not often correspond to the relevant banking market. These statistics suggest that some of the smaller European countries' banking markets, at least those which continue to be purely national, are highly concentrated. In the large European countries the picture varies, with the five largest banks accounting for a large share of national markets in the UK, Italy, and Spain but for much less in France, and Germany. At the pan-European level, the European banking appears to be fairly unconcentrated, especially compared with the United States and Japan.

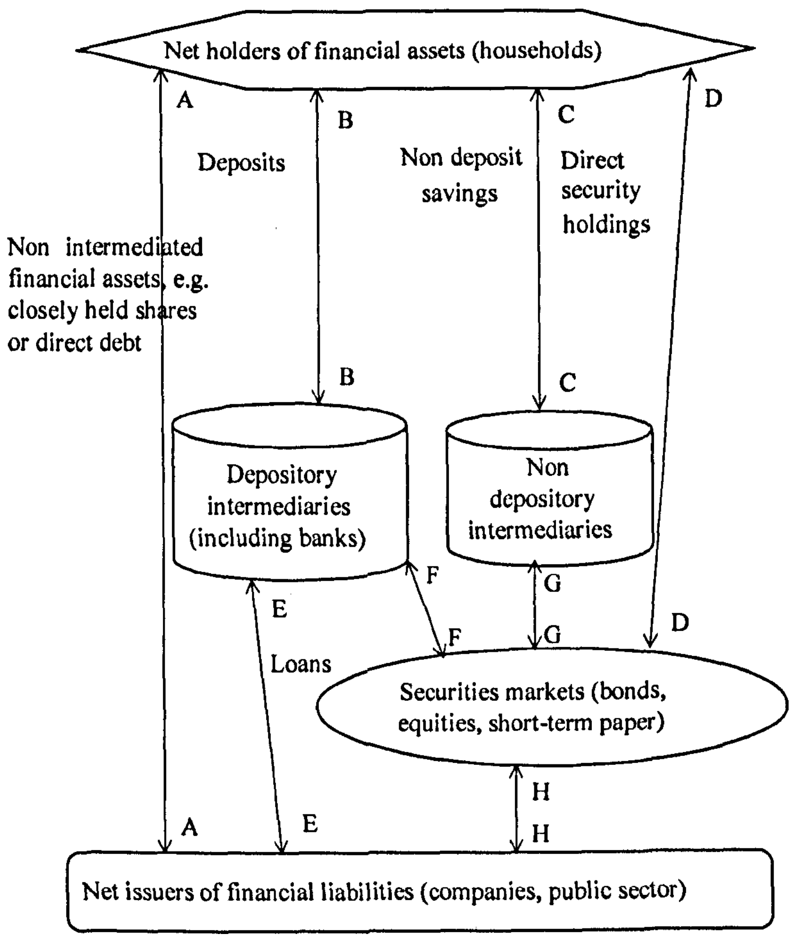
Finally, while the number of credit institutions has fallen almost everywhere, conventional measures of bank capacity – bank branches and employees per number of inhabitants – present a far more mixed picture, with considerable variation across countries in terms of both levels and trends in the euro area.

3.3. The Importance of Bank Intermediation

3.3.1. Banks versus Other Intermediaries

Figure 2 provides a schematic picture of the role of banks in the wider financial system. There are three principal alternatives to bank intermediation. First corporate financial liabilities may be held directly by households, an important characteristic for example both of the United Kingdom during the 19th century and of modern-day Italy where a large proportion of companies continue to operate under family ownership. France has just made a major statistical reassessment, reducing the apparent importance of non-quoted shares. Secondly households may accumulate financial assets issued by non-bank financial intermediaries, such as mutual funds, life assurance companies, or pension funds, which in turn hold market securities. Finally, households may choose to hold securities directly.

Figure 2: Schematic illustration of financial structure



Source: Own illustration

It is usual to distinguish between depository and non-depository intermediaries. The distinguishing feature of depository institutions as intermediaries is that they issue certain liabilities, that can either be used as means of payment or can be transformed quickly and at low cost into means of payment. Banks are just one type of depository institutions, which hold illiquid assets (loans) and transform them into liquid assets (deposits)[19]. The other main type of depository intermediary is the money-market mutual fund, whose liabilities represent shares in a portfolio of short-term money market assets.

A widespread trend in developed economies over recent years has been a blurring of the distinction between depository and non-depository financial intermediaries, and between bank and other depository intermediaries. For example, the increasing use of securitisation by commercial banks means that banks' loans are converted into traded securities so the differences between their assets and investment banks' assets are less pronounced. Similarly, a growing number of non-depository financial intermediaries have started offering traditional bank products, like chequebooks.

It is sometimes claimed that financial systems go through a characteristic pattern of development, beginning from an initial situation where financial claims are predominantly unintermediated, evolving into a bank-orientated system where most claims are bank-intermediated, and then finally becoming market-orientated with the development of substantial and liquid securities markets.

In practice there is considerable variation in the structure and evolution of financial systems between countries and no clear evidence that countries are converging on a common market-orientated financial system. The shifting market share of each type of financial intermediaries and organised markets in a given financial sector depends on many issues, like competition, regulation, or cultural and structural differences. Banks not only compete for funds and investment opportunities amongst themselves, but also against other financial intermediaries and organised markets.

Figure 2 can be used to distinguish the concepts of "disintermediation" and "securitisation". Disintermediation occurs when there is a decline in claims on financial intermediaries, either banks or non-banks, as a proportion of total household

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[19] The term "bank" is used here in a wider sense, so it includes not only "commercial" or "savings" banks, but also "mortgage" banks, British "building" societies, German

financial assets i.e. in Figure 2 an increase of the proportion of household wealth held in the form of AA and DD relative to BB and CC. Securitisation is an increase in the proportion of non-financial corporate and public sector financial liabilities traded on securities markets i.e. an increase of liabilities issued as HH relative to AA and EE. In many countries there has been, over recent years, a rise in the proportion of financial liabilities traded on securities markets (a rise of HH) and a corresponding growth in the importance of non-bank financial intermediaries (an increase of CC and GG). This is securitisation but, because the new securities are not held directly by households, it is not disintermediation[20].

Figure 2 also illustrates the difference between bank-orientated and market-orientated financial systems. Bank-orientated financial systems are those where bank deposits (BB) and bank loans (EE) represent respectively a relatively high proportion of total household assets and of total financial claims on non-financial domestic borrowers. A market-orientated financial system, in contrast, is one in which traded securities (HH) represent a relatively high proportion of claims on non-financial domestic borrowers.

3.3.2. Statistics on Bank and Market Intermediation

Table 1 shows the current allocation of market and bank intermediation in the Euro area, Japan and the United States. The data must be interpreted with some care since there is no sectoral allocation. The securities could be held either directly by households (DD in Figure 2) or indirectly via bank or non-bank intermediaries (FF and GG in Figure 2).

Compared to the United States, the euro area has a larger banking sector, as evidenced by the weight of its deposit and loan sectors, and relatively smaller equity and debt markets. In the euro area the percentage of debt securities issued by the private sector is smaller than in the United States, indicating that corporate borrowers depend more

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"bansparkassen", Spanish "cajas de ahorro", etc.

[20] It is however still bank disintermediation, and for this reason some commentators still use the word disintermediation to describe a shift of intermediation from banks to non-bank financial intermediaries.

on banking finance. Japan has even a larger banking sector, with a developed debt securities market.

Table 1: Banking and market intermediation by major economic blocs, 1998 (% of GDP unless stated)

	Euro area	*United States*	*Japan*
GDP (% of world)	22.2	29.3	13.0
Bank deposits	84.0	54.0	122.0
Domestic credit	130.0	81.0	152.0
Domestic debt securities	91.0	155.0	132.0
Domestic debt securities issued by private sector (% of total domestic debt)	38.1	43.2	27.6
Stock market capitalisation	63.0	172.0	62.0

Source: European Central Bank, Monthly Bulletin, August 1999

An intuition of the banking sector size in Europe is that the banking systems of EU countries taken together form the largest banking system in the world, with more than 40% of world banking assets. The total banking assets of France and Germany alone would be a third larger than those of the United States; those of the four largest countries (Germany, France, the UK, and Italy) would be two times larger; and those of all EU countries would be almost three times larger.

Reflecting the predominant role of bank-intermediated credit in continental Europe, the EU banking system is also large in relation to the EU economy: at the end of 1997, the ratio of unconsolidated banking assets of credit institutions resident in the countries which now comprise the euro area to GDP was 234% in the EU[21], compared to a ratio of 60% in the United States in mid 1998[22]. This ratio, in sharp contrast with the

[21] European Central Bank, Monthly Bulletin, April 1999.

[22] Federal Reserve Board website. This ratio includes only the assets of commercial banks.

declining trends of the United States and Japan, has considerably grown in the period 1985-97 (in 1985 the ratio stood at 176%), and the growth of the banking sector has been faster than the growth of the economy as a whole. Furthermore, there has been a general increase in derivative, guarantee and other off-balance sheet activities of banks that do not enter into the above measurement. Hence the changes in total assets do not fully reflect the changes in the volume of services offered by banks.

A more systematic approach to examine financial structure in different countries is to use sectoral balance sheet and flow-of-funds statistics, in order to quantify the financial relationships in the economy, such as those illustrated in Figure 2. These sources provide data both on stocks and on flows for all the financial assets and liabilities of the various sectors of the economy, including households, non-financial corporations, banks, non-bank financial companies, public, and overseas sectors.

3.4. Numbers and Type of Banks

3.4.1. Numbers of Credit and Other Monetary Institutions

European Union statistics distinguish credit institutions (i.e. banks) and other monetary institutions which do not offer credit (money market mutual funds). Within Europe there is considerable heterogeneity amongst these monetary institutions. Table 2 provides statistics on the number of monetary financial institutions. The total number of credit institutions in the euro area was 8,185 at the end of July 1999 (Table 2). This includes the large number of savings and co-operative banks in several countries. With regard to the credit institutions category, Germany is the most fragmented market (3,180 credit institutions), followed by France (1,200), Italy and Austria (925 and 899 respectively). France has the most money market funds (710), followed by Luxembourg (463) and Spain (206). In France and Spain the number of money market funds suggests that the FF channel in Figure 2 is relatively important. In the United States, where population size is comparable with that of the euro area, the number of credit institutions is even higher, with more than 10,400 insured commercial banks and savings institutions at end-1998 according to statistics published by the Federal Deposit Insurance Corporation. This fragmentation reflected the legislation in the

United States that imposed restrictions on the geographical breadth of banks' operations.

Table 2: Number of European monetary financial institutions[23] (July 1999)

	Numbers		*Percentages (%)*	
	Credit institutions	*Money market funds*	*Credit institutions**	*Money market funds**
Austria	899	8	9.8%	0.5%
Belgium	117	29	1.3%	1.8%
Finland	345	5	3.6%	0.3%
France	1200	710	13.1%	43.5%
Germany	3180	41	34.8%	2.5%
Ireland	78	17	0.8%	1.0%
Italy	925	17	10.1%	1.0%
Luxembourg	210	463	2.3%	28.4%
Netherlands	613	28	6.7%	1.7%
Portugal	228	0	2.5%	0.0%
Spain	390	206	4.2%	12.6%
Euro zone	***8185***	***1524***	***89.6%***	***93.4%***
Denmark	212	3	2.4%	0.1%
Greece	59	42	0.7%	2.6%
Sweden	148	29	1.7%	1.8%
UK	508	33	5.6%	2.1%
EU total	***9112***	***1631***	***100%***	***100%***

* As percentage of EU total monetary financial institutions.

Source: European Central Bank, Monthly Bulletin, August 1999

[23] "Monetary Financial Institutions" (MFIs) comprise resident Credit Institutions as defined in Community Law, and other resident Financial Institutions whose business is to receive deposits and/or close substitutes for deposits from entities other than MFIs, and, for their own account (at least in economic terms), to grant credits and/or make investments in securities". "Credit institutions" are depository financial intermediaries; and "money market funds" include investment vehicles whose shares or units are close substitutes to deposits but the government does not insure them. The investors in these funds can usually redeem the invested amount at par value and have transaction facilities similar to banks' cheque accounts.

Table 3: Number of credit institutions

	1980	1985	1990	1995	1996	1997	1998	% change 1985-1995	% change 1996-1997	% change 1994-1998
France	na	2105	2027	1469	1407	1299	1041	-30.2	-7.7	-25.9
Austria	1595	1241	1210	1041	1019	995	925	-16.1	-2.4	-9.1
Italy	1156	1192	1156	970	937	935	921	-18.6	-0.2	-8.1
Germany	5356	4740	4720	3785	3675	3578	3295	-20.2	-2.6	-11.8
Spain	na	695	696	506	458	416	404	-27.2	-9.2	-20.8
Finland	669	654	529	381	373	371	361	-41.7	-0.5	+0.8
Portugal	35	224	260	233	228	235	226	+4.0	+3.1	-25.2
Luxembourg	111	118	177	220	221	215	209	+86.4	-2.7	-5.9
Belgium	176	165	157	145	141	134	95	-12.1	-5.0	-22.1
Netherlands	na	81	111	102	101	90	na	+25.9	-10.9	na
Ireland	61	58	48	56	62	70	53	-3.5	+12.9	35.9
Euro zone	***na***	***11273***	***11091***	***8908***	***8622***	***8338***	***na***	***-26.5***	***-3.4***	***na***
Denmark	197	166	124	122	125	100	201	-26.5	-20.0	-3.4
Greece	34	38	39	53	55	54	43	+39.5	-1.8	+10.3
Sweden	na	779	704	249	237	242	210	-68.0	+2.1	-11.8
UK	na	Na	na	564	550	551	525	Na	+0.2	-7.4
EU	***na***	***12256***	***11958***	***9896***	***9589***	***9285***	***8618***	***-23.9***	***-3.2***	***-12.9***

Source: European Central Bank (ECB), February 1999, and for 1998 data European Commission Publication (October 2000).

Table 3 concentrates on the figures for the credit institutions of the EU countries and shows how their numbers have altered over time. Particularly since the early 1990s, the number of credit institutions has shown a declining trend. In 1985 there were more than 12,200 credit institutions in the European Union. Since then, in most European countries the total number of credit institutions declined, with the exception of Finland, Ireland and Greece (smaller countries). At the end of 1998 there were 8,618 financial institutions in EU countries, a 13% reduction from 1994. Similar is the trend for US (8,817 financial institutions in 1998, a 16% reduction from 1994). Major reductions in the number of institutions occurred in France, Portugal, Belgium, and Spain. The decline in the number of credit institutions reflects mergers rather than closures of existing institutions. The largest reduction in the number of institutions has taken place among the smaller savings and co-operative banks.

3.4.2. Types of Credit Institutions

We usually think of banks as commercial banks. However, in many European countries other depository institutions e.g. savings banks play a significant role. Major institutional demarcations within the banking sector continue to be important in both Germany and Spain. In Spain the market share of the savings banks, which can be either privately or publicly (i.e. state, provincial, or municipal) owned, expanded significantly in the early 1990s. By and large, the restrictions initially imposed on their business activities by the Savings Bank Act of 1933, one of which limited their operations to regions, were abolished in 1989. However, each savings bank (caja) is anchored to its own region. It can buy private bank networks and open branches anywhere in Spain – nearly 50% of Caja Madrid's 1,600 offices are outside the Madrid region – but it may only merge with another savings bank if it is within its own region; it cannot buy the caja of another region. There are 51 savings banks in Spain, but the 12 largest, those with more than euro 8bn on their balance sheets, account for about 70% of the total savings banks assets, and La Caixa and Caja Madrid, alone account for 35% between them. By March 1999, Spanish savings institutions held about 44% of total bank deposits, the highest proportion of any European Union country.

In Germany the savings banks sector (savings banks plus Landesbanks) is state owned and accounts for 36.7% of banking sector business (1997)[24]. The different types of commercial banks hold 25.2% and the cooperative banks 14.4% of business volume. Mortgage banks and credit institutions with special functions each carry out 14.4% and 9.3% of the total business volume of all types of banks respectively. Comparing 1995 with 1997 figures it can be seen that the Grossbanken (the big three banks) have increased their share of the market at the expense of the savings and co-operative banks.

In other countries institutional demarcations matter somewhat less than in Spain or Germany. At the opposite extreme of the two countries is the UK, where former distinctions between clearing banks and merchant banks are no longer operative, and where conversion of mutual building societies to private owned banks has meant that only a rump of mutual institutions remains.

In Italy commercial banks (banks accepting short term deposits) are now the dominant institutional form. Co-operative and mutual banks are an important sub-sector, accounting for just over a quarter of bank branches. Co-operative and mutual banks are also an important subsector in the French banking system. There were 124 mutual and co-operative banks in 1998, while commercial banks accounted for 359. It is significant that many of the most recent important French banking takeovers – including that of CIC by Crédit Mutuel, Banque Indosuez and Sofinco by Crédit Agricole, and Banques Populaires by Natexis – have been mutuals absorbing commercial banks.

3.4.3. Ownership

Banks which are owned or strongly supported by the state have traditionally played a very significant role in France, Italy, Germany, Spain, and some other smaller countries. Among the smaller EU countries, ownership was until recently almost

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[24] At the end of 1998, the savings banks had 36m customers – twice as many as the big banks (Grossbanken) combined, and more than five times as many as Deutsche Bank (Financial Times, 25 October 1999).

entirely public in Greece and Portugal. The role of the state in European banking has changed in virtually all respects in the last decade. With the exception of some of the German Landesbanks, the largest banks in Europe are now all under private or mutual ownership. In Austria, Greece, France, and Italy steps have been taken to reduce direct state ownership of banks. In Greece there has been a sale of four state-owned banks to the private sector and the partial privatisation of the fifth in the last three years.

Only in Germany do state-owned institutions remain of central importance. The savings banks, the regional giro institutions (Landesbanks) and a large proportion of specialised lending institutions are state-owned. They account for over 40% of German banking assets, and since the German co-operative sector accounts for a further 14% of banking assets, less than half of bank assets are held by private institutions (the commercial, regional, and mortgage banks).

To Germany's non-public sector banks, and to the European Commission's competition authorities the main problem with Germany's banking structure is that it assigns a special role to the public sector, including the 13 so-called Landesbanks. Landesbanks benefit from legal support mechanisms, known as Anstaltlast and Gewahrtagerhaftung, which amount to an unlimited guarantee against insolvency. Savings banks (Sparkassen) carry as capital a guarantee from local municipalities, which makes it difficult for them to merge or be purchased by a shareholding company. This enables them to receive higher credit ratings and to borrow money at lower interest rates than their financial strength might otherwise justify. In response to a complaint by private German banks, the EU is currently considering whether German public law banks (Sparkassen and Landesbanken) have an unfair competitive advantage deriving from subsidised public capital injections. The European Commission recently ruled (July 1999) that Westdeutsche Landesbank (West LB) must repay euro 808mn in aid to its main owner, the State of North Rhine Westphalia[25]. The decision, though under appeal, could erode what Germany's commercial banks regard as the public sector's privileged position in the banking market. West LB in particular

[25] Financial Times, 25 October 1999, Survey.

stands out among the Landesbanken for its ambitious international strategy. It had euro 345 bn assets in 1998 and representation in 35 countries (data from Fitch-IBCA Bankscope database).

In Italy there has been a major transfer of bank assets from public to private sector during the past six years. When the Credito Italiano was sold in December 1993, 70% of the banking system was in public sector ownership[26]. The share of banks controlled by the state, local authorities and foundations fell to 25% in 1997, and to 18% in 1998 (Banco d'Italia, 1999)[27]. With the privatisation in November 1999 of Mediocredito Centrale, the government has sold its last controlling stake in a banking group.

Since World War II, French banks have been moved between the state and private sector. In 1982, three banks were nationalised: Société Générale, Crédit Lyonnais and Banque Nationale de Paris. Five years later, a few important banks returned to the private sector, notably Société Générale, Paribas, Suez and BNP. In 1999, Crédit Lyonnais has been privatised. The restructuring undertaken in 1998 in France led to a change in the control of 139 credit institutions and 16 investment firms and the revocation of authorisation from 36 credit institutions and 17 investment banks (Banque de France, 1999).

3.5. Asset and Liability Structure

The European Central Bank (ECB) publishes balance sheet data covering the monetary financial institutions of the euro area. The data gives a good perspective of the relative importance of the different channels of funds across the euro countries (see Table 4) (see also Annex 4 for the structure according to the Fitch-IBCA Bankscope database and our own calculations).

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[26] The Banker, February 1999, p. 31

[27] And has fallen further in 1999 with the privatisation of Mediocredito Centrale and of Monte dei Paschi di Siena (MPS). At 2.1 million, the number of applicants for shares in MPS was

Table 4: Balance sheet structure of euro area monetary financial institutions, (% of national total assets or liabilities, March 1999)

Liabilities							
	Deposits	*Debt securities issued*	*Money market funds share /units*	*Money market paper*	*Capital*	*Other liabilities*	*Total liabilities (% of national GDP*
Austria	71.4	17.2	0.0	0.0	5.0	6.3	243.1
Belgium	76.0	11.3	0.2	0.0	3.9	8.7	318.9
Finland	67.4	5.0	0.0	14.1	5.9	7.6	95.9
France	63.4	9.6	4.9	3.5	5.5	13.0	272.1
Germany	67.3	22.4	0.4	0.5	4.1	5.3	274.6
Ireland	78.1	8.3	0.0	0.0	7.2	16.5	146.5
Italy	59.6	16.5	0.2	0.0	7.2	16.5	146.5
Luxembourg	78.4	5.6	5.8	2.4	2.4	5.4	3768.3
Netherlands	74.7	13.9	0.0	0.0	4.9	6.5	253.0
Portugal	63.8	5.1	0.0	0.0	6.0	25.2	295.8
Spain	78.0	3.4	4.8	0.0	8.0	5.8	187.5
Euro zone	***67.8***	***14.9***	***1.9***	***1.2***	***5.1***	***9.1***	***249.5***
*UK**	69.7	11.0					273.2

Assets							
	Loans	*Securities other than shares*	*Shares and other equity*	*Money market paper*	*Fixed assets*	*Remaining assets*	*Total assets (% of national GDP)*
Austria	77.3	12.4	5.7	0.0	1.0	3.6	243.1
Belgium	63.5	27.1	2.3	0.0	0.5	6.6	318.9
Finland	70.6	13.2	1.9	3.6	2.4	8.3	95.9
France	67.2	16.1	1.7	2.1	3.4	9.5	272.1
Germany	76.3	15.2	5.0	0.1	0.7	2.7	274.6
Ireland	73.0	18.6	1.7	0.0	0.6	6.1	333.3
Italy	65.5	16.5	4.1	0.0	2.9	11.0	146.5
Luxembourg	66.9	27.1	1.6	1.0	0.5	3.0	3768.3
Netherlands	81.4	11.3	3.5	0.0	0.5	3.2	253.0
Portugal	57.2	11.0	4.5	0.0	1.3	26.1	295.8
Spain	73.9	15.0	4.1	0.5	2.2	4.3	187.5
Euro zone	***71.7***	***16.2***	***3.6***	***0.7***	***1.7***	***6.3***	***249.5***
*UK**	68.0	10.6	2.8				273.2

greater than in any Italian privatisation and a substantial advance on the 1.6 million applicants for shares when Banca Nazionale del Lavoro was privatised in November 1998.

* Data for end-1998, UK monetary financial institutions includes the Bank of England and foreign banks. Also UK deposits include private deposits and money market instruments, and UK securities include any type of securities except derivatives.

Sources: European Central Bank, Monthly Bulletin, August 1999; Financial Statistics, September 1999.

Traditional bank deposits are still the most important liability in the intermediaries' balance sheet, ranging from 60% of assets in Italy to nearly 80% in Spain (similar results are obtained from the Fitch-IBCA database, where only Greece and Belgium have higher proportion of deposits to total assets than Spain at the end of 1999). The volume of deposits in the UK is very large, even allowing for the inclusion of money market instruments. As expected, the liabilities of money market funds represent a larger proportion of total liabilities in France and Spain. Debt securities issued represent the second largest liability item in the aggregated balance sheet of the euro area monetary financial institutions, with its share approaching 15%. The amounts issued are particularly high in Germany, amounted to 22.5% of total liabilities.

Banks have faced intense competition on the liabilities side, as institutionalisation took hold, leading to a sharp fall in deposits as a share of households' gross financial wealth (this fall can be observed also from Annex 4 with the Fitch-IBCA results where there is observed a 10% reduction of deposits to total assets in EMU and EU countries in the period 1992-1999; deposits as a proportion of total assets is falling from 78% in 1992 in EU countries to almost 70% in 1999). Money market mutual funds offered banks direct competition in providing liquid transaction balances. Previously, such liquid transactions balances have been a source of relatively cheap funds for banks. Yet more important, there was a shift in preferences to the longer end of life insurers and pension funds accounted for an increasing share of household assets.

Loans represent the main asset category of the European monetary financial institutions (this is also obvious from the Fitch-IBCA database results presented in Annex 4, although the observed levels are different). At March 1999, the overall share of loans in total assets was almost 72% at the euro level (Table 4). Debt securities (excluding equity) constituted 16% of total assets, while shares and other types of equity holdings had only a 3.6% share. In Netherlands, Austria, Germany, Spain and Ireland the volume of loans as a percentage of total assets is higher than the euro average. The financial intermediaries' equity investments are relatively high in Austria, Germany, Portugal, Spain and Italy. In these countries, the extensive use of "relationship banking" means that banks often hold equity of their corporate borrowers. From the big EU countries, in France and Italy securities represent a high proportion of intermediaries' investments.

Table 5 shows the different composition of the loan portfolio of the monetary financial institutions: at the aggregate euro level, households loan borrowing is just slightly larger than the respective for non-financial corporations borrowing. However country differences are striking: in Germany, non-financial corporation borrowing represents nine-tenths of the intermediaries' loan portfolios, and in Italy two-thirds. Non-financial corporations in these countries raise the majority of their funds from banks. By contrast, in the UK borrowing by non-financial corporations is only a quarter of loans to the non-financial private sector.

Table 5: Monetary financial institutions loans to the non-financial private sector by type (% of total loans by country, March 1999)

	Non-financial corporations	Households	Non-profit institutions servicing households
Austria	69.9	29.3	0.8
Belgium	50.7	48.8	0.5
Finland	40.9	58.2	0.9
France	50.8	48.3	0.9
Germany*	90.0	9.5	0.6
Ireland	46.1	52.2	1.7
Italy	66.7	32.2	1.2
Luxembourg	67.7	30.3	1.9
Netherlands	46.2	53.8	0.0
Portugal	47.8	51.9	0.3
Spain	48.3	51.2	0.5
UK**	26.9	73.1	

* Own calculations for 1998 from Deutsche Bundesbank Financial Accounts, 1990-98.

** Own calculations from Hoggarth, G., and Chrystal, A. (1998), "*The UK corporate and personal sectors during the 1980s and 1990s*", Bank of England, Quarterly Bulletin, September 1998.

Source: European Central Bank, Monthly Bulletin, August 1999.

3.6. Concentration in European Banking Markets

3.6.1. Geographical Scope of Banking Markets

The euro area banking sector is still very fragmented in terms of national and sometimes even local characteristics. In some countries a large part of the banking activity is in the hands of a few nationwide banks, while in some others the market share of banks that operate on a nationwide basis is rather small. A key to analyse the impact of current changes in European banking, especially the impact of cross-border and within-country consolidation and competition in the banking industry and hence in economic efficiency, is identifying the appropriate geographical unit within which competition takes place. Because statistics are usually available on a national basis, there is a tendency to identity the market within the borders of a country, but this is a misleading assumption if competition actually takes place at a sub- or supra-national level. A small share of the national banking market held by the largest institutions could co-exist with a high level of concentration in local markets. Equally importantly it suggests that, at least until competition on a pan-European scale emerges in most banking markets, considerable differences in pricing, branch networks, and employment will persist, either between countries, or between different regions of one country.

3.6.2. Measures of National Concentration

As the preceding discussion highlights, European nations do not necessarily correspond to the appropriate geographical area of banking competition. Nonetheless, virtually all the available statistics on concentration are for shares of national markets.

In recent years, the concentration of the banking system, measured by the share of national bank assets owned by the top 5 (or 10) institutions, has not shown a uniform trend. Within the different national banking markets, the degree of concentration varies (Annex 5). The concentration measures suggest that the market power of the major banks in Finland, the Netherlands, Greece, and Denmark is significant. As a rule of thumb, smaller markets are more concentrated as there is less room for a large number of banks. For example, Finland boasted a 5-firm concentration ratio of 91.5% of total assets in 1998 (Annex 5). Therefore, in these smaller markets consolidation is unlikely to go much farther.

In the Nordic countries a high degree of consolidation has already taken place, especially after the banking crises of the early 1990s, and they rank amongst the most developed banking sectors in Europe. Consolidation in the Netherlands resulted in the creation of huge institutions such as ABN AMRO and ING in the early and mid 90s, but in neighbouring Belgium the shake-up began only towards the end of 1997.

The five big banking markets in Europe (Germany, Italy, France, UK, and Spain) are on the other hand less concentrated. The series of mergers has increased concentration further in 1998, notably in Spain, France and Italy, and the trend is continuing. In Germany the degree of concentration measured at the national level just approached 40% of total German banking assets and is the lowest among the EU countries (Table 6). Italy has shown the greatest rise in concentration in the last two years; the five-firm concentration ratio increased from almost 40% in 1996 to 47% in 1998. The re-composition of the Italian banking landscape commenced in 1997 and speeded up during 1998; this trend is expected to continue for the foreseeable future.

Using 1998 data, it appears that the individual European banking markets are much more concentrated than the US market. If instead the whole European Union area is considered, concentration appears to increase (Table 6) but is much lower than the US one: the market share of the top five European banks is 12.10% of total assets while in the US the respective figures are double (24.25%). During the period 1996-1998 the degree of concentration of the US banking industry has increased considerably due mainly to concentration of big credit institutions (Annex 5).

Table 6: Five-firm concentration ratios in major countries by total assets (1998)

Germany	39.31
Spain	59.58
France	44.03
Italy	47.04
UK	47.99
EU	12.10
US	24.25
Japan	33.13

Source: IBCA database and own calculations.

The EU banking industry is composed of relatively few large institutions and a substantial number of smaller, local and more specialised banks. Most countries in the European Union have three to five large well known banks, though in some countries such as Germany, Spain, Italy and France, regional banking is important because of, as we have already mentioned before, the large number of mutual and co-operative banks.

Table 7: Top 20 European banks by total assets

Company name – 1997	%	Cum %
Deutsche Bank AG	2.66	2.66
HSBC Holdings Plc	2.20	4.86
Bayerische Hypo-und Vereinsbank	2.15	7.01
Crédit Agricole CA	1.99	8.99
ABN Amro Holding NV	1.96	10.95
Société Générale	1.94	12.89
Barclays Bank Plc	1.77	14.66
Caisse Nationale de Credit Agricole CNCA	1.76	16.43
Dresdner Bank AG	1.76	18.19
Banque Nationale de Paris	1.61	19.80

National Westminster Bank Plc	1.42	21.22
Commerzbank AG	1.39	22.61
Banca Intesa+Banca Commerciale Italiana	1.32	23.94
Credit Lyonnais	1.18	25.12
Banco Santander Central Hispano	1.17	26.29
Bayerische Vereinsbank AG	1.15	27.44
Abbey National	1.10	28.54
Landesbank Baden Wuerttemberg	1.07	29.61
Banco Bilbao Viscaya Argentaria SA	1.02	30.63
Groupe Caisse d'Epargne	1.02	31.64
Company name – 1998	**%**	**Cum %**
Deutsche Bank AG	3.21	3.21
ABN Amro Holding NV	2.37	5.58
HSBC Holdings Plc	2.29	7.87
Crédit Agricole CA	2.16	10.03
Société Générale	2.07	12.10
Bayerische Hypo-und Vereinsbank	2.03	14.13
Dresdner Bank AG	1.93	16.06
Caisse Nationale de Credit Agricole CNCA	1.83	17.89
Banque Nationale de Paris	1.72	19.62
Commerzbank AG	1.70	21.32
Barclays Bank Plc	1.61	22.92
ING Bank NV	1.49	24.41
Banca Intesa+Banca Commerciale Italiana	1.42	25.83
National Westminster Bank Plc	1.35	27.18
Rabobank Group	1.32	28.50
Banco Santander Central Hispano	1.22	29.73
Deutsche Genossenschaftsbank	1.17	30.89
Landesbank Baden-Wuerttemberg	1.14	32.03
Abbey National	1.13	33.16
Crédit Lyonnais	1.11	34.27

Source: IBCA database

Consolidation of the European banking industry has been rapid. The share of bank assets accounted for by the top 20 European banks has risen from 31% in 1997 to nearly 34% in 1998 (Table 7). Ten European banks are now in the top 25 worldwide as ranked by capital strength (Tier One Capital)[28] and five EU banks (with Switzerland seven banks) are among the top 10 worldwide measured by total assets ($ million)[29] (Table 8).

Table 8: Global top 10 banks by total assets, 1998 ($ million)

Deutsche Bank	Germany	732,534
UBS	Switzerland	685,882
Citigroup	US	668,641
BankAmerica Corp	US	617,679
Bank of Tokyo-Mitsubishi	Japan	598,720
ABN AMRO Bank	Netherlands	504,122
HSBC Holdings	UK	488,655
Crédit Suisse Group	Switzerland	473,983
Crédit Agricole Groupe	France	457,037
Société Générale	France	447,545

Source: The Banker, July 1999

3.6.3. Foreign Penetration

Cross-border competition and cross-border entry is beginning to have an input on certain national markets. A prominent example is in the Benelux group of countries, where interpenetration by different banking groups (ABN–Amro, Générale de Banque etc.) has proceeded to the point that with the introduction of the euro it is questionable whether these can be regarded as separate domestic banking markets. Elsewhere there have been prominent cross-border entries into other national domestic banking

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[28] The Banker, July 1999, p. 114.

[29] The Banker, July 1999, p. 90.

markets, most notably Deutsche Bank which has relatively large commercial banking subsidiaries in Italy, Spain and elsewhere.

Nevertheless, despite these examples, it is easy to exaggerate the current level of cross-border competition and cross-border entry. The combined market share of foreign branches and subsidiaries established by credit institutions domiciled in the European Economic area was at end 1997 below 10% in terms of banking assets in all euro area countries with the exception of Belgium, Ireland and Luxembourg.[30]

Annex 6 reports deposits held with foreign banks by all entities banks. In no country does the proportion of assets held with non-resident banks exceed 15% in 1997. However there have been rising almost everywhere throughout the 1990s, with the exception of Switzerland. The second table makes the same observation for bank lending. The figures have also an upward trend. Worth mentioning is the case of the Netherlands where 30.5% of the liabilities obtained by the Dutch non-financial sector have been issued by non-resident banks (1997). The above evidence indicates that European commercial banking markets remain mostly national, with few direct inroads by foreign competitors.

In certain countries foreign banks dominate (Luxembourg) or at least have a major market presence (Belgium, UK, Ireland). For the first time in the history of the banking system in 1998, the number of commercial banks in France under foreign control exceeded that of French-owned banks, with 187 against 172[31]. The number of non-German institutions with active branches or subsidiaries remains stable at about 180 in 1998, and a similar number has representative offices[32].

A key feature of the UK banking system is the presence of a large number of branches and subsidiaries of foreign banks in London. These institutions are primarily engaged

[30] European Central Bank publication, "Possible effects of EMU on the EU banking systems in the medium to long term", February 1999.
[31] Banque de France Annual Report, 1998.

in international business booked in London, international and investment banking, and wholesale lending to large corporates and to UK local authorities.

3.7. Concluding Remarks

In recent months, the possible implications of the introduction of the single currency for the European banking industry have received increasing attention. While the euro may act as a catalyst for change, it is the underlying forces (technological change, demographic trends, globalisation, deregulation, securitisation) that will play a more important role in shaping the direction of the change.

The objective of this chapter is to monitor and assess developments in the structure of European banking. In general, banks dominate the financial system of the European Union more than that of the US. There are also substantial variations between EU countries, particularly on the asset side of the balance sheet. There is less variation in banks' liability structures, which are dominated in all countries by deposits.

Public ownership was until recently an important feature of banks in several major countries, but Italy and France have recently undertaken substantial privatisation programmes. Finally, it is hard to measure concentration in banking adequately. On the five-firm asset ratio, concentration at a national level seems to be excessive in some smaller EU countries, while among the major countries, the UK, Spain, and Italy have quite concentrated banking industries. Some product markets are already EU-wide, and at this level European banking is not highly concentrated, with a five-firm concentration ratio lower than in Japan or the US. But other markets are national or local in character, and high local levels of concentration will remain a concern until they are challenged by cross-border European banking competition. Important policy issues include establishing the degree of national consolidation likely to enhance

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[32] Financial Times, 25 October 1999.

efficiency whilst maintaining competition. Closely related are prudential issues having to do with ensuring financial stability during a period of heightened competition.

Chapter 4

"European Bank Performance and Profitability"

Abstract

In this chapter we first make comparisons of overall profitability of banks in Europe, using return on assets as our measure of profitability, examining both trends over time and differences between countries. Data from the comprehensive Fitch-IBCA database of bank income statements and balance sheets show that there are substantial performance variations across countries. We then examine in greater detail the various income sources, both net interest and non-interest income. Our goal here is both to assess the contribution of these various components to overall profitability and to discuss economic and other factors explaining differences in performance, both over time and between countries (an econometric analysis for these factors will continue at Chapters 5 and 8).

4. European Bank Performance and Profitability

4.1. Introduction

Our principal data source on both banks' balance sheets and profit and loss accounts is taken from the database produced by the rating agency Fitch-IBCA (Bankscope Database). This database does not give quite complete coverage of all banks in Europe, but all except the very smallest are included in the database. The advantage of using the Fitch-IBCA database is that, since the data are provided at the level of the individual institution, it is possible to filter this, so it covers a subset of comparable institutions allowing sensible comparisons to be made between European countries. It contains fewer banks in the beginning of 1990s than in very recent years. Separate categorisation is available for commercial, savings, mortgage and co-operative banks and it is also possible to select banks by criteria such as the size of balance sheet items.

We find that net interest income measured as a share of assets, has declined since the early 1990s in all European countries. However, this is not obviously due, as is often claimed, to increased competition. It seems likely to be the consequence of reductions in nominal interest rates which – because of the mismatch between a relatively high proportion of interest earning assets on bank balance sheets compared with the relatively lower proportion of interest earning liabilities (the endowment effect) – lower gross interest received by more than gross interest paid (see also Chapter 5). We also note that net interest income is unusually low as a proportion of bank assets in France and Germany, perhaps due to the important influence of state owned and mutual institutions. Across Europe the reduction of net interest income in the 1990s has been roughly offset by an increase of non-interest income, net of costs, so that total net income before loan loss provisions and taxes was broadly flat during the 1990s. Despite this, non-interest bank income remains remarkably low in some European countries, notably Germany. The increase in European bank profitability was largely a cyclical reduction of loan loss provisions.

Total costs, in relation to either income or assets, do not show any systematic relationship with more direct indicators of excess capacity either over time or between countries. But these numbers are affected both by the linkage between non-interest income and total costs and by IT expenditures. Distinguishing personnel expenses from other costs, we find that significant reductions of personnel expenses have occurred to date in only a few European countries (Italy, Spain) and that there is considerable scope for further reductions in bank personnel costs in most European countries (Annex 7 and 8).

4.2. Profitability Comparisons

4.2.1. Trends Over Time

Because the Fitch-IBCA data are available only from 1992 onwards, longer-term analysis of the trends in bank profitability requires us to make use of the OECD Bank Profitability publication on banking performance. Table 9 summarises OECD data on the ratio of return on assets (ROA) for the European countries. This indicates that banking profitability in most of the European Union countries fell from the mid-1980s to mid-1990s (see also Annex 7).

Table 9: Long-term trends in banks' ROA*

Countries	Pre-tax profits		
	1982-84	1988-90	1995-97
	As a percentage of assets		
Austria	NA	0.52	0.42
Belgium	0.34	0.27	0.37
Denmark	2.00	0.32	1.23
Finland	0.47	0.46	0.25
France	0.34	0.28	0.08
Germany	0.62	0.69	0.47
Greece	0.42	0.43	0.80
Italy**	0.79	1.11	0.40
Luxembourg	0.28	0.31	0.53
Netherlands***	0.55	0.77	0.75
Portugal	0.47	0.89	0.71
Spain	0.61	0.82	0.75
Sweden	0.38	0.43	1.08
UK	0.88	0.78	1.15

* For Belgium, Austria, and the Netherlands, all banks; for all other countries, commercial banks only.
** For Italy commercial banks, except the period 1995-1997.
*** For Netherlands 1983-1984, Portugal for 1989-1990, and the UK for 1984.
Source: OECD and own calculations

The principal contribution to this declining trend in return on assets has been a narrowing of net interest income/total assets (or of the net interest margins = net interest income/total earning assets) (Annex 7). There have also been substantial declines in operating expenses and rises, in most countries, in non-interest income as a share of total assets (Annex 7).

Abolition of the interest rate and service charge regulations in most countries during the 1980s seems to have narrowed significantly banks' interest margins. The most important reduction has taken place in France. While banks' net non-interest to net interest income has risen in most countries, most significantly in France and Sweden

(Annex 7), the rise has not generally been strong enough with respect to asset growth to offset the fall in intermediation margins. A downward trend therefore tends to characterise the evolution of banks' overall gross margins. Although showing a downward trend, banks' overall profit margins have been relatively large in the UK.

Also, among the major EU countries, the recession in the early 1990s seems to have resulted in higher aggregate write-offs and provisions only in the case of the UK. In Scandinavian countries, banks have experienced a vast increase in credit losses in the early 1990s, which has resulted in substantial pre-tax losses.

To examine more recent trends we use the Fitch-IBCA database (providing data from 1992-1999)[33]. This indicates that something of a reversal in the longer-term downward trend in profitability has taken place since 1994 (Table 10 and Annex 8). This improvement was most pronounced in the UK and the smaller European Union countries. It was however primarily a cyclical upswing in profitability, due to a reduction in loan-loss provisions. In general, sustained economic growth throughout the year contributed to the improved quality of credit portfolios on the European market. Aggregate banking profitability before provisions remained fairly constant between 1991-94 and 1995-98.

Our analysis with Fitch-IBCA data using income statement data for the period from 1992 to 1999 reveals that net interest margins have continued to decline in the majority of EU countries. With the prominent exception of Germany profitability before provisions increased in the period 1996-1999 compared with the period 1992-1995, as the fall of net interest income was more than offset by lower costs and higher non-interest income.

The declines of net interest margins have been particularly marked in those countries that had the highest interest margins in 1990 – namely, Greece, Portugal and Spain. In

[33] However, we should be very careful on the use of the figures for years 1992 and 1999 since the number of banks that provide data is quite small relative to other years (see also Annex 8).

fact, even though Spain had its worst recession between 1991 and 1993, margins at levels close to 3% were still being achieved in this period.

In France during the 1990s there was also a particularly large decline of net interest income, down from 1.85% of total assets in 1992-95 to 1.32% of total assets in 1996-99 (Table 10). As a result, despite substantial reduction of operating expenses and increases of non-interest income, profitability before provisions actually declined during the 1990s and French banks continue to be the least profitable in Europe in 1999, after Germany and Austria. However, profits before tax increased by 0.2% of total assets, from an average value of 0.26% in 1992-1995 to 0.46% in 1996-1999.

Germany also diverges somewhat from the overall European trend. In the German case there has been little increase in non-interest income as a share of bank assets. As a result significant reductions of net interest margins led to a decline of overall profitability (profits before tax were 0.58% of total assets in 1996 and 0.39% of total assets in 1999) (Annex 8).

Table 10: Bank profitability in Europe (% of total assets) (1992-1999)

	Germany		Spain		France		Italy		UK	
	1992-95	*1996-99*	*1992-95*	*1996-99*	*1992-95*	*1996-99*	*1992-95*	*1996-99*	*1992-95*	*1996-99*
Profits before tax	0.59	0.48	0.83	1.07	0.26	0.46	0.51	0.76	0.98	1.16
Net interest income	2.03	1.37	2.84	2.63	1.85	1.32	2.72	2.32	2.18	1.98
Non interest income	0.56	0.68	0.92	1.21	0.86	1.09	0.85	1.24	1.38	1.26
Operating expenses	1.64	1.37	2.48	2.47	1.97	1.76	2.75	2.49	2.12	1.87

Source: IBCA database and own calculations

4.2.2. Comparisons Between Countries

Table 10 and Annex 8 also allow us to make "cross-sectional" comparisons of the level of profitability between countries. Among the major EU countries, Spanish and the UK banks have consistently earned the highest return on assets in recent years. Return on bank assets has been especially low in Germany and France. Largely for cyclical reasons banks in Finland, Sweden, Denmark, Austria and France earned particularly low return on assets in 1990-95 (Table 9, Annex 7 and Annex 8). Among the smaller countries, the highest levels of ROA are observed in Greece, Ireland, and Finland (Annex 8).

Comparing with Table 9, it seems that the relative profitability of banks within Europe has not altered greatly since the 1980s. At that time Spanish and UK banks were again among the most profitable. Italian and German banks were comparatively more profitable, and French and Belgian banks were the least profitable. Throughout Europe banking is less profitable than in the United States where banks' (foreign and domestic but excluding the investment banks) recorded profits before tax of 1.65% in the period 1996-99, more than double the respective European figures (Table 11 and Annex 8). But also throughout the 1990s banks from all European countries have reported much higher profits as a share of assets than banks in Japan.

Table 11: Bank profitability (% of total assets) (1992-1999)

European Union

	1992-95	*1996-99*
Profit before tax	0.55	0.72
Net interest income	2.11	1.69
Non interest income	0.87	1.26
Operating expenses	1.99	1.78
Loan loss provisions and other	0.44	0.45

United States

	1992-95	*1996-99*
Profit before tax	1.31	1.65
Net interest income	3.00	2.98
Non interest income	1.64	2.02
Operating expenses	2.91	3.07
Loan loss provisions and other	0.42	0.28

Japan*

	1992-95	*1996-99*
Profit before tax	0.10	-0.44
Net interest income	1.54	1.36
Non interest income	0.39	0.52
Operating expenses	0.78	1.18
Loan loss provisions and other	1.05	1.14

*We do not have data for Japan for the year 1999.

Source: IBCA database and own calculations

It is also worthwhile to compare differences in the sources of income between EU countries (see again Table 10 and Table 11). Among the major EU countries Spain and Italy have especially high net interest income, while Spain, Italy, and the UK have particularly high non-interest income (all measured as a share of total assets). Germany and France have low interest margins, undermining the overall profitability of their banking sectors. It is unclear quite why French and German banks earn such low interest margins in relation to bank assets, though perhaps the most plausible explanation is competition from mutual or state-owned institutions which undercut the pricing of profit maximising commercial shareholder owned banks.

The level of non-interest income is almost similar in the UK, Italy and Spain (around 1.25% of total assets in the period 1996-1999). Finally operating expenses (including wage and non-wage expenses) are particularly high in Italy and Spain (see also Annex 8).

4.3. The Decline of Net Interest Income

Despite its recent decline as a share of total assets, net interest income continues to be the most important source of bank income with at least two-thirds of banks' gross income coming from this source of income in most countries. Interest on loans and investments comprises the bulk of revenue. Interest payments on borrowings similarly represent the primary expense. Understanding the trends of net interest income is therefore central to monitoring and predicting bank performance.

Our findings of a continued decline of net interest income as a share of assets is confirmed by a number of other studies, e.g. a BIS study (1999) reports that between 1996-98 net interest margins fell in all the countries surveyed except Finland and Spain[34]. For the euro area countries surveyed net interest margins fell by 13% between 1996-98[35].

A number of hypotheses can be advanced about the causes of this decline in net-interest income. One explanation frequently put forward is increased competition in both deposit and lending markets. It is however difficult to test this explanation because it is not at all easy to measure the level of competition. A related hypothesis

[34] The other countries surveyed were the United States, Japan, Belgium, France, Germany, Italy, Netherlands, Spain, Denmark, Norway, Sweden, Switzerland, UK, Canada, Australia (Quarterly Review of International Banking and Financial Market Developments, November 1999).

[35] The euro area countries surveyed were France, Germany, Italy, Spain, Netherlands, Belgium and Finland.

explaining declines of interest margins is deregulation and financial innovation. The removal of administrative constraints on interest rates paid on customer deposits and the increasing common practice of making some interest payments on sight deposits has tended to reduce interest margins. But most of this deregulation took place in the 1980s or earlier. It cannot explain the recent decline of net interest income. Reductions in requirements to hold non-interest bearing reserves will have a positive impact on net interest income as a share of assets, but this makes the widespread decline of net interest income more rather than less difficult to be explained.

The mix of assets is also an important determinant of net interest income. If secure components of the loan book, such as mortgage lending, grow relatively fast then this can lead to a decline of net interest income as a share of total assets (or net interest margin). Similarly increases of inter-bank lending or of holdings of marketable securities could reduce interest margins.

Much the most compelling explanation of the reduction in bank net interest income as a share of assets for European banks is the reduction of inflation and nominal interest rates in the 1980s and early 1990s (see also Chapter 5). Banks have access to important sources of non-interest bearing or funding, notably capital reserves and non-interest bearing sight deposits. As nominal interest rates decline then the "endowment" income on interest free liabilities, i.e. the income arising because interest-bearing assets exceed interest-bearing liabilities, is reduced. This is the case that occurs in the great majority of EU banks (see also Chapter 5).

A related point, made in several studies examining the impact of nominal interest rates on bank earnings, is the long lags between adjustments to market and bank rates of interest. According to the Deutsche Bundesbank Monthly Report:

"...the reasons for this lagged connection are the price and volume responses through which changes in interest rates affect balance sheet structures and interest rate lock-in periods. In the process, different elasticities and lock-in periods which are reduced at a different pace result in corresponding time lags."

The "endowment" effect is not a complete explanation of recent changes to net interest margins in Europe. Amongst the major European countries the decline of interest margins in France has been particularly sharp. This may be explained, at least in part, by the competition for bank deposits from higher-yielding money-market mutual funds. The decline of net interest margins in Italy, on the other hand, seems much smaller than would have been expected from the fall in nominal interest rates.

Net interest income/total assets is much higher in the United States than in the EU (at 2.98% in the US compared with 1.69% for the EU in 1996-1999), and has also remained stable in the examined period (Table 11). A partial explanation of this might be the widespread securitisation of mortgage assets in the United States, leaving banks with relatively higher interest earning assets (but also higher risk assets) on their balance sheets. The result is that declines of nominal interest rate may have a rather different short run and long run impact on bank interest margins.

4.4. The Contribution of Non-Interest Income

As discussed above, our data (Table 10 and Annex 8) show that the ratio of non-interest income to total assets varies considerably across Europe. In 1996-99 among the major EU countries it is the highest in the UK and Italy (1.26% and 1.24% respectively) and the lowest in Germany (0.68%.) Among other EU countries Greece, Ireland and Portugal have relatively large non-interest income exposure (Annex 8) - the first one is the only European country where the ratio of non-interest income to total assets is higher than in the United States in the last three years. Many different but important conclusions can be reached referring to the non-interest income structure.

First we note that there seems to have been a modest but steady rise, across several countries in non-interest income as a proportion of total assets. This was most pronounced during the 1980s, with OECD data indicating a substantial rises of non-interest income as a share of bank assets in almost all countries (Annex 7). Our analysis of the Fitch-IBCA database indicates that during the 1990s the rate of increase in non-interest income, in relation to assets, slowed but was still on an upward trend in most countries (Annex 8).

There is also observed considerable variation in the rate of increase of non-interest income during the 1990s across the EU. Increases of non-interest income have been especially strong (around 0.20% of total assets) in France, Italy and Spain. In Germany, the UK, Switzerland and in most of the smaller EU countries there have been more modest increases or even declines in non-interest income as a share of total assets (Annex 8).

The breakdown of non-interest income into its components is also informative. Two-thirds of the total non-interest income derives from fee and commission revenues (Annex 8). The average proportion of net trading income to non-interest income in all EU countries has remained stable since 1995 (around 22% of total non-interest income). Credit institutions benefited from the buoyant financial environment and increased the volume of their trading activities. However this increase may prove to have been a temporary phenomenon driven by lower inflation and interest rates and the consequent rise of asset prices, i.e. the case of Greece. Nevertheless, although trading activities continued in general to boost the performance of the French banking sector, the financial turmoil observed in 1998 caused concern and underscored the volatility in income from such activities. In any case trading income still remains a relatively small contributor to total non-interest income.

It is unclear what factors explain either the differences between countries in the contribution of non-interest income or the trends in non-interest income. The only studies that we have been able to uncover are for the comparison of non-interest income in the United States. While not directly informative about the situation in Europe, this work indicates that in the United States traditional banking services are the major source of fee and commission income for commercial banks (see also Chapter 6).

Turning to Europe, we can do little more than advance alternative hypotheses about the substantial variation in non-interest income. One possibility is that the variation in fee and commission income reflects differences in charging practices rather than in underlying banking activity, with banks in some countries making explicit charges for payments and other services while banks in other countries cover the cost of equivalent services out of interest margins. Changes in these charging practice could explain substantial changes in reported non-interest income over time.

International comparisons provide some support for this view. According to OECD data, the ratio of non-interest income to total bank assets was around 1.8% in the UK in the mid 1980s (it then actually fell slightly by the mid-1990s (Annex 7)) and around 1.4% in the United States (and has risen further to over 2% during the 1990s). This suggests that UK and US commercial banks earned substantial amounts of non-interest income from "traditional" banking services such as checking, asset management and cash management. Amongst European banks, in contrast, non-interest income was relatively unimportant in the early 1980s and even now still amounts to less than 1% of total bank assets in some European countries e.g. Austria, or Sweden etc.

It is difficult to believe that the cross-country differences in the contribution of non-interest income, dating back to the early 1980s, are entirely due to differences in underlying banking services. Throughout Europe banks provided payment services and cash management for companies not entirely unlike the services provided by the UK and the US banks. Of course it may be that payments and cash management services in the UK and the United States were more advanced than in continental Europe, at least in the early 1980s, and this might explain higher levels of charging. Nevertheless relatively low shares of non-interest income on traditional banking services outside the United States and the UK can be explained simply by differences in charging practice.

One can hypothesise that the practice of providing such services at relatively low cost, subsidised out of net interest income, may be a feature of more "relationship orientated" banking systems. Certainly this is one explanation of the relatively low levels of non-interest income in Germany. Regulation may also play a role, e.g. in France where banks are forbidden from charging for cheque payments and clearing even to business customers. Ultimately however this is speculative. We have been unable to determine the extent of implicit charging for payments and other bank services in Europe.

Another suggestion sometimes made is that increased non-interest income is due to a greater volume of off balance-sheet services, such as guarantees, loan commitments, or market making in derivatives.

Table 12: Off-balance sheet items/total assets (%)

	Avg. 1992-95	Avg. 1996-99
EU	22.71	24.45
EMU	20.35	21.80
Japan	5.97	5.08
US	45.49	58.64

* We do not have data for 1992 for the UK and 1999 for Japan.

Source: IBCA database and own calculations

Table 12 indicates that there has been a substantial increase in the proportion of off-balance sheet items to total assets both in the US and the European Union area. France, Italy, and the UK have the largest proportions of off-balance sheet items to total assets (Annex 8). Between 1992 and 1998, the average ratio of off-balance sheet items to total assets in EU area has increased by almost 4% and in 1998 stands at about 25% (Table 12 and Annex 8). The data mask variation in the importance of off balance sheet activities across countries: one country has banks registering more than 100% of off-balance sheet items relative to total assets (Denmark) and another country includes banks with as little as 2.41% of off-balance sheet items (Ireland). Two points are worth mentioning: a) this proportion is higher in the United States than in the EU, and b) the smaller EU countries rely more on off-balance sheet items compared with the big five continental countries. Not all, possibly only a small part, of this off-balance sheet exposure will be fee generating. To the extent that it reflects hedging or insurance activity -e.g. through the purchase of interest rate swaps or interest rate options – it will be risk reducing and cost increasing, not fee generating.

Yet another possible explanation of the statistics on non-interest income is sale of financial products such as life-assurance, casualty insurance, pension products etc.

Certainly bank management sees the exploitation of economies of scope through such cross-selling as an important contributor to future profits and it is a justification for the purchase of life-assurance subsidiaries.

This can help explain higher levels of non-interest income in the Switzerland, the United States, the Netherlands, and the UK, where banks play an important role (along with other financial intermediaries) in the provision of asset management services. The widespread switch from state to private provision of retirement income offers the opportunity for banks in Europe to raise over time their share of non-interest income derived from commissions on savings products.

We are unable to determine which of these factors explains the substantial differences in the contribution of non-interest income to the returns of European banks. What we can say is that over time most these factors should move in the same direction, generating increased non-interest income in relation to total bank assets. Many analysts assume that the dramatic rise in non-interest revenues as proportion of total income came from investment banking, trading, and brokerage activities. These new products, in addition to generating fee income, make banks more competitive with other banks and non-banks that offer a wide array of services and products.

4.5. Concluding Remarks

In this chapter we make comparisons of overall profitability of banks in Europe and we examine the sources of income. Data from OECD publications and Fitch-IBCA database of bank income statements and balance sheets confirm that there are substantial performance variations across countries.

Generally speaking, net interest income has declined over time. This has been due mainly to the fall in nominal interest rates and the consequent fall in banks' "endowment" income, and only to a small extent to increased competition in lending and deposit markets. Meanwhile there have been substantial rises in non-interest income, though even now it is nothing like as important, in relation to total income, as in the US banking industry. Across major EU countries, it appears that Spanish and

Italian banks are the most reliant on interest margins, while those in the UK earn most from fees and other non-interest sources.

Chapter 5

"Net Interest Income, Balance Sheet Structure and Interest Rates"

Abstract

This chapter examines the response of bank net interest margins to changes in the level and volatility of market interest rates, the funds gap ratio (i.e. the difference between the interest rate sensitive assets and liabilities divided by total assets), and market conditions. The gap position gauges a bank's exposure to interest rate risk. In fact, however, a number of factors may affect the yields that banks earn and pay on assets and liabilities and therefore their interest income flows. These factors include market demand characteristics, market supply conditions including market structure, and macroeconomic conditions. Exclusion of relevant influences from the model will result in inefficient estimation and may lead to biased coefficient estimates. This is why in our analysis we include variables such as the level and variability of interest rates (principally the result of changes in the rate of inflation), the size of the bank (log of total assets), and the concentration ratio of the banking industry in the several European countries. Regression models are tested to determine the effects of all these variables on net interest margins.

Chapter 5: Net Interest Income, Balance Sheet Structure and Interest Rates

5.1. Introduction

The sensitivity of a commercial bank's income and market values to changes in interest rates is of interest to bankers, regulators, investors, and researchers. Conventional wisdom has long viewed financial intermediaries, such as banks, as being susceptible to interest rate risk. Since the early 1970s, bankers have become increasingly aware of the effects volatile interest rates have on net interest margins. This arises because of banks' propensity to undertake asset transformation or intermediation functions by lending long (often at fixed rates) and borrowing short (often at variable rates). Although there is no generally accepted view as to why 'banks' have an advantage in undertaking this asset transformation function (as compared to other firms) banks typically keep title to the relatively long-term loan portfolios they originate while selling (deposit) contracts of short maturity. A priori, such mismatched asset-liability structures make bank earnings (or stock values) more susceptible to interest rate changes than firms who choose not to specialise in providing asset transformation services.

Interest sensitivity (or gap management) is the popular concept used for managing banks' net interest income and exposure to interest rate risk. The sensitivity or gap position, defined as the relationship between rate-sensitive assets and rate-sensitive liabilities, gauges a bank's exposure to interest rate risk. Assets, liabilities and equity are valued in book terms. Common equity is usually treated similarly to non-sensitive liabilities. Most of the banks have a positive funds gap i.e. the interest sensitive assets exceed its interest bearing liabilities (the same occurs with the data of our analysis). Nowadays, banks make increasing use of non-deposit sources of funds and began challenging more of these funds into interest earning assets other than loans. We assume that the yields on sensitive assets and cost rates on sensitive liabilities vary simultaneously and proportionately. Under rising short-term rates, this positive gap would increase net interest margin, which is defined as the ratio of net interest income divided by total assets. In other words this is the interest yield on the intermediation process.

A common fallacy of interest sensitivity analysis is to attribute all credit cycle variation in interest margin to changes in market rates. The traditional statistical cost model implicitly assumes that all banks face identical interest rates on various asset and liability items, so that interbank variations in portfolio mix simply reflect different portfolio preferences. In fact, however, a number of factors may affect the yields that banks earn and pay on assets and liabilities respectively and therefore their income flows. These factors include market demand characteristics, market supply conditions including market structure and the cost of non-financial factor inputs, and macroeconomic conditions. Ho and Saunders (1981) found that the size of the interest spread was a function of four variables: the degree of managerial risk aversion, average transaction size, competition within the bank's market, and the variability of interest rates. Exclusion of relevant influences from the model will result in inefficient estimation and may lead to biased coefficient estimates.

In this chapter we examine the effect of the funds gap on the net interest margins of the European banks. We then evaluate the sources of net interest margin behavior via size effects, macroeconomic effects and market structure effects. Finally, we carry out the same analysis for the several types of financial institutions in Europe.

5.2. Literature Review

The impact of market interest rates on commercial bank revenues, costs and profitability has increasingly concerned economists and policymakers as financial market conditions have become more volatile in recent years. Two distinct aspects of market rate conditions may affect bank profits: the *level* of interest rates and the *variability* of rates around their average level within each period.

A substantial proportion of banking activities involves small investors and borrowers. Differential information and transaction costs in these investors' portfolio allocations make them unable to respond fully to a change in the level of market rates. Because of such retail customers, bank profit margins can vary with the level of market rates.

Thistle, McLeod and Conrads (1989) have found that (a) the composition of the balance sheet depends on both the level and the change in interest rates, and (b) the response to changes in interest rates is different, depending on whether rates are rising or falling.

Banks no doubt experience short-term profit fluctuations when market rates change, perhaps because they are actively speculating on nominal rate movements. The potential for adverse effects on bank profitability of increased rate variability was noted long ago. Contrary to the conventional wisdom, Flannery (1981, 1983) found that for bank organisations the reported profits generally fluctuate little when market rates change. When market rates change, their revenues and costs adjust equally quickly, leaving net current operating earnings largely unaffected. Individual banks certainly can choose to undertake interest rate risk, but most banks possess a sufficient range of asset and liability choices to hedge their annual profit margins effectively. As he writes: "*... for most banks they* [the fluctuations of interest rates] *represent no serious threat to long-run viability and profits*". Flannery examined the sensitivity of large and small banks' net current operating earnings to interest rate movements. He found a significant long-term impact for only two of the fifteen large banks sampled, while for small banks only seven out of sixty were significantly affected (all in a positive direction). Flannery supports the view that a ceteris paribus increase (for example) in market rate variability has two potential effects on financial intermediary firms. First, firms with a comparative advantage in securities trading would tend to benefit at the expense of less informed traders in the market. Such bank profits are reported separately. Secondly, the public's demand for intermediated securities - deposits and/or loans- might depend on the degree of uncertainty in primary security markets. For example on the loan side, the demand for fixed rate intermediary loans might be expected to increase with higher market rate variability. Elsewhere, Maisel and Jacobson (1978) arrived at basically the same conclusions.

For Scott (1966) bank profitability does not depend to any significant extent upon the level or the pattern of interest rates. For him, there are issues involving the capital values of bond holdings, and the special tax advantages accruing to banks from their ability to offset capital losses against ordinary income that may depend upon the movements of interest rates as well as the levels of interest rates. But these are short-term considerations, and bankers at large should perhaps not be greatly concerned whether monetary policy is 'tight' or 'easy' from the narrow point of view of their concern over firm profitability, although, of course, they should be concerned about monetary policy from the broader point of view of its impact upon economic stability.

The level of market interest rates is used in bank performance studies as proxy for capital scarcity. When capital is scarce, the cost of money is high, something that will be reflected in market interest rates. High interest rates can produce deteriorating asset quality. These high rates contribute to lending problems because some borrowers lack the ability either to pass along or to absorb increased funding costs. However, Samuelson (1945) wrote that "*...the banking system as a whole is immeasurably helped rather than hindered by an increase in interest rates...and commercial banks would profit more than savings banks*". The nominal interest rate increasingly influences the net interest revenues and these in turn influence positively the ratio of net profits over the assets. When market interest rates increase, central banks raise their discount rates, and commercial banks may raise their lending rates sooner by more percentage points than their deposit rates. In this case, banks' 'spread'/ interest margin (interest income - interest expense) widens, thus banks' net interest margin increases. When the inverse situation arises, banks lower their interest rates but the reduction on the deposit rates is lower than the reduction on their lending rates. Although interest costs of banks would also decline with a reduction in rates, these costs amount to only about half the interest income of banks. As a result, a given percentage point drop in both interest income and interest costs would reduce revenues twice as much as costs. Therefore, banks' net interest income shrinkages, and so do their profit rates. This could be more valid where banks possess some market power so that their interest rates are not market determined.

For Revell (1980) banks and other credit institutions will benefit from a rise in interest rates if the proportion of assets on which they can raise the rates is greater than the proportion of deposits on which they must pay increased rates. Santoni (1986) supports the view that an increase in interest rates reduces the bank's capital. In other words, an interest rate change affects the payment stream obligated by the bank's liabilities before it affects the bank's receipt stream, as maturity dates of a bank's assets generally extend beyond those of its liabilities. Consequently, an increase in the interest rate reduces the expected net stream of dollar receipts as the bank's creditors renegotiate for the higher interest rate, while the interest rate earn by the bank on the existing loans is locked up. Of course, the loans eventually mature and are renegotiated at the higher nominal rate, but the bank's capital is reduced nonetheless.

Anderson (1979) found that a reduction in interest rates cuts the income of banks significantly, while similarly, the high interest rates during 1980 in US led the insured commercial banks to experience relatively strong profitability (also Opper, 1981). Cole (1981) mentions that the improved profitability of small banks in the period 1977-1980 occurred due to the increase in gross interest earned on assets. High average interest rates provided an opportunity to increase yields on interest-earning assets. Small banks were able to take advantage of this opportunity because of their relatively large holdings of assets with moderately short-term maturities. Hancock (1985) in an examination of eighteen New York-New Jersey member banks for the period 1973-1978 concluded that banks appear to have profits that increase with interest rates. Davis et.al. (1993) note that those banks that reside in a high interest rate environment generally make higher profits than those who do not cover the higher opportunity cost of their own capital.

Hence, a positive relationship between interest rates and net interest margins and an adverse between variability of interest rates and these margins is proposed.

5.3. Empirical Implementation

The analysis will be based on cross-country time-series data (panel data). A panel data set offers a certain number of advantages over traditional pure cross section or pure time series data sets. The most obvious advantage is that the number of observations is typically much larger in panel data. A related advantage is that panel data sets may alleviate the problem of multicollinearity. When the explanatory variables vary in two dimensions they are less likely to be highly correlated. A third advantage is that these data sets make it possible to identify and measure effects that are simply not detectable in pure cross section or pure time series data. It is sometimes argued that cross section data reflect long-term behavior, while time series data emphasise short-run effects. By combining the two sorts of information, a distinctive feature of panel data, a more general and comprehensive dynamic structure can be formulated and estimated.

A panel data regression differs from the regular time-series or cross-section regression in that it has a double subscript on its variables, i.e.

$$y_{it} = a + x_{it}\beta + u_{it} \qquad i = 1,\ldots,N;\ t = 1,\ldots,T$$

where a is the intercept.

Many models and corresponding estimation techniques can be used to pool time-series and cross-sectional data. These models differ according to the assumptions about the constancy of coefficients and the various error terms. These models are:

- *Ordinary Regression Model*
- *Individual Regression Model*
- *Seemingly Unrelated Regression (SUR Model)*
- *The Error Component Model*
- *The Fixed Effects Model*
- *The Random Coefficients Model*

When N is very large and T relatively small, as in many panel data problems, there is a serious lack of degrees of freedom necessary for the implementation of the individual regression and the SUR model (this problem is also applied in our case).

Panel data (or longitudinal data) permit correcting for the effect of any combination of omitted variables that are stable over the period of observation. This is done by "simulating" the combined effect of such time-invariant omitted variables by the individual-specific intercepts a_i.

The previous model becomes:

$$y_{it} = a_i + x_{it}\beta + u_{it} \qquad i = 1,\ldots,N;\ t = 1,\ldots,T$$

The individual specific intercepts a_i capture any combination of time-invariant variables that have been omitted, knowing or not, from the regression model. There are two approaches to estimate that model, the fixed effects model and the random effects model.

The salient distinction between the fixed effects and random effects models is whether the time-invariant effects are correlated with the regressors or not. Many authors have observed that when the random effects model is valid, the fixed effects estimator will still produce consistent estimates of the identifiable parameters. It would appear therefore that, in general, the fixed effects estimator is to be preferred to the random effects estimator unless we can be sure that we can measure all of the time-invariant factors possibly correlated with the other regressors. In our case we will use the OLS and the fixed effects and random effects models. The Hausman test bears on the question of which estimator, random or fixed effects, is to be preferred. The null hypothesis in this instance is that the individual effects are uncorrelated with the included variables. Under the null hypothesis of no correlation between the error and the regressors, the random effects model is applicable.

5.4. Data

The data have been taken from the Fitch-IBCA Bankscope database and cover the period 1992-1999. We have data for banks across all the countries of the European Union area, but we do not include Luxembourg since we do not have figures on interest rates for that country (from Datastream). Initially the sample was unbalanced, however, in our analysis, we have avoided including years 1992, 1993, and 1999 since the availability of data for these years is small. We conclude with a balanced data set i.e. observations are available for all the variables for all the units-banks at all dates in the period 1994-1998 (5 years time period). We include commercial banks, savings banks, mortgage banks and co-operative banks. Then we split the data according to the type of institution. Also we include in each country all banks, even foreign banks, to capture for the effects of changes in the macroeconomic and market environment of the host country. We try to use unconsolidated data, only where these are not available do we use consolidated data. All banks are sorted by 1998 data for total assets. We exclude data that seem peculiar e.g. when the proportion of interest bearing assets to total assets exceeds 1 (or 100%), or the figures for the proportion of interest bearing assets and liabilities is very small e.g. 0.12 (or 12%), or large differences exist between interest bearing assets and interest bearing liabilities (we have inserted the cut off point at 0.20 for their difference). So, we conclude with a sample of 2,324 banks. We have a panel data set since a given set of individual firms (financial institutions) is repeatedly sampled at different points in time. Table 13 shows the number of banks that are included from each EU country in our sample.

The net interest margin, i.e. the net interest income divided by total assets, is a measure of portfolio returns before considering the net burden; the latter refers to non-interest expenses minus non-interest income divided by total assets. It is the overall interest yield on the intermediation process. The ratio of rate-sensitive assets minus the rate-sensitive liabilities divided by total assets is called the funds gap ratio. In our regression models we multiple the funds gap by the level of interest rates of the country where the bank is established.

The external factors are assumed to be similar in each type of institution category. The level and volatility of interest rates are assumed to be determined in the loanable funds market and, thus, are exogenous to the model. The traditional statistical cost model implicitly assumes that all banks in a country face identical interest rates on various asset and liability items, so that interbank variations in portfolio mix simply reflect different portfolio preferences (Kwast and Rose, 1982). Relevant money market rates are summarised by weekly observations on the *interbank three months offered rates.* The rate level for each year (measured in percentage points) was the simple average of 52 weekly rates. The source for interest rates is Datastream. Unfortunately this database does not provide data for short-term treasury bills for all the European countries in order to use a second measure for the level of interest rates. The variability measure constructed for each interest rate is the standard deviation of weekly rates around their annual average.

Table 13: Sample of financial institutions by country and type of institution

Country	*Number of banks*	*Country*	*Number of banks*
Austria	31	Ireland	9
Belgium	28	Italy	363
Denmark	67	Netherlands	28
Finland	6	Portugal	25
France	212	Spain	96
Germany	1327	Sweden	10
Greece	15	UK	107

Type of institution	*Number of banks*
Commercial banks	603
Savings banks	676
Cooperative banks	936
Mortgage banks	109

Source: Own calculations from Fitch-IBCA Bankscope Database

A number of alternative hypotheses can be advanced about the causes of the decline in net interest margin. One explanation frequently put forward is increased competition. It is however difficult to test this explanation because it is not at all easy to measure the level of competition. In this case, for the concentration we calculate the three-firm concentration measure, which is simply the market share of the three largest banks in a country in terms of total assets. We take the natural logarithm of the total assets of each financial institution to measure the size effects on net interest margin. It would seem natural to include in the regression equation a full set of time dummies in order to allow for time effects. However, since the number of years is small (only 4 years) we avoid using time dummy variables.

5.5. Results

The initial specification for the examination of net interest margin is the following:

$$m_{jt} = a \cdot (i_{kt} \cdot [a_{jt} - l_{jt}]) + \varepsilon_{jt}$$

where

j enumerates jth firm within country k;

k enumerates the country;

t enumerates the year;

m is the interest margin defined as the net interest income (interest income minus interest expenses) divided by total assets;

a_j the proportion of total assets that are interest bearing;

l_j the proportion of total liabilities that are interest bearing;

i the market level of nominal interest rates.

Table 14 provides the descriptive statistics of the variables for the banks in the sample and the different types of financial institutions. From this analysis we can mention the high variation of the level of interest rates and concentration measures among the EU countries. The mean value of the net interest income is 3.07% of total assets, while that of the funds gap (already multiplied by the level of interest rates of the country) is 0.21%. It must be mentioned that there are some banks that have negative funds gap i.e the interest sensitive liabilities exceed the interest sensitive assets. From the analysis of the several types of institutions, the cooperative banks (CoB) have the highest interest margins (mean value of 3.30%), followed by the savings banks (SB) (3.10%). Commercial banks (CB) not only have lower interest margins than the previous financial institutions, but also much higher standard deviation (the standard deviation of commercial banks is 1.85%, followed by that of the co-operative banks with standard deviation at 1.36%). Moreover, commercial banks exhibit the highest funds gap levels compared with the other types of financial institutions (with the exception of the mortgage banks), but have also higher variability. The skewness (the extent to which a distribution of data points is concentrated at one end or the other, the lack of symmetry) and kurtosis (the degree of peakedness of a distribution of points) statistics for the net interest margin of co-operative banks are huge (23.94 and 81.60 respectively).

The mean size of commercial banks is the largest. The mean natural logarithm of assets for commercial banks is 14.30, while for co-operative and savings banks are 12.81 and 13.96 respectively. Since the number of mortgage banks in the sample is quite small (only 109 financial institutions with the vast majority being the UK building societies) we don't refer on their size which seems to be the largest one. Commercial banks have also the largest variation on their size. The skewness and kurtosis statistics for all size of all types of institutions are quite similar.

Table 14: Descriptive statistics for the variables

	mean	*st. dev.*	*min*	*max*	*Var*	*skewn.*	*kurt.*
nim	3.0669	1.4392	-2.3345	18.3610	2.0714	3.0816	23.1027
int. rat.	5.0977	2.1639	3.0753	27.2734	4.6825	2.4798	14.9128
funds gap	0.2054	0.3413	-5.7767	2.7614	0.1165	-1.3636	30.4845
conc.	30.8991	11.1563	23.9400	88.7000	124.4600	2.5983	6.4563
lnassets	13.5520	1.6051	8.9899	20.0383	2.5766	0.6789	1.0159

		mean	*st. dev.*	*min*	*max*	*var*	*skewn.*	*kurt.*
nim	CB	2.7486	1.8480	-2.4165	17.1425	3.4151	1.2127	2.7412
	CoB	3.3049	1.3581	-5.3873	16.7679	4.05619	23.9400	81.6200
	SB	3.0963	0.8284	0.1554	7.7422	0.6863	1.5783	5.0517
	MB	1.8481	0.9542	-0.1938	7.3038	0.9104	1.1668	5.0942
funds gap	CB	0.3249	0.3328	-1.7586	2.4433	0.1108	0.8394	3.8454
	CoB	0.2008	0.3173	-1.4297	2.3513	0.1007	1.6044	5.1321
	SB	0.1481	0.2475	-0.4677	1.9050	0.0613	2.7698	8.7701
	MB	0.3593	0.2585	-1.1536	2.6540	0.0668	1.9117	16.8538

Lnasset	CB	14.256	1.9084	9.4966	20.3752	3.6421	0.7117	0.1689
	CoB	12.809	1.3228	9.3496	19.9843	1.7499	0.9380	2.9407
	SB	13.955	1.1561	9.3393	19.2779	1.3367	0.2132	1.6676
	MB	14.724	1.8425	10.6350	19.3309	3.3947	0.0040	-0.7636

Where CB: commercial banks, CoB: co-operative banks, SB: savings banks, and MB: mortgage banks.

Table 15 provides data on the correlation matrix of the variables. A check of the correlation matrix revealed no evidence of multicollinearity for all pairs of variables. There is quite high correlation of the level of interest rates with their variability (as to be expected) and the funds gap (also expected since gap-to-assets ratio is multiplied by the level of interest rates), and a negative correlation of the natural logarithm of assets with the net interest margin. Similar results exist for the several types of institutions (see Annex 9).

Table 15: Correlation matrix

	nim	*in. rat.*	*var. of int. rat.*	*funds gap*	*conc.*	*lnassets*
nim	1.0000					
in. rat.	0.2730	1.0000				
var. of int. rat.	0.0479	0.5568	1.0000			
funds gap	-0.1915	0.3262	0.0269	1.0000		
conc.	-0.0223	0.1971	0.2012	0.1400	1.0000	
lnassets	-0.4006	-0.0618	0.0054	-0.0431	0.1415	1.0000

Initially, we run the plain ordinary least squares (OLS) and within (fixed effects) estimates when the independent variable is only the funds gap. However we present only the fixed effects estimates since, from the results, these are the best (Table 16). In many applications, the easiest way to implement a fixed effects estimator with conventional software is to include a different dummy variable for each individual unit. This method is often called the least-squares dummy variable (LQDV) method. If n is very large, however, it may be computationally prohibitive to compute coefficients for each cross-section unit. In that case, another way to implement a fixed effects estimator is as follows: a) transform all the variables by subtracting bank-specific means, and b) run OLS on the transformed variables. This approach will work perfectly, apart from the fact that the standard errors need to be corrected. The fact that the fixed effects estimator can be interpreted as a simple OLS regression of mean-differenced variables explains why this estimator is often called a **within group estimator.** That is, it uses only the variation within an individual's set of observations. The analysis that follows is carried out using the TSP 4.3 econometric software.

Table 16: Within (fixed effects) estimates (independent variable: funds gap)

Dependent variable: *net interest margin*			
Sum of squared residuals = 4014.69		R-squared = 0.8331	
Variance of residuals = 0.4319		Adjusted R-squared = 0.7915	
Std. error of regression = 0.6572			
Variance	***Estimated Coefficient***	***Standard error***	***t-statistic***
Funds gap	0.2009	0.0360	5.5834
F (2323, 9295) = 19.106, p-value = [.0000] *Hausman test H0: RE vs. FE: CHISQ(1) = 68.995, P-value = [.0000]*			

The table above shows that the funds gap has a positive and significant effect on net interest margin. The sign of the influence is expected. If the gap-to-assets ratio is positive, an increase in the level of interest rates will have a major effect on net interest margin. The R-squared is high, and much higher compared with the other estimation methods. A confirmation of the result arises from the examination of the OLS estimates (Annex 10), where, however, the R-squared and the standard error of the regression are much smaller and larger respectively.

To test for the significance of the firm effects the F statistic is used. The F statistic for testing the joint significance of the firm effects is given by the formula:

$$F(n-1, nT-n-K) = \frac{\left(R_u^2 - R_p^2\right)/(n-1)}{\left(1-R_u^2\right)/(nT-n-K)}$$

where u indicates the unrestricted model and p indicates the pooled or restricted model with only a single overall constant term. Since the p-value of F obtained is sufficiently low, we reject the null hypothesis that all the coefficients are equal to zero and the evidence is strongly in favor of firm specific effects.

A Hausman test for correlation between the error and the regressors can be used to check for whether the random effects model is appropriate. Under the null hypothesis of no correlation between the error and the regressors, the random effects model is applicable and its generalised least square (GLS) estimator is consistent and efficient. Under the alternative it is inconsistent. The OLS estimator of the fixed effects model is consistent under both the null and the alternative. Consequently, the difference between the variance-covariance matrices of the OLS and GLS estimators is the variance-covariance matrix of the difference between the two estimators, allowing calculation of the chi-square statistic to test this difference against zero. Based on a Hausman test we can conclude that of the two alternatives (fixed versus random effects), the fixed effects estimator is the appropriate choice since the p-value of chi-square obtained is sufficiently low and we reject the null hypothesis. We expected this since the data exhaust the population, and the fixed effects approach, which produces results conditional on the units in the data set, is reasonable.

At that point of the analysis we add some more variables, namely the level and variation of interest rates, the concentration measure and the asset size of each financial institution. (Table 17) [there is no difference in the results if we exclude the size variable or even the concentration measure (Annex 11 and Annex 12)]. The model has improved a lot; the R-squared has increased from 0.8331 to 0.8616, while the sum of the squared residuals and the variance of the residuals have both been reduced. The interesting point is that the introduction of these variables has done the effects of the funds gap on net interest margin insignificant, although the coefficient has the right positive sign (the t-statistic is 0.1736 while the coefficient 0.0057). It seems that there is a strong positive impact of the level of interest rates (the t-statistic is 23.2239 and the estimated coefficient 0.1451), and a negative impact of the variability of interest rates (the t-statistic is -10.8739 and the estimated coefficient -0.1042) on net interest margin. For example, a 100-basis-point increase in the average level of market interest rates raises the net interest margin of banks by 0.14 percentage points. There is also a negative impact of the size of the financial institutions on net interest margin (t-statistic equals to -18.3968 while the estimated coefficient is -0.6973). Smaller banks are able to take advantage of possible increase in the yield of interest earning assets because of their relative large holdings of assets with moderately short-term maturities. The large banks can diversify and earn profits from other activities e.g. non-interest income from fees and commissions[36]. The concentration variable is significant and negative. However, there is an ambiguity on the interpretation of this negative sign. If banks are able to exert market power, interest margins will be higher due to lower deposit rates, higher loan rates, or both. However, the collusion effects of that power may lead to a regulation of the interest rate sensitive part of the total income with clear implications for the net interest margins. In any case, as we have already mentioned, it is difficult to make conclusions since it is not easy to measure the level of competition.

[36] Sinkey (1998) shows that net interest margins vary inversely with bank asset size. The smallest banks (i.e., those not among the 1,000 largest, about 9,000) had, on average, a 173 basis point advantage over the 10 largest banks (4.41% versus 2.68%).

Table 17: Within (fixed effects) estimates (independent variables: level and variability of interest rates, the funds gap, concentration and asset)

Dependent variable: *net interest margin*			
Sum of squared residuals = 3330.98		R-squared = 0.8616	
Variance of residuals = 0.3585		Adjusted R-squared = 0.8269	
Std. error of regression = 0.5987			
Variance	***Estimated Coefficient***	***Standard error***	***t-statistic***
in. rat.	0.1451	0.0063	23.2239
var. of int. rat.	-0.1043	0.0096	-10.8739
funds gap	0.0057	0.0033	0.1736
conc.	-0.0249	0.0029	-8.4654
lnassets	-0.6973	0.0379	-18.3968
F (2323, 9291) = 17.952, p-value = [.0000] *Hausman test H0: RE vs. FE: CHISQ(5) = 181.88, p-value = [.0000]*			

We conduct the same analysis for the several types of financial institutions. In Annex 13 we present the results from the within (fixed effects) estimates when the only independent variable is the funds gap ratio. In all cases the funds gap ratio has a significantly positive effect on profitability. The only exception is the case of the co-operative banks where the t-statistic is negative but insignificant (-0.9169). The R-squared of the model is the highest for commercial and mortgage banks (0.9252 and 0.9331 respectively) and the lowest for co-operative banks (0.7813). The most significant is the effect of the funds gap on savings banks, where the coefficient is 1.2913.

In Table 18 we present the results of the fixed effects estimators for the four different bank types when the independent variables are the level of interest rates, the variability of interest rates, the funds gap, the concentration and the asset size. The R-squared is very high in the case of commercial banks (0.9318), savings banks (0.9344), and mortgage banks (0.9412), and significant but smaller for co-operative banks (0.8253). Also the sum of squared residuals is much higher for the co-operative banks. In all the types of financial institutions, the fixed effects model seem to provide the best estimates, since the p-value of the chi-squared is significantly low. With the exception of the mortgage banks (where we have the smallest sample), the level of interest rates has a positive and significant effect on net interest margins; for mortgage banks it remains positive but insignificant. The t-statistics are 10.7278, 11.3392, and 12.6501 for commercial banks, savings banks, and co-operative banks respectively. The coefficient is larger in the case of the co-operative banks (0.1657), followed by that of the commercial banks (0.1026). Commercial banks seem to profit more than the savings banks from an increase in the level of interest rates (similar results to those of Samuelson, 1945). The variability of interest rates has a significant negative effect in the case of commercial and savings banks (the t-statistics are -7.1752 and -6.5422 respectively) while it is negative but insignificant in the case of co-operative banks (the t-statistic is -0.8365). Also, the funds gap is significant and positive for the commercial and savings (the t-statistic are 3.8469, and 8.6116 respectively), but negative and significant for the cooperative banks (the t-statistic is -3.6786). The latter has not the expected sign but an explanation can be that many cooperative banks have a negative gap-to-assets ratio (more interest bearing liabilities than interest bearing assets), so an increase in the funds gap through the increase in the level of interest rates will have negative effects on net interest margins. Finally, in all types of financial institutions the effect of the size is negative and significant, as is the case for concentration (only for commercial banks the t-statistic for the concentration measure has negative sign but is insignificant).

Table 18: Within (Fixed effects) estimators for the different bank types

Dependent variable: *net interest margin (commercial banks)*			
Sum of squared residuals = 725.482		R-squared = 0.9318	
Variance of residuals = 0.2917		Adjusted R-squared = 0.9146	
Std. error of regression = 0.5401			
Variance	***Estimated Coefficient***	***Standard error***	***t-statistic***
in. rat.	0.1026	0.0096	10.7278
var. int. rat.	-0.0849	0.0118	-7.1752
Funds gap	0.2613	0.0679	3.8469
Conc.	-0.0049	0.0039	-1.2464
Lnassets	-0.3780	0.0404	-9.3590
F (622,2487) =49.157, p-value = [.0000] *Hausman test H0: RE vs. FE: CHISQ(5) = 8.7780, P-value = [.1183]*			

Dependent variable: *net interest margin (savings banks)*			
Sum of squared residuals = 156.536		R-squared = 0.9344	
Variance of residuals = 0.0563		Adjusted R-squared = 0.9179	
Std. error of regression = 0.2373			
Variance	***Estimated Coefficient***	***Standard error***	***t-statistic***
in. rat.	0.0697	0.0061	11.3392
var. int. rat.	-0.2160	0.0330	-6.5422
Funds gap	0.5169	0.0600	8.6116
Conc.	-0.0315	0.0027	-11.8823
Lnassets	-0.7816	0.0476	-16.4233
F (695, 2779) = 28.214, p-value = [.0000] *Hausman test H0: RE vs. FE: CHISQ(5) = 467.03, P-value = [.0000]*			

Dependent variable: *net interest margin (cooperative banks)*			
Sum of squared residuals = 1572.25		R-squared = 0.8253	
Variance of residuals = 0.4032		Adjusted R-squared = 0.7814	
Std. error of regression = 0.6350			
Variance	***Estimated Coefficient***	***Standard error***	***t-statistic***
in. rat.	0.1657	0.0131	12.6501
var. int. rat.	-0.0484	0.0579	-0.8365
Funds gap	-0.2512	0.0683	-3.6786
Conc.	-0.0376	0.0067	-5.6295
Lnassets	-0.4700	0.0873	-5.3855
F (975, 3899) = 11.369, p-value = [.0000]			
Hausman test H0: RE vs. FE: CHISQ(5) = 93.121, P-value = [.0000]			

Dependent variable: *net interest margin (mortgage banks)*			
Sum of squared residuals = 30.2157		R-squared = 0.9412	
Variance of residuals = 0.06776		Adjusted R-squared = 0.9258	
Std. error of regression = 0.2600			
Variance	***Estimated Coefficient***	***Standard error***	***t-statistic***
in. rat.	0.0212	0.0180	1.1756
var. int. rat.	0.0577	0.0725	0.7970
Funds gap	0.1341	0.1289	1.0397
Conc.	0.0066	0.0053	1.2424
Lnassets	-0.4429	0.0590	-7.5041
F (112, 447) = 45.406, p-value = [.0000]			
Hausman test H0: RE vs. FE: CHISQ(5) = 14.316, P-value = [.0137]			

An extension to the above models is the introduction of the lagged values for the independent variables. The number of financial institutions is the same, however the time period is now 4 years, so the total number of observations is 9296. Initially we work with a simple model which includes as independent variables only the funds gap and the lagged funds gap (Table 19). The lag is presumed to reflect uncertainties, delays inherent in the decision process, and institutional rigidities. For example, banks may adjust their sensitivity positions only a little at a time in order to determine whether their rate forecasts are materializing as planned[37]. Compared with Table 16, the R-squared is worse, while the effect of the funds gap continues to be positive and even more significant (the t-statistic rises from 5.5834 when we do not include the lagged values of the independent variables to 12.1322 and the estimated coefficient from 0.2009 to 0.3007). An interesting point is that the lagged value of the funds gap has also a significant positive effect (the t-statistic is 5.7576 and the estimated coefficient 0.1427). However, the p-value of the chi-square is quite significant. By implementing the random effects model the R-squared is smaller (0.6161) but the effects of the funds gap continues to be positive and significant (the t-statistic is 12.2172 and the estimated coefficient 0.3015), while the lagged value has also a positive effect (the t-statistic is 5.7555 and the estimated coefficient 0.1420).

[37] Lags may also arise in the decision process itself. "*Once interest rates begin to change, the asset-liability management committee will have to decide (forecast) whether the shift is permanent or merely an aberration. If the change is regarded as lasting over several intervals, the committee will have to develop an intermediate-term strategy which sustains the long-run strategic plan. Time may elapse between the recognision of the need to modify the intermediate-term strategy and its actual implementation*" (Graddy and Karna, 1984).

Table 19: Within (fixed effects) estimates (independent variables: funds gap and its lag)

Dependent variable: *net interest margin*			
Sum of squared residuals = 5598.27		R-squared = 0.7121	
Variance of residuals = 0.8032		Adjusted R-squared = 0.6161	
Std. error of regression = 0.8962			
Variance	***Estimated Coefficient***	***Standard error***	***t-statistic***
funds gap	0.3007	0.2479	12.1322
funds gap (-1)	0.1427	0.2479	5.7576
F (2323, 6970) = 7.3488, p-value = [.0000] *Hausman test H0: RE vs. FE: CHISQ(2) = 0.2488, P-value = [.0137]*			

We also add the lagged values of the level and variability of interest rates, and also the concentration and the size measures (Table 20). The R-squared has increased slightly (now at 0.7324, while the variance of the residuals have been reduced). In this case the level of interest income is not significant (as also the lagged value of the level of interest rates), while the variability of interest rates and the funds gap (and their first lagged values) are significantly negative and positive respectively. The t-statistic for the level of interest rates, the variability of the interest rates, and the funds gap are 1.5872, -17.4729, and 2.9772 respectively. The t-value of the concentration measure continues to be negative and significant (-7.6168), as well as for the natural logarithm of the assets (-3.9106 and the coefficient becomes equal to -4).

We conduct the same analysis for the several types of financial institutions and the results are quite similar (Annex 14). In the case of commercial banks the level of interest rates, their variability, and the funds gap have significant effect on net interest income (the t-statistics are 4.8510, -2.0124, and 4.0307 respectively), while the size has significant negative effect. Similar are the results for the savings and co-operative banks with the exception of the level of interest rates for the savings banks and the funds gap for the co-operative banks which have significant negative effect on net interest margin (for the latter case an explanation may be again the balance sheet structure of the co-operative banks).

Table 20: Within (fixed effects) estimates (independent variables: level and variability of interest rates, funds gap, their lagged values, concentration and asset size)

Dependent variable: *net interest margin*			
Sum of squared residuals = 5203.01		R-squared = 0.7324	
Variance of residuals = 0.7471		Adjusted R-squared = 0.6429	
Std. error of regression = 0.8644			
Variance	***Estimated Coefficient***	***Standard error***	***t-statistic***
in. rat.	0.0194	0.0123	1.5872
in. rat. (-1)	0.0575	0.0444	1.2946
var. int. rat.	-0.0812	0.0047	-17.4729
var. int. rat. (-1)	-0.2442	0.0212	-11.5201
funds gap	0.0823	0.0277	2.9772
funds gap (-1)	0.0552	0.0257	2.1449
conc.	-0.1973	0.0259	-7.6168
lnassets	-4.0079	1.0249	-3.9106
F (2323, 6964) = 5.9656, p-value = [.0000]			
Hausman test H0: RE vs. FE: CHISQ(8) = 314.96, P-value = [.0000]			

To conclude, the main findings from the examination of the above tables are the following:

- The funds gap has a significant and positive effect on net interest income; however, when we introduce the level and variability of interest rates this becomes insignificant (for the several types of financial institutions the funds gap continues to be significant and positive with the exception of co-operative banks).

- The level and variability of interest rates have significant positive and negative effects respectively on net interest income. Also, concentration and the size of each financial institution have significant negative effects.
- If we introduce lagged values, in all the cases (even with interest rates), the funds gap and its first lagged value is significant and positive (except for co-operative banks). In this case, the variability of interest rates, the size, and the concentration measure continue to have negative sign, while the level of interest rates is no longer significant (the latter does not occur if we split the sample in the four different types of institutions that we have).

It is important to understand that those financial observers concerned about the potential costs associated with greater interest rate volatility generally have not been opposed to changes in the level of interest rates over time. Thus, a central issue in the debate over the appropriate short-run policy strategy has not been interest rate movements per se, but rather the character of interest rate movements per unit of time. To illustrate the distinction between these concepts, assume that the movement in "the interest rate" within the period [t_0-t_1] "required to keep the money stock on a smooth growth path is an increase of 100 basis points, followed by a decline of 50 basis points, and another increase of 50 basis points. Facing this prospect, the central bank has nearly always preferred to take actions designed to smooth the interest rate path. Although the net change in the interest rate over the period might be the same in both cases (100 basis points), the presumption is that the larger variance implied by the former could seriously disrupt financial markets.

5.6. Dynamic Models

Panel data are well suited for examining dynamic effects, as is the first-order model,

$$y_{it} = a_i + x_{it}^{'}b + \delta y_{i,t-1} + \varepsilon_{i,t}$$

The problem with the estimation of dynamic (or autoregressive) error components models is that there is a correlation between the lagged endogenous variable and the individual effects. The problem of heterogeneity is very serious in that case. *In our case the stationarity assumption is not necessary as long as T is finite and small.* This problem is well-known in classical econometrics as the inconsistency of the least squares method for dynamic models with autocorrelated errors. The general approach, which has been developed in several stages in the literature relies on instrumental variables estimators and, more recently on a Generalised Method of Moments (GMM) estimator. Several such estimators have been proposed, based on different instruments sets and/or different ways of (re)writing the model. This requires to look for a set of instrumental variables, whose number must be at least equal to the number of regressors in the model, and which must satisfy the following two conditions:

- They must be uncorrelated with the disturbances, at least assymptotically,
- They must be assymptotically correlated with the X variables.

In our case dynamic modelling cannot have serious implications since the number of observed years is small. The dynamic model introduces the lagged value of the dependent variable. In its simplest form only the funds gap is included (Table 21). The R-squared is quite significant (0.7248), while the sum of the squared residuals is 5350.60 and the variance of residuals 0.7677 (the standard error of the regression is 0.8762). The result is that the funds gap is significant and the estimated coefficient is 0.0644. The t-statistic for the lagged value of the dependent variable is very significant and positive (the t-statistic is 18.9029 and the coefficient is 0.1584).

Table 21: Within (fixed effects) estimates (independent variables: funds gap and the lagged value of the net interest margin)

Dependent variable: *net interest margin*			
Sum of squared residuals = 5350.60		R-squared = 0.7248	
Variance of residuals = 0.7677		Adjusted R-squared = 0.6331	
Std. error of regression = 0.8762			
Variance	***Estimated Coefficient***	***Standard error***	***t-statistic***
nim (-1)	0.1584	0.0084	18.9029

funds gap	0.0644	0.0258	2.4988
F (2323, 6970) = 6.8497, p-value = [.0000] *Hausman test H0: RE vs. FE: CHISQ(2) = 12.474, P-value = [.0020]*			

Any observation about x corresponding to a date other that t is a valid instrument i.e. there exist at least T-1 instruments for estimating this model at each time period, which implies a total of T(T-1) instruments for the whole period. In other words lagged values of the endogenous variable are valid instruments.

In econometric textbooks it is proposed estimating the model by using *lagged values of the X variables* as instruments. This estimator is consistent as long as the X variables are exogenous i.e. do not exhibit any correlation with the individual effects and the non-specific disturbances. If it is not satisfied, the Balestra-Nerlove estimator is inconsistent; except when it can be assumed that at least one of the X variables does not suffer from such correlation, lagged values of this variable being then used as instruments. In order to avoid this problem, it is usually proposed using as instruments the first differences of the X's of the model as well as either $y_{i,t-2}$ or $(y_{i,t-2}-y_{i,t-3})$. We add as an instrumental variable the second lagged value of the dependent variable. In this case we conclude with three years time period and 6,972 total observations (Table 22).

Table 22: Instrumental variables (C, the lagged value of the funds gap, and the second lagged value of the net interest income)

Dependent variable: *net interest margin*			
Sum of squared residuals = 18607		R-squared = 0.0218	
Variance of residuals = 2.6700		Adjusted R-squared = 0.0215	
Std. Error of regression = 1.6340		Durbin-Watson statistic = 0.6125	
Variance	***Estimated Coefficient***	***Standard error***	***t-statistic***
C	2.6567	0.0814	32.6275
nim (-1)	0.0556	0.0137	4.0677
funds gap	0.7398	0.1962	3.7708

In this case the R-squared is very small (0.0218) while the sum of the squared residuals is more than tripled compared with the previous case (from 5350 becomes 18607). The funds gap effect continues to be positive (the coefficient is 0.7398) and more significant (the t-statistic is 3.7708). Compared with Table 16 where we used the within (fixed effects) estimates with the funds gap as the only independent variable, the estimated coefficient is almost four times larger (from 0.2009 becomes 0.7398).

5.7. Concluding Remarks

Monetary policy affects banks' income and profitability in many ways. Examining the effect of interest rates changes captures only one aspect of the issue. The endowment effect and the spread are captured in our analysis by the level of interest rates and the funds gap. From the analysis above it seems that there is a direct (level and variability) or indirect (through the balance sheet structure) influence of nominal interest rates on the net interest margin of the banks. In the long run, the direct effects have the major impact, while in the short run the indirect effects do. Rising rates increase the demand for rate-sensitive assets relative to that of rate-sensitive liabilities, while falling rates have the opposite effect. Incremental changes in bank net interest margin are directly related to the movement in market rates. However, although these effects are highly significant, there are also some other variables that have a great effect on the net interest margins, and these are the concentration of the market and the asset size of the financial institution.

In today's volatile interest-rate environment sound gap management is important. Asset decisions must not be made independent of liability decisions; they must be coordinated through a written asset-liability management policy. Since cyclical gap management involves speculation on the movement of future interest rates, the size of the gap needs to be monitored closely. With volatile interest rates, the stability of net interest margin indicates that the interest sensitive assets and liabilities are matched. If not, the monetary authorities must have estimates of the impact of market rate fluctuations on bank profitability in order to evaluate the trade-off between rate stability and the other policy goals. The Bank of International Settlements (BIS) reported in its Fifty Second Annual Report (June 1982) that "*...the liquidity and balance sheet positions of some* [financial institutions] *have been adversely affected by distorted interest rate relationships and by the need to make increased provision for loan losses. Some commercial and savings banks which traditionally engaged heavily in maturity transformation have been locked into long-term low interest rate loans and securities while having to pay high money-market related rates to retain deposit funds*" (in our analysis the funds gap ratio has a significant and positive effect on net interest margin).

Chapter 6

"Non Interest Income and Total Income Stability"

Abstract

Banks differ markedly in their sources of income, with some banks focusing on business lending, others on consumer lending, and some on non-interest fee income activities. Whether differences exist primarily across size classes or business lines, this variation suggests reallocation effects will be important as the aggregate data reflect the changing mix of heterogeneous banks within the industry. A key feature in stabilising profitability can be diversification. Expanding a firm's range of activities can reduce the variability of the earnings stream. But it may not do so; key is whether or not income from the various activities move in the same direction. In this chapter we examine what is the effect of the increase on the level of non-interest income on the stability of the banks' total income. While all return and risks are ex post, considerable attention is given to the issue of whether the distribution of ex post returns and risks is stable across time and groups of banks. Experiments designed to estimate the effect of using industry and time aggregated data are performed.

Chapter 6: Non Interest Income and Total Income Stability

6.1. Introduction

Traditionally banks have been thought of as firms which take deposits and make loans, and profit by the difference between the costs of the former and the earnings from the latter activities. There have, of course, been specialised institutions – UK merchant banks were a good example of these – where activities, such as advising on how to raise capital, were mainly fee-earning. But such banks were small relative to the banking system as a whole, and were not a key part of the monetary system of an economy.

In recent years, though, the distinction between types of banks has become blurred, partly by takeovers and partly by traditional retail banks going into fee-earning activities. As a source of funds for financial institutions, deposits have steadily diminished in importance. In addition, the profitability of traditional banking activities such as business lending has diminished in recent years. As a result, banks have increasingly turned to new, non-traditional financial activities as a way of maintaining their position as financial intermediaries. The changes are of importance for financial stability. The reason is straightforward. The more unstable is a bank's (or any other firm's) earnings stream, the more risky the firm is. A recent paper by Hoggarth, Milne and Wood (1999) drew attention to an example of this, comparing banking sector profitability in Britain and Germany. It was observed that banking profitability in Germany was lower than in Britain, but also less variable, suggesting that the systems had pursued alternative routes to stability.

This chapter explores the correlation between the different sources of income and sets out various measures of the variability of each source. To the extent that it is possible, the results are reported not just for banking systems as a whole, but also separated by size and type of financial institution. Then we look in a little detail at the nature of non-interest income, focussing in particular on the extent to which it represents not earnings from new activities, but earnings from doing the same things in a new way – for example, earning a fee by arranging a loan for a customer rather than earning an interest spread by lending to the customer. This section provides an overview of different sources of non-interest income for depository institutions, including securitisation, and other major off-balance sheet activities. It also considers why the changes discovered have taken place; this may have implications both for the durability of the changes (where they are the result of a passing fashion, or of some more durable change in conditions) and for future regulation or supervisory policy. The study then concludes with a brief summary of our main findings and an assessment of their implications for the stability of the banking system.

6.2. Literature Review

It has been widely believed that banking is a declining industry, faced with reduced demand for the intermediation services it produces. To support this view, economists have relied on data which show banks with a declining share of intermediated savings instruments, loans, and total savings of the customer sector. However, recent research suggests that the banking industry is not actually declining in any meaningful economic sense; rather, the nature of its intermediation activity is changing (e.g. Kaufman and Mote (1994)). While the basic functions of banks and other financial service companies have remained relatively constant over time, the specific products and services through which these functions are provided have changed. Economic forces have led to financial innovations that have increased competition in financial markets. Greater competition in turn has diminished the cost advantage banks had in acquiring funds and has undercut their position in loan markets. As a result, traditional banking has lost profitability, and banks have begun to diversify into new activities that may bring higher returns.

It appears to be the conventional wisdom that non-interest income is more stable than interest income and that fee-based activities reduce bank risk via diversification. The combination of banking, insurance and securities activities may lead to a more stable profit stream, since the revenues stemming from different products in a conglomerate organisation are usually imperfectly correlated. While banks' net interest margins are highly dependent on interest-rate movements and economic cycles, fee income provides diversification and greater stability for bank profits. If that is correct, it then follows that mixing interest and non-interest income will reduce the volatility of earnings. For example, the Chairman of Firstar Corporation, Roger Fitzsimmons, observed that "... *there is a stability to [fee] income that we like*"[38]; and Richard X. Bone, a banking analyst, observed that "*banks that have strong fee-based business and that do not have major commitment to the loan sector can weather the storm much better than those banks that are building a loan portfolio*"[39].

Several empirical studies have indicated substantial benefits from diversification into nonbank activities e.g Eisemann (1976), Brewer (1989) and others. More recently, Gallo, Apilado and Kolari (1996) found that a high proportion of mutual fund assets managed relative to total assets of bank holding companies over the period 1987-1994 was associated with substantially increased profitability for Bank Holding Companies (BHCs) and also with risk reduction. Canals (1993) concluded that the increased revenues obtained from new business units have significantly contributed to improving bank performance in recent years. Saunders and Walter (1994) found that the expansion of banks' activities reduces risk, with the main risk reduction gains arising from insurance rather than securities activities.

There are also studies which find that fee-based income stabilises profitability. Proponents of this view point out that those studies which found risk-reduction benefits from asset diversification generally report their findings in terms of potential, not actual realisations. Heggestad (1975) examined the riskiness of various industries between 1953 and 1967. He measured riskiness by the coefficient of variation of return on equity for thirteen different industries. In addition, Heggestad correlated industry earnings with returns in banking. He discovered that commercial banking was one of the least risky activities but also found that industries such as leasing, insurance, or real estate offer risk-reducing diversification potential given their negative correlation with banking. Also, interestingly, most of these tend to suggest that a modest amount of fee-earning activity captures all the potential for risk reduction. For example, Boyd,

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[38] American Banker, May 30, 1997.

[39] American Banker, May 30, 1997.

Hanweck and Pithyachariyakul (1980) measured the correlation between accounting rates of return of bank and non-bank affiliates of BHCs between 1971 and 1977 and concluded that the potential for risk reduction was exhausted at relatively low levels of non-bank activities. Mester (1992) found that mixing traditional banking activities of originating and monitoring loans with non-traditional activities of loan selling and buying products leads to diseconomies of scope and some economies of scale.

This conventional wisdom may however be rooted in the past behaviour of non-interest income. Banks have, for many years, earned some non-interest income; trustee business, for example, is a traditional banking activity. But non-interest income provided only a small part of their earnings, and may well, as is certainly the case for trustee business, have been largely unaffected by the economic cycle.

As fee-based activity of banks has increased, this conventional wisdom may no longer be justified. DeYoung and Roland (1999) consider three fundamental observations each of which suggests that fee-based income need not be more stable than income from traditional banking activities. Revenue from a bank's traditional lending activities is likely to be relatively stable over time, because switching and information costs make it costly for either borrower or lender to walk away from a lending relationship, while revenue from fee-based activities may fluctuate from period to period because it may be easier to switch from bank to bank for many of the new fee-based activities than it is for traditional banking. Secondly, expanding fee-based services can require substantial additions to fixed costs, which increase the operational leverage of the bank. Once a lending relationship is established the only cost of an additional loan is the interest expense while the same does not occur for non interest income where additional staff may be required. Finally, capital is not required for many fee-based activities. This suggests a higher degree of financial leverage; hence earnings volatility may increase.

In addition to these a priori reasons for doubting the conventional wisdom there is a growing body of evidence which casts doubt on it. Much of this evidence is for the

USA, but there is also some from elsewhere. Also, most of the literature review refers to the expansion of bank holding companies into non-bank activities.

Three studies in the 1970s and 1980s showed that not all fee-earning activities would reduce earnings volatility. Johnson and Meinster (1974), Heggestad (1975), and Wall and Eisenbeis (1984) compared the earnings stream of the banking industry with that of other financial industries (e.g. securities, insurance, real estate, leasing). Banking earnings were more volatile than those of some industries but less than those of others, while the correlation of bank earnings was negative with the earnings of some financial industries and positive with others. For example, in Heggestad's paper, data indicate that there is very little diversification gain for BHCs from expanding into either business or personal credit activities. Perhaps most troubling for the conventional wisdom is the fact that these studies found no consistent pattern of relationships between banking earnings and non-banking earnings. This suggests that the relationships changed over time.

Several studies have calculated the effects of hypothetical mergers between banks and other types of financial firms. An interesting example is that by Boyd, Graham and Hewitt (1993). That study, by simulating mergers between bank holding companies and non banking financial firms between 1971 and 1987, and using both accounting and market data, found that risk was reduced by merging with life insurance or property/casualty firms but increased by merging with securities or real estate firms. Wall, Reichert and Mohanty (1993) constructed synthetic portfolios based on the accounting rates of return earned by banks and non-bank financial firms. Their results suggest that, had banks been able to diversify into small amounts of insurance, mutual fund, securities brokerage, or real estate activities, they could have experienced higher returns and lower risk between 1981 and 1989.

More recent US studies have started to disaggregate the data to a lower stage i.e. firm level than the industry level examined in the previous mentioned papers. A number of approaches were tried and again, suggesting a lack of reliable diversification effects, a variety of results emerged. According to Boyd and Graham (1986), expansion by

BHCs into non-bank activities tended to increase the risk of failure. Their results indicate, however, that when BHCs are more stringently regulated, the positive association between non-bank activity and risk may disappear. Sinkey and Nash (1983) found that credit card lending specialisation (that activity is often securitised in the USA and thus generates fee income) gives higher and more volatile returns than those achieved by banks with "conventional" product mixes. Demsetz and Strahan (1995) found that, although BHCs tend to become more diversified as they grow larger, this diversification does not necessarily translate into risk reduction because these firms also tend to shift into riskier activities and hold less equity. In other words, the risk reducing potential of diversification at large BHCs is offset by their lower capital ratios, larger commercial and industrial loan portfolios, and greater use of derivatives. Indicating that it is easier for "fee-based customers" to move, Roland (1997) found that high returns from fee-based activities were less persistent than those from lending and deposit-taking. Most recently, De Young and Roland (1999) found that as banks move towards fee earning activities, revenue volatility increases, as do both total leverage and earnings.

Kwan (1997) studied the implications of securities activities on bank safety and soundness. He examined the returns on securities activities conducted by Section 20 subsidiaries -subsidiaries that were authorised by the Federal Reserve Bank to conduct bank-ineligible securities activities- and their relationship with the returns on banking activities. He found that securities subsidiaries tend to be riskier but not necessary more profitable that their bank affiliates. For securities subsidiaries that are primary dealers of government securities, their higher riskiness partially comes from their higher leverage, whereas for those that are nor primary dealers, despite having lower leverage, they tend to be riskier than their bank affiliates because of their aggressive trading behaviour. Nevertheless, in this study, securities subsidiaries appear to provide diversification benefits to bank holding companies. Kwast (1989) found that both the mean and standard deviation of securities activities' returns are greater than those of non-securities activities. Some potential for diversification gains is found, although this appears to be quite limited. A related study is that of Eisenbeis, Harris and Lakonishok (1984) which examined the effects of one-bank holding company formations on bank stock returns. They found significant positive abnormal returns to the stock of banking firms announcing the formation of one-BHCs between 1968 and 1970, a brief period during which one-BHCs were permitted to engage in a wide variety of non-banking activities. The authors found no abnormal returns to announcements of one-BHC formations after 1970, when regulation limited the scope of these activities.

In summary, the main conclusion of the US studies is that the picture is much more complex than the conventional wisdom suggests. Whether diversification in fee-based activities actually increases or decreases risk seems to be an empirical question, with the answer varying from case to case and study to study. Theory alone does not answer this question or strongly support either side of the argument. Now, these findings prompt numerous questions and hypotheses, but before turning to these we set out some detailed finding on the behaviour of non-interest income in several banking industries.

Using OECD data what is found is a rise in the share of non-interest income, associated with a common but not universal fall in total profitability. The growth of non-interest income is, however, much slower than in the USA. From 1984-87 (they used 4 year averages) to 1992-95, non-interest income grew from 0.9% of assets to 1.0% of assets. The corresponding US figures are 1.3% and 2.1%. Within Europe a wide range of non-interest variation was observed. They also noted that non-interest income is less volatile in Europe than in the US. Also, drawing on a survey among EU supervisory authorities, the European Central Bank (2000) released a report on the EU banks' income structure. This report confirms the increased importance of non-interest income (fees, commissions and profits from financial operations and securities holdings) for EU banks. The growth of non-interest income seems to have a positive effect on bank profitability. The positive impact on profitability has, however, been limited by the increased operating costs associated with the development of activities generating non-interest income.

Findings also varied with the banks' size: large banks tended to be (proportionately) more dependent on non-interest income than did small banks. Also worth mentioning is that high non-interest income was positively associated with high cost-to-income ratios. In considering whether non-interest income served to stabilise total income, the results were mixed; it seemed to do so in Germany, Greece, France and Luxembourg, but to destabilise in Italy, the Netherlands, Portugal, Finland and Sweden.

A publication by Aggeler and Feldman (1998) show that while net interest income of the US banks (Ninth District U.S. banks) rose by 12 percent over the period 1992-1997, the biggest gain in bank earnings came from non-interest income. Non-interest income grew by 34 percent in that period – nearly three times as fast as interest income. Also, the most important difference in profitability between large banks (banks with $1 billion or more in total assets) and small banks concerns the source of income. Non-interest income made up an average of 27 percent of total income in the large banks between 1992 and 1997, compared with 12 percent for smaller banks. Since 1992, non-interest income as a percent of assets increased by 83 percent in the largest banks but was essentially flat in smaller banks.

6.3. Data and Sources

Fitch-IBCA Bancscope database provides data for interest and non-interest income of the financial institutions in all EU countries. It provides figures for interest revenues and interest expenses, so the net interest income is the difference between them. Non-interest income includes fees and commission income, trading income, and income from financial transactions, and other operating income. We exclude banks that do not provide data for the whole period 1994-1998. We exclude also "births and deaths" during that time period. So we conclude with a balanced sample of 2655 financial institutions across the European Union area that provide data for the examined time period. An extension to the above sample is to take all the banks that provide data for some or all the years in the period 1992-1999. In this case the unbalanced sample consists of 4166 financial institutions (see Table 23).

The analysis is both for all the years in the time period 1994-1998 (or 1992-1999) and in cross section across this time horizon (the pooled results are also presented). We examine not only the country differences, but also the size and type of institution effects. Initially, we examine the income sources for the financial institutions of the fifteen EU countries by using the balanced sample. Table 23 shows the number of banks from each EU country. Then we split the European banks between large and small banks. We have sorted all the banks by their total assets in 1998 and we have selected as a cut-off point for the size separation the US$10 bn. In this case we have 200 large banks and 2455 small banks (the respective figures for the unbalanced sample are 251 large banks and 3915 small banks). Finally we examine the several types of financial institutions. In this case we have 830 commercial banks, 700 savings banks, 1011 co-operative banks, and 114 mortgage banks (the respective figures for the unbalanced sample are 1314 commercial banks, 968 savings banks, 1711 co-operative banks and 173 mortgage banks) (the several categories are also presented in Annex 15). Most of the savings banks are in Germany, Spain, and Austria, while the vast majority of co-operative banks are established in Germany and Italy. Finally, most of the mortgage banks are the UK building societies.

The study is in advance over previous efforts. First, because the unit of observation is the firm, returns and risks can be examined at the appropriate level of aggregation. Using firm-level data avoids the potential aggregation bias of using industry-level data. Also, the microeconomic cross-sectional yearly time series nature of the data, combined with the large number of banks used, means that enough observations are available to reliably investigate hypotheses. Finally, a recent time period is examined.

Table 23: Number of banks in the sample from each EU country

Country	*Number of institutions (unbalanced sample)*	*Number of institutions (balanced sample)*
Austria	153	34
Belgium	80	45
Denmark	181	74
Finland	13	6
France	435	305
Germany	2023	1378
Greece	22	9
Ireland	30	11
Italy	617	390
Luxembourg	132	108
Netherlands	58	34
Portugal	36	28
Spain	160	90
Sweden	22	11
UK	204	132
Total	***4166***	***2655***

Source: Own calculations based on Fitch-IBCA Bankscope database

6.4. Return and Risk of Income Sources

We provide the arithmetic mean, the statistical term for the average. However, it is important to measure and understand the dispersion of a distribution. If a wide spread of values away from the centre is undesirable or presents an unacceptable risk, we need to be able to recognise and avoid choosing those distributions with the greatest dispersion. A common measure of dispersion is the standard deviation. However, the standard deviation is an absolute measure of dispersion that expresses variation in the same units as the original data. The standard deviation cannot be the sole basis for comparing two distributions[40]. What we need is a relative measure that will give us a feel of the magnitude of the deviation relative to the magnitude of the mean. The coefficient of variation is one such measure of dispersion. It relates the standard deviation and the mean by expressing the standard deviation as a percentage of the mean.

Table 24 presents not only the mean values of net interest income, non-interest income, and profits before tax to total assets, but also their standard deviation and coefficient of variation across the five years time period for the industry aggregation experiments of each EU country. It must be mentioned that these statistics are only for the balanced sample, and this is why the figures have not the same values with the data for interest and non-interest income provided in previous chapters for the whole banking industry of the several EU countries. Also, these are the mean values of each individual financial institution's the net interest income/total assets (NII/TA), non-interest income/total assets (NonII/TA), and profits before tax/total assets (PbT/TA) and not the ratios for the whole industry where we aggregate the country figures for the numerator and the denominator. We are much more interested in this chapter on the relative measures of net interest income and non-interest income to total assets, and on the risk measures of these income sources, rather than the actual levels of income (this analysis has been conducted in Chapter 4).

[40] Two idustries with the same variability of profits but with different levels of profits cannot be considered to have identical risk characteristics. The greater the average profit rate is for a given level of variability the safer the industry. If we have a standard deviation of 10 and a mean of 5, the values vary by an amount twice as large as the mean itself. If, on the other hand,

Table 24: Return and Risk of Income Sources for EU Countries

	Year	Statistics	NII/TA	NonII/TA	PbT/TA
Austria	*1994*	*Mean*	2.3012	1.0522	0.8802
		St. Dev.	0.9094	0.6028	2.1774
		C.V.	39.5178	57.2893	247.3774
	1995	*Mean*	2.3329	1.2494	0.4562
		St. Dev.	0.9134	1.1825	2.1785
		C.V.	39.1558	94.6451	477.5454
	1996	*Mean*	2.2815	1.2812	0.6379
		St. Dev.	0.9048	1.0255	1.4005
		C.V.	39.6577	80.0399	219.5327
	1997	*Mean*	2.0944	1.2220	0.5087
		St. Dev.	0.9039	0.9736	0.7284
		C.V.	43.1603	79.6764	143.1961
	1998	*Mean*	1.9703	1.3172	0.5636
		St. Dev.	0.8203	0.8689	0.5828
		C.V.	41.6322	65.9682	103.4036

	Year	Statistics	NII/TA	NonII/TA	PbT/TA
Belgium	*1994*	*Mean*	2.2313	0.6643	0.6688
		St. Dev.	1.4488	1.5065	1.2202
		C.V.	64.9322	226.792	182.4502
	1995	*Mean*	1.9915	0.6671	0.1591
		St. Dev.	1.5914	1.2123	2.6295
		C.V.	79.9106	181.7137	1652.9320
	1996	*Mean*	2.0341	0.8169	0.5460
		St. Dev.	1.3949	1.2528	1.6873
		C.V.	68.5782	153.3491	309.0301
	1997	*Mean*	1.8968	0.9556	0.6503
		St. Dev.	1.6737	1.5112	2.0705
		C.V.	88.2354	158.1381	318.3711
	1998	*Mean*	1.9993	1.3486	0.4262
		St. Dev.	2.0918	2.1021	4.5313

we have a standard deviation of 10 and a mean of 5000, the variation relative to the mean is insignificant.

		C.V.	104.6238	155.873	1063.138

	Year	*Statistics*	*NII/TA*	*NonII/TA*	*PbT/TA*
Denmark	*1994*	*Mean*	4.9599	0.8405	0.7456
		St. Dev.	1.8898	0.4037	1.0115
		C.V.	38.1008	48.0272	135.6601
	1995	*Mean*	4.7202	0.7185	2.3371
		St. Dev.	1.8923	0.3689	1.2769
		C.V.	40.0890	51.3525	54.6345
	1996	*Mean*	4.4501	0.8059	2.2081
		St. Dev.	1.8247	0.3480	1.2768
		C.V.	41.0044	43.1842	57.8222
	1997	*Mean*	4.1010	0.8034	1.7164
		St. Dev.	1.6779	0.3568	1.3249
		C.V.	40.9140	44.4154	77.1888
	1998	*Mean*	4.0122	0.8758	1.6768
		St. Dev.	1.5347	0.3874	1.2230
		C.V.	38.2505	44.2325	72.9368

	Year	*Statistics*	*NII/TA*	*NonII/TA*	*PbT/TA*
Finland	*1994*	*Mean*	2.0670	1.0832	-0.2861
		St. Dev.	0.9157	0.6967	1.0701
		C.V.	44.3007	64.3171	-373.987
	1995	*Mean*	1.8899	1.0602	0.2990
		St. Dev.	0.9179	0.6285	0.7106
		C.V.	48.5711	59.2847	237.6845
	1996	*Mean*	1.7466	1.2675	0.5942
		St. Dev.	0.8235	0.6681	0.2556
		C.V.	47.1499	52.7131	43.0151
	1997	*Mean*	1.7482	1.0114	0.7587
		St. Dev.	0.6900	0.5524	0.3537
		C.V.	39.4696	54.6117	46.6184
	1998	*Mean*	1.7353	1.0184	0.4960
		St. Dev.	0.5357	0.4413	0.5155
		C.V.	30.8686	43.3372	103.9211

	Year	*Statistics*	*NII/TA*	*NonII/TA*	*PbT/TA*
France	*1994*	*Mean*	2.8948	1.5039	0.6033
		St. Dev.	1.9294	2.8625	1.8529
		C.V.	66.6485	190.3374	307.1424
	1995	*Mean*	2.7891	1.4122	0.7309
		St. Dev.	1.8641	2.2611	1.9715
		C.V.	66.8370	160.11	269.7378
	1996	*Mean*	2.7788	1.5484	0.4675
		St. Dev.	2.1518	2.9209	3.0347
		C.V.	77.4361	188.6393	649.1929
	1997	*Mean*	2.7119	1.6514	0.6906
		St. Dev.	2.2883	3.4073	2.7497
		C.V.	84.3810	206.3326	398.1483
	1998	*Mean*	2.6111	1.8079	0.6974
		St. Dev.	2.3800	4.5026	4.3683
		C.V.	91.1852	249.0485	626.3299

	Year	*Statistics*	*NII/TA*	*NonII/TA*	*PbT/TA*
Germany	*1994*	*Mean*	3.1158	0.8158	0.7781
		St. Dev.	0.9563	1.5891	0.8760
		C.V.	30.6906	194.7929	112.5847
	1995	*Mean*	2.9756	0.7606	0.8851
		St. Dev.	0.8965	1.4634	0.7492
		C.V.	30.1269	192.3943	84.6374
	1996	*Mean*	2.8983	0.7685	0.8705
		St. Dev.	0.9006	1.9719	1.0122
		C.V.	31.0730	256.5726	116.2742
	1997	*Mean*	2.7659	0.8127	0.7810
		St. Dev.	0.9723	2.1398	1.0598
		C.V.	35.1525	263.2958	135.7002
	1998	*Mean*	2.5821	0.8534	0.6785
		St. Dev.	0.9665	2.4661	1.3059
		C.V.	37.4320	288.9555	192.4739

	Year	Statistics	NII/TA	NonII/TA	PbT/TA
Greece	*1994*	*Mean*	2.7432	2.4390	0.9797
		St. Dev.	1.3938	1.0778	2.6723
		C.V.	50.8116	44.1907	272.7768
	1995	*Mean*	3.0037	2.3603	1.3801
		St. Dev.	1.6157	1.0448	1.5714
		C.V.	53.7908	44.2631	113.8601
	1996	*Mean*	3.0151	2.3077	1.4152
		St. Dev.	1.4420	1.1066	1.4223
		C.V.	47.8256	47.9535	100.5004
	1997	*Mean*	3.0085	2.5421	1.4133
		St. Dev.	1.2375	1.2630	1.5061
		C.V.	41.1335	49.6846	106.5656
	1998	*Mean*	2.8285	2.3108	1.4799
		St. Dev.	1.0644	1.0093	1.7416
		C.V.	37.6329	43.6799	117.6816

	Year	Statistics	NII/TA	NonII/TA	PbT/TA
Ireland	*1994*	*Mean*	2.5148	0.5107	1.1708
		St. Dev.	1.2382	0.7748	0.6890
		C.V.	49.2348	151.7193	58.8524
	1995	*Mean*	2.3028	0.5675	1.2289
		St. Dev.	1.3392	0.6354	0.6131
		C.V.	58.1561	111.9689	49.8887
	1996	*Mean*	2.2143	0.6001	1.2038
		St. Dev.	1.2532	0.7065	0.6900
		C.V.	56.5949	117.7266	57.3204
	1997	*Mean*	1.7643	0.5984	0.9343
		St. Dev.	1.0536	0.6761	0.7031
		C.V.	59.7145	112.9892	75.2502
	1998	*Mean*	1.7209	0.7022	0.9366
		St. Dev.	0.9958	0.8350	0.6591
		C.V.	57.8614	118.9030	70.3775

	Year	Statistics	NII/TA	NonII/TA	PbT/TA
Italy	*1994*	*Mean*	4.6970	0.6470	0.7221
		St. Dev.	2.7313	0.6110	0.9267
		C.V.	58.1495	94.4351	128.3434
	1995	*Mean*	4.8872	1.0109	1.2441
		St. Dev.	2.3429	0.5145	1.0114
		C.V.	47.9397	50.8923	81.2953
	1996	*Mean*	4.3335	1.2284	1.2559
		St. Dev.	1.9533	1.0447	0.7738
		C.V.	45.0737	85.0428	61.6123
	1997	*Mean*	3.8387	1.2070	1.0574
		St. Dev.	1.4394	1.3674	1.0670
		C.V.	37.4985	113.2969	101.1886
	1998	*Mean*	3.6685	1.5571	1.3013
		St. Dev.	2.1423	1.8697	1.3029
		C.V.	58.3968	120.0703	100.1226

	Year	Statistics	NII/TA	NonII/TA	PbT/TA
Luxembourg	*1994*	*Mean*	0.9222	0.7853	0.6303
		St. Dev.	0.5485	1.5810	0.8813
		C.V.	59.4739	201.3195	139.8399
	1995	*Mean*	0.8885	0.8811	0.6032
		St. Dev.	0.5502	1.6025	0.7426
		C.V.	61.9257	181.8711	123.1058
	1996	*Mean*	0.8649	0.9020	0.6725
		St. Dev.	0.5820	1.2326	0.6872
		C.V.	67.2890	136.6494	102.1882
	1997	*Mean*	0.8898	1.0654	0.8393
		St. Dev.	0.7447	1.2482	1.0107
		C.V.	83.6870	117.1592	120.4132
	1998	*Mean*	1.1094	0.1818	0.5242
		St. Dev.	2.1321	12.1692	5.1216
		C.V.	192.184	6692.032	977.0428

	Year	Statistics	NII/TA	NonII/TA	PbT/TA
Netherlands	*1994*	*Mean*	1.7184	1.0444	0.7308
		St. Dev.	0.8132	1.6403	0.8673
		C.V.	47.3215	157.0582	118.6830
	1995	*Mean*	1.6737	1.1675	0.9779
		St. Dev.	0.7217	1.9631	0.9389
		C.V.	43.1208	168.1547	96.0192
	1996	*Mean*	1.5504	1.1921	0.9997
		St. Dev.	0.7098	2.1672	1.1245
		C.V.	45.7819	181.7937	112.4768
	1997	*Mean*	1.4377	1.2764	1.0295
		St. Dev.	0.6135	2.0957	1.3001
		C.V.	42.6740	164.1919	126.2883
	1998	*Mean*	1.6754	1.5456	1.1279
		St. Dev.	0.7361	2.9687	1.9624
		C.V.	43.9355	192.0666	173.9833

	Year	Statistics	NII/TA	NonII/TA	PbT/TA
Portugal	*1994*	*Mean*	2.9828	1.0228	0.2761
		St. Dev.	2.1912	0.9264	1.7362
		C.V.	73.4610	90.5715	628.8171
	1995	*Mean*	2.4907	0.9813	0.3804
		St. Dev.	1.1379	0.8604	1.1543
		C.V.	45.6863	87.6773	303.4206
	1996	*Mean*	2.2710	1.1932	04681
		St. Dev.	1.1684	1.0050	1.4064
		C.V.	51.4503	84.2283	300.4334
	1997	*Mean*	2.1632	1.3408	0.1555
		St. Dev.	1.3472	1.3782	2.9665
		C.V.	62.2794	102.7886	1907.844
	1998	*Mean*	2.1924	1.1973	0.4400
		St. Dev.	1.0994	0.7786	1.8100
		C.V.	50.1481	65.0287	411.4070

	Year	Statistics	NII/TA	NonII/TA	PbT/TA
Spain	*1994*	*Mean*	3.7291	0.7144	1.3239
		St. Dev.	1.4489	0.7282	1.9838
		C.V.	38.8539	101.9290	149.8477
	1995	*Mean*	3.7132	0.9128	1.8052
		St. Dev.	1.9111	1.1109	4.0716
		C.V.	51.4685	121.7022	225.5445
	1996	*Mean*	3.4107	0.8724	1.4154
		St. Dev.	1.3862	0.5053	1.3607
		C.V.	40.6417	57.9130	96.1365
	1997	*Mean*	3.3713	1.3486	2.0174
		St. Dev.	1.4779	2.8910	4.0300
		C.V.	43.8376	214.3696	199.7563
	1998	*Mean*	3.1530	1.1389	1.9153
		St. Dev.	1.6426	0.7040	3.7876
		C.V.	52.0979	61.8160	197.7601

	Year	Statistics	NII/TA	NonII/TA	PbT/TA
Sweden	*1994*	*Mean*	1.9240	0.7058	0.7048
		St. Dev.	0.9686	1.2599	0.6105
		C.V.	50.3438	178.5191	86.6160
	1995	*Mean*	1.8357	0.6835	0.8964
		St. Dev.	1.1937	1.0793	0.4670
		C.V.	65.0258	157.9205	52.0934
	1996	*Mean*	1.6752	0.6620	0.9786
		St. Dev.	0.9590	0.9239	0.4992
		C.V.	57.2500	139.5582	51.0093
	1997	*Mean*	1.4103	0.5319	0.6517
		St. Dev.	0.8158	0.7440	0.4321
		C.V.	57.8440	139.8677	66.3051
	1998	*Mean*	1.2765	0.6126	0.6954
		St. Dev.	0.7647	0.9283	0.3370
		C.V.	59.9093	151.5228	48.4634

	Year	Statistics	NII/TA	NonII/TA	PbT/TA
UK	*1994*	*Mean*	2.6114	1.0527	1.1972
		St. Dev.	2.7800	1.7995	1.3792
		C.V.	106.5341	170.9382	115.2036
	1995	*Mean*	2.6972	1.0215	1.3983
		St. Dev.	2.8699	1.7121	1.4835
		C.V.	106.4059	167.6097	106.0909
	1996	*Mean*	2.5550	1.1035	1.3693
		St. Dev.	2.8662	1.8643	1.5289
		C.V.	112.179	168.9493	111.6580
	1997	*Mean*	2.5293	1.1641	1.2751
		St. Dev.	2.9196	1.9491	1.6974
		C.V.	115.4305	167.4351	133.1194
	1998	*Mean*	2.7810	1.2715	3.1899
		St. Dev.	4.6139	2.4621	24.0030
		C.V.	165.9037	193.6332	752.4629

	Year	Statistics	NII/TA	NonII/TA	PbT/TA
EU	*1994*	*Mean*	3.2269	0.8785	0.7644
		St. Dev.	1.7920	1.6285	1.1655
		C.V.	55.5327	185.3683	152.4700
	1995	*Mean*	3.1512	0.9034	0.9534
		St. Dev.	1.7277	1.4506	1.3992
		C.V.	54.8273	160.5697	146.7621
	1996	*Mean*	2.9984	0.9678	0.9041
		St. Dev.	1.5938	1.8813	1.4771
		C.V.	53.1552	194.3772	163.378
	1997	*Mean*	2.8251	1.0271	0.8657
		St. Dev.	1.5019	2.1623	1.6419
		C.V.	53.1630	210.5313	189.6525
	1998	*Mean*	2.6948	1.0907	0.8058
		St. Dev.	1.6630	3.5495	2.4474
		C.V.	61.7110	325.4211	303.7217

From the above tables the following conclusions can be drawn:

- There is a clear decrease in the level of net interest income as a proportion of total assets. This is accompanied by an increase in the level of non-interest income to total assets. Only in the UK, Belgium, Netherlands, Portugal, and Luxembourg the net interest income/total assets increases in 1997-1998. For the whole EU sample the average net interest income falls from 3.23% of total assets in 1994 to 2.69% in 1998. Also only in Spain, Greece, Finland, Portugal, and Sweden non-interest income as a proportion of total assets decreases in 1997-1998. For the whole EU sample the average non-interest income increases from 0.88% of total assets in 1994 to 1.09% in 1998. Profits before tax as percentage of total assets (ROA) increase in Europe from 1994 to 1995 and then it follows a falling trend. It seems that the increase of non-interest income to total assets is accompanied by a universal fall in profitability. *This evolution may indicate that the growth of non-interest income did not fully offset the reduction in the interest margin or that this may occur due to increased operating costs associated with the development of activities generating non-interest income.* However, we should repeat at this point that we used a balanced sample in the period 1994-1998, excluding the banks that entry or exit the market.
- The standard deviation of net interest income to total assets follows a falling trend, except 1998. So, while it was 1.79% on the pan EU basis in 1994 it felt to 1.66% in 1998. Similar are the findings for the coefficient of variation. However, the fall in average net interest income rates and the significant increase of the standard deviation in 1997-1998 have led to very high coefficient of variation for that source of income in the last examined year. Germany and Netherlands have the lowest standard deviation of net interest income among the EU countries. Worth mentioning is the finding that the standard deviation of net interest income reduces through the examined period in almost all the smaller EU countries (Austria, Denmark, Sweden, Finland, Greece, Ireland, Portugal), but increases in the larger countries (UK, France, Spain, Italy) or remain steady (Germany). Especially the increase for the banking industries in the UK and Italy in 1997-1998 is significant.
- The standard deviation of non-interest income to total assets significantly increases (for the EU financial institutions from 1.63% in 1994 to 3.55% in 1998). The same occurs for the coefficient of variation. Among the big EU countries, only in Spain

the standard deviation of the non-interest income to total assets reduced; in all the others it increased substantially. *In other words, the increase of non-interest income is accompanied by its higher variability.*

- In 1994 and 1995 non-interest income seems to have less variability, measured by the standard deviation, than net interest income (both income sources are divided by total assets). However the picture changes in 1996-1998. If we take also into account the average levels of these sources, then we see that for all years the coefficient of variation for non-interest income is larger than for net interest income. *So, although net interest income levels are much higher than the respective for non-interest income, the volatility of the non-interest sources of income is larger.* This occurs because mainly in France and Germany the standard deviation of non-interest income is much larger than the standard deviation of net interest income (e.g. more than double figures in Germany i.e. the standard deviation for net interest income is 0.97% and for non-interest income 2.47% in 1998). However, if we exclude Germany, France and Netherlands, non-interest income has not been more volatile than net interest income for the other EU countries. On the one hand, profits from financial operations and, to a lesser extent, income from securities have demonstrated high volatility, but, on the other, fees and commissions have typically been quite stable.
- If the statistical indicator used to measure volatility is the coefficient of variation, the volatility of non-interest income is higher than the volatility of interest income for most of the EU countries and the time period that is observed.

After that time series analysis we continue with the cross-sectional analysis. Table 25 provides results using data for the period 1994-1998. In this case the variability is measured by the standard deviation of each bank's interest and non-interest income to total assets over the period 1994-1998. As we can see, in all countries, except Luxembourg, non-interest income to total assets has lower standard deviation compared with the net interest margin over the period 1994-1998. In major EU countries the proportion of banks with higher standard deviation of non-interest income to total assets than that of net interest margin fluctuates from around 15% in Germany to 34% in France. So, for most of the financial institutions in the whole period 1994-1998, non-interest activities do not seem to be more volatile than net interest income. Hence, the ongoing changes in the business activities of banks do not necessarily increase their income variability.

However, if we use the relative measure of the coefficient of variation the picture is the opposite one. With the exceptions of Belgium, Greece, and Sweden, in all other EU countries the coefficient of variation of non-interest income as a proportion of total assets is much higher than the ratio for the net interest margin for the majority of the financial institutions. Italy and Spain are among the countries with the highest proportions of banks where the coefficient of variation of non-interest income is larger than the respective figure for net interest income, 85% and 80% respectively of total banks in the sample for the two countries.

Table 25: Risk for Income Sources among the EU countries

Country	$SD_{NonII} > SD_{NII}$	$CV_{NonII} > CV_{NII}$
Austria	10/34 (29.41%)	22/34 (64.71%)
Belgium	13/45 (28.75%)	17/45 (37.50%)
Denmark	7/74 (9.46%)	53/74 (71.62%)
Finland	3/6 (50.00%)	4/6 (66.67%)
France	104/305 (34.10%)	207/305 (67.88%)
Germany	207/1378 (15.02%)	1021/1378 (74.09%)
Greece	3/9 (33.33%)	4/9 (44.44%)
Ireland	2/11 (18.18%)	6/11 (54.55%)
Italy	107/390 (27.43%)	330/390 (84.62%)
Luxembourg	80/108 (74.07%)	88/108 (81.48%)
Netherlands	13/34 (38.23%)	30/34 (88.24%)
Portugal	7/28 (25%)	19.28 (67.86%)
Spain	28/90 (31.11%)	72/90 (80.00%)
Sweden	1/11 (9.09%)	5/11 (45.45%)

UK	41/132 (31.06%)	98/132 (74.24%)

We continue the analysis by taking large and small banks respectively (Table 26). In the examined period, small banks have higher levels of net interest income and non-interest income than large banks[41]. However, non-interest income makes up a higher proportion of total income for the large banks, compared with the smaller banks. In both size categories, non-interest income as a percentage of total assets increased. The trend for these two ratios is common for both categories: net interest margin decreases and non-interest income to total assets increases from 1994 to 1998. The mean value of net interest income to total assets is 2.11% and 3.35% respectively for large and small banks in 1994, and falls to 1.68% and 2.82% respectively in 1998. For non-interest income to total assets, it is 0.74% and 0.91% for large and small banks in 1994, and 0.96% and 1.10% respectively in 1998. The riskiness (measured by the standard deviation or even the coefficient of variation) of non-interest income to total assets for large banks is much smaller than the respective one for small banks. Moreover, the standard deviation of net interest margin is larger than that of non-interest income to total assets for large banks e.g. in 1998, the standard deviation of non-interest and interest income to total assets is 0.90% and 1.25% respectively for large banks and 3.64% and 1.95% respectively for small banks. However, through the years, the increase of non-interest income is accompanied by a similar increase on its riskiness. It must be mentioned that from 1996, the standard deviation of non-interest income to total assets exceeds the standard deviation of net interest margin[42].

[41] If we take time series cross sectional data for the period 1994-1998, the net interest and non-interest income are 3.1041% and 1.0030% of assets for small banks, and 1.8983% and 0.8258% of assets respectively for large banks.

Table 26: Return and Risk of Income Sources for Large and Small EU Countries

	Year	*Statistics*	*NII/TA*	*NonII/TA*	*PbT/TA*
Large banks	*1994*	*Mean*	2.1114	0.7402	0.6325
		St. Dev.	1.3969	0.8449	0.6787
		C.V.	66.1580	114.1504	107.3111
	1995	*Mean*	2.0259	0.7694	0.7449
		St. Dev.	1.4408	0.6964	0.5841
		C.V.	71.1187	90.5153	78.4152
	1996	*Mean*	1.8948	0.8221	0.7535
		St. Dev.	1.3652	0.7767	0.5731
		C.V.	72.0515	94.4820	76.0590
	1997	*Mean*	1.7790	0.8267	0.7291
		St. Dev.	1.2412	0.7200	0.6322
		C.V.	69.7691	87.0978	86.7088
	1998	*Mean*	1.6838	0.9645	0.7905
		St. Dev.	1.2522	0.8991	0.6717
		C.V.	74.3697	93.2182	84.9687

Small banks	*1994*	*Mean*	3.3543	0.9115	0.7239
		St. Dev.	2.1481	1.7717	1.1904
		C.V.	64.0387	194.3744	164.4198
	1995	*Mean*	3.2875	0.9344	0.9033
		St. Dev.	2.1426	1.6253	1.4060
		C.V.	66.1747	173.9442	155.6441
	1996	*Mean*	3.1290	1.0106	0.8574
		St. Dev.	2.0312	2.1557	1.5028
		C.V.	64.9152	213.3111	175.2691
	1997	*Mean*	2.9331	1.0570	0.8158
		St. Dev.	1.5880	2.2855	1.6520
		C.V.	54.1400	216.2334	202.4822

[42] If we take time series cross sectional data for the period 1994-1998, the standard deviation of net interest and non-interest income are 1.3484% and 0.7945% for large banks, and 1.9931% and 2.4045% respectively for small banks.

	1998	*Mean*	2.8164	1.1016	0.8589
		St. Dev.	1.9512	3.6388	6.0207
		C.V.	69.2822	330.328	700.9998

From Table 27 we can see that in 33.50% of big European banks the standard deviation of non-interest income to total assets is larger than the respective one for net interest margin. For small banks the proportion with this mathematical relation is smaller, just exceeding 23%. However, the picture changes if we take the coefficient of variation. In this case for the majority of big and small banks this ratio for the non-interest income to total assets is larger than the respective one for net interest margin (67% and 75% respectively for large and small banks).

Table 27: Risk for Income Sources among Large and Small EU banks

Size	$SD_{NonII} > SD_{NII}$	$CV_{NonII} > CV_{NII}$
Large banks	67/200 (33.50%)	134/200 (67.00%)
Small banks	571/2455 (23.26%)	1851/2455 (75.40%)

The last analysis is based on data for the different types of financial institutions (Table 28). Commercial banks rely much more on non-interest income compared with the other types of banking institutions. Based on 1998 figures, the mean values of non-interest income to total assets is 1.74% for commercial banks, 0.64% for savings banks, 0.98% for co-operative banks, and 0.31% for mortgage banks. The figures for net interest margins are 2.48%, 2.76%, 2.95%, and 1.64% respectively[43]. There is a clear increase in the proportion of non-interest income to total assets for all types of financial institutions and a decrease of net interest margin (with the only exception of commercial banks for the period 1997-1998). For all types of financial institutions the standard deviation of the non-interest ratio is lower that that of the net interest margin; exception is the case of commercial banks which have higher variation of non-interest

[43] Based on time series cross sectional data for the period 1994-1998, the mean values of non-interest income to total assets is 1.55% for commercial banks, 0.60% for savings banks, 0.86% for co-operative banks, and 0.26% for mortgage banks. The figures for net interest margins are 2.51%, 3.09%, 3.39%, and 1.81% respectively.

ratio and even bigger coefficient of variation. It must be mentioned that the standard deviation of non-interest income to total assets increase significantly from 2.85% in 1994 to 6.17% in 1998. This may occur because commercial banks rely much more compared with the counterparts on non-interest income. Also we can point to the steady increase in the riskiness of non-interest income for all types of banks.

Table 28: Return and Risk of Income Sources for Types of EU Banks

	Year	*Statistics*	*NII/TA*	*NonII/TA*	*PbT/TA*
Commercial banks	*1994*	*Mean*	2.6133	1.4136	0.7954
		St. Dev.	2.1902	2.8514	1.9320
		C.V.	83.8095	201.7133	242.9065
	1995	*Mean*	2.5614	1.4119	0.9299
		St. Dev.	2.2060	2.5254	2.3115
		C.V.	86.1268	178.8662	248.5777
	1996	*Mean*	2.4851	1.5019	0.8933
		St. Dev.	2.2234	3.2145	2.5064
		C.V.	89.4681	214.0209	280.5702
	1997	*Mean*	2.4088	1.6928	1.0128
		St. Dev.	2.3279	3.6851	2.7583
		C.V.	96.6410	217.6936	272.3391
	1998	*Mean*	2.4793	1.7405	1.2596
		St. Dev.	2.8863	6.1676	10.3893
		C.V.	116.414	354.3544	824.8351

	Year	*Statistics*	*NII/TA*	*NonII/TA*	*PbT/TA*
Savings banks	*1994*	*Mean*	3.3536	0.5583	0.7617
		St. Dev.	0.8884	0.3145	0.5839
		C.V.	26.4899	56.3298	76.6502
	1995	*Mean*	3.2462	0.5846	1.0152
		St. Dev.	0.8783	0.3433	0.6870
		C.V.	27.0554	58.7354	67.8636
	1996	*Mean*	3.1495	0.5955	0.9924
		St. Dev.	0.8172	0.3630	0.6290
		C.V.	25.9474	60.9512	63.3873
	1997	*Mean*	2.9756	0.6082	0.8633
		St. Dev.	0.7888	0.3166	0.5409
		C.V.	26.5090	52.0659	62.6528

	1998	Mean	2.7580	0.6448	0.8025
		St. Dev.	0.7405	0.3750	0.4884
		C.V.	26.8510	58.1548	60.8571
	Year	Statistics	NII/TA	NonII/TA	PbT/TA
Cooperative banks	1994	Mean	3.7480	0.7449	0.6409
		St. Dev.	2.5225	0.4909	0.5372
		C.V.	67.3023	65.9065	83.8246
	1995	Mean	3.7015	0.8216	0.7465
		St. Dev.	2.5282	0.7389	0.6051
		C.V.	68.3029	89.9438	81.0491
	1996	Mean	3.4560	0.9108	0.7129
		St. Dev.	2.3217	1.3611	0.5744
		C.V.	67.1797	149.4359	80.5650
	1997	Mean	3.1536	0.8696	0.6195
		St. Dev.	1.0805	0.4504	0.5164
		C.V.	34.2605	51.7997	83.3505
	1998	Mean	2.9545	0.9807	0.5458
		St. Dev.	1.4794	0.8600	0.5219
		C.V.	50.0735	87.6942	95.6189

	Year	Statistics	NII/TA	NonII/TA	PbT/TA
Mortgage banks	1994	Mean	1.9827	0.3242	0.7619
		St. Dev.	1.0024	0.7750	0.7331
		C.V.	50.5592	239.0353	96.2295
	1995	Mean	1.9583	0.1986	0.6434
		St. Dev.	1.0547	0.3464	1.5311
		C.V.	53.8599	174.5229	237.9702
	1996	Mean	1.8155	0.2451	0.6120
		St. Dev.	0.9806	0.5093	1.0887
		C.V.	54.0114	207.7414	177.8867
	1997	Mean	1.6751	0.2304	0.4982
		St. Dev.	1.1095	0.4177	1.4463
		C.V.	66.2342	181.2902	290.2911
	1998	Mean	1.6396	0.3128	0.5759
		St. Dev.	1.1094	0.5812	1.0452
		C.V.	67.6585	185.8152	181.5015

Table 29 presents cross sectional analysis for the several types of institutions.

Table 29: Risk for Income Sources for the Several Types of EU Institutions

Type	$SD_{NonII} > SD_{NII}$	$CV_{NonII} > CV_{NII}$
Commercial banks	388/830 (46.75%)	582/830 (70.12%)
Savings banks	70/700 (10.00%)	527/700 (75.29%)
Cooperative banks	173/1011 (17.11%)	798/1011 (78.93%)
Mortgage banks	26/114 (22.81%)	77/114 (67.54%)

The findings are similar with those observed in the cases of size and country examination; the standard deviation of non-interest income to total assets is smaller than that of net interest margins in the majority of banks in the several type categories. However, it should be noted the high proportion of commercial banks (almost 47% of total commercial banks) where non-interest activities are riskier that the interest bearing activities.

6.5. Return, Risk and Correlation of Income Sources

Do the results set out suggest that banking systems have become more or less stable? In answer to this question, the first point to be made is, quite simply, that the variety of responses suggest responses to different circumstances, and, as banks surely wish to survive, that will be stabilising. But beyond that, what matters is how these changes have affected vulnerability to shocks.

Shocks are of two types –bank specific or system wide. Bank specific shocks are, in turn, internal or external. External ones can have their effects mitigated only by diversification across a wide range of customers. The data presented here do not enable us to distinguish among earnings from different customers or classes of customers. So we cannot address this issue. But they do help with regard to internal shocks –fraud, failure of risk management, failure of part of the business. The more diversified are sources of earnings, the less likely is any one such shock to affect a bank. That is as far as we can go on bank-specific shocks.

The methodology of this chapter is based on the modern portfolio theory. Returns and risks of existing securities and non-securities activities, as well as the correlation of such returns, are estimated and used to compute the potential for diversification gains. While all returns are ex post, considerable attention is given to the issue of whether the distribution of ex post returns and risks is stable across time and groups of banks.

Let I (t), NII (t) and NonII (t) represent the total income, the net interest income and the non-interest income respectively at time t, all of them divided by the total assets at time t, so that:

$$I(t) = NII(t) + NonII(t) \quad (1)$$

We use the variance (or square of the standard deviation) for measuring the fluctuations around the trend. The main question is under what conditions will the variance of income (σ_I^2) be less than the variance of net interest income (σ_{NII}^2), so that the non-interest income succeeds in reducing the instability of total income.

By a well-known statistical theorem

$$\sigma_I^2 = \sigma_{NII}^2 + \sigma_{NonII}^2 + 2\, r_{NII\ NonII}\, \sigma_{NII}\, \sigma_{NonII} \quad (2)$$

where $r_{NII\ NonII}$ is the correlation coefficient between the net interest income and the non-interest income. If $r_{NII\ NonII} = 0$, the variance of income exceeds the variance of the net interest income by the variance of the non-interest income.

For a more precise statement we divide both sides of (2) by σ_{NII}^2. This gives

$$\sigma_I^2/\sigma_{NII}^2 = 1 + \sigma_{NonII}^2/\sigma_{NII}^2 + 2\, r_{NII\ NonII}\, \sigma_{NonII}/\sigma_{NII} \quad (3)$$

The left-hand side of (3) is the ratio of the variance of income to the variance of net interest income. If this ratio is unity, the non-interest income may be regarded as having had no effect on stability; if the ratio is less than unity, the non-interest ratio has succeeded in promoting the stability of income; if the ratio is greater than unity, the non-interest income is destabilising rather than stabilising total operating income.

In other words, non-interest income stabilises total operating income if

$$\sigma_I^2/\sigma_{NII}^2 < 1$$

according as

$$\sigma_{NonII}^2/\sigma_{NII}^2 + 2\, r_{NII\ NonII}\, \sigma_{NonII}/\sigma_{NII} < 0$$

or

$$r_{NII\ NonII} < -0.5\, \sigma_{NonII}/\sigma_{NII}$$

The last equation indicates the conditions under which non-interest income succeeds in stabilising bank income: if $r_{NII\ NonII}$ is less than $-0.5\ \sigma_{NonII}/\sigma_{NII}$, the non-interest income will be stabilising total operating income; if it is greater than $-0.5\ \sigma_{NonII}/\sigma_{NII}$, the non-interest income will be destabilising total operating income. For a given magnitude of the standard deviation of non-interest income i.e. a given σ_{NonII}, it is obvious that, the closer the correlation coefficient between net interest income and non-interest income is to -1, the better, since this means that the non-interest income will be better adapted to needs of stabilising the total operating income of the bank. A correlation coefficient significantly lower than one would indicate a stabilising influence, while a negative correlation would even imply that any decreases in interest income could be expected to be compensated by an increase in non-interest income.

We will present in the main text the time series and cross sectional results for the balanced sample. However, in Annex 16 one can find the results of the unbalanced sample extended over the period 1992-1999. We can make similar conclusions by using the unbalanced sample.

We start the analysis by presenting the results for the several EU countries (Table 30). With regard to the empirical evidence, it is worth mentioning that with the exception of some years for some countries, the correlation coefficient of non-interest income with interest income is positive and quite close to zero. However, in all countries and for all years in the period 1994-1998 non-interest income does not seem to help stabilising total operating income; the only exception is for Spain and for years 1996 and 1998. The correlation coefficient of interest and non-interest income to total assets is not only larger than -0.5 ($\sigma_{NonII}/\sigma_{NII}$) but also in most of the cases positive, except for some of the examined years in France, Belgium, Italy, Luxembourg, Portugal, and Germany. So, not only non-interest activities from the previous analysis are more risky than the interest earning activities for most of the countries in the period 1996-1998, they don't also help stabilising total income since the correlation coefficient with interest activities is mainly positive. *This may indicate that fluctuation in one source of income could not offset fluctuation in the other.* However, this result should be interpreted with caution, mainly owing to the fact that the composition of non-interest income has not been stable. Finally we observe an increase of the variation of non-interest income to interest income almost in all countries (similar results as previously mentioned) through the period 1994-1998, something that has clear implications for the future stability of total income.

Table 30: Correlation of income sources and income stability for the several EU countries

Country	*Year*	$r_{NII\ NonII}$	$-0.5\ \sigma_{NonII}/\sigma_{NII}$
Austria	*1994*	0.0670	-0.3314
	1995	0.0655	-0.6473
	1996	0.0314	-0.5667
	1997	0.0027	-0.5385
	1998	0.1574	-0.5297
Belgium	*1994*	-0.1114	-0.5199
	1995	-0.0147	-0.3809
	1996	0.2093	-0.4490
	1997	0.0545	-0.4515
	1998	0.1432	-0.5025
Denmark	*1994*	0.2040	-0.1568
	1995	0.3066	-0.1193
	1996	0.3455	-0.1202
	1997	0.3872	-0.1342
	1998	0.4920	-0.1497

Finland	*1994*	0.6147	-0.3804
	1995	0.4187	-0.3423
	1996	0.3052	-0.4056
	1997	0.7438	-0.4002
	1998	0.9098	-0.4119
France	*1994*	-0.0191	-0.7418
	1995	-0.0169	-0.6065
	1996	-0.1232	-0.6787
	1997	0.0237	-0.7445
	1998	-0.0669	-0.9455
Germany	*1994*	0.1402	-0.8309
	1995	0.1120	-0.8162
	1996	0.0387	-1.0948
	1997	-0.0069	-1.1004
	1998	0.0092	-1.2757
Greece	*1994*	0.4831	-0.3867
	1995	0.6901	-0.3233
	1996	0.8103	-0.3837
	1997	0.6619	-0.5103
	1998	0.5429	-0.4741
Ireland	*1994*	0.5560	-0.3129
	1995	0.7159	-0.2372
	1996	0.7751	-0.2819
	1997	0.7672	-0.3209
	1998	0.7960	-0.4193

Italy	*1994*	0.0771	-0.1119
	1995	0.0129	-0.1098
	1996	-0.0040	-0.2674
	1997	-0.0275	-0.4750
	1998	0.2883	-0.4364
Luxembourg	*1994*	0.2163	-1.4413
	1995	0.3089	-1.4563
	1996	0.2199	-1.0590
	1997	0.4273	-0.8382
	1998	-0.8349	-2.8539
Netherlands	*1994*	0.1695	-1.0086
	1995	0.1673	-1.3601
	1996	0.0137	-1.5266
	1997	0.0593	-1.7079
	1998	0.0798	-2.0165
Portugal	*1994*	-0.1489	-0.2113
	1995	-0.2947	-0.3781
	1996	0.1260	-0.4301
	1997	0.1245	-0.5114
	1998	0.1933	-0.3541
Spain	*1994*	-0.1127	-0.2513
	1995	0.2594	-0.2907
	1996	**-0.2900**	**-0.1823**
	1997	0.1760	-0.9781
	1998	**-0.2522**	**-0.2143**

Sweden	*1994*	0.8323	-0.6504
	1995	0.8036	-0.4521
	1996	0.7562	-0.4817
	1997	0.7601	-0.4560
	1998	0.7575	-0.6069
UK	*1994*	0.7523	-0.3234
	1995	0.7325	-0.2983
	1996	0.6721	-0.3252
	1997	0.6388	-0.3338
	1998	0.5078	-0.2600

From Table 31, where we work with cross sectional data, we find the same results: in most of the countries the non-interest income to total assets in the vast majority of their financial institutions do not seem to help stabilising total income divided by total assets. Exceptions are the cases of financial institutions in Portugal, Denmark, and Spain where in more than 50% of the financial institutions non-interest income helps stabilising total operating income.

Table 31: Correlation of income sources and income stability for the several EU countries

Country	*Stabilisation of total income*
Austria	13/34
Belgium	8/45
Denmark	**39/74**
Finland	1/5
France	150/305
Germany	478/1378
Greece	2/9
Ireland	4/11
Italy	185/390
Luxembourg	11/108
Netherlands	9/34
Portugal	**17/28**
Spain	**49/90**
Sweden	3/11
UK	33/132

We then examine the effects of non-interest activities on the stability of the total income by spliting the banks according to their size (Table 32).

Table 32: Correlation of income sources and income stability for large and small EU countries

Size	*Year*	$r_{NII\,NonII}$	$-0.5\ \sigma_{NonII}/\sigma_{NII}$
Large banks	*1994*	0.1678	-0.3024
	1995	0.1001	-0.2440
	1996	0.0887	-0.2845
	1997	0.2868	-0.2901
	1998	0.1340	-0.3590
Small banks	*1994*	0.0647	-0.4101
	1995	0.2142	-0.3771
	1996	0.2594	-0.5271
	1997	0.0667	-0.7116
	1998	-0.0552	-0.9253

Both for large and small EU countries, non-interest activities do not seem to help stabilising total income[44]. Again we observe the increase of the variation of non-interest income to the variation of interest income for both bank size categories; *especially for small banks the increase of that ratio is significant through the examined years and has clear implications for the stability of their income.*

In most of the financial institutions, we observe again the inability of non-interest activities to stabilise total income (Table 33).

[44] If we take time series cross sectional data for the period 1994-1998, the correlation coefficient of net interest income with that of non-interest income is 0.1388 for large banks and 0.0807 for small banks.

Table 33: Correlation of income sources and income stability for large and small EU banks

Size	*Stabilisation of total income*
Large banks	83/200
Small banks	923/2455

Finally, we examine the same hypotheses for the several types of institutions (Table 34). Similar are the results that we extract[45]. For all years and for all types of financial institutions (with the exception of mortgage banks in 1997) non-interest income does not manage to stabilise total income. With the exception of the mortgage banks (1995-1997) and commercial banks (1998), in all the other cases the correlation of non-interest income to total income with net interest margin is positive. Moreover, we observe for all types of institutions but mainly for commercial banks a clear increase in the variation of non-interest activities to the variation of interest bearing activities.

Finally, we examine the effects of non-interest income sources on income stability for the banks in the several type categories across the time period 1994-1998 (Table 35). In most of the financial institutions non-interest income does not stabilise total income.

[45] If we take time series cross sectional data for the period 1994-1998, the correlation coefficient of net interest income with that of non-interest income is 0.030 for commercial banks, 0.5168 for savings banks, 0.3039 for co-operative banks, and –0.2344 for mortgage banks.

Table 34: Correlation of income sources and income stability for the several types of institutions

Type	*Year*	$r_{NII\,NonII}$	$-0.5\ \sigma_{NonII}/\sigma_{NII}$
Commercial banks	*1994*	0.1519	-0.6509
	1995	0.1703	-0.5724
	1996	0.0731	-0.7229
	1997	0.1035	-0.7915
	1998	-0.1067	-1.0684
Savings banks	*1994*	0.2116	-0.1770
	1995	0.3493	-0.1955
	1996	0.4429	-0.2221
	1997	0.3468	-0.2008
	1998	0.3314	-0.2532
Cooperative banks	*1994*	0.0992	-0.0973
	1995	0.7084	-0.1461
	1996	0.7884	-0.2931
	1997	0.2166	-0.2084
	1998	0.5234	-0.2896
Mortgage banks	*1994*	0.0330	-0.3865
	1995	-0.1379	-0.1642
	1996	-0.0388	-0.2597
	1997	**-0.2344**	**-0.1882**
	1998	0.0839	-0.2623

Table 35: Correlation of income sources and income stability for the several types of EU institutions

Type	*Stabilisation of total income*
Commercial banks	255/830
Savings banks	300/700
Cooperative banks	204/1011
Mortgage banks	37/114

6.6. Nature of Non-Interest Income

Some sources of fee income have been available to depository institutions for many years, but have recently taken on a more dominant position in the overall financial management strategies of banks. These include deposit service charges, credit card fees, and fees associated with electronic funds transfer. Banks have long earned non-interest income by offering 'traditional' banking services. The investment management and trust businesses of banks can be divided into two aspects: asset management and accounting/record keeping. Asset management includes personal funds management, personal trust and retail mutual funds, defined benefit and contribution pensions, and corporate money management. The account businesses include master trust, global custody, domestic custody, and corporate trust.

Although banks have made significant headway in generating traditional fee income, for banks to remain competitive with other financial institutions, they need to expand their product breadth and to improve sales, relationships, servicing, and investment know-how. New types of activities that generate fee income include securities brokerage, municipal securities underwriting, real estate brokerage services, real estate development, real estate equity participation, and insurance brokerage activities. Many analysts assume that the dramatic rise in non-interest revenues as proportion of total revenues came from investment banking, trading, and brokerage activities. These new products, in addition to generating fee income, make banks more competitive with other banks and non-banks that offer a wide array of services and products.

Banks also receive fee income from a number of off-balance sheet items including loan commitments, note issuance facilities, letters of credit, foreign exchange services, and derivative activities (contracts for futures, forwards, interest rate swaps, and other derivative contracts)[46].

Many institutions have broadened their range of corporate services to include management consulting, data processing and information systems, or other technological services. In addition, depository institutions generate fee income from personal financial planning services, assisting individuals with decisions on budgeting taxes, investments, retirement, estate planning and other financial matters. Since these services can be costly in terms of hiring and training individuals, fees must be commensurate with the cost of producing the service.

However, fee income is not only generated by the traditional fee-based activities and the provision of new products; non-interest income may represent earnings from doing the same things in a new way –earning a fee by arranging a loan for a customer rather than earning an interest spread by lending to the customer, for example. Since the data do not distinguish new lending from lending drawn from existing lines of credit, the possibility exists that any acceleration in loan growth is the result of new loan originations. Anecdotal evidence, however, suggests otherwise. The New York Times, for example, reported in November 1998, that *"rather than signalling a flow of new loans, much of the lending appears to be borrowers' drawing on existing lines of*

[46] Loan commitments are legally binding agreements by banks promising a to guarantee that a certain amount of funds will be available for a borrower over a given time period for a given rate. Letters of credit include standby and commercial letters of credit. Standby letters of credit provide a promise by a bank that it will perform a contract in the event that the buyer of the letter of credit defaults. Commercial letters of credit are similar but guarantee the credit standing of a buyer for an international trade transaction.

credit'[47]. This process, known as securitisation, was applied first to mortgages in the 1970s, and then to both consumer loans and business loans in the 1980s and 1990s. As a result of securitisation, loans originated by banks are often ultimately held by mutual funds and pension funds. Loan securitisation involves removing loans from bank's balance sheet and selling them to investors. However, before being sold, the loans are packaged into securities with characteristics that make them attractive to large and small investors. The mechanics of securitisation are subject to a variety of tax, securities, regulatory, and accounting laws.

The process of securitisation allows a bank to diversify its risk, but does not eliminate its role in monitoring borrowers. In a securitisation contract, a loan (or the credit risk associated with a loan) is split in small pieces and distributed among many banks, but the 'originator', i.e. the bank which had the original contract with the borrower, still performs the monitoring function on behalf of the parties involved. The big difference is that since the originator keeps on its books only a fraction of the risk associated with each loan, the cost of lending –in terms of the capital required- is proportionally smaller. Thus the origination and monitoring of loans will largely remain with banks, although this function will no longer be tied to the existence of loans on banks' books. Only when a loan is packaged in a larger pool, and sold to final investors, does the bank lose its monitoring function: but in this case it is as the borrower had financed itself directly in the market.

In the US over the past 10 years, non-interest income has accounted for an expanding share of bank revenue. A small part of the increase has been from fiduciary activities and trading revenue, but most of the growth has been in the broad category "other non-interest income", which includes merchant credit card fees, annual cardholder fees, fees for servicing mortgages, and income from loans that have been securitised. Thus, the increase in the proportion of revenue accounted for by non-interest income likely reflects both the expansion of bank lending to households and the growing fraction of bank loans that are securitised. According to De Young and Roland (1999):

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[47] Uchitelle, L., 1998, "Sure, Banks are Lending, But will They Keep It Up?", New York

"...the recent increase in the importance of non-interest income has come from several sources. First, banks have expanded into less traditional fee-for-service products such as insurance and mutual fund sales and (limited) investment banking activities. Second, banks now charge explicit fees for a number of financial services which traditionally had been bundled together with deposit accounts and which customers previously had paid for by accepting lower interest rates on deposits....Third, the growth of securitisation in mortgage, credit card, and other loan markets."

Also Radecki (1999), in a study of the importance of fee income to the top 25 US bank holding companies, found that payment services were responsible for as much as two-fifths of the total combined operating revenues. The very substantial amount of revenue derived from payments services indicates that the production and distribution of these services constitute one of the core business activities of commercial banks. The size of payments-related income also implies that lending contributes less revenue to banks than is commonly believed. Radecki (1999) mentions analytically the several categories of non-interest income (Annex 17).

Aggeler and Feldman (1998) concluded that about 40 percent of non-interest income was from fees earned from non-lending products and services provided to customer and commercial customers. These services range from issuing money orders, to selling insurance, to "servicing" loans (that is, administering and distributing the loan payments of a borrower). Another large element of non-interest income (26 percent) comes from service charges and fees on, for example, deposit and checking accounts and automated teller machine transactions. Non-interest income from these service charges and fees has remained at near the same percent over the last five years. Finally, banks also earn non-interest income from trust services whereby, for example, they invest funds for the benefit of clients. Over the past three decades, securities markets have captured a growing share of financial transactions. The decreasing reliance on bank loans has been more pronounced among large businesses, which routinely use the commercial paper market to fill short-term funding needs and the bond market for

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Times, November 1.

long-term needs. In addition, illiquid loans that in the past would have remained on bank balance sheets are now used to create tradable securities.

The increasing reliance on net trading income may prove to be a temporary phenomenon driven by lower inflation and interest rates and the consequent rise in asset prices. Investment banking, trading, and brokerage activities are much more market sensitive than trust fees and service charges for typical non-interest income. With volatile security markets, some analysts argue that it is too early to look at brokerage activities and other non-traditional securities activities as a way to smooth income for banks in the face of cyclical lending cycles. Hence, many bankers have recently focused on the "right combination" of fee-based businesses. For instance, a bank enjoying increased revenues from mortgage, investment banking, or mutual fund areas during a bull market might want to invest more in mortgage servicing, securities processing, mutual fund processing, insurance, or cash management, which will provide more consistent annuity-like fees during future bear markets.

6.7. Concluding Remarks

The two basic questions to be answered in this study are the followings: (i) what are the profitability and risk of non-interest activities, relative to interest bearing banking activities, and (ii) what are the potential diversification benefits of non-interest activities to a banking firm. To answer the first question, we examine the mean and standard deviation of the non-interest returns and compare them to those of interest earning activities, with the mean return measuring profitability and the standard deviation of returns measuring risk. To answer the second question, we examine the return correlation between interest and non-interest activities.

The main findings -which are deemed useful both for banks and to the public authorities responsible for maintaining financial stability- can be summarised as follows:

- Non-interest income has increased in importance relative to net interest income.

- The evolution of non-interest income may indicate that this source of income did not fully offset the reduction in the interest margin.
- Through the years the variability of non-interest income increases. If we exclude Germany and France where non-interest income is much more volatile than net interest income, non-interest income as a whole does not seem to be more volatile than net interest income. However, if we use the coefficient of variation (according to the ECB this is the appropriate statistical indicator for measuring relative variability across samples or groups of data), the variability of non-interest income is almost always larger than the respective one for net interest income.
- A positive correlation between interest and non-interest income seems to exist in several countries, although in varying degrees.
- The composition of non-interest income is rather heterogeneous.

As a result of the increased importance of activities generating non-interest income, banks' operational, reputation and strategic risks seem to be heightened. The increased relevance of these categories of risk has made banks' risk management activity, and, accordingly, the task of the supervisors, more complex and requires a focus on these other categories of risk. As regards the current view of the capital adequacy relations, this development supports arguments in favour of specific capital requirements for other categories of risk than credit and market risks.

Chapter 7

"Determinants of Bank Profitability – Literature Review"

Abstract

The rate of return earned by a financial institution is affected by numerous factors. These factors include elements internal to each financial institution and several important external forces shaping earnings performance. Several authors through their studies have analysed the differential effects of internal and external variables on bank profitability. The type of explanation would determine possible policy implications and ought to be taken seriously. This chapter reviews the literature on bank performance studies and classifies the bank profitability determinants.

Chapter 7: Determinants of Bank Profitability - Literature Review

7.1. Introduction

After reviewing the empirical literature concerning bank performance and the main components of income sources, we can determine the several factors that influence the bank performance. A number of studies have examined bank performance in an effort to isolate the factors that account for interbank differences in profitability. These studies fall generally into several categories. One group has focused broadly on the tie between bank earnings and various aspects of bank operating performance. For example, studies by Haslem (1968, 1969), and Bryan (1972) each searched through a set of bank operating ratios, using one or more statistical procedures, to find a subset of ratios that could best explain interbank differences in profitability over some time period, usually one or two years. The consensus of these studies is that expense control is the most important factor in achieving high bank profitability. A second set of studies has focused on the relationship between bank earnings performance and balance sheet structure. Principal works in these areas are those of Hester and Zoellner (1966), and Bond (1971) all of whom have used statistical cost accounting techniques, or some variations, to estimate marginal rates of return for various bank assets and/or liability items. Results indicate that variations in bank portfolios do explain variations in bank earnings. Moreover, rates of return vary considerably across balance sheet items.

Another body of literature has examined the impact of some regulatory, macroeconomic or structural factors on overall bank performance. For example, bank holding company affiliation, branching restrictions, interest rates ceilings, Federal Reserve membership for the US banks, minority or government ownership, and market structure have all been studied for their effects on bank performance, including profitability. For Schranz (1993) the performance of a firm is influenced by its size, the competitive nature of the market within which the firm operates, the effects of the various management monitoring mechanisms, and the riskiness of the firm's investment strategy. Smirlock (1985) mentions that profitability and asset quality of different segments of the industry to a large degree reflect the economic conditions impacting these institutions. When the local economy has been faring poorly, it is likely that the banking sector will follow suit.

The term **bank structure** is frequently used when referring to the characteristics of individual institutions. Individual bank characteristics such as the portfolio composition, and the scale and scope of operations, can affect the costs at which banks produce financial services. **Market structure**, measured by the relative size and number of firms, can influence the degree of local competition, and, by extension, the quality, quantity, and price of financial services ultimately available to bank customers. Researchers have studied how both bank and market structure (internal and external determinants respectively) are related to bank performance (see also Annex 18).

7.2. Internal Determinants

Internal determinants of bank profitability can be defined as those factors that are influenced by the bank's management decisions and policy objectives. Management effects are the results of differences in bank management objectives, policies, decisions, and actions reflected in differences in bank operating results, including profitability. The operating relationships reflect (1) overall profitability and gross revenue; (2) funds-use measures (asset-management measures, including return on the uses); (3) funds-source measures (deposit and capital measures, including cost of the sources); and (4) expense measures. These issues are related to the balance sheet and income statement structure. Zimmerman (1996) found that management decisions, especially regarding loan portfolio concentration, were an important contributing factor in bank performance. Researchers frequently attribute good bank performance to quality management. Management quality is assessed in terms of senior officers' awareness and control of the bank's policies and performance.

Many of the internal determinants rely for their estimation on data which are available in limited local, typically American, circumstances but which may not be obtained in an international survey. Examples are funds source management and funds use management [Haslem (1968)]. Other variables for which data are available and which are suggested in the literature are capital and liquidity ratios, the loan/deposit ratio (in principal, the reciprocal of the liquidity ratio), loan loss expenses and some overhead expenses.

Haslem (1968, 1969) computed balance sheet and income statement ratios for all the member banks of the US Federal Reserve System in a two-year study. His results indicated that most of the ratios were significantly related to profitability, particularly capital ratios, interest paid and received, salaries and wages. He also stated that a guide for improved management should first emphasise expense management, fund source management and lastly funds use management. Wall (1985) concludes that a bank's asset and liability management, its funding management and the non-interest cost controls all have a significant effect on the profitability record.

7.2.1. Balance Sheet Structure and Bank Costs

The principal factors that influence several measures of performance e.g. bank costs, deposit and loan composition etc., are all under the control of bank management, although Bryan (1972) suggested that unsuccessful banks have unfavourable cost ratios on items that are assumed to be outside the banks' control and related to the macroeconomic environment. The financial success of a bank depends on its management's ability to generate sufficient revenue while controlling costs. Bank managers make numerous decisions during the year concerning, among others, asset and liability management, the pricing of services and operating expenses. Like bank revenues, bank expenses are described and measured in terms of interest and non-interest items. Interest expenses, of course, vary considerably with the interest rate cycle; in contrast, non-interest expenses are a relatively stable percentage of a bank's assets. Because deposits are the major source of bank funding, interest paid on deposits is the major interest expense.

Berger and Mester (1999) found that, during 1991-1997, cost productivity for the US banks worsened while profit productivity improved substantially. The most likely explanation is weakness in the cost minimisation approach, which does not account for significant revenue charges. Over time, banks have offered wider varieties of financial services (such as mutual funds, derivatives, and other products of financial engineering) and provided multi-distribution channels through more extensive branching and ATM networks, expanded availability of debit and credit cards, and a proliferation of on-line services. These additional services of higher service quality, which are difficult to control for in cost and profit functions, may have raised cost but also raised revenues by more than the cost increases, resulting in measurement of worsened cost productivity, but improved profit productivity.

The importance of internal bank management is demonstrated in many more papers which have concluded that profitable banks are those banks which have been able to reduce cost without scarifying revenues. Neither bank size nor market concentration play a significant role in bank profitability. The latter gives support to Bryan's (1992) findings which indicate that aggressive balance sheet management is related to profitability. The strength of the argument is weakened due to the lack of other costs besides portfolio costs, because there is no obvious reason why differences in bank performance should be unrelated to operating costs of various kinds.

A number of studies have concluded that expense control is the primary determinant of bank profitability. Expense management offers a major and consistent opportunity for profitability improvement. With the large size and the large differences in salaries and wages, the efficient use of labour is a key determinant of relative profitability.

7.2.1.1. Operating Expenses

Wall (1985) examined small and mid-sized banks over the period 1972 to 1981 to identify factors important to bank profits. He found that consistently profitable banks had lower interest and non-interest expenses than did their less profitable counterparts because of more capital, more demand deposits, slightly lower rates paid on liabilities, greater holdings of securities, and more efficient management. Staff expenses, as conventional wisdom proposes, is expected to be inversely related to profitability because these costs reduce the 'bottom line' or the total operations of the bank. The level of staff expenses appears to have a negative impact on banks' ROA in the studies of Bourke (1989) and Abdula (1994). However, Molyneux and Thornton (1992) found a positive relationship between staff expenses and total profits. As they suggest "*high* *profits earned by firms in a regulated industry may be appropriated in the form of higher payroll expenditures*".

Kwast and Rose (1982) challenged this work on the grounds that no theoretical framework linking earnings and costs have been forwarded. They proposed the application of a statistical (least square) accounting technique, developed in another branch of the literature, which related bank earnings to balance sheet structure. A sample of 41 high-profit banks and 39 low-profit banks with assets exceeding $500 million were examined over the period 1970-1977 for differences in (i) yield on assets and liabilities, and (ii) operating costs, as determined by statistical cost analyses. When certain market demand costs and supply conditions were held constant, yield differences between high and low profit banks using gross operating income could not be detected. Therefore, price efficiency was not believed to be responsible for gross earnings disparities. When net operating income and net income (after taxes) were used as dependent variables, mixed figures were resulted, with no strong evidence that high-earning banks had different price structures. Tests for differences in earnings flows from scale economies could also not be rejected. In sum, the consensus of previous literature, pointing to expense control as the key to profitability, was not supported. Kwast and Rose cited the following as being potentially responsible for differences in bank profitability: (a) regional conditions, (b) portfolio and risk preferences, and (c) management ability.

In defence of prior research, we could comment that the Kwast and Rose study is limited in scope to large banks; therefore, the results cannot be generalised to the entire banking population. Also, the sample sizes are relatively small compared to previous research studies, and although theory and statistical modelling are applied, further testing is needed to verify the results. Perhaps the most important inference to be drawn from their study is that the relationship between product costs and profitability is a complex one. Maintenance of peak pricing strategy and operating efficiency does not necessarily ensure impressive earnings, although they appear to be essential ingredients for survival.

7.2.1.2. Economies of scale

Another line of research concentrates on the potential existence (or not) of economies of scale, and if the size is related to a bank's structural characteristics. Scale economies in the provision of banking services are one determinant of optimal bank size. Other influences include tax policies, regulatory restrictions, progressive reserve requirements, market size, and risk diversification. In recent years, two important literatures on this relation have developed. Both predict a positive relationship between the size of banking firms and their performance. Vennet (1998) suggests that the average bank size in Europe, for which no diseconomies are found, is higher in 1997 than in the 1980s, a result that was also confirmed by studies on US banks.

Acquiring banks claim to benefit by increasing their profitability and shareholder value. Among their rationales for merging are scale economies that follow from consolidating administrative and back-office operations and from consolidating branches, when the merging banks' branching networks overlap. Scale economies can also result from diversification of assets and liabilities that reduces the costs of risk management. Moreover, given the current emphasis on relationship banking, many merger partners expect to achieve scope economies by combining their different product lines in a single institution. With a broader array of financial products, the consolidated bank expects to increase the potential revenues that can be obtained from any particular relationship and to reduce the average costs of marketing these products. Nevertheless, while expansion may provide many, if not all, of these benefits, it may also increase the complexity of the organisation, which can raise the costs of production and the costs of controlling agency problems. On balance, the existence of consolidation benefits is an empirical issue.

A substantial part of the literature deals with *deposit insurance* and the effect that it has on bank decisions. A fundamental finding is that the U.S. system of deposit insurance produces an incentive for insured banking firms to take risk. 'Too big to fail' banking firms receive free insurance on their uninsured deposits and other liabilities. Other banking firms do not. This asymmetric treatment is defended on the grounds that banking authorities fear the possible macroeconomic consequences of permitting a large banking firm to default on its liabilities. The government infuses public money into the problematic bank and either operates it under the government management or arranges for a 'short-gun'-wedding merger with the healthier bank. So, in essence, attaining a certain size provides a bank with some free insurance and more complete coverage than it would get otherwise. The problem with this approach is that it is encouraging excessive risk-taking.

Another recent body of literature deals with the economic role of banking firms in environments in which agents are asymmetrically informed. This predicts economies of scale in intermediation, quite apart from any production efficiency gains. This *modern intermediation theory* supports the view that large imtermediary firms will be less likely to fail than small ones. The costly monitoring of lenders by borrowers and large-scale investment projects imply that there exists increasing return on scale in lending and borrowing which can be exploited by financial intermediaries. Here the advantage of size is that it means an intermediary can contract with a large number of borrowers and lenders. Large numbers are assumed to result in diversification, and that has been shown to be valuable even in environments where all agents are risk-neutral. Specifically, diversification is valuable because it reduces the cost of contracting among asymmetrically informed agents.

Nevertheless, past studies have concluded that scale advantages in U.S. banking are exhausted at a fairly low level of output, suggesting that horizontal bank mergers would yield little or no cost savings. Clark (1986) provides an excellent survey of the existence of economies of scale in the banking industry. He reports that in thirteen studies of the possible existence of economies of scale in banking, only two have found significant scale economies with deposits over $100 million. Some evidence even suggests diseconomies of scale for the very largest banks. These results explain why bank size is constructed in logarithmic form; the scale effect increasing at a decreasing rate as the size range of banks increases, so the expected relationship is non-linear. Recent U.S. studies find scale economies up to higher levels than the previous studies. The effect of technology and deregulation may partly explain these results. Wall (1985) found that bank size doesn't have any significant effect on bank profitability.

Miller and Noulas (1997) concluded that the size measure is significantly negative related to the return on assets, implying that larger banks are less profitable. Also, Boyd and Runkle (1993) found an inverse relationship between size and the ratio of equity to assets and the rate of return on assets. In other words, larger banking firms are systematically less profitable in terms of asset returns and highly leveraged.

As a conclusion, different results can generally be explained by different assumptions, methodology, or both. Some studies have examined just operating costs, which will bias the results in the direction of finding scale economies. The most appropriate variable to consider is total costs, including overhead and indirect costs. Other studies have taken as size measure individual office size instead of the overall size of the banking firm. Such studies also ignore overhead and administrative costs. Additionally, the variables measuring the cost of branching may be mispecified.

7.2.2. Risks

A possibility is that European banks will react to strengthening competitive pressures by taking on increasingly risky business. The likelihood of such behaviour will be increased if banks focus extensively on the relative size of their portfolios (rather than profits) and/or keep low capital ratios, conditions which might in fact apply to a number of continental banks. Trading in underlying and derivative instruments also offers enormous potential for taking on market risk for those tempted to do so. These specific risks generate variability in banks' cash flows. Excessive risk taking and adverse economic conditions are the ingredients for bank failure.

A possible influence on bank performance is the difference in the level of risk taking, and especially proclivity to take on risk. Bank managers have considerable control over the risk exposure of their banks in their daily portfolio decisions. Studies have demonstrated that one impact of managerial control will be a propensity toward liquidity and a tendency for more risk averse behaviour than under owner control (Elliott, 1972). Bryan's (1972) study surveys 1,600 medium sized banks throughout the US and finds that profitable banks structure their balance sheets on less conservative - i.e. riskier- lines than do unsuccessful banks [also Heggestad (1977)]. Bourke (1989) also added that some banks are profitable because they are engaged in higher levels of risk.

Any profit maximisation business, including banking, confronts macroeconomic risks (for example, the effect of recession) and microeconomic risks (for example, new competitive threat). However, banks also face a number or risks atypical of non-financial firms. Improvements in the techniques used to control risks in banking are intended to carry a number of potential benefits for banks: less volatile profits, which should improve the bank's standing in the market; lower costs; and greater speed and consistency in decision-making.

A risk measure used in Whalen's study (1988) is the standard deviation of return on equity over the examined period. There is some disagreement about the nature of the relationship between this variable and profitability. Heggestad (1979) and Clark (1986) have argued that the relationship should be positive; others have suggested that it should be negative (there is empirical evidence in support of both views). In the latter view, greater profit variability implies greater expected costs and associated penalties in the bank, resulting in a negative relationship between profit variability and expected profit margins.

There are five fundamental risks that are faced by all banks:

1. Credit Risk
2. Liquidity Risk
3. Interest Rate Risk
4. Operational Risk
5. Capital or Solvency Risk

Banks that engage in significant off-balance sheet activity and transactions with foreign borrowers also face risk associated with contingent liabilities, foreign exchange, sovereign, and political risk. The following analysis focuses on specific aspects of each type of risk.

7.2.2.1. Credit Risk

The *credit risk* of a bank is defined as the risk that the interest, or principal, or both, on securities and loans will not be paid as promised. In this case we say that the borrower will default. Different types of assets have different default probabilities. If the agreement is a financial contract between two parties, *counterparty risk* is the risk that the counterparty reneges on the terms of the contract. The term counterparty risk is normally used in the context of traded financial instruments, whereas credit risk refers to the probability of default on a loan agreement. Because most of the bank's earning assets are in the form of loans, problems with loan quality have been the major cause of bank failure.

Credit risk is associated with the quality of assets and the likelihood of default. Serious banking problems have arisen from the failure of banks to recognise impaired assets, to create reserves for writing-off these assets, and to suspend recognision of interest income when appropriate. It is extremely difficult to assess asset quality because limited information are available. Credit risk measures focus predominantly on loan experience because loans exhibit the highest default rates. This risk applies not only to loans but to other on- and off- balance sheet exposures such as guarantees, acceptances, and securities investments. Symptoms of poor loan quality include high levels of non-performing loans, loan losses, and examiner-classified loans (i.e. substandard, doubtful, and loss). A high proportion of loans relative to total assets and rapid growth of the loan portfolio are potential early-warning signals of loan quality problems, which may indicate potential failure. In contrast, high performance loans tend to have high-quality loan portfolios as characterised by low levels of non-performing loans and loan losses.

Analysts frequently cited the over-exposure to commercial real estate, construction and land development loans as probable candidates for explaining poor bank performance. For Hoggarth et.al. (1999) a possible influence on bank performance is the difference in the case of residential and commercial property lending. Commercial real estate and construction loans are extremely risky as these types have the highest net charge-offs[48]. Zimmerman's (1996) results are somehow identical. He found that the number of commercial real estate loans is closely driving the asset quality (ratio of loan losses to total loans) rather than the earnings performance of the banks. This may be related to the lags between the time a loan might become delinquent, when it might be classified as a problem loan, when expenses on loan provisions are taken, and when it might actually result in a charge against earnings. It also may reflect a bank's ability to charge higher rates on higher-risk loans over the business or real estate cycles. In any case mountaining loan losses have decreased the average profitability of banks while continued declines in loan-loss provisions are many times the primary catalysts for increases in profit margins (see also Miller and Noulas, 1997). So, variations in bank profitability are largely attributable to variations in loan loss provisions. This means that net income does not vary too much after netting out loan loss provisions.

Gross loan losses (charge-offs) equal the value of loans actually written-off as uncollectable during the examined period. Recoveries refer to the amount of loans initially charged-off and is repaid. Net charge-offs equal the difference between recoveries and gross charge-offs. Analysts also look at a bank's reserves for loan losses. When management expects to charge off large amounts of loans, it will build up the reserve base of the financial institution.

In order to measure a bank's credit risk exposure, four ratios can be used:

- Loan loss reserves/total loans
- Provision for loan losses/total loans[49]
- Charge-offs/total loans
- Net income before loan loss provisions and taxes/Provision for loan losses

[48] At this point, it must be noted that the Basle framework distributes real estate and commercial property to the highest (100%) risk-weighted measure.

[49] The relationship between the loan loss provision, which is an income statement item, and the loan loss reserves, which is a balance sheet item, can be seen as follows: Beginning Loan Loss Reserves + Loan Loss Provisions – Actual Charge-offs = Ending Loan Loss Reserves.

7.2.2.2. Liquidity Risk

Banks need liquidity for two reasons: (i) to meet deposit withdrawals, and (ii) to fund customer loan demand. Bank liquidity can be stored in the balance sheet by holding liquid assets. Liquidity risk arises from the inability of a bank to accommodate decreases in liabilities or to fund increases in assets. It is the variation in net income and market value of equity caused by a bank's difficulty in obtaining cash at reasonable cost from either the sale of assets or new borrowings. The problem arises because of a shortage of liquid assets or because the bank is unable to raise cash on the retail and wholesale markets. Liquidity risk is greater when a bank cannot anticipate new loan demand or experience deposit withdrawals and does not have access to new sources of cash. Liquidity is generally discussed in terms of assets, with reference to an owner's ability to convert the asset to cash with minimum loss from price depreciation. Most banks hold some assets that can be readily sold near par to meet liquidity needs.

The level of liquidity and reserve requirements may impact on bank profitability, because liquidity holdings represent an expense for banks. Although, conflicting results appear in the case of testing for this relationship, Molyneux and Thornton (1992), and Abdula (1994), find a negative relationship between bank profitability and the level of liquid assets being hold. Bourke (1989) finds the opposite result. It must be noted that banks at some countries (e.g. Germany) maintain "hidden reserves" which they use to smooth provisions and earnings from year to year.

The *loans to deposit ratio* is a traditional measure of bank liquidity, indicating the extent to which deposits are used to meet loan requests. The lower this ratio is, the more "stored" liquidity a bank has. The ratio of *loans to total assets* is another measure of bank liquidity. Since loans are difficult to trade in a secondary market, they are the least liquid assets, after fixed assets, in a bank's balance sheet. Hence, a high ratio of net loans to total assets indicate a bank that is relative illiquid, whereas a low ratio indicates a liquid bank with excess lending capacity. Finally, the *liquid assets to deposits ratio* indicates the cash and near cash funds as a proportion of total deposits. It shows the proportion of funds available to meet the deposits' withdrawals.

7.2.2.3. Interest Rate Risk

Interest rate risk arises from interest rate mismatches in both the volume and maturity of interest-sensitive assets, liabilities, and off-balance sheet items. It refers to the potential variability in a bank's net interest income and market value of equity due to changes in the level of market interest rates. For example, the removal of rate ceilings forced banks to pay market rates on an increased portion of their liabilities. This increased the sensitivity of interest expense to changes in interest rates and, in turn, increased the likelihood of lower net interest income and firm value because of rising rates. The traditional focus of an asset-liability management group within a bank is the management of interest rate risk.

The primary focus of interest rate risk to which banks are typically exposed are: (i) repricing risk, which arises from timing differences in the maturity (for fixed rate) and repricing (for floating rate) of bank assets, liabilities and off-balance sheet positions; (ii) yield curve risk, which arises from changes in the slope and shape of the yield curve; (iii) basis risk, which arises from imperfect correlation in the adjustment of the rates earned and paid on different instruments with otherwise similar repricing characteristics; and (iv) optionality, which arises from the implied options imbedded in many bank assets, liabilities, and off-balance sheet portfolios.

A bank's exposure to interest rate risk can be measured in two ways: *funds gap or maturity gap* measurement, and *duration* analysis. Gap analysis compares the sensitivity of interest income to changes in asset yields with the sensitivity of interest expense to changes in interest costs of liabilities. The purpose is to determine how much net interest income will vary with movements in market interest rates (see also Chapter 5). Duration analysis provides us the appropriate information concerning asset and liability durations. When asset and liability durations are matched, general interest rate movements should have roughly the same effects on the values of the firm's assets and liabilities. Duration gap is a measure of the mismatch of asset and liability durations and, theoretically at least, provides an index of the interest rate exposure of portfolio net worth.

7.2.2.4. Operational Risk

Operational risk is the risk associated with losses arising from fraud or unexpected expenses. Some banks are relatively inefficient in controlling direct costs and employee processing errors. A bank's operational risk is thus closely relating to its burden, number of divisions or subsidiaries, and number of employees. Operating efficiency refers to the cost efficiency of the bank's activities. Typical ratios focus on *total assets per employee* or *total personnel expenses per employee.* There is no meaningful way to estimate the likelihood of fraud or other contingencies from published data across the European banks.

7.2.2.5. Capital Risk

Capital risk represents the possibility that a bank may become insolvent. A firm is technically insolvent when it has negative net worth on stockholders' equity. Capital risk is closely associated with financial leverage, which refers to the use of debt and preferred stock that pay fixed rates as part of a firm's capital structure. If all banks have relatively the same rate of return on assets, then those banks with the highest leverage will have the highest return on equity. The whole literature review on bank capital adequacy supports that banks want to maximise leverage in order to maximise profits. High amounts of fixed-rate sources of funds increase the expected volatility of a firm's income because interest payments are mandatory.

Traditional measures of this kind of risk include the *equity to total assets* and the *equity to deposits* ratios. Equity operates as a buffer or cushion against unexpected losses. The *ratio of equity to loans* indicates the percentage of loans financed by equity. The higher the ratio, the higher the ability to absorb credit risk.

Capital ratios, i.e. capital including reserves as percentage of total assets is expected to be positively related to profitability because capital represents a "free" resource. Revell (1980) noted an inverse relationship between capital ratios and cost of intermediation. Moreover, Bourke (1989) stated that "*it is possible to speculate that well capitilised banks enjoy access to cheaper (because less risky) sources of funds or that the* *prudence implied by high capital ratios is maintained in the loan portfolio with consequent improvement in profit rates*". Studies by Bourke (1989), and Molyneux and Thornton (1992), using asset-based returns, showed a positive relationship between capital ratios and profitability. On the other hand, Berger (1995) noted that in banking, a higher capital-asset ratio is associated with a lower after-tax return on equity and therefore lowers the equilibrium expected return on equity required by investors. However, after examining data on U.S. banks in the mid-to-late 1980s, he found a both statistically and economically significant positive relationship between book values of capital-asset ratio and ROE.

7.2.3. Other Issues

Arshadi and Lawrence (1987) looked at the performance of *newly chartered banks* in the USA. Fourteen endogenous and exogenous variables were selected to identify the external and internal factors influencing bank performance for 438 three-year-old and five-year-old banks chartered between 1977 and 1979. The authors concluded that the performance of the new banks, '*first and foremost*', is a function of endogenous factors under the control of bank management. The success or failure of a new institution can be largely attributed to its organisers' ability to attract new deposits. Containment of operating costs and deposit growth are two major considerations that are internally influenced by management's policies ('quality of management'). Other elements such as decisions about the composition of the loan portfolios, the credit standards, and the loan and deposit rates, clearly impact upon the performance of newly chartered banks. The structural variables and demand factors (demographics and effective income) are not by themselves critical determinants of performance.

Exogenous variables such as growth of family income, population per bamk branch and the number of branch offices in the trade area play an important role in determining the deposit growth of new banks. DeYoung and Hassan (1998) found that profit efficiency improves rapidly at the typical de novo bank during its first three years of operation, but on average it takes about nine years to reach established bank levels. They also identified a number of economic, regulatory, structural, and financial conditions associated with the de novo bank profitability levels.

Simultaneously, the entry of a new bank has implications on some aspects of the performance of existing banks e.g. changes in the nature of banking services offered to the local community by the established banks (modification in the composition of assets and liabilities). Theory suggests that when the number of banks in the market is small, the impact of the de novo entry is likely to be more pronounced and most easily observed. The argument is that the chartering of new banks tend to reduce the profits of local banking institutions. At the same time a potentially important impact of bank entry performance may occur through the rate of growth of the established banks, thus affecting the future viability of these institutions. In particular, in the absence of an increase in the rate at which an area generates deposits, the entry of a new bank would force previously existing institutions to share the growth potential of the communities with new banks.

However, Fraser and Rose (1972) did not find any adverse impact of this entry upon the profitability of existing banks. New banks are formed because existing banks are inefficient and/or too conservative. Banks, in markets where new banks entered, tended to have higher staff operating costs (or higher ratios of salaries and wages-to-total operating earnings) than the norm, and these costs returned to normal subsequent to entry. The force for new competition appeared to result in competing banks that better served their communities and, at the same time, provided at least a normal rate of return on capital to their shareholders. The main limitation of this study is that it doesn't examine the impact of the de novo entry on the service dimensions of performance in banking –the quality and convenience of banking services provided to the local community.

7.3. External Determinants

External determinants of bank profitability are concerned with those factors which are not influenced by specific bank's decisions and policies, but by events outside the influence of the bank. Many differences between banks result from the different environments in which they operate instead of explicitly different management policies. The key external factors shaping the earnings performance of a financial institution include changes in the technology of service delivery, competition from bank and non-bank institutions, laws and regulations applying to financial institutions, government policies affecting the economy and financial system etc. Management cannot control these external factors. The most it can do is to anticipate future changes and try to position the institution (especially the composition of its assets and liabilities) to take advantage of expected developments. Several external determinants are included separately in the performance examination to isolate their influence from that of bank structure so the impact of the formers on profitability may be more clearly discerned.

7.3.1. Concentration and Market Share

A substantial amount of effort has been devoted to the determination of the relationship between banking structure and performance. *Many studies in the banking literature and in the more general industrial organisation find a positive relationship between profitability and measures of market structure – either concentration or market share.* On first blush, this may suggest that the current wave of merger activity in the banking industry is motivated by the prospective benefits from greater market power created by increasing the concentration or market shares of the merging firms. The bulk of the studies examining bank performance and market concentration have been on U.S. banking markets. In contrast to the national markets used in industrial studies, banking markets that are used in these studies are generally local markets which service individuals and small businesses.

Two competing hypotheses with regard to market structure and performance are the traditional structure-conduct-performance (SCP) hypothesis and the efficiency-structure (EFS) hypothesis.

7.3.1.1. Structure-Conduct-Performance (SCP) Hypothesis

The *structure-conduct-performance (SCP) hypothesis* is a general statement on the determinants of market performance. There is a well-defined linkage between structure, conduct, and performance. Market structure is determined by the interaction of cost (supply) and demand in a particular industry. The conduct or rivalty in a market is determined by market structure conditions, especially the number and the size distribution of firms entry conditions. This rivalty process results in unique price levels, advertising profits, and other aspects of market performance. Performance will depend on pricing behaviour.

In banking, the SCP model has been used extensively to analyse the state of the banking market in a given country. This relationship in banking markets, as noted by Gilbert (1984), "*...was initiated in the 1960s, when the federal bank regulatory agencies began responding to new legal requirement concerning the effects of bank mergers on competition*". These studies applied the framework available at the time from the field of industrial organisation: the market structure-performance framework. The studies are industry based, and lack any explicit model for the banking firm. Hannan (1991) tried to rectify this deficiency by developing a theoretical model of the banking firm, from which the SCP relationship can be derived. He included the relationships between market structure on one hand and bank loan rates, bank deposit rates, and bank profit rates on the other. He finds that the positive relationship between the return on assets and concentration estimated in the empirical literature review reflects the summation of the effects of concentration on the profits attributable to each of the bank's activities (divided by total assets), plus a positive term reflecting the fact that increments in concentration also serve to reduce bank assets. Estimations of the relationship should also include measures of the capital-asset ratio and the ratio of fixed costs to total assets and, most importantly, should attempt to account for the fact that some banks are more heavily involved in activities likely to be affected by local market concentration than the others.

This method has also been used by international studies of bank performance. However, the extent of this kind of analysis is limited. Short (1979), Bourke (1989), and Molyneux and Thornton (1992) are using several independent variables related to characteristics both internal and external to bank's operations, in order to explain bank profitability either at an international or European level. For example, Bourke (1989), in the context of an international comparison of banks' profitability, devote a part of it to apply the methodology to a sample of seventeen French banks over the period 1972 to 1981.

The traditional structure-conduct-performance (SCP) hypothesis, asserts that banks are able to extract monopolistic rents in concentrated markets by their ability to offer lower deposit rates and charge higher loan rates. This finding reflects the setting of prices less favourable to consumers in more concentrated markets as a result of collusion or other forms of non-competitive behaviour. The more concentrated the market, the less the degree of competition. The smaller the number of firms and the more concentrated the market structure, the greater is the probability that firms in the market will achieve a joint price-output configuration that approaches the monopolistic solution. Empirically, the SCP relationship is usually tested by examining the relationship between profitability and market concentration with a positive relationship indicating non-competitive behaviour in concentrated 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 (Berger, 1995).

Various studies support the above arguments; papers presented by Years (1974), Rhoades (1977), Honohan and Kinsella (1982), Rhoades and Rutz (1982), Bourke (1989), Hannan (1991), Lloyd-Williams, Molyneux, and Thornton (1994), and Abdula (1994) are the most notable of the traditional SCP studies. Rhoades, for example, in his survey of 39 studies from the 1961-77, determined that 30 of these studies had been successful in finding support for the basic validity of the SCP hypothesis. Molyneux and Forbes (1993) tested the SCP hypothesis using annual pooled European banking data for the period 1986-1989. The main finding was a significantly positive concentration ratio. The authors concluded that the SCP hypothesis is supported by this

European banking sample. Lloyd-Williams et.al. (1994) also find support for the SCP hypothesis in the case of Spanish banks for the period 1986-1988. Yeats' (1974) key finding is that the structure-performance relation in banking may best be characterised by a dichotomous relationship. If this in fact occurs, banks which operate in market above some critical level of concentration earn monopoly profits while those in markets below the breakpoint earn competitive or near competitive profits. Finally, the pooled country estimates reported in Molyneux 's (1993) paper indicate that, over the period 1986 to 1989, collusive profits occur in the Belgian, French, Italian, Dutch and Spanish banking markets. His estimates also imply that collusive profits do not appear to accrue in non-EC banking markets.

7.3.1.2. Efficient-Structure (EFS) Hypothesis

A challenge to this interpretation is the *efficient-structure (EFS) hypothesis* posited by Demsetz (1973), Peltzman (1977) [see Gilbert's paper (1984)] and others. Market concentration is not a random event but rather the result in industries where some firms possess superior efficiency. This hypothesis states that efficient firms increase in size and market share because of their ability to generate higher profits, which usually leads to higher market concentration. In principle, firms in markets with a large dispersion of efficiencies could be either more or less efficient on average than firms in other markets. However, proponents of the EFS hypothesis usually assume (explicitly or implicitly) that the dispersion of efficiencies within markets that creates high levels of concentration also results in greater than average efficiency in these markets, yielding a positive profit-concentration relationship. In effect, it is maintained that higher than average concentration is more often due to the high market shares of firms that are efficient than to the low market shares of firms that are inefficient. Otherwise, profits and concentration would not be positively related (Berger and Hannan, 1988).

Thus, the traditional SCP hypothesis and the usual form of the EFS hypothesis imply an observationally equivalent positive relationship between concentration and profits, but differ as to the structural model creating it. Essentially, the SCP hypothesis takes concentration as exogenous and maintains that high concentration allows for non-competitive behaviour that results in less favourable prices to consumers and higher profits to firms. The usual form of the EFS hypothesis, however, takes firm-specific efficiencies as exogenous and maintains that these efficiencies result in both more concentrated markets and higher profits. These different explanations of variances in profitability levels among banks -market power versus efficiency- have directly opposing implications for antitrust policy. If high profits are created by market power, then antitrust actions are likely to be socially beneficial, moving prices toward competitive levels and allocating resources more effectively. However, if high efficiency is the explanation of high profits, then breaking up efficient firms that have gained large market shares or disallowing efficient firms to acquire other firms is likely to raise costs and may lead to prices less favourable to consumers. Regulatory agencies have typically followed the market-power paradigm in their antitrust policies. The issue is very important today because the Second Banking Directive allows banks chartered in one country to open branches in other EC countries. The nature of the structure-performance relationship must be uncovered in order the EC and European governments to determine whether to strengthen or weaken existing antitrust laws. If the SCP hypothesis is supported for European banking, then regulators may have to be more cautious in approving cross-border mergers, especially among the large banks. On the other hand, if the alternative EFS hypothesis is supported, no application of antitrust measures is required.

To distinguish between the two hypotheses, past researchers have included market share as an independent variable, with a positive coefficient usually supporting the EFS hypothesis (Smirlock, 1985). However, this conclusion depends on whether market share can be considered as a proxy for efficiency of larger firms rather than as a measure of market power. An obvious solution to this problem is to include a measure of efficiency directly in the model. A necessary condition for the EFS hypothesis to be true is that efficiency must be positively related to concentration and/or market share. Only recently, some authors [Berger and Hannan (1993), Goldberg and Rai (1996)] have tried to examine the implications of the EFS hypothesis regarding the effects of efficiency on market structure. Berger and Hannan (1993), and Berger (1995) formulated models that included two measures of efficiency, **X-efficiency and scale-efficiency**, to test the structure-performance relationship. The positive relationship between profits and concentration is explained by lower costs achieved through either superior management or production processes. An advantage of this model is that by testing the relationship between performance and efficiency directly, the relationship between performance and concentration has a clear-cut interpretation.

Under the X-efficiency version of the efficient-structure hypothesis (ESX), firms with superior management or production technologies have lower costs. In this case the banks may have higher quality products, enabling them to charge higher prices and earn higher profits. Under the scale-efficiency version (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 profits. In both cases, these firms are assumed to have larger market shares that may result in higher levels of concentration, again yielding a positive profit-structure relationship as a spurious outcome.

Evidence supporting the EFS hypothesis have been found for studies of the US banking system [Brozen (1982), Smirlock (1985), Evanoff and Fortier (1988)]. Ravenscraft (1983) found a positive profit-market share relationship. This may reflects higher product quality and lower unit costs in relatively large business units. Smirlock (1985) models bank profitability as a function of market share, concentration, and an interaction term between market share and concentration (as well as several control variables) for over 2,700 unit state banks. He finds that market share is positively related to profitability, and concludes that this provides evidence in favour of the EFS hypothesis. Once this link is controlled for, there is no discernible positive relationship between concentration and profitability. This study is limited to unit states banks, and generalisation to branching state banks may not be appropriate. Berger's (1995) findings indicate some limited support for the X-efficiency version of the EFS hypothesis and for the relative market power hypothesis, where no support is found for both the scale-efficiency version of the EFS hypothesis and the traditional SCP hypothesis. Finally, Peristiani (1997) shows that acquiring banks achieve moderate improvements in scale efficiency. This moderate rise in scale efficiency may partly be attributed to the fact that smaller target markets are on average less scale-efficient than their acquirers.

7.3.1.3. Hypotheses' Weaknesses

Generally speaking, the banking studies have not found a positive relationship as consistently as has been found in the inter-industry studies. Gilbert (1984), in a survey article, find thirty-two out of forty-four studies have produced some evidence of significant association between market structure and measures of performance, with the direction of influence as indicated by the structure-performance hypothesis. In seven of those thirty-two studies the coefficients on measures of market structure are not statistically significant in most of the reported equations [Fraser and Rose (1971, 1972), Heggestad and Mingo (1976), Wall (1985), Whalen (1985), Gup and Walter (1989)]. In two papers Vernon (1971) and Whitehead (1978) [see Gilbert's paper (1984)], the coefficients on market concentration are significant but have signs that are opposite from those indicated by the traditional SCP hypothesis theory. Moore (1998) casts doubt on the notion that concentration in banking markets continues to affect the terms that consumers of banking services receive and thus the banking profitability. The finding that a market's profitability is no longer tied to its concentration is consistent with the argument that geographic distance is becoming less relevant in banking. Rhoades and Rutz (1981) have found a significant negative relationship between concentration and firm rank stability (which is itself a proxy for competitive behaviour and is measured by mobility –the rank changes that take place among the market leaders- and turnover) for U.S. banking markets. They also found no significant relationship between concentration and market share in these markets. Osborne and Wendel (1983) in a detailed critique of the literature, argue that "*...it contains so many inconsistencies as to provide no evidence of a positive association between concentration and performance in banking*". Schuster's (1984) regression analysis did not show a significant correlation between profitability and market share of banks, at least not in Switzerland, West Germany and New York. This makes him to conclude that "*...concentration in the banking sector is not inevitable and that credit institutions need not be less profitable or even fear for their survival or independence just because they have a smaller market share than their competitors*".

Extent banking literature has suggested that the quantitative weakness of the concentration-profitability relationship is due to concentration permitting managers to behave in a manner inconsistent with profit maximisation. For example, banks might spend resources on lobbying efforts to limit the number of new bank entries or to preserve geographic restrictions on branching in order to maintain barriers to entry and impediments to competition. Such expenditures would rise costs and reduce measured cost efficiency, although profits might be higher as a result. Also, market power may allow managerial incompetence to persist without any willful shrinking of work effort, pursuit of other goals, or efforts to defend or obtain market power. Some studies test the hypothesis that banks with market power hold less risky assets than those in markets with lower concentration (*risk avoidance behaviour*). Banks are trading off higher profits for less risk. Other studies test the hypothesis that banks in more highly concentrated markets have higher expenses than those with similar characteristics in less concentrated markets (*expense preference behaviour*).

7.3.1.3.1. Additional Problems

A serious problem has been the *interpretation of the positive relationship between profitability and concentration* (when it can be found) and whether it supports the SCP or EFS hypotheses. Several methods have been proposed to resolve this issue. Berger and Hannan (1988) [also Hannan (1991)] try to provide a cleaner test by using price data rather than profit data as the dependent variable. Since the SCP hypothesis implies that consumers will be treated less favourable in more concentrated markets, they examine whether retail deposit rates (six rates have been used and among them CD rates) are negatively related to market concentration. By examining the price-concentration relationship, this paper tests the structure-performance hypothesis as an alternative explanation of the results. The results strongly support the traditional SCP hypothesis and are robust with respect to model specification, measurement of concentration, and econometric technique. Even though they question the appropriateness of including market share in their model because of its endogeneity, market share does have a positive coefficient when included in the model. The authors say that this result may be due to firms providing different levels of quality of service or offering higher deposit rates, allowing banks to increase their market share. However, the coefficient of concentration still remains negative. A linear regression over the entire sample did produce a significant relationship between price and market share using retail deposit rates, sub-samples regressions did not. Only for the lowest concentration sub-sample does he find the negative relationship between deposit rates and profitability needed to validate the traditional SCP hypothesis.

Berger and Hannan (1992) found that the relationship varies for different concentration levels and for different time periods. They conclude that the price-concentration relationship is negative for some ranges of concentration levels, though it does vary across time periods. At high concentration levels, it turns positive.

Kaufman (1965) notes that market structure and performance may *not be related linearly.* It may reasonably be expected that the impact of a change in structure on performance becomes greater the closer structure approaches total concentration. As he notes "*a deduction in the number of banks from two to one, for example, may have greater impact on performance than a reduction from, say, twelve to eleven*". Simultaneously, Clark (1986) notes that the failure to identify a more consistently strong, positive, and statistically significant direct relationship between market concentration and commercial bank profitability may be due in part to problems with the *methodology* employed.

The estimation of a structural equation with the application of ordinary least squares (OLS) on bank profitability may result in biased and inconsistent estimates of the structural parameters. Such studies ignore the statistical difficulties associated with the interdependence among the variables and the disturbances in the equations. The problem of including a market share variable along with a measure of market concentration in a regression model is that the two variables tend to be highly, positively correlated. A methodological problem is that unlike in the U.S., sub-market banking data were not publicly available in many European countries. Only one concentration measure is available for any one year in each European country.

Various studies, such as those undertaken by Short (1979) and Bourke (1989), have examined the relationship between bank profitability and concentration across different countries which has enabled them to avoid this problem. These studies, however, tell us little about the SCP relationship in individual countries. Yet another group of researchers argue that the concentration/collusion hypothesis is unreasonable because it embodies two questionable implicit assumption. The first is that technological conditions, regulation, or other barriers to entry allow colluding firms in concentrated markets to disregard potential competitors. The second is that creating and enforcing tacit collusive agreements is relatively easy. For a collusive agreement to be stable, participating firms must institute some mechanism to set and adjust price(s) and allocate market shares. This is not a trivial exercise, particularly for banks, which are multiproduct firms selling complex, heterogeneous products and services in a number of different geographic markets.

Finally, the role of bank regulation tended to be neglected. Only a few of the bank market structure studies mention the level of market interest rates relative to these ceiling interest rates on deposits and loans as a criterion of choosing the timing of observations, and many of the studies do not mention the effects of regulations in interpreting the results. The point here is that there may be strong interactive effects between regulation and other variables which could have a significant impact on market concentration and performance. For example, interest rate ceilings and high entry barriers facilitate market collusion with the result that even markets with low concentration may exhibit collusive behaviour. While different regulatory regimes may lead to different relationships between structure and performance, it remains likely that market structure will impact on performance.

7.3.1.3.2. Risk Avoidance Behaviour

Edwards and Heggestad (1973), Heggestad and Mingo (1976), and Rhoades and Rutz (1982) have suggested that market power experienced by banking corporations may be translated into *risk avoidance* (it is measured as the ratio of the variance of profits to expected profits) through the creation of a 'low risk' loan portfolio (they found a statistically significant inverse relationship between a firm's market power and its ratio of profit variability to profit level) rather than being reflected in higher profits. This is based on the Galbraith-Caves Hypothesis: uncertainty avoidance by large firms varies directly with the degree of market power that these firms possess. As Caves notes: "... *he* [Galbraith] *has touched upon an important and oft-ignored aspect of the large firm's behaviour: that a significant portion of the potential profits latent in its position* *of market power is taken in the form of avoiding uncertainty, with important allocative effects on the economy*" (Edwards and Heggestad, 1973).

First, large firms more frequently occupy positions of greater market power so that they have the option of trading off excess profits for an increased amount of the 'quiet life'. 'Quiet life' is synonymous with less risk. Second, large firms may be run by more risk-averse managers, since managerial personnel may distribute themselves between large and small firms on the basis of their differing marginal rates of substitution between the level of returns and risk. Implicit in this argument is the assumption that the management of large firms are insulated from the kind of stockholder pressure that would prevent them from pursuing objectives other than the maximisation of the value of the firm.

Thus, this explanation is based upon two very different notions. On the one hand, it is postulated that managerial personnel have different utility functions. Managers of large firms are more risk-averse. On the other hand, it is contended that large firms have market power and are therefore located on an "opportunity set", which allows them greater freedom to trade off profits for less risk. Although these explanations are entirely different in substance, they cannot in practice be neatly separated and distinguished. In fact, the logic underlying them requires their interrelationship. It is precisely because large firms (with market power) are on a preferred opportunity set that more risk-averse managers will gravitate towards them. The greater the monopoly power possessed by a firm, the more attractive that firm should be to risk-averse managers. Thus, if uncertainty-avoidance behaviour is characteristic of large firms, it is likely to be the result of both the above explanations working in tandem. In other words, the degree of firm uncertainty falls significantly as the level of concentration in the respective bank's market increases. Therefore, banks with monopoly power operate under conditions of less risk than their counterparts in more competitive markets.

The implications of these findings for the structure-profitability relationship is clear. Part of potential profits inherent in monopoly power are being taken in the form of reduced risk. These secure profits are preferred to the riskier profits earned by more competitive firms. This, in practise, is difficult to be evaluated because it is also unclear what provides the underlying mechanism for any risk avoidance to occur. Influences other than risk affect the variance of bank profits, such as the timing of recognising loan losses and capital gains or losses on securities. More direct indicators of the risks assumed by banks can be derived by examining the composition of assets held by banks. Mingo (1975) tests the hypothesis, but does find that banks in areas with relatively high market concentration hold relatively high percentages of their assets in commercial and industrial loans. These results appear to be inconsistent with the hypothesis that banks in more highly concentrated markets hold less risky assets.

7.3.1.3.3. Expense-Preference Behaviour

Edwards (1977) in his study of expense-preference behaviour in banking, suggests that managers of regulated firms may be utility maximisers rather than profit maximisers. Banks in market areas with higher concentration use their market power to engage in expense preference behaviour, rather than report relatively high profit rates. He finds that banks in areas with relatively high concentration have more employees than other banks.

However, for Berger and Hannan (1998), the high levels of market concentration allow firms to charge prices in excess of competitive levels, and managers take part of the benefits of the higher prices not as higher profits, but in the form of 'quiet life' (another definition of this term), in which they do not work so hard to keep costs under control. So banks in concentrated markets may take advantage of market power in pricing, but much of the benefit of this power may be manifested as higher costs rather than as higher profits. Smirlock, Gilligan and Marchall (1984) argue that it is the size of a bank, not the structure of its market, that is more important in creating opportunities for its managers to engage in expense preference behaviour. They find that if the type of equations estimated by Edwards (1977) control for bank size, there is no evidence of a relation between market concentration and expense preference behaviour by bank managers. Thus, the evidence that banks in highly concentrated markets pursue objectives other than profit maximisation is weak or non-existent. His findings, also, indicate that expense-preference behaviour better explains the performance of regulated firms than does in a profit-maximising framework. Bourke (1989), also, noted that: "*...in concentrated or regulated markets, reported net income may not be an accurate measure of the earning power of the firm because potential net profit may be appropriated as payroll expenses or other non-interest expenses...this difficulty may be overcome by use of a 'value added' concept.*"

7.3.2. Regulation

Historically, commercial banks have been the most heavily regulated companies. Regulations took many forms, including maximum interest rates that could be paid on deposits or charged on loans, minimum capital-to-asset ratios, minimum legal reserve requirements, limited geographic markets for full-service banking, constraints on the type of investments permitted, and restrictions on the range of products and services offered. Prior to the 1970s, most major countries of the world had protective and restrictive branching regulations. Interest rates paid on deposits were fixed or capped, and the division between banking and securities-related activities was fairly strict or at least limited.

Nowadays among the fundamental forces of change that affect the structure of banking -the others are innovation, securitisation, and globalisation- is the deregulation of the financial services. Deregulation is the process of eliminating existing regulations. This term is often confused with re-regulation, which is the process of implementing new restrictions on existing controls on individuals and activities associated with banking. Re-regulation arises in response to market participants' efforts to circumvent existing regulations. Efforts at deregulation and re-regulation generally address either pricing issues, allowable geographic market penetration, or the ability to offer new products and services. Generally, they have introduced several changes in the banking decision-making process related to the allocation of funding resources. Jayaratne and Strahan (1998) find that operating costs and loan losses decrease sharply after states permit statewide branching and, to a lesser extent, interstate banking. The improvements following branching deregulation appear to occur because better banks grow at the expense of their less efficient rivals.

Many authors argue that bank activities need to be regulated in order to produce a finite and relatively predictable money supply. In particular it has been argued that an unregulated and competitive banking system would have a tendency to overproduce inside money, with resulting problems for financial and commercial sector stability. Consonant with this body of monetary theory, Saunders and Yourougou (1990) have found that the micro bank regulation approach to monetary policy has created a banking system that is less stable and exposed to a higher degree of systematic interest rate risk that would exist in a less restricted banking system.

Changing regulations is a key environmental factor in understanding performance. First, deregulation allows the fragmentation and reshaping of the industry, while technology facilitates this movement. There is empirical evidence that deregulation reduced the number of banks and banking companies while increasing their size. Emery (1971), Jordan (1972), Tucillo (1973), and Edwards (1977) have examined the effects of regulation on banks' profitability. However, the direction of this impact is unclear. It is not possible to determine from the literature whether changes in the intensity of regulation strengthen or weaken the performance. Bourke (1989) noted that theory is dubious about the likely impact of regulation on bank profitability. For instance, contestable market theory[50], and indeed regulation theory in general, point the importance of entry barriers in enhancing profitability, while some other regulatory interventions may depress profitability. For example, entry restrictions are supported as being necessary for the prevention of ruinous competition, unsafe and unsound banking practices, and bank failures. On the other hand, restrictions on branching have historically limited the geographic scope of bank operations, and these surely represent an important reason why American banks were unusually vulnerable to localised economic distress.

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[50] A contestable market is one in which existing firms are vulnerable to "hit and run" entry. For this type of market to exist, sunk costs must be largely absent. In the banking industry, some experts argue that most of the costs are fixed but not sunk, making it contestable (see Whalen, 1988). That is, firms can "hit and run" in banking markets by entering the market if incumbent firms are exhibiting price-making behaviour, hit the market and capture market share with lower prices, and then, because most of their costs are not sunk, exit the market when increased competition narrows profit margins. There are important policy implications if a market is found to be contestable.

Evanoff and Fortier (1988) found that entry barriers help the traditional SCP paradigm to hold and market structure influence profits positively only in markets with high entry barriers. Edwards (1977) in his article on expense preference behaviour proposes that one of the regulation effects is to take profits away from the 'bottom line'. Differences in the capital ratio could also be used as a proxy for regulation on the basis that the market could equalise capital ratios for banks of the magnitude and stature of the financial institutions in the sample. However, this requires that market-derived cost of capital figures be first obtained and excess costs of capital be computed for banks in each country.

Jayaratne and Strahan (1998) shows that bank performance improves significantly after restrictions on bank expansion are lifted. They found that operating costs and loan losses decrease sharply after states permit statewide branching, and -to a lesser extent- after states allow interstate banking. The improvements following branching deregulation appear to occur because better banks grow at the expense of their less efficient rivals. The improvements in loan losses, along with the declines in operating costs, suggest that banks are, on average, operating more efficiently following deregulation. The estimated improvements are economically, as well as, statistically large. Reduced loan losses in the banking system following branch deregulation may have implications beyond increased profits to banks and decreased loan rates to bank borrowers. To the extent that loan losses decrease because banks improve their monitoring and screening of their borrowers (they have shown that loan losses did not shrink because banks made safer loans after deregulation), branch deregulation may have helped improving the quality of bank intermediation.

The empirical problems of examining the consequences of changes in regulation, however, daunting as regulation is not readily susceptible of comparative measurement. Bourke (1989) after examining several approaches concluded that the most promising one was a Delphi/Juty of Expert Opinion ranking of the intensivity of regulation on a limited scale. Even in this case, while it may be possible to locate experts who are familiar enough with regulation in each of the sample countries to provide a comparative ranking for a particular year, it is proved impossible to do this in a time series study extending over ten years.

The issues of regulation, competitive behaviour and concentration are related because the source of the correlation between profitability and concentration may be a correlation between concentration and regulatory protection, and regulatory protection with profitability. Superimposed on the banking industry is a complex system of prudential regulation e.g. state and federal regulations in U.S. that have the effect of moderating competition between banks. If research proves that banks earn monopoly profits, a prime objective of regulatory policy would be to insure against any increase in markets' concentration just below the critical level and to prevent any further increases in the highly concentrated markets. In the structure-conduct-performance (SCP) literature, Gilbert (1984) stated that *"...eliminating entry regulation would tend to weaken the structure - performance relationship in banking markets"*.

7.3.3. Government Ownership

Various studies have found that ownership characteristics may influence bank profitability. This is based on the view that management incentives differ under different forms of bank ownership. For example, Short (1979) found an inverse relation between government ownership and profitability. The same author, in an earlier paper (1977), suggested that the predominance of government banks in a particular country may depress the profit performance of all banks in that country. Bourke (1989), and Marriot and Molyneux (1991) also found a strong statistically significant inverse relationship between return on capital and government ownership. Molyneux (1993), in the examination of the European banking systems, concludes that only in France, out of a sample of seventeen countries, are state owned banks significantly more profitable than their private sector counterparts. One explanation of all these findings may be that government-owned banks may not be profit maximisers (as a matter of government policy). One implication of state ownership is that in the absence of shareholders, an institution may place less emphasis on increasing profits and more on other management goals. State-owned institutions may also be risk-averse rather than profit-maximising banks.

Unlike the previous studies, Molyneux and Thornton (1992) and Abdula (1994) found a statistically significant positive relationship, suggesting that government owned banks generate higher return on capital than their private sector competitors. This result can be possibly explained by the fact that state-owned banks have traditionally tended to be relatively undercapitalised (maintain lower capital ratios because the government implicitly underwrites their operations) compared with their private sector counterparts. Additionally, Hoggarth et.al. (1999) support the view that the dominant position of state-owned banks in the German banking system, which has discouraged competition, innovation, and risk-taking, leads to lower bank loan losses.

Evidence presented in Gilbert's and Peterson's paper (1975) [and also Brimmer (1978)] indicates that significant changes in performance are associated with changes in *Federal Reserve membership status*. The Federal Reserve System inevitably influences the profitability of the banking system so long as it maintains control over an effective legal reserve ratio and a scarce stock of legal reserves. With factors other than membership status taken into account, commercial banks withdrawing from the System experienced sharp decreases in their cash holdings, increases in their loan ratio, and most of them significantly increased their net current earnings ratios. The state reserve requirements for non-member banks are less onerous than those imposed by the Federal Reserve System on member banks, giving non-member banks a competitive advantage by allowing them to invest a larger proportion of their funds in earning assets and offer more attractive terms to borrowers and depositors. The increased quantity of loans didn't significantly change the operating expenses or the rates that charge customers, resulting in significant increases in all revenues and income measures.

On the other hand, the results for banks that entered the Federal Reserve System offer symmetric evidence on charges in cash and loan ratios. Federal Reserve membership increased the proportion of assets held in cash, reduced the proportion of assets invested in loans, but experienced no significant change in profits. It is suggested that this asymmetry in the impact of a change in membership status on earnings may be explained by different state regulations other than reserve requirements. Non-member banks are subject to a diversity of branching and merger laws, chartering and entry restrictions, and regulation of other banking activities, as well as state reserve requirements.

Many authors have noted that *minority banks* in the US i.e. banks established in areas with many minority groups have poor average performance compared with the non-minority institutions. This means lower profits, higher operating costs, lower efficiency, substantial greater loan losses, and less adequately communities' service than non-attribute banks. Meinster and Elyasiani (1988) mention that the performance problems in the aggregate minority banks are primarily due to the performance of black owned banks. The adverse loss experience of the black banks is ultimately related to the inherent risk of doing business in the urban: high unemployment rates, low family income, high failure rates among small businesses, and, sometimes, chronic physical deterioration. However, several factors internal to these institutions also have a major bearing on the outcome. Among these, capital adequacy, asset quality and management personnel are particular important. In fact, the severe shortage of management talent was probably the most critical problem facing the black banks.

Boorman (1974) and others have noted that minority banks have consistently failed to attain the profitability levels of non-attribute banks for several reasons. First, minority banks were found to be overly liquidity conscious. Second, they are not believed to have a stable deposit rate, and, consequently, they rely on costly purchased funds. They attract a large number of small, highly active deposit accounts, while they experience lower gross earnings resulting from the banks' greater need to diversify into lower yielding but more secure assets. Third, they are believed to be located in neighbourhoods where there are higher operating costs -high cost of handling a relative large amount of small transactions- and significant volume of loan losses. In order to offset these factors, minority banks were charging higher loan and deposit service rates and paid lower deposit rates. Two interesting points are contributed to this issue by Boorman (1974). His study concludes that (i) the performance of minority-owned banks compares substantially more favourable with that of the non-minority banks if loan loss experience is kept separate from the other operating statistics of these banks (the provision for loan losses was almost three times as large for the minority as for the non-minority banks), and (ii) there has been significant improvement in some aspects of minority-owned operations compared with studies of previous years.

The remarkable growth of *bank holding companies* (*BHCs*) in the US during the last three decades has created a great deal of interest and controversy among academic economists and bank regulators. One of the most important issues has been the impact of holding company affiliation on the operating performance of the acquired banks. Subsequent empirical testing of the question has produced a wide variety of results [Mingo (1975), Heggestad (1975), Mayne (1976), Karna (1979), Graddy and Kyle (1980), Rhoades and Rutz (1982), Curry and Rose (1984), Meinster and Elyasiani (1988)]. On the one hand, as Graddy and Kyle (1980) mention, the lack of a theoretical model on consolidated holding company behaviour frustrates the study of affiliated bank performance. Early studies on the effect of holding company affiliation on bank performance did not find that holding company affiliation results in changes in bank profitability. At the same time Curry and Rose (1984) paper confirm the importance of disaggregating multibank holding company activity between entry by outside organisations and expansion by locally based companies (differences in loan composition, bank prices etc.).

We share the view that the acquired banks performed better in terms of profitability and measures of providing community needs and services, but they may also be subject to greater risk exposure. Banks which are part of holding companies may have better monitoring capabilities and more ability to transfer problem assets to the holding company or an affiliate. The parent organisation of a holding company operating in multiple states is itself diversified geographically. Moreover, a bank subsidiary may be able to withstand an economic downturn in its local market better if it benefits from the financial strength of a parent operating over a wide area. Graddy and Kyle (1980) found that affiliated banks behaved differently than independent banks with regard to decisions concerning secondary reserves, loan portfolio composition, loan rates, deposit rates, and bank capital. They may focus their attention away from local markets and their asset and liability structures may become riskier. These concerns follow from the assumption that bank holding companies are formed to obtain geographic and/or product diversification which may result in greater market concentration. Increase risk structure can be illustrated by holding greater proportion of risky assets, relying more on purchased funds and less on equity capital.

Mingo (1975) offered evidence that bank holding companies exhibit lower capital-asset ratios and, hence, higher net earnings to capital ratios (ROC) than do independent banks. This result implies that holding companies are willing to pay premiums[51] for banks, because they expect to raise asset-capital (and, therefore, earnings to capital) ratios after the takeover. There is another implication of this result. Bank holding companies should tend to purchase banks with high capital-asset ratios and/or low earnings to asset ratios (ROA). In this way, the holding company would find it easier to achieve a decline in the bank's capital-asset ratio[52], or an increase in the earnings-asset ratio -hence, increasing profitability and justifying any premium to induce the bank to sell.

Finally, other authors have attempted to measure the differences in performance between *domestic and foreign owned U.S. banks* (e.g. Meinster and Elyasiani, 1988). They show that U.S. banks owned by foreign banks had performed no worse than domestic owned banks, but they had greater risk exposure. It may be possible for these banks to better absorb more risk exposure through greater geographic and product diversification, and it would have to be determined by further research. Williams (1998) examines the factors affecting the performance of foreign-owned banks in

[51] Such premiums are often measured as a ratio of book value of holding company stock to book value of bank stock. The researcher believes that such a measurement is a reasonable proxy for the true economic premium – the difference between the sale price and the present discounted value of the earnings stream of the acquired bank.

[52] The decline in the capital-asset ratio could be achieved in several ways. First, the newly acquired bank could begin to retain fewer earnings. Or the acquired bank could spend relatively large amounts on advertising or other non-pricing forms of competition in an attempt to increase deposit (asset) growth. Net earnings to assets could be increased by a portfolio shift towards higher-yield assets or by realising the cost advantages of affiliation.

Australia. He concludes that firm-specific characteristics, rather than country-specific events, are of greater importance when modelling foreign banks.

On the other hand, several recent studies have documented that foreign-owned banks are not as profitable as their domestic peers because they are less profit efficient due to their reliance on purchased funds. Peek et.al. (1998) show that foreign-owned banks in the US tend to be less profitable and less input-efficient than their domestically owned peers. However, they find that the target banks of foreign acquirers have less capital and lower returns than other banks prior to the acquisition. In addition, past-due loans at these targets increase in the period immediately after the ownership change. Thus, the targets of foreign acquirers tend to be in poorer financial conditions than banks in general or banks targeted by domestic acquirers, even before the acquisition.

7.3.4. Market Growth

Growth in market deposits is included in many studies to cover the argument that rapidly growing markets are relatively attractive and easy to enter, and the possibility that rapid growth will disrupt the status quo of established firm relationships. Various researchers have found that market growth has an impact on bank profitability [e.g. Kwast and Rose (1982)].

Previous research has generally found that market growth has a positive effect on new bank formations. To the extent that new entry stimulates competition, we may therefore expect a positive relationship between market growth and the level of competitive performance in the short-run by increasing the demand for banking services. Market growth should also affect the level of demand. Rapidly growing markets may exhibit higher prices as demand curves shift out over time. This relationship was found for household banking products by Heggestad and Mingo (1976). This, in turn, may affect the prices of banking services, bank profitability and bank portfolio composition, apart from any longer influence due to the tie between market growth and new entry. So, if market growth can be exploited without the threat of rival entry, profitable opportunities should occur for incumbent banks. If growth encourages entry then profitability may be depressed.

Growth rates, however, may affect bank costs as well. "*If, in rapidly growing markets, banks expand faster than market demand in anticipation of even greater demand in the future, their current average costs may be high, reflecting excess capacity*" (Heggestad, 1977). This, in turn, may result in some portfolio restructuring to improve earnings performance. Thus, the net effect of growth on profitability may be negative or positive, depending on the relative strength of the two conflicting effects. Short (1979) has found that assets growth in individual banks did not significantly affect profitability levels. He noted this assets growth can be used as a control measure for bank managers who were growth maximisers, rather than profit maximisers.

It is suggested that market growth in each country may be considered as a factor affecting individual bank performance in so far as an expanding market, particularly if associated with entry barriers, should produce the capability of earning increased profits. The rate assets' growth is also included because some banks might sacrifice profits to grow faster perhaps in order to earn higher profits in the future as a result of increasing their market share, or alternatively to gratify managers. This is enhanced by the acquisition of smaller local banks.

7.3.5. Interest Rates and Inflation

The effects of inflation can be substantial and undermines the stability of the financial system and the ability of the regulator to control the solvency of financial intermediaries. Inflation is a pervasive phenomenon with direct and indirect effects[53] on the profitability of the banks. It is not simply the rate of inflation that affects financial institutions but also the rate of change in the rate of inflation. A steady inflation will cause little trouble, since it can easily be allowed for in the charges. It is the acceleration in the rate of inflation that will expose institutions to real danger because it is not sufficient to increase the current charges in line with the current rate of inflation. Revell (1980) noted that variations in bank profitability can be strongly explained by the level of inflation.

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[53] A direct effect is one caused immediately by the rise in prices, including a rise in the price of labour, whereas an indirect effect is one that strikes at financial institutions through some secondary phenomenon influenced by inflation. Some of these secondary phenomena are obvious, such as changes in interest rates, asset prices, and exchange rates.

The direct effects of inflation on the operations of financial institutions are limited, and the main impact has come from various indirect effects. Inflation affects the banks in three main ways: through the inexorable rise in operating costs, through the need for increased risk provision, and through the volatility of interest and exchange rates. The most important route by which the influence of inflation reaches banks in through the rise of staff cost. Since staff cost is the major non-interest expense, accounting for 10 to 25 percent of a bank's total income (Sinkey, 1998), an increase in this expense category is expected to reduce bank profits. Its effect depends on the assumption that wages and other non-interest costs are growing faster than the inflation rate (Bourke, 1989).

An important indirect influence on commercial banks lies in the impact of inflation on their customers and the consequent changes in the demand for different kinds of financial services. Unexpected rises of inflation cause cash flow difficulties for borrowers which can lead to premature termination of loan arrangements and precipitate loan losses (Hoggarth et.al., 1999). Furthermore, inflation is one of the main routes through which it is possible to affect the operations and margins of banks through interest rates. Although this phenomenon has long been recognised, it was first mentioned in the literature in terms of the 'endowment effect', a phrase coined by the National Board of Prices and Incomes (1967) to refer to the widening of the margin of London clearing banks as interest rates rose. The endowment effect came from the particular method adopted to charge for current account services.

The traditional theoretical approach to this problem points out that the reduced equilibrium interest rates, which are caused by lower inflation, have negative effects on profitability, if a part of the banks' liability is composed of interest free or low interest rate deposits. Specifically, lower general interest rate level, with unchanged cost for deposits of this category, causes lower weighted average net revenues from interests and, consequently, lower profitability. This constitutes a simplification to the extent that a significant part of the assets of a modern banking system is composed of fixed interest rate claims, such as public securities, mortgage loans with fixed interest claims, etc. With such a portfolio structure, the bank possibly will benefit from a lower inflation rate, only if the adaptation of such asset elements' interest rates is remarkably slower than the respective adaptation of the other portfolio elements' interest rates. The final result depends on the total structure of the banks' portfolio on aggregate.

These approaches are based on a theoretical framework which accepts that the banks operate in a non fully competitive environment. For some economists, the model of the fully competitive banking environment is of special interest. According to this pattern all interest rates, as long as these reflect the prices of the financial services, are totally flexible, and, consequently, they can bring forward either losses or gains in the banks.

Taking into account the existence of these opposing factors, the problem acquires a purely empirical content. The basic channel through which the expected inflation rate acts upon the banks' profitability is the equilibrium interest rate. Given that the anticipated inflation rate is reflected in the long-term interest rate the long-term interest rate in several countries increasingly influences the net revenues from interests and these in tern influence positively the ratio of the net profits over the assets. From the above, some economists concluded that the expected fall in inflation in 1990s would have propitious effects on the operations of the banking system.

The effects of inflation or real bank profits has been widely discussed in the economics and finance literature. Two competing and conflicting models exist. Kessel and Alchian (1962), Alchian and Klein (1973), and Santoni (1986) support the view that unanticipated inflation imposes a wealth loss on commercial banks, since every bank is a net monetary creditor[54] (i.e. their monetary assets are greater than their monetary liabilities). Commercial banks are, in effect, intermediaries in a *wealth-transfer*

[54] An entity is a monetary creditor when its monetary assets (i.e. legal claims or rights to fixed number of dollars, currency, bank deposits, bonds, notes now or in the future) exceed its monetary liabilities. The monetary assets denominated in nominal terms (loans, investments etc.) plus the real assets (real estate, building etc.) must equal monetary or nominal liabilities plus equity. Since banks' real assets are less than the value of bank equity, in order for the balance to balance, monetary assets must be greater than monetary liabilities. Thus, banks are net monetary creditors.

process. Unanticipated inflation[55] transfers wealth from net monetary creditors to net monetary debtors. Fluctuations in the nominal rate of interest caused by unanticipated inflation will form the mechanism which leads to wealth transfers. The nominal rate of interest fails to reflect rising prices because estimates of the course of future prices are biased, not because of market imperfections. Unanticipated inflation imposes a wealth loss on commercial banks since, they are invariably net monetary creditors. Depreciation of real values of monetary obligations are a real loss to the creditor and gain to the debtor. During an unanticipated inflation, the commercial banks obtain wealth from the people to whom they owe the deposits (as their real value declines), but they lose even more to the people who are indebted to the bank. Rising prices would then decrease the value of their assets more than diminishing the value of their monetary liabilities. Consequently, banks will lose during an inflation period. In this way, the inflation imposes a *"private tax" (or wealth redistribution)* on holders of money and monetary assets. A major beneficiary therefore is the government since it is typically a net monetary debtor to the rest of the community and gain at the expense of the holders of the governmental obligations, both interest-bearing and non-interest bearing. In other words it gains from its monetary liabilities, which serve as money, and also from its monetary debts (bonds and notes), which are held by the public. If the rate of inflation is fully anticipated, the nominal rate of interest negotiated in debt instruments increases just enough to maintain the real rate of interest unchanged.

There are two problems with this approach. On empirical level it is very difficult to measure expectations and know to what extent nominal yields in fact reflect those expectations. The second problem is that the net monetary position does not reveal all types of transfers of economic resources between government and the private sector. Some of these mainly related to taxation and accounting principles. For Kanniainen (1979), it is not enough to know the net monetary position of an economic agent. Information is also needed about the responsiveness of yields and rates of financial assets and liabilities to the rate of inflation. Furthermore, the heart of the debtor-

[55] Anticipated inflation is this for which people foresee the timing and extent of the inflation and they plan and act accordingly. Inflation in which people inaccurately forecast (usually underestimate) the extent of the inflation is unanticipated inflation.

creditor hypothesis is the assumption that inflation is not fully anticipated and that therefore interest rates fail to reflect completely price level changes. This is why Hong (1977) found no evidence of transfers from creditors to the government.

On the other hand, the inflation tax school has argued that since banks' demand deposits are a portion of the money supply, they should capture a portion of the inflation tax and therefore gain during an inflation due to the fact that inflation acts as a tax on cash balance holdings. Many writers have mentioned that point, as the real value of cash balances decreases when prices rise. For a stationary economy, this tax is equal to the inflation rate times the cash balance held. In an economy where the right to issue the medium of exchange is a monopoly of the government, the tax is the equivalent of government revenues[56]. However, when the right to issue the medium of exchange is shared with private money issuers (banks), the tax proceeds are shared. The revenues accruing to the private money issuing firms are equal to (1-q) times outstanding balances issued times the inflation rate, where q is the reserve-deposit ratio[57]. Commercial banks then should gain during inflation because they collect a portion of the inflation tax.

For Perry (1992) both Alchian and Kessel and the inflation tax school are correct, but under special and different circumstances. In brief, if inflation is unanticipated and continues to be unanticipated, then banks, being net monetary creditors, will lose. On the other hand, if inflation is fully anticipated, all interest rates will rise to include an inflation premium; the real value of all assets and liabilities, except demand deposits and reserves, will then be changed. Demand deposits, net of reserves, however will shrink in value as prices rise. Consequently, the liabilities of the bank fall in real terms and banks gain. Whether banks gain or lose depends crucially on the particular circumstances of expectations and portfolio adjustments. For Perry, with greater indexing and more correct anticipation of future inflation, the banks can gain from

[56] Government gains command over real resources by issuing money. The public gives up command over real resources of an equal magnitude owing to a decline in the real value of its existing monetary holdings.

[57] This assumes no interest is paid on demand deposits issued.

inflation. Since banks are net monetary creditors, they will gain as inflation becomes anticipated relative to a situation of unanticipated inflation. Further, as adjustments to inflation are more rapid and more complete, banks gain.

For Santoni (1986), changes in anticipated inflation have similar effects to those of unanticipated inflation because both reflect a misguess about inflation and cause nominal interest rates to rise unexpectedly. On the contrary, the anticipated inflation has no real effect on the bank's capital and, therefore, on the wealth of its stockholders since all values of all nominal instruments in the bank's balance sheet will be higher at maturity. In this case, the nominal rate of interest negotiated in debt instruments increases just enough to maintain the real rate of interest unchanged. The bank will also gain as inflation becomes anticipated relative to a situation of unanticipated inflation.

Hoggarth et.al. (1999) also mention that high and variable inflation has a major impact on bank earnings. Firstly, it creates great difficulty for the "assessment of loan decisions", since a loan arrangement which performs at the anticipated rate of inflation may turn out to be much more marginal if inflation is unexpectedly low and realised interest rates thus unexpectedly high. Uncertainty about future inflation may cause problems in planning and in negotiation of loans. Finally, high and variable inflation encourages bank financing investment in property markets, an investment strategy which may lead to market losses or great profitability according to the implemented monetary policy.

7.3.6. Other Issues

Performance is also influenced by numerous other forces that are frequently described as "demand" factors. While all demand factors cannot be identified or quantified, Kaufman (1965) believes that levels and changes in population and income may reasonably be assumed to be among the most important (also Yeats, 1974). Nelly and Wheelock (1997) conclude that state per capita income in US exerts a strong positive statistical effect on state bank earnings while income growth explains a relatively small amount of the variation in bank earnings. On the other hand, Heggestad (1977) found that per capita income does not affect bank profits. In any case, we suspect that per capita income may not be a good proxy for economic shocks that most directly affect bank earnings -for example, oil crises or commercial real estate crashes. A sharp downturn in a sector, such as real estate, could dramatically affect bank earnings without having a large impact on per capita income.

Schranz (1993) conducts an empirical test examining whether banks that operate in an environment in which takeovers are possible perform better than banks in environments in which takeovers are impossible or highly unlikely. The evidence indicates that firms in the U.S. states with an active takeover market are more profitable than those in markets restricting takeovers; takeovers do provide an incentive for managers to improve firm performance. Saunders (1994) argues that allowing banks to be acquired by other financial companies or even commercial firms would impose monitoring and create incentives for efficiency and value-maximising behaviour. This fact gave rise to Vennen (1996) to address the question whether acquisitions and mergers improve the performance of the institutions involved. He examines the EC banking since deregulation and harmonisation efforts have triggered a substantial increase in the takeover activity among credit institutions. The results indicate that domestic mergers among equal-sized partners significantly increase the performance of the merged banks. On the other hand, domestic takeovers are found to be influenced predominantly by defensive and managerial motives such as size maximisation. In such cases, the banking consolidation trend is not driven by the market forces but by the public policy intervention. Boyd and Graham (1991) have identified aspects of public policy, which arguably do produce non-market incentives for consolidation, especially larger average bank size. For Peristiani (1997) the profitability and operating cost performance of the surviving banks after the merger are greatly influenced by balance sheet attributes (e.g. asset quality) and other bank characteristics.

Fraser and Rose (1972) mentions as determinants of bank performance changes in the community's economic base, demand for banking services by local households and business firms, bank operations, monetary policy, and the nature of nonbank competition. Growth in employment, reflecting favourable economic conditions, is expected to result in improved bank performance. Zimmerman (1996) found that regional employment conditions are a significant contributing factor for both community bank asset quality and ROA.

Nelly and Wheelock (1997) believes that greater geographic diversification would make it easier for banks to offset losses incurred in one region with profits from another, and it would, presumably make the industry less vulnerable to localised economic distress like that of the 1980s and early 1990s in the US. Haslem (1968) found that the effects of location on profitability are not important (these effects are important only to bank managers and others).

Tirtiroglou and Daniels (2000) suggest strongly that the regional heterogeneity of US banking geography and its temporal dynamics are important determinants of bank performance. On the other hand, Zimmerman (1996) suggests that location is an important factor in determining profitability. Prasad and Harker (1997) found that in the competitive environment of retail banking, neither IT capital not IT labour investments should make significant impacts on the firm's profitability. The results bear this hypothesis out: IT investment has zero or insignificant effect on bank profitability.

The use of GDP growth as a variable does not feature extensively in the literature. However, Hoggarth et.al. (1999) conclude that the behaviour of real GDP fails to explain the greater variability of banking sector profits in the UK than in Germany. In the former country, average profitability is higher than in the latter. But they do not say that GDP variability did not affect profits, only that they could not use it to explain different UK/German banks performance.

7.4. Concluding Remarks

The purpose of this chapter has been to review the literature on bank performance studies. In general, the SCP framework appears to be widely used to evaluate bank performance in and across banking areas. We find that bank performance is usually evaluated by profit measure (ROA and ROE) and the determinants of profitability are explained by, internal and external factors to the banking firm. The main internal factors appear to relate to management-controlled variables such as the level of risk included in their balance sheets, expense management, the level of capital in a bank, and the level of liquidity. The external factors seem to be those that are influenced by specific banks' decisions and policies such as regulation, concentration, interest rates, and inflation. The following chapter will deal with the model specification and the examination of the specific factors affecting European bank profitability.

Chapter 8

"Determinants of Bank Profitability – Econometric Analysis"

Abstract

As the EU banking industry continuously evolves, changes in industry composition and in the macroeconomic environment have a direct impact on the aggregate performance of the industry. This chapter quantifies how internal determinants ("within effects" changes) due to changes in the balance composition and external factors ("dynamic reallocation" effects) due to market share changes and the macroeconomic environment contribute to the performance of the EU banking industry as a whole in 1994-1998. We construct OLS and fixed effects models, and the results provide a new perspective for understanding the impact of changes in competition on the performance of the EU banking industry.

Chapter 8: Determinants of Bank Profitability – Econometric Analysis

8.1. Introduction

The main aim of this chapter is to identify the determinants of European banking profitability, over the period 1994-1998. The purpose is to describe the model and present the estimation results. A linear function of a multiple regression equation, on a pooled cross section time series sample, is utilised to test the effects of firm and market specific variables on bank profitability. Estimation results indicate that the return on assets models provide more robust estimates than the return on equity models.

8.2. Estimation Procedures

Haslem (1968) mentions that aggregate profitability estimating equations were designed to serve three purposes: (1) to give bank management and other interested private parties -such as bank stockholders, bank customers, and investors- insight into the operating relationships that best predict bank profitability; (2) to develop a set of equations that consider the fact that banks must, in the short run, operate in a particular regulation framework; and (3) to assist legislators and bank regulatory officials to understand better the effects of bank statutes, regulations, and policies of bank profitability.

8.2.1. Multiple Regression Analysis

The literature generally comes to the conclusion that the appropriate functional form for testing is a linear function although there are dissenting opinions. Short (1979) investigated this question and concluded that "*linear functions produced as good results as any other functional form.* On the other hand, Graddy and Kyle (1979) have noted that studies estimating performance equations with single equation methods ignore important statistical properties associated with the interdependence among the variables and among the disturbances across equations.

The vast majority of bank performance studies use multiple cross-section regression analysis in their estimation procedure [Kaufman (1965), Haslem (1968, 1969), Fraser and Rose (1971), Yeats (1974), Heggestad (1977), Short (1979), Curry and Rose (1984), Wall (1985), Smirlock (1985), Clark (1986), Bourke (1988), Meinster and Elyasiani (1988), Molyneux and Thornton (1992), Berger (1995)]. The separate cross-sections provide a comprehensive treatment of the sector and determine whether the results are stable over time and across competitive environments. In multiple regression the relation between the dependent variable and a number of explanatory variables is examined. The model assumed can be described as:

$$y = b_0 + b_1x_{1i} + b_2x_{2i} + \ldots + b_nx_{ni} + u_i, \quad i=1,2,\ldots,n$$

The errors u_i can be attributed to errors from lack of inclusion of all relevant factors, errors of observation or measurement, errors in the specification of the relationship between y and x's, and a basic element of randomness in economic behavior.

The intercept term, i.e. the average value of y when x_i and u_i are equal to zero is the b_0 and $b_1 \ldots b_n$ are called partial regression coefficients. Gujarati (1995) stated that "*...a partial regression coefficient reflects the (partial) effect of one explanatory variable on the mean value of the dependent variable when the values of other explanatory variables included in the model are held constant*". He, also, noted that the above characteristic enables the researchers not only to include more than one explanatory variable in the model, but also to "isolate" the effect of each x variable on y from the other x_i variables included in the model.

Generally, whether the objective is to explain interbank differences in costs, revenues, profits, or loan rates, several explanatory variables are isolated which vary systematically among banks, and which at least partially explain differences in the dependent variable. The explanatory variables which are shown to be theoretically relevant, and statistically significant, are then interpreted literally and designated as having causal characteristics.

For example, following Smirlock (1985), the traditional and efficient structure-performance hypothesis can be tested by estimating the profit equation shown below:

$$P_{ij} = a_0 + a_1CR + a_2MS + X$$

where P is a profit measure, CR is a measure of market structure (usually concentration measure), MS is a measure of market share, and X is a vector of control variables which are included to account for firm- and market-specific characteristics. The traditional SCP hypothesis can be verified by finding a_1 greater than zero and a_2 equal to zero; and the efficient hypothesis by the finding that a_1 equals to zero and a_2 is greater than zero.

Kwast and Rose (1982) use a statistical cost accounting model that accounts the differences in market structure, regional demand and supply conditions, and macroeconomic factors. Flannery (1981) employs an alternative framework for evaluating the impact of market rates on bank profits, which has the advantage of utilising only reported bank data. It is based on the terms of a single valuation formula:

$$V=\text{sum}[(R_t-C_t)/(1+i_t)^t], \quad t=1,...$$

where: V=current market valuation of the firm's equity, R_t=gross after tax revenues in period t, C_t=total after tax costs incurred in period t, i_t=the discount rate applied by the market in period t.

A number of studies have recently attempted to explain cross sectional variations in selected characteristics of commercial bank operations through *least squares regression analysis*. While this general method of analysis is simple and straightforward, it does not take into consideration the possibility that one or more of the selected explanatory variables in a specific regression equation may actually represent a more general interaction of influences, either endogenous or exogenous. Further, this approach omits any specific check on the possibility that sets of two or more of the regressors are actually measuring similar proportions of the systematic variation across banks e.g. as the number of alternative measures computed from one cross section sample is increased, an increasing number of the measures tend to reflect slightly different mutations of the same limited set of basic factors. From an interpretative point of view the practice of selecting one of the several alternative specifications of structure while ignoring any interaction among variables included in the regression model is completely justifiable only if the significant independent variables are in fact not related to any other causal factors and are proxies for nothing except the literal measure they purport to reflect.

For Clark (1986) the application of OLS to such a model must necessary imply one of three possibilities. First, the economic structure underlying the determination of a bank's profit rate can be adequately described through the use of a single structural equation. A second possibility is that the structural equation is part of a simultaneous-equations system. The application of OLS to a structural equation in a system of simultaneous equations will result in biased and inconsistent estimates of the parameters of the structural equation (Graddy and Kyle, 1980). A third possibility is that the model is a reduced-form model derived from an underlying simultaneous system of structural equations. If so, the coefficients being estimated are reduced-form coefficients rather than the desired structural parameters. Heggestad (1979) characterises the equations that relate bank performance measures to measures of market structure and other independent variables as reduced form equations. Some of the independent variables that are commonly included in these equations violate the characterisation as reduced forms and bias the estimates of the influence of market structure on performance.

Haslem (1968) uses the Wherry-Doolittle program to select the most potent combination of twenty-seven explanatory operating ratio variables adjusted for intercorrelation. This program selects independent variables in the order of highest correlation with the dependent variable, e.g. in this study the ratio of net income after taxes to total capital accounts, and the lowest correlation with any independent variable previously selected. The procedure is initiated by selection of the independent variable that has the largest simple correlation with the dependent variable.

Some authors use 2SLS or 3SLS [e.g. Graddy and Kyle (1980)] techniques for the estimation of the model. Meinster and Elyasiani (1988) point out that the 3SLS technique has two advantages over the use of OLS in the single equation models: avoidance of simultaneous equation bias and increased efficiency. In the single equation models an implicit assumption is that the cause and effect relationship is unidirectional. In bank performance modeling, however, there typically exists substantial interdependence or mutual causality. The use of OLS under these conditions leads to biased and inconsistent estimators since it does not utilise the information of cross equation relationships. Additionally, Flannery (1983) employed regressions which were estimated simultaneously for each bank using Zellner's 'seemingly unrelated' method, since the net income includes more than just the difference between revenues and costs at any time, there is no fixed relationship among the estimated regressions' dependent variables. This approach yields noticeably more efficient estimates of the underlying parameters than ordinary least squares. Moreover, Zellner generates covariances between coefficient estimates in different equations, allowing more accurate comparisons of the revenue and cost adjustments in market rate changes.

The isolation of the effect of each qualitative explanatory variable is accomplished by using "dummy" variables which assumed the values of zero or one [Haslem (1968)]. Dummy variables have been widely used in econometric research to represent attributes such as temporal effects, qualitative variables, and quantitative variables where only broad groupings are relevant.

In order to examine the percentage of the total variation in the dependent variable explained by all the independent variables, the multiple coefficient of determination, R^2, is utilised. The R^2 is calculated by dividing the Error Sum of Squares (ESS) by the Total Sum of Squares (TSS) of the dependent variable.

Finally, the overall significance of the model of the estimation regression line is provided through the use of the F-test [Fraser and Rose (1971, 1972)]. The F-test based on the ratio of the regression mean square to the residual mean square is appropriate for testing the hypothesis: H_0: $b_1 = b_2 = \ldots = b_n = 0$. If true, this implies that the variation in the response y is simple chance variation. In other words, the F-values computed to measure the significance of the ratio differences are partial F variable ratios. These partial F-values result from the use of analysis of variance to test the significance of the partial regression coefficients for the explanatory effects.

8.3. The Process and the Data

The balance sheet and the income statement are obtained from the Fitch - International Bank Credit Analysis Ltd. (IBCA) Bankscope database. Accounting information are from the full spreadsheet and raw data files. This source provides data for the period 1992-1999. All of them have been consolidated on the 31st of December of each year and are calculated in US$. However, since the availability of data for early years (i.e. 1992, and 1993) and 1999 is short, we work with a balanced sample covering all the EU banking industries in the period 1994-1998. The main objective in choosing the particular sample period and their respective data is to utilise the most recent year-end financial data that are available in the new European economic and monetary environment that has been created.

The data was pooled to account for simultaneous consideration of intermproval movements and cross sectional differences. However, in our case with firm level data, there are typically large numbers of cross sectional units, but few time series observations on each firm. We therefore also approach panel techniques from the opposite direction, seeking to exploit the time series dimension of the data in order to achieve more powerful tests than are available based on pure cross sectional estimations. So, in addition to the pooled time series cross sectional regressions, the models also were estimated as a series of five year-by-year cross-sectional regressions, If the results are similar, this suggests that the findings are robust with respect to the pooling approach, the sample composition, and the period estimated. The analysis is extended to cover the different types of financial institutions i.e. commercial banks, savings banks, cooperative banks, and mortgage banks. Also we split the whole dataset in two parts; one covering large banks (total assets of over US10bn in 1998) and small banks that include all the other financial institutions. Regression models, with the TSP-43 econometric package, using pooled time-series cross-sectional data for banking sectors across Europe will be utilised in our econometric analysis.

The data were reviewed for reporting errors and other inconsistencies. For example, in some cases banks reported negative assets. Where possible, in these cases, values were imputed by assuming a constant rate of growth between two correct data points. In some such cases it seemed obvious that these should in fact be set to zero. In a very few cases observations were dropped from the sample. It was finally decided to drop from the sample these yearly observations where the absolute value of the return was 100 percent or larger.

A very particular and careful attention must be paid to the problem of consolidation which meaning differs from the concept applied at the United States. While in the United States consolidated financial statements mean information covering domestic activities and activities carried out abroad as well, in Europe consolidation refers to the aggregate activities of subsidiary banks, fund management companies, leasing companies, factoring companies, asset management companies, dealers and joint venture companies. In this case, the unconsolidated data from the parent company will be used. When such a procedure is followed, the only information lost is related with non-bank subsidiary companies. Profits from these companies may be considered negligible when compared to the core activities of banks. Therefore we assume that the current research will not introduce biased results on estimation procedures or inconsistency on hypothesis testing in the models that will be developed. Additionally, the unconsolidated data are used to make the bank information as country specific as possible.

The data in the sample also include accounts for foreign bank subsidiaries. We do not omit these data on foreign bank subsidiaries for the following reasons. One of the major problems with concentration-profit analyses is defining the extent of the market. As there is no sub-market data officially available for different European countries, we choose the simplest and broadest market definition – total banking sector assets in each particular country. As we aim to evaluate banking industry performance across different European markets, and as our market definition includes the assets of both domestic and foreign banks, it seems justifiable to include information on these types of banks in our analysis. The majority of individual bank data for Luxembourg and the United Kingdom are on foreign bank subsidiaries.

In the previous chapters we show that many different determinants may influence profitability. However, it is difficult to tell whether all are significant factors in bank performance, and if they are, which their relative importance is. With this limitation in mind the study now moves to exploring these relationships at the individual bank level. The underlying assumption of the empirical analysis is that the measure of the profitability reflects management efforts to maximise shareholder wealth and not engage in expense preference behaviour. The underlying economic structure which determines the profitability of the bank indicates that profit is determined simultaneously with overall bank risk and the composition of the bank's balance sheet; the appropriate structural model must provide for this simultaneity. Further, the structural model may include variables which capture the influence the risk-return preferences of the bank management (ownership), as well as any element of the market, regulatory and organisational structures may have on the return and cost attributes of the assets and liabilities selected by the bank. The whole process is not an easy one. Haslem (1969) managed to explain as much as 77 per cent of the total variation in profitability for each of his examined years by using fourteen explanatory variables (two qualitative and twelve ratios) to do it.

In banking, output and productivity are difficult to be estimated due to definitional problems, joint products, and conceptual issues about which services a bank actually provides. To avoid this problem, researchers interested in the performance of the banking industry have often looked at profitability. Using accounting data has some appeal. First, market data are typically available only for the largest firms in an industry, so they clearly are more limited than accounting data. In addition, regulators rely heavily on accounting figures in their evaluation of a firm's financial condition. The earnings quality of European banks will be examined through the use of the return on assets (ROA). Similar are the results if we use the return on equity (ROE). In both cases the profits are taking before tax to cover the different taxation systems that are implemented across Europe. For example the tax figure reported on a firm's annual statements may include tax credits or carry-forwards that do not pertain to the current year's performance.

As reported earlier, the literature review on bank performance studies suggests that bank profitability is determined by factors both internal and external to the bank. Since the performance measure is not risk-adjusted, we employ four variables to account for firm-specific risk. The *loan-to-assets ratio (LA)* provides a measure of risk since loans are riskier and have a greater expected return than other bank assets, like government securities. Thus, one would expect a positive relationship between this variable and the performance measure. It could be the case, however, that banks that are rapidly increasing their loan books have to pay a higher cost for their funding requirements and this could reduce the positive impact on profitability.

The *equity-to-assets ratio (EA)* is also included as a measure of the overall capital strength. The ratio is a measure of capital adequacy, and should capture the general average safety and soundness of the financial institutions. A deterioration of the equity-to-assets ratio indicates either an increase in debt financing of banks' total assets (while holding total assets constant), or a decline in banks' total assets (while holding total equity constant), or both over time and space. Irrespectively, this is an increase in banks' risk, and potentially, in banks' cost-to-capital. The theory of capital structure states that a higher use of debt (equity) financing within a certain range, called the target capital structure, might actually reduce (increase) firms' cost of capital. Thus a positive (negative) coefficient estimate for equity-to-assets indicates an efficient (inefficient) management of banks' capital structure.

According to some authors the equity (capital)-to-assets ratio is negatively related to the total revenue dependent variable, since lower capital ratios should lead to higher bank revenues[58]. Accounting to conventional wisdom in banking, a higher capital-to-assets ratio is associated with lower profitability. A higher capital-to-assets ratio tends to reduce the risk of equity and therefore lowers the equilibrium expected return on equity required by investors. In addition, a higher equity-to-assets ratio lowers after tax earnings by reducing the tax shield provided by the deductibility of interest payments. Moreover, the reduced risk from a higher capital ratio may depress earnings by lowering the value of access to federal deposit insurance (as is the case in the United States) that at best imperfectly prices risk. Despite these arguments, the data on banks in 1990s tell a very different story. Book values of capital-to-assets ratio and

[58] Molyneux (1993) states that: "*As lower* [equity-to-assets] *ratios suggest a relatively risky position, one would expect a negative coefficient on this variable, although it could be the case that high levels of equity suggest that the cost of capital is relatively cheap and therefore this variable may have a positive impact on profitability*".

profitability are positively related, and this relationship is both statistically and economically significant. According to Berger (1995) there are a number of potential explanations for the positive capital-earnings relationship. An increase in capital may raise expected earnings by reducing the expected costs of financial distress including bankruptcy. Also, an increase in earnings may raise the capital ratio, provided that marginal earnings are not fully paid out in dividends. Higher capital-to-assets ratio may also cause higher profitability if the higher capital reduces risk-related barriers to entry or expansion into some profitable product lines. Banks that increase capital and reduce their risks may be better able to avoid issuing off-balance-sheet guarantess, such as loan commitments and standby letters of credit. Safer banks may also be able to borrow uninsured funds more easily to pursue high revenue on-balance-sheet investment opportunities as they arise.

The *provisions for loan losses-to-total loans (PLL/TL)* ratio provides a measure of the capital risk. In our analysis we have the problem that the dataset does not provide figures for that ratio in Germany. So, the sample is much smaller (especially for savings and cooperative banks) compared with the case that we do not include the measure of capital risk. However, we prefer to present initially the results with the participation of that variable in order to cover the whole set of possible risks that a bank can face. Unfortunately we do not have enough data to include other credit risk measures, as are the net charge offs or the non-performing loans to total loans. Finally, as a measure of interest rate risk we include the *gap-to-assets ratio (Gap)* which is defined as the difference between interest rate sensitive assets and interest rate sensitive liabilities divided by total assets of each financial institution.

The concentration ratio and the bank market share variables are calculated on the basis of the size of the national markets, i.e. total banking sector assets. Concentration is measured country by country in terms of assets, either by the *3-firm concentration ratio (conc)* or the *Herfindahl index (H)* [59]. The 3-firm concentration ratio for each country is defined as the sum of the market shares of the 3 firms with the largest

[59] This index is calculated as the sum of the squares of the market shares of the several banks in a country.

market shares, where market share is measured in terms of the book value of assets. Table 36 presents this Herfindahl index for the several EU countries. *Firm-specific market share (MSH)*, defined as the bank's assets divided by total value of assets of all banks in a given country and in Fitch's Bankscope. These measures are used to capture for both the traditional concentration-performance relationship and the efficient hypothesis.

Empirical industrial organisation literature has shown that the distribution of firm sizes within many industries and countries can often be approximated by various skewed distributions of which the most widely used is the lognormal. The size effect is captured by the *natural logarithm of the total assets for each financial institution (lnassets)*. The log of assets is used instead of assets in order to reduce the scale effect. This variable controls for cost differences related to bank size and for the greater ability of larger banks to diversify. The first factor would lead to positive coefficient for profitability if there are significant economies of scale and the second to negative coefficients if increased diversification leads to lower risk and thus lower required returns.

Quite sophisticated meaures of both scale efficiency and X-efficiency are discussed in the literature (Berger and Hannan, 1998). In general, these require estimating a cost function for banks, which is feasible only for a sufficiently long time series. For the purpose of the analysis here, we have decided to follow a simpler approach and measure inefficiency as the ratio of *overheads*, which is available as a cost item in the income statement *to total assets (OA)* in each year and for each bank. We expect an inverse relationship with profitability.

A last group hypotheses concerns macroeconomic conditions. The evidence suggests that bank performance is sensitive to macroeconomic conditions despite the trend in the industry towards greater geographic diversification and greater use of financial engineering techniques to manage risk. We also introduce the *level of interest rates (IR)* and their *variability (VAR)*. We use the three months interbank rate for each European country from Datastream (we do not have data only for Luxembourg). Drawing data for all countries from the same source ensures comparability across the measures. The variability is measured as the standard deviation of weekly rates around their annual average[60].

Finally we include the *growth rate of the GDP (dGDP)* and of *the gross personal income (dGPI)* for each EU country (Table 37). Both of them affect numerous factors related to the supply and demand for loans and deposits. One might expect bank profitability to be driven by real GDP for a number of reasons. First, bank asset quality will depend on the position in the cycle. Loan loss provisions will be related to default risks. These will be greater in downturns than in upturns, so that bank profitability will be positively correlated with GDP growth. One can also view GDP as measuring the size of the market in which banks operate. In upturns, there will be higher demand for bank credit than in downturns. If the number of banks operating across the cycle is constant, one would, under conditions of imperfect competition, expect bank profitability to be positively related to market size as measured by GDP. However, the coefficient may also be negative because countries with higher GDP or GPI are assumed to have a banking system that operates in a mature environment resulting in more competitive interest and profit margins (see also Goldberg and Rai, 1995). These data have been taken from national statistics published in the IMF's International Financial Statistics and the OECD. These factors could well be important for the experience of EU banks, which since 1994 have operated under conditions of relative high GDP growth and falling interest rates. Ireland shows the highest growth rates of real GDP, which has had an average growth rate of more than three times the average. Greece and Portugal are followed.

[60] The level of interest rates is used instead of the rate of inflation in order to avoid *multicollinearity problems*. The rate of inflation is an important factor and is related to the endowment effect from interest free deposits. Higher inflation means a higher opportunity cost of leaving funds in interest free deposits. This opportunity cost accrues to the bank, as it lends out funds at a nominal rate, which reflects the rate of inflation. This would lead one to expect a positive relationship between inflation and bank profitability. One could also hypothesise, however, that there are positive wealth effects for banks associated with unanticipated decreases in inflation (one can also see Chapter 7).

Table 36: Herfindahl Index

	1994	*1995*	*1996*	*1997*	*1998*
Austria	1729.9270	980.0316	896.7714	1083.725	1188.844
Belgium	1118.844	1126.925	1136.7100	1072.614	1577.4100
Denmark	1635.887	1574.126	1585.333	1668.864	1658.684
Finland	2686.742	3637.543	2619.994	2375.813	2467.619
France	470.3594	442.3404	506.4851	484.6482	505.8327
Germany	249.2857	268.3548	295.3182	336.9897	388.2777
Greece	2614.607	2458.620	2274.645	1872.306	1893.5400
Ireland	2668.041	2252.634	1787.994	1710.970	1381.825
Italy	458.8573	430.4616	491.0702	470.5402	600.2837
Netherlands	2243.365	2147.712	1994.9500	2339.049	2399.371
Portugal	980.5929	985.0205	907.1316	872.1221	989.9542
Spain	810.4091	798.7463	764.5571	808.7134	849.4669
Sweden	1244.994	1220.772	1087.534	1276.652	1360.512
UK	706.6012	646.2008	545.6745	657.7967	641.3557

Source: Own calculations based on Fitch-IBCA Bankscope database

Table 37: Real GDP Growth of EU countries (1994-1998)

	1994	*1995*	*1996*	*1997*	*1998*
Austria	na	na	0.0324	0.0286	0.0349
Belgium	0.0491	0.0440	0.0216	0.0492	0.0431
Denmark	0.0728	0.0456	0.0506	0.0481	0.0466
Finland	0.0603	0.0809	0.0377	0.0848	0.0876
France	0.0362	0.0359	0.0253	0.0315	0.0403
Germany	0.0497	0.0385	0.0181	0.0237	0.0298
Greece	0.1338	0.1202	0.1059	0.1052	0.0749
Ireland	0.0798	0.0757	0.1247	0.1019	0.1508
Italy	0.0576	0.0812	0.0643	0.0428	0.0423
Netherlands	0.0322	0.0226	0.0304	0.0379	0.0366
Portugal	0.0869	0.0813	0.0635	0.0624	0.0777
Spain	0.0545	0.0581	0.0586	0.0605	0.0634
Sweden	0.0412	0.0369	0.0108	0.0198	0.0295
UK	0.0443	0.0277	0.0255	0.0351	0.0264

Source: IMF International Financial Statistics and OECD

The sample includes 685 European banks (138 large banks and 547 small banks) (Table 38). If we do not include the loan loss provisions ratio the sample comprises of 2,162 European banks because, as we hane already mentioned above, we include the German banks that do not provide the above mentioned ratio.

Table 38: Number of banks in the sample

Country	*Large banks*	*Small banks*	*Total number of banks*
Austria	8	39	47
Belgium	7	18	25
Denmark	5	44	49
Greece	4	4	8
France	34	176	210
UK	15	51	66
Ireland	3	5	8
Sweden	4	3	7
Italy	22	149	171
Germany	1	0	1
Portugal	7	13	20
Spain	19	42	61
Finland	4	2	6
Netherlands	5	12	17
Totals	***138***	***547***	***685***

Source: Own calculations from Fitch-IBCA Bankscope database

Table 39 provides summary statistics for the variables that are used in the analysis. The profit rates have a mean of 0.9297% of total assets and a standard deviation of 1.2726%. The mean value of the loans-to-assets ratio is 54% but with the standard deviation approaching 20%. Equity is, on average, 7.7% of total assets but with a significant variation (3.92%). The overheads are 3% of total assets. The *dGDP* and the *dGPI* have similar levels for their mean values, but the *dGDP* has much higher variability. Worth mentioning is the high variability of the loan loss provisions to total loans and the market share variable (2.64% and 11.08% respectively). Also, the return on assets has a negative skewness, while OA significant positive kurtosis.

Table 39: Descriptive Statistics

	mean	*st. dev.*	*min*	*max*	*var.*	*Skew.*	*kurt.*
ROA	0.9297	1.2746	-22.6530	14.6611	1.6245	-4.7911	75.2807
Lnassets	14.5790	1.8978	9.3393	20.3752	3.6019	0.3907	0.0901
LA	54.0069	19.2529	0.3110	99.5503	370.6758	0.0861	-0.1490
Gap	0.0603	0.0485	-0.1831	0.3796	0.0024	0.1074	1.3588
EA	7.7217	3.9219	-11.2884	38.4245	15.3816	0.9458	1.6346
OA	2.9963	1.4034	0.0398	15.295	1.9696	0.8463	4.1734
LLP/TL	1.1386	2.6440	-37.0154	77.7832	6.9922	9.7118	271.7168
MSH	2.4319	11.0807	0.0015	179.0446	122.7822	9.4619	110.2415
H	786.6545	512.9612	249.2857	3637.543	263129.2	1.9231	3.3595
INT	6.1488	2.4173	3.0754	27.2734	5.8432	2.0506	12.9465
DEV	0.5234	1.1030	0.0484	22.2561	1.2388	17.5549	337.8466
dGDP	4.8098	16.3800	-37.2823	106.4748	268.3048	3.9170	24.3683
dGPI	4.6992	1.9183	-7.3847	14.0852	3.6800	1.3091	2.4003

Table 40 presents the correlation matrix for the several variables. We will select initially independent variables in the order of highest correlation with the dependent variable, and the lowest correlation with any independent variable previously selected. We find a significant positive correlation of ROA with the Gap and EA variables and negative with the LLP/TL variable. Also there is a strong negative correlation of assets with EA and OA and positive with MSH, as well as a positive one of gap with EA, of EA with OA, and a negative one of LA with EA, and of IR with DEV and dGPI (all of them expected).

Table 40: Correlation Matrix

	ROA	Lnas	LA	Gap	EA	OA	LLP	MSH	H	IR	DEV	dGD	dGPI
ROA	1.00												
Lnas	-0.12	1.00											
LA	0.09	-0.03	1.00										
Gap	**0.32**	-0.23	0.06	1.00									
EA	**0.39**	**-0.51**	**-0.39**	**0.69**	1.00								
OA	0.11	**-0.41**	0.06	0.10	**0.37**	1.00							
LLP	**-0.43**	-0.09	-0.10	-0.01	-0.01	0.12	1.00						
MSH	0.01	**0.43**	-0.01	-0.03	-0.16	-0.14	-0.04	1.00					
H	0.08	-0.02	0.02	0.01	0.04	-0.12	-0.03	0.11	1.00				
IR	0.08	-0.02	-0.18	0.07	0.16	0.14	0.02	0.04	-0.07	1.00			
DEV	0.02	0.01	-0.07	-0.01	0.01	0.03	0.03	0.03	0.16	**0.55**	1.00		
dGDP	-0.08	-0.04	-0.01	-0.01	0.016	0.02	0.03	0.02	0.12	0.19	0.04	1.00	
dGPI	0.14	-0.08	0.00	0.07	0.20	0.08	-0.02	0.05	0.22	**0.41**	0.28	0.23	1.00

8.4. Empirical Results

In order to test for the empirical relevance of the hypotheses regarding the causes of bank profitability, we adopt a multiple regression framework to analyse the panel data set that has been constructed. The basic equation we have worked with is:

$$DEP_{it}=f(\text{lnassets}_{it}, LA_{it}, OA_{it}, Gap_{it}, EA_{it}, LLP/TL_{it}, MSH_{it}, H_{jt}, INT_{jt}, DEV_{jt}, DGDP_{jt}, DGPI_{jt}) + u_{it}$$

where i refers to an individual bank, t refers to time, and j refers to the country in which bank i operates. DEP_{it} is the dependent variable and is the observation of a particular bank in a particular year.

At each stage of model building and for each group of regression results, we perform the regression with all variables included and we examine the results. We start by running OLS estimates and fixed effects estimates with the Gap, EA and LLP/TA variables as the only independent variables (Table 41). However, in the main text we will present only the fixed effects' results since they present the best estimates. The sample is comprised of 685 European banks for the period 1994-1998, or 3425 observations. The explanatory power of the model, the R-squared, is at the satisfactory level of 0.68. The standard error of the regression is 0.8069. It also seems that we do not have heteroscedasticity problems, since we conduct the Lagrange multiplier (LM)[61] test for heteroscedasticity. Since the Durbin-Watson statistic is 1.85, one may assume that there is no first-order autocorrelation, either positive or negative. All the variables are significant at the 5% level in the regression with the expected sign (the results are the same if we run the plain OLS estimates, Annex 19). The t-statistics for the Gap, EA, and LLP/TL variables are 5.0938, 8.8783, and -27.5798 respectively. Based on a Hausman test we can conclude that of the two alternatives (fixed versus random effects), the fixed effects estimator is the appropriate choice.

Table 41: Within (fixed effects) estimates (independent variables: Gap, EA, LLP/TL)

Dependent variable: *return on assets*				
Sum of squared residuals = 1782.21		R-squared = 0.6796		
Variance of residuals = 0.6512		Adjusted R-squared = 0.5992		
Std. error of regression = 0.8069		LM het. Test = 362.697 [.000]		
		Durbin-Watson = 1.8560 [.000, .000]		
Variance	***Estimated Coefficient***	***Standard error***	***t-statistic***	***p-value***
Gap	4.3817	0.8602	5.0938	[.000]
EA	0.1192	0.0134	8.8783	[.000]
LLP/TL	-0.1926	0.0070	-27.5798	[.000]
F (684, 2737) = 4.0960, p-value = [.0000]				
Hausman test H0: RE vs. FE: CHISQ(3) = 12.380, p-value = [.0062]				

[61] The assumptions of homoscedastic residual variance is often violated by the use of cross-sectional data. To investigate whether there is evidence of heteroscedasticity in the residual variance we use the Lagrange Multiplier (LM) test. The LM test is performed by regressing the residuals into the predicted values from which they were obtained. Calculating nR^2, where n is the sample size and R^2 obtained from this regression gives the test statistic. Its distribution will be chi-squared with S degrees of freedom, where S is the number of restrictions in the model. The critical chi-square values are 3.84146 (at the 55 level) and 6.63490 (at the 10% level). Values below this would reject the null hypothesis of heteroscedastic residual variance.

We then introduce in the model the two variables, the market share (MSH) and the Herfindahl index (H), to examine whether the structure-conduct-performance or the efficient hypothesis is validate (Table 42). The results for the significance and the sign of the variables Gap, EA, and LLP/TL do not change, while both the MSH and the H are not significant at the 5% level (the t-statistics for MSH and H are 0.2383 and -1.7804 respectively, while the p-values are 0.812 and 0.075 respectively). The plain (OLS) estimates differ on the significance of the structure variables; both the MSH and the H variables are significant and positive with t-value 3.0723 and 3.4366 respectively (Annex 20). The statistical figures for the regression remain almost the same. If we introduce only the MSH variable the results for the significance and the sign do not change (the same if we introduce only the H variable).

Table 42: Within (fixed effects) estimates (independent variables: Gap, EA, LLP/TL, MSH, H)

Dependent variable: *return on assets*				
Sum of squared residuals = 1780.14		R-squared = 0.6800		
Variance of residuals = 0.6509		Adjusted R-squared = 0.5993		
Std. error of regression = 0.8068		LM het. Test = 363.775 [.000]		
		Durbin-Watson = 1.8543 [.000, .000]		
Variance	***Estimated Coefficient***	***Standard error***	***t-statistic***	***p-value***
Gap	4.4710	0.8616	5.1893	[.000]
EA	0.1202	0.0135	8.9303	[.000]
LLP/TL	-0.1924	0.0070	-27.5650	[.000]
MSH	0.0027	0.0113	0.2383	[.812]
H	-0.0003	0.0002	-1.7804	[.075]
F (684, 2735) =4.0457, p-value = [.0000]				
Hausman test H0: RE vs. FE: CHISQ(5) = 17.623, p-value = [.0035]				

We then introduce the lnassets, LA, and OA variables in the model (Table 43). The R-square is improved (it is now 0.70) while the variance and the standard error of the regression are smaller (0.6138 and 0.7835 respectively). LA has a negative and significant sign (the t-statistic is -4.8493 and the coefficient -0.0144). Although conflicting results appear in the case of testing for this relationship, Molyneux and Thornton (1992) and Abdula (1994) find also a negative relationship between bank profitability and the level of liquid assets being in the balance structure of the banks. Also the lnassets and OA have positive and negative significant values respectively, as expected (the t-statistics are 9.0297 and -4.7869 respectively). The signs and significance of the other variables remain the same.

Table 43: Within (fixed effects) estimates (independent variables: lnassets, LA, OA, Gap, EA, LLP/TL, MSH, H)

Dependent variable: *return on assets*				
Sum of squared residuals = 1676.89		R-squared = 0.6985		
Variance of residuals = 0.6138		Adjusted R-squared = 0.6222		
Std. error of regression =0.7835		LM het. Test = 463.142 [.000]		
		Durbin-Watson = 1.8061 [.000, .000]		
Variance	***Estimated Coefficient***	***Standard error***	***t-statistic***	***p-value***
Lnassets	0.7347	0.0814	9.0297	[.000]
LA	-0.0144	0.0030	-4.8493	[.000]
OA	-0.1593	0.0333	-4.7869	[.000]
Gap	2.2922	0.8592	2.6677	[.008]
EA	0.2076	0.0148	14.0502	[.000]
LLP/TL	-0.1812	0.0069	-26.2436	[.000]
MSH	-0.0099	0.0111	-0.8970	[.370]
H	-0.0003	0.0001	-1.8459	[.065]
F (684, 2732) =4.4489 , p-value = [.0000]				
Hausman test H0: RE vs. FE: CHISQ(8) = 199.36 , p-value = [.0035]				

If we exclude LLP/TL, the size of the sample increases significantly (German banks are also included), the explanatory power of the model is at satisfactory levels but lower than the respective one if we include this ratio (the R-squared is now 0.6054) (Table 44). In this case LA has positive but insigificant effect on profitability, while the concentration index has negative and significant values (the t-statistic is -7.7488 and the coefficient is -0.0006).

Table 44: Within (fixed effects) estimates (independent variables: lnassets, LA, OA, Gap, EA, MSH, H)

Dependent variable: *return on assets*				
Sum of squared residuals = 3355.08		R-squared = 0.6054		
Variance of residuals = 0.3883		Adjusted R-squared = 0.5064		
Std. error of regression =0.6231		LM het. Test = 405.142 [.000]		
		Durbin-Watson = 1.7521 [.000, .000]		
Variance	***Estimated Coefficient***	***Standard error***	***t-statistic***	***p-value***
Lnassets	0.3898	0.0432	9.0142	[.000]
LA	0.0026	0.0016	1.6295	[.000]
OA	-0.3361	0.0198	-16.9455	[.000]
Gap	2.2339	0.4952	4.5113	[.000]
EA	0.1887	0.0082	21.8926	[.000]
MSH	-0.0052	0.0083	-0.6199	[.195]
H	-0.0006	0.0001	-7.7488	[.000]
F (2161, 8641) =4.9924 , p-value = [.0000] *Hausman test H0: RE vs. FE: CHISQ(7) = 574.41 , p-value = [.0000]*				

We then introduce the macroeconomic variables in the model. In this case all the values have the expected sign (Table 45). The sum of the squared residuals is further reduced, as do the variance of the residuals and the standard error of the regression (with values 1630.40, 0.5977, and 0.7731 respectively). The market structure variables do not have any influence, while the change of the GDP and the level of interest rates have significant negative and positive effects respectively (their t-statistics are -8.4756 and 4.5202 respectively). The OLS estimates show similar results, with the MSH, LA, and H being significantly positive (only the OA has not the expected sign) (Annex 21). If we exclude LLP/TL the results are similar with Table 44 (the level of interest rates has positive and significant effect on ROA, while H continues to have significantly negative impact).

Table 45: Within (fixed effects) estimates (independent variables: lnassets, LA, OA, Gap, EA, LLP/TL, MSH, H, and the macroeconomic variables)

Dependent variable: *return on assets*				
Sum of squared residuals = 1630.40		R-squared = 0.7069		
Variance of residuals = 0.5977		Adjusted R-squared = 0.6321		
Std. Error of regression = 0.7731		LM het. Test = 444.384 [.000]		
		Durbin-Watson = 1.7816 [.000, .000]		
Variance	***Estimated Coefficient***	***Standard error***	***t-statistic***	***p-value***
Lnassets	0.7022	0.0820	8.5659	[.000]
LA	-0.0119	0.0031	-3.8547	[.000]
OA	-0.1860	0.0335	-5.5549	[.000]
Gap	2.1827	0.8495	2.5695	[.010]
EA	0.1968	0.0147	13.3499	[.000]
LLP/TL	-0.1806	0.0068	-26.4952	[.000]
MSH	-0.0104	0.0109	-0.9488	[.343]
H	0.0000	0.0002	-0.2379	[.812]
INT	0.0537	0.0118	4.5202	[.000]
DEV	-0.0313	0.0171	-1.8377	[.066]
DGDP	-0.0076	0.0009	-8.4756	[.000]
DGPI	0.0142	0.0091	1.5652	[.118]
F (684, 2728) =4.5111, p-value = [.0000] *Hausman test H0: RE vs. FE: CHISQ(12) = 202.35, p-value = [.0000]*				

8.4.1. Size effects

We split the banks according to the cut-off point we have defined for the size of the financial institutions i.e. the large banks have total assets of over US$ 10,000bn in 1998. In this case the two sub-samples comprise from 138 large banks (or 690 observations) and 547 small banks (or 2735 observations) respectively. Table 46 provides summary statistics for the variables that are used in the analysis. Small banks have larger mean value for the profit rates in the examined period compared with the large banks (profits before tax have a mean value of 0.9596% and 0.8110% of total assets respectively), but also almost double values of ROA's standard deviation. Worth mentioning is the high variability of the loan loss provisions to total loans, for both size types. The mean values of LA, Gap, and EA are larger for small banks, but these banks have also larger values for OA, and LLP/TL. For large banks the equity-to-assets ratio is 5.3% (compared with 8.3% for small banks), and the proportion of overheads to total assets is 2.14% (compared with the 3.2% for the smaller banks).

Table 46: Descriptive Statistics for Large and Small Banks

Large	*mean*	*st. dev.*	*min*	*max*	*var.*	*skew.*	*kurt.*
ROA	0.8110	0.6345	-1.8991	3.0788	0.4025	0.2616	1.7023
Lnassets	17.3478	1.1644	13.5466	20.3752	1.3560	0.5390	-0.4948
LA	50.9770	18.9619	0.3110	97.0450	359.553	0.2729	0.5049
Gap	0.0480	0.0411	-0.0798	0.3796	0.0017	1.6480	8.5514
EA	5.2859	2.3928	0.9182	38.4245	5.7255	4.1684	52.4865
OA	2.1423	0.9531	0.0398	6.9137	0.9084	0.0450	1.0085
LLP/TL	0.7597	1.7693	-37.0154	15.0251	3.1304	-12.9840	309.1122
MSH	11.3737	22.5636	0.0821	179.0446	509.1184	4.3312	22.0652
H	895.4995	589.028	249.285	3637.543	346954.4	1.8710	2.9092
INT	6.2900	2.8180	3.0754	27.2734	7.9408	2.8950	17.0322
DEV	0.6127	1.7157	0.0484	22.2561	2.9435	11.7816	145.5572
DGDP	4.6188	12.1018	-37.2833	106.4748	146.4542	4.0037	35.2252
DGPI	4.7322	2.0484	-7.3847	14.0852	4.1958	0.9763	3.8788

Small	*mean*	*st. dev.*	*min*	*max*	*var.*	*skew.*	*kurt.*
ROA	0.9596	1.3887	-22.6530	14.6611	1.9286	-4.6967	66.9395
Lnassets	13.8804	1.3215	9.3393	16.2905	1.7462	-0.4624	-0.4539
LA	54.7713	19.2539	1.7728	99.5503	370.7129	0.0395	-0.2683
Gap	0.0635	0.0497	-0.1831	0.2352	0.0025	-0.1659	0.7780
EA	8.3362	3.9932	-11.2884	24.3390	15.9455	0.6543	0.3789
OA	3.2117	1.4168	0.1328	15.2950	2.0073	0.8285	4.5287
LLP/TL	1.2342	2.8147	-30.9892	77.7832	7.9226	10.8358	250.9740
MSH	0.1761	0.4430	0.0015	5.9298	0.1962	6.7401	57.6223
H	759.1945	488.2174	430.4616	3637.542	238356	1.9282	3.1720
INT	6.1132	2.3044	3.0754	27.2734	5.3104	1.6125	9.7318
DEV	0.5009	0.8984	0.0484	22.2561	0.8071	20.9772	502.1211
DGDP	4.8580	17.2945	-37.2822	106.4748	299.0992	3.8192	22.2696
DGPI	4.6909	1.8844	1.7948	14.0852	3.5511	1.4122	1.8601

Table 47 presents the correlation matrix for the several variables in the two size categories. We find a significant positive correlation in both categories for ROA with with Gap and EA, Gap with EA (especially for small banks), EA with OA, and IR with DEV and dGPI. Also there is a negative correlation of Lnassets with EA for both large and small banks. Moreover, for large banks there exist a significant positive correlation of LA with the Gap and the EA, ROA with LA, OA with IR, and the deviation of the interest rates with dGPI. Finally, for small banks there is a strong negative correlation of ROA with the LLP/TL, and Lnassets with EA, and a positive one of Lnassets with the market share of the financial institutions. There does not seem to exist any collinearity problem.

Table 47: Correlation Matrix of Large and Small Banks

Large	ROA	Lnas	LA	Gap	EA	OA	LLP	MSH	H	IR	DEV	dGD	dGPI
ROA	1.00												
Lnas	-0.16	1.00											
LA	**0.30**	-0.09	1.00										
Gap	**0.26**	-0.08	**0.25**	1.00									
EA	**0.51**	**-0.34**	**0.30**	**0.40**	1.00								
OA	0.25	-0.14	0.01	-0.17	**0.32**	1.00							
LLP	-0.08	-0.02	-0.04	-0.07	0.01	0.17	1.00						
MSH	0.14	**0.52**	0.06	0.07	-0.12	-0.04	-0.04	1.00					
H	0.01	-0.01	0.08	0.02	-0.01	-0.14	-0.02	0.11	1.00				
IR	0.12	-0.15	-0.03	-0.12	0.14	**0.29**	0.06	0.04	0.10	1.00			
DEV	0.08	-0.07	-0.07	-0.05	0.02	0.07	0.02	0.02	0.23	**0.66**	1.00		
dGDP	-0.07	-0.01	0.04	-0.05	0.00	0.03	0.01	0.08	0.12	0.24	0.05	1.00	
dGPI	0.20	-0.09	0.05	-0.08	0.14	0.17	-0.02	0.09	0.22	**0.54**	**0.38**	0.24	1.00

Small	ROA	Lnas	LA	Gap	EA	OA	LLP	MSH	H	IR	DEV	dGD	dGPI
ROA	1.00												
Lnas	-0.13	1.00											
LA	0.08	0.07	1.00										
Gap	**0.34**	-0.24	0.01	1.00									
EA	**0.40**	**-0.46**	-0.12	**0.74**	1.00								
OA	0.10	**-0.32**	0.05	0.10	**0.31**	1.00							
LLP	**-0.47**	-0.07	-0.12	-0.01	-0.04	0.09	1.00						
MSH	0.01	**0.33**	-0.01	-0.14	-0.16	-0.14	-0.03	1.00					
H	0.10	-0.18	0.02	0.03	0.10	-0.09	-0.03	0.37	1.00				
IR	0.08	-0.04	-0.23	0.13	0.20	0.13	0.01	0.11	-0.15	1.00			
DEV	0.02	0.01	-0.08	0.00	0.03	0.03	0.05	0.12	0.12	**0.51**	1.00		
dGDP	-0.08	-0.08	-0.01	0.00	0.02	0.01	0.03	0.04	0.13	0.19	0.05	1.00	
dGPI	0.15	-0.13	-0.01	0.11	0.23	0.07	-0.02	0.13	0.22	**0.37**	0.24	0.23	1.00

We begin the econometric analysis by running the fixed effects estimates for the two size categories, with the Gap, EA and LLP/TL variables as the only independent variables (Table 48). All the variables are significant with the expected sign (the results are the same if we run the plain OLS estimates, Annex 22). The t-statistics are much more significant in the case of small banks. However, the R-squared is much higher for large banks (R-squared equal to 0.8097 for large banks compared with 0.6879 for small banks), and the sum of the squared residuals and their variance smaller.

Table 48: Within (fixed effects) estimates for large and small banks (independent variables: Gap, EA, LLP/TL)

Dependent variable: *return on assets*				
Sum of squared residuals 52.7678 *(1645.39)*		R-squared 0.8097 *(0.6879)*		
Variance of residuals 0.0961 *(0.7530)*		Adjusted R-squared 0.7612 *(0.6095)*		
Standard error of regression 0.3100 *(0.8678)*		LM heteroscedasticity test 2.5359 [.111] *(277.478 [.000])*		
		Durbin-Watson test 1.4857 [.000] *(1.8250 [.000])*		
Variance	***Estimated Coefficient***	***Standard error***	***t-statistic***	***p-value***
Gap	2.4470 *(5.4342)*	0.6960 *(1.0540)*	3.5156 *(5.1557)*	[.000] *([.000])*
EA	0.0282 *(0.1336)*	0.0117 *(0.0161)*	2.4041 *(8.3013)*	[.017] *([.000])*
LLP/TL	-0.019 *(-0.2198)*	0.0071 *(0.0081)*	-2.7016 *(-27.0082)*	[.007] *([.000])*
F (137, 549) = 11.439, p-value = [.0000] *F (546, 2185) = 4.0568, p-value = [.0000]* Hausman test H0: RE vs. FE: CHISQ(3) = 34.340, P-value = [.0000] *Hausman test H0: RE vs. FE: CHISQ(3) = 13.953, P-value = [.0030]*				

Note: Fonds with italics refer to small banks; otherwise, large banks.

We then introduce in the model the two variables, MSH and H (Table 49). The results for the significance and the sign of the variables Gap, EA, and LLP/TL do not change, while both the MSH and the H are not significant for large banks (the t-statistics for MSH and H are -1.6813 and -0.8997 respectively). In the case of small banks, it seems that the MSH is significant and positive (the t-statistic for the market share variable is 5.4666 and the coefficient is 0.8736) (the latter case gives support to the efficient hypothesis).

Table 49: Within (fixed effects) estimates for large and small banks (independent variables: Gap, EA, LLP/TL, MSH, and H)

Dependent variable: *return on assets*				
Sum of squared residuals 52.3734 *(1622.30)*		R-squared 0.8112 *(0.6923)*		
Variance of residuals 0.0957 *(0.7432)*		Adjusted R-squared 0.7621 *(0.6147)*		
Standard error of regression 0.3094 *(0.8621)*		LM heteroscedasticity test 2.8111 [.094] *(281.445 [.000])*		
		Durbin-Watson test 1.4837 [.000] *(1.8436 [.000])*		
Variance	***Estimated Coefficient***	***Standard error***	***t-statistic***	***p-value***
Gap	2.5111 *(5.1309)*	0.6956 *(1.0509)*	3.6096 *(4.8823)*	[.000] *([.000])*
EA	0.0278 *(0.1469)*	0.0120 *(0.0162)*	2.3221 *(9.0755)*	[.021] *([.000])*
LLP/TL	-0.0191 *(-0.2224)*	0.0070 *(0.0081)*	-2.7161 *(-27.4640)*	[.007] *([.000])*
MSH	-0.0074 *(0.8736)*	0.0044 *(0.1598)*	-1.6813 *(5.4666)*	[.093] *([.000])*
H	0.0001 *(-0.0004)*	0.0001 *(0.0002)*	-0.8997 *(-1.9305)*	[.369] *([.054])*
F (137, 547) = 10.702, p-value = [.0000] *F (546, 2183) = 4.1048, p-value = [.0000]* Hausman test H0: RE vs. FE: CHISQ(5) = 46.614, P-value = [.0000] *Hausman test H0: RE vs. FE: CHISQ(5) = 35.777, P-value = [.0000]*				

Note: Fonds with italics refer to small banks; otherwise, large banks.

We also introduce the lnassets, LA, and OA in the model (Table 50). The results we find for small banks are similar with those for the total sample of banks. However, the MSH continues to be positive and significant (the t-statistic is 2.7914 and the coefficient 0.4574). In the case of large banks, the LA has a positive and significant sign (the t-statistic is 3.0475 and the coefficient 0.0095), supporting the view that a positive relationship exists between this variable and the performance measure.

Table 50: Within (fixed effects) estimates for large and small banks (independent variables: lnassets, LA, H, MSH, OA, Gap, EA, LLP/TL)

Dependent variable: *return on assets*				
Sum of squared residuals 50.8351 *(1519.70)*		R-squared 0.8167 *(0.7118)*		
Variance of residuals 0.0934 *(0.6971)*		Adjusted R-squared 0.7679 *(0.6385)*		
Standard error of regression 0.3057 *(0.8349)*		LM heteroscedasticity test 2.4304 [.119] *(365.006 [.000])*		
		Durbin-Watson test 1.5280 [.000] *(1.7828 [.000])*		
Variance	***Estimated Coefficient***	***Standard error***	***t-statistic***	***p-value***
Lnassets	-0.1137 *(0.8144)*	0.0750 *(0.1027)*	-1.5156 *(7.9277)*	[.130] *([.000])*
LA	0.0095 *(-0.1758)*	0.0031 *(0.0034)*	3.0475 *(-5.1285)*	[.002] *([.000])*
Gap	2.2896 *(3.2988)*	0.7388 *(1.0366)*	3.0991 *(3.1824)*	[.002] *([.001])*
EA	0.0191 *(0.2328)*	0.0146 *(0.0173)*	1.3101 *(13.4630)*	[.191] *([.000])*
OA	-0.1484 *(-0.1645)*	0.0489 *(0.0374)*	-3.0324 *(-4.3942)*	[.003] *([.000])*
LLP/TL	-0.0174 *(-0.2089)*	0.0070 *(0.0080)*	-2.4845 *(-26.0541)*	[.013] *([.000])*
MSH	-0.0086 *(0.4574)*	0.0044 *(0.1639)*	-1.9313 (2.7914)	[.054] *([.005])*
H	0.0000 *(-0.0003)*	0.0001 *(0.0002)*	-0.5968 *(-1.4392)*	[.551] *([.150])*
F (137, 544) = 10.092, p-value = [.0000] *F (546, 2180) = 4.5737, p-value = [.0000]* Hausman test H0: RE vs. FE: CHISQ(8) = 60.292, P-value = [.0000] *Hausman test H0: RE vs. FE: CHISQ(8) = 196.59, P-value = [.0000]*				

Note: Fonds with italics refer to small banks; otherwise, large banks.

We then introduce the macroeconomic variables in the model (Table 51). The interesting points are that the size variable has negative impact on large banks, while a significant positive one on small banks, and the level of interest rates has a negative impact on large banks and positive on small banks. This result gives support to the recent papers that mention the diseconomies of scale that exist from a level of size upwards. Growing banks may face diminishing marginal returns so average profits would decline with size. Information advantage and the enforcement power gain from size is significant for small banks.

Table 51: Within (fixed effects) estimates (independent variables: lnassets, LA, OA, Gap, EA, LLP/TL, MSH, H, INT, DEV, dGDP, dGPI)

Dependent variable: *return on assets*				
Sum of squared residuals 46.7127 *(1473.74)*		R-squared 0.8316 *(0.7205)*		
Variance of residuals 0.0865 *(0.6773)*		Adjusted R-squared 0.7851 *(0.6488)*		
Standard error of regression 0.2941 *(0.8230)*		LM heteroscedasticity test 2.8639 [.091] *(352.007 [.000])*		
		Durbin-Watson test 1.5901 [.000] *(1.7532 [.000])*		
Variance	***Estimated Coefficient***	***Standard error***	***t-statistic***	***p-value***
Lnassets	-0.1777 *(0.7688)*	0.0743 *(0.1041)*	-2.3914 *(7.3857)*	[.017] *([.000])*
LA	0.0069 *(-0.0147)*	0.0031 *(0.0036)*	2.2368 *(-4.1084)*	[.026] *([.000])*
Gap	2.0573 *(3.2008)*	0.7203 *(1.0234)*	2.8563 *(3.1276)*	[.004] *([.002])*
EA	0.0172 *(0.2213)*	0.0141 *(0.0173)*	1.2205 *(12.7822)*	[.223] *([.000])*
OA	-0.0850 *(-0.1991)*	0.0483 *(0.0376)*	-1.7585 *(-5.2955)*	[.079] *([.000])*
LLP/TL	-0.0154 *(-0.2083)*	0.0067 *(0.0079)*	-2.2793 *(-26.3182)*	[.023] *([.000])*
MSH	-0.0056 *(0.4480)*	0.0043 *(0.1661)*	-1.3013 *(2.6971)*	[.194] *(.007])*

H	-0.0001 *(0.0000)*	0.0001 *(0.0002)*	-1.0532 *(0.4261)*	[.293] *([.670])*
INT	-0.0276 *(0.0663)*	0.0102 *(0.0147)*	-2.7231 *(4.5001)*	[.007] *([.000])*
DEV	0.0273 *(-0.0448)*	0.0104 *(0.0249)*	2.6304 *(-1.7979)*	[.009] *([.072])*
DGDP	-0.0044 *(-0.0079)*	0.0010 *(0.0010)*	-4.0787 *(-7.8128)*	[.000] *([.000])*
DGPI	0.0320 *(0.0136)*	0.0078 *(0.0109)*	4.0957 *(1.2478)*	[.000] *([.212])*
F (137, 540) = 10.598, p-value = [.0000] *F (546, 2176) = 4.6695, p-value = [.0000]* Hausman test H0: RE vs. FE: CHISQ(12) = 51.058, P-value = [.0000] *Hausman test H0: RE vs. FE: CHISQ(12) = 204.49, P-value = [.0000]*				

Note: Fonds with italics refer to small banks; otherwise, large banks.

8.4.2. Type effects

Finally, we split the banks according to their type. The four categories are those of commercial, co-operative, savings and mortgage banks. We conclude with 356 commercial banks, 135 savings banks and 151 co-operative banks. We do not include the mortgage banks since the number of institutions in that category is small (only 43 financial institutions are mortgage banks). We should repeat at this point that the number of savings and co-operative banks has been reduced since we do not have available data for the loan loss provisions of the German banks (where most of the savings and cooperative banks are established) and our sample is balanced.

Table 52 provides summary statistics for the variables that are used in the analysis. All variables vary widely among the different types of financial institutions. The mean value of the ROA is the largest for the savings banks (1.10%), and the smallest for commercial banks (0.79%); the latter category of financial institutions also have the largest variability on their profits (1.82%). The proportion of loans to total assets is the largest for cooperative and commercial banks (almost 54% in both cases) and 7% smaller for the savings banks. The equity to assets ratio is almost 9% for cooperative and savings banks, and about 7% for commercial banks. Finally, all types of institutions have almost similar levels of overheads to total assets.

Table 52: Descriptive Statistics for Commercial, Co-operative and Savings Banks

Commercial banks	*mean*	*st. dev.*	*min*	*max*	*var.*	*skew.*	*kurt.*
ROA	0.7930	1.8158	-22.6530	14.6611	3.2973	-5.0261	52.4382
Lnassets	14.7058	2.0581	10.5180	20.3752	4.2356	0.4530	-0.3067
LA	53.5723	19.3345	0.8423	99.5503	373.8225	0.1827	-0.0597
Gap	0.0538	0.0513	-0.2787	0.2163	0.0026	-0.4218	2.5846
EA	7.2241	3.9956	-36.3921	24.3389	15.9653	-0.4293	11.5249
OA	3.1837	1.6577	0.0398	16.7623	2.7481	1.5356	7.1034
LLP/TL	1.3781	3.1275	-30.9892	77.7832	9.7813	10.1395	232.3713
MSH	2.0932	5.6343	0.0014	54.0289	31.7448	4.1826	21.0995
H	885.002	583.569	249.285	3637.543	340553.3	1.5057	1.5883
INT	5.9560	2.6543	3.0754	27.2734	7.0452	2.9507	18.1691
DEV	0.5619	1.5183	0.0485	22.2561	2.3051	13.2416	185.4120
DGDP	5.1354	18.4871	-37.2822	106.4748	341.7717	3.5716	19.1182
DGPI	4.7489	2.0108	-7.3847	14.0852	4.0434	1.3222	3.1368

Coop. banks	*mean*	*st. dev.*	*min*	*max*	*var.*	*skew.*	*kurt.*
ROA	1.0378	0.7318	-2.7363	4.1115	0.5356	0.1505	3.2343
Lnassets	14.2726	1.6523	10.4679	19.9843	2.7299	0.4913	0.8730
LA	54.3152	16.3485	4.7219	90.2399	267.2746	-0.1844	0.1025
Gap	0.0650	0.0433	-0.0798	0.2622	0.0019	0.4588	0.4359
EA	8.7115	4.1825	-0.9289	26.5105	17.4935	0.7959	0.3648
OA	3.1703	0.8278	0.0773	6.2382	0.6852	-0.4651	1.5448
LLP/TL	0.9426	0.8635	-0.1926	9.5714	0.7456	4.0506	25.5219
MSH	0.4209	2.0046	0.0018	21.1895	4.0183	7.8202	67.6215
H	509.4587	172.3246	430.4616	2399.371	29695.7	7.8179	70.9744
INT	6.3407	2.2886	3.2283	10.2825	5.2374	0.2324	-1.1871

DEV	0.5023	0.3151	0.0484	1.0384	0.0993	0.1917	-1.2164
DGDP	3.2634	7.0572	-9.5517	18.4549	49.8044	-0.0986	-0.5674
DGPI	4.3138	1.6865	1.7948	8.7928	2.8442	1.7795	2.2882

Savings banks	*mean*	*st. dev.*	*min*	*max*	*var.*	*skew.*	*kurt.*
ROA	1.1003	0.8558	-3.8062	5.6328	0.7324	0.4647	4.7470
Lnassets	14.3440	1.7443	9.3393	19.2779	3.0427	-0.2409	0.3725
LA	47.1624	14.3969	9.0526	96.8180	207.2700	0.0923	0.1976
Gap	0.0672	0.0504	-0.0766	0.2172	0.0025	0.1326	-0.8969
EA	8.6997	3.9362	1.7134	21.7069	15.4934	0.5219	-0.4028
OA	3.1479	1.1525	0.5304	7.7744	1.3282	0.0071	-0.5351
LLP/TL	0.9496	1.0106	-2.1659	9.7336	1.0214	3.4355	21.4075
MSH	0.6597	2.3892	0.0026	21.7841	5.7084	6.2477	41.6039
H	823.3682	460.6764	430.4616	2668.041	212222.7	1.2379	0.5578
INT	6.4653	2.1429	3.2283	10.2825	4.5919	0.1979	-1.1568
DEV	0.5019	0.2584	0.0484	1.3877	0.0668	0.2495	-0.8499
DGDP	5.0855	20.6660	-37.2822	106.4748	427.0844	3.3902	15.7935
DGPI	4.9303	2.0744	1.7948	10.3204	4.3033	0.9686	0.0836

Table 53 presents the correlation matrix for the several variables. We find a significant positive correlation of ROA with Gap and EA (especially for cooperative banks) and negative with LLP/TL (especially for commercial banks and insignificant for savings banks). Also there is a strong negative correlation of assets with EA and OA and positive with MSH, and a positive one for Gap with EA, for all different types of financial institutions. Finally, savings banks seem to have a positive correlation of OA with EA and Gap.

Table 53: Correlation Matrix of Commercial, Cooperative and Savings Banks

	ROA	Lnas	LA	Gap	EA	OA	LLP	MSH	H	IR	DEV	dGD	dGPI
ROA	1.00												
Lnas	-0.02	1.00											
LA	0.10	-0.11	1.00										
Gap	0.32	-0.14	0.13	1.00									
EA	**0.38**	**-0.43**	0.05	**0.66**	1.00								
OA	-0.05	**-0.39**	0.24	0.02	0.25	1.00							
LLP	**-0.53**	-0.13	-0.05	-0.04	-0.07	0.18	1.00						
MSH	0.00	**0.57**	-0.10	-0.09	-0.22	-0.20	-0.06	1.00					
H	0.10	-0.01	-0.07	0.06	0.10	-0.15	-0.06	0.37	1.00				
IR	0.06	0.09	-0.17	-0.04	0.04	0.02	0.00	0.14	0.06	1.00			
DEV	0.02	0.02	-0.08	-0.04	-0.01	0.00	0.03	0.13	0.21	**0.65**	1.00		
dGDP	-0.06	-0.04	-0.02	0.00	0.03	0.00	0.04	0.03	0.12	0.17	0.03	1.00	
dGPI	0.13	-0.03	-0.04	0.04	0.18	0.02	-0.04	0.11	0.29	**0.46**	0.35	0.23	1.00

Note: commercial banks

	ROA	Lnas	LA	Gap	EA	OA	LLP	MSH	H	IR	DEV	dGD	dGPI
ROA	1.00												
Lnas	-0.34	1.00											
LA	-0.10	0.19	1.00										
Gap	**0.64**	-0.38	-0.19	1.00									
EA	**0.65**	**-0.56**	-0.25	**0.86**	1.00								
OA	0.17	**-0.50**	0.08	0.03	0.23	1.00							
LLP	**-0.39**	-0.09	-0.11	-0.04	-0.01	0.12	1.00						
MSH	-0.12	**0.51**	-0.08	-0.01	-0.16	-0.32	-0.04	1.00					
H	-0.06	0.24	0.01	0.16	0.01	-0.30	-0.05	**0.72**	1.00				
IR	0.32	-0.38	**-0.47**	0.29	0.43	0.38	0.17	-0.13	-0.25	1.00			
DEV	0.19	-0.16	-0.23	0.16	0.19	0.12	0.12	-0.06	-0.05	**0.54**	1.00		
dGDP	0.07	-0.01	-0.08	-0.04	0.00	0.09	0.07	0.00	-0.06	**0.51**	**0.73**	1.00	
dGPI	0.23	-0.17	-0.15	0.14	0.20	0.16	0.08	-0.07	-0.14	**0.48**	0.34	0.28	1.00

Note: cooperative banks

	ROA	Lnas	LA	Gap	EA	OA	LLP	MSH	H	IR	DEV	dGD	dGPI
ROA	1.00												
Lnas	-0.30	1.00											
LA	0.26	-0.19	1.00										
Gap	**0.38**	-0.43	0.16	1.00									
EA	**0.51**	**-0.60**	0.15	**0.81**	1.00								
OA	0.19	**-0.57**	0.25	**0.54**	**0.64**	1.00							
LLP	-0.05	-0.18	-0.02	0.21	0.25	0.34	1.00						
MSH	-0.05	**0.44**	0.08	-0.17	-0.23	-0.26	-0.08	1.00					
H	0.30	**-0.45**	0.30	0.04	0.23	-0.05	-0.04	0.11	1.00				
IR	-0.01	0.06	0.03	0.23	0.14	0.39	0.30	-0.03	-0.47	1.00			
DEV	0.14	0.06	0.05	0.17	0.06	0.14	0.16	-0.04	-0.26	**0.47**	1.00		
dGDP	-0.22	-0.13	0.02	0.00	0.04	0.09	0.04	-0.01	0.15	0.15	0.01	1.00	
dGPI	0.23	-0.19	0.26	0.15	0.29	0.26	0.09	-0.03	0.17	0.21	0.10	0.22	1.00

Note: savings banks

We start by running fixed effects estimates with the Gap, EA and LLP/TL variables as the only independent variables (Table 54). The reported R-squared is higher for cooperative banks (0.82), while it is 0.72 for commercial banks and 0.65 for savings banks. However, the standard error of the regression is the highest one for commercial banks. All the variables are significant with the expected sign (the results are the same if we run the plain OLS estimates, Annex 23). The Gap variable is more significant for savings banks (the t-statistic is 7.0490), while the EA variable is more significant for commercial banks (the t-statistic is 9.5187). For savings banks, the sign for EA is negative but insignificant. The LLP/TL is more significant with negative effect on profitability for commercial and cooperative banks (the t-statistics equal -24.1567 and -12.2459 respectively). From the Hausman test, it seems that the random effects may give better estimates in the case of co-operative banks. However the results, even with the implementation of the random effects model, are the same (Annex 24)

Table 54: Within (fixed effects) estimates for the types of institutions (independent variables: Gap, EA, LLP/TL)

Dependent variable: *return on assets*				
Sum of squared residuals 1667.23 *71.11* **173.677**		*R-squared* 0.7158 *0.8239* **0.6482**		
Variance of residuals 1.1733 *0.1183* **0.3234**		*Adjusted R-squared* 0.6442 *0.7791* **0.5584**		
Standard error of regression 1.0832 *0.3440* **0.5687**		*LM heteroscedasticity test* 303.123[.000] *30.9751[.000]* **56.6363[.000]**		
		Durbin-Watson test 1.9366[.073,.096] *1.4389[.000,.000]* **1.6720[.000,.000]**		
Variance	***Estimated Coefficient***	***Standard error***	***t-statistic***	***p-value***
Gap	5.1963 *5.0041* **12.5828**	1.3972 *1.1042* **1.7851**	3.7190 *4.5319* **7.0490**	[.000] *[.000]* **[.000]**
EA	0.1769 *0.0557* **-0.0070**	0.0186 *0.0177* **0.0298**	9.5187 *3.1476* **-0.2340**	[.000] *[.002]* **[.815]**
LLP/TL	-0.2441 *-0.2969* **-0.0967**	0.0101 *0.0242* **0.0316**	-24.1567 *-12.2459* **-3.0591**	[.000] *[.000]* **[.002]**
F (355, 1421) = 4.3452, p-value = [.0000] *F (150, 601) = 5.3093, p-value = [.0000]* **F (134, 537) = 3.9819, p-value = [.0000]** Hausman test H0: RE vs. FE: CHISQ(3) = 34.340, P-value = [.0000] *Hausman test H0: RE vs. FE: CHISQ(3) = 1.6122, P-value = [.6566]* **Hausman test H0: RE vs. FE: CHISQ(3) = 55.347, P-value = [.0030]**				

Note: normal letters = commercial banks, italics = cooperative banks, bold = savings banks

We then introduce in the model the two variables (MSH and H) to examine whether the structure-conduct-performance or the efficient hypothesis are validate for each type of financial institution (Table 55). The R-squared do not seem to have been improved in any type of financial institution. Also, the results for the significance and the signs of the variables Gap, EA, and LLP/TL do not change. MSH is not a significant variable, while H is significant only for cooperative banks (the t-statistics is 2.0547 and the coefficient is 0.0005). This gives support to the traditional structure-conduct-performance hypothesis. If we introduce only MSH the results for the significance and the sign do not change (the same if we introduce only the H variable).

Table 55: Within (fixed effects) estimates (independent variables: Gap, EA, LLP/TL, MSH, H)

Dependent variable: *return on assets*	
Sum of squared residuals	*R-squared*
1666.50	0.7159
70.2725	*0.8260*
173.668	**0.6482**
Variance of residuals	*Adjusted R-squared*
1.1744	0.6438
0.1173	*0.7809*
0.3246	**0.5568**
Standard error of regression	*LM heteroscedasticity test*
1.0837	303.308 [.000]
0.3425	*27.0000 [.000]*
0.5697	**56.6234 [.000]**
	Durbin-Watson test
	1.9359 [.064, .102]
	1.4628 [.000, .000]
	1.6708 [.000, .000]

Variance	*Estimated Coefficient*	*Standard error*	*t-statistic*	*p-value*
Gap	5.2157	1.3989	3.7283	[.000]
	5.7336	*1.1356*	*5.0590*	*[.000]*
	12.5966	**1.7940**	**7.0213**	**[.000]**
EA	0.1769	0.0186	9.5036	[.000]
	0.0510	*0.0180*	*2.8274*	*[.005]*
	-0.0071	**0.0299**	**-0.2382**	**[.812]**
LLP/TL	-0.2441	0.0101	-24.1371	[.000]
	-0.3007	*0.0242*	*-12.4271*	*[.000]*
	-0.0970	**0.0319**	**-3.0386**	**[.002]**
MSH	0.0077	0.0263	0.2929	[.770]
	-0.0999	*0.0859*	*-1.1625*	*[.245]*
	-0.0136	**0.1135**	**-0.1196**	**[.905]**
H	-0.0002	0.0003	-0.7878	[.431]
	0.0005	*0.0003*	*2.0547*	*[.040]*
	0.0000	**0.0003**	**-0.0844**	**[.933]**
F (355, 1419) = 4.3110, p-value = [.0000]				
F (150, 599) = 4.9661, p-value = [.0000]				
F (134, 535) = 3.6577, p-value = [.0000]				
Hausman test H0: RE vs. FE: CHISQ(5) = 28.533, P-value = [.0000]				
Hausman test H0: RE vs. FE: CHISQ(5) = 3.2844, P-value = [.6566]				
Hausman test H0: RE vs. FE: CHISQ(5) = 48.074, P-value = [.0000]				

Note: normal letters = commercial banks, italics = cooperative banks, bold = savings banks

We also introduce the lnassets, LA, and OA variables in the model. LA has a negative and significant sign for commercial and savings banks, while it is insignificant for cooperative banks (Table 56). The results for the significance of Gap, EA and LLP/TL remain robust (significantly positive for Gap and EA, and negative for LLP/TL) for all types of financial institutions. The size variable is positive and significant for all types of banks (the t-statistics are 7.3854, 2.9768, and 3.0245 for commercial, cooperative, and savings banks respectively). The difference with the previous table is on the sign of OA for cooperative banks. It can be argued that this result occurs because more profitable co-operative banks may employ better paid but more productive staff. This finding would indicate that more profitable cooperative banks direct a large proportion of their resources towards staff expenses. Also, the H is not any more significant for the cooperative banks, but MSH is significant with negative sign (the t-statistic of

MSH is -2.4437 and the coefficient is -0.2335). However, for cooperative banks the random effects model gives good estimates for the cooperative banks (Annex 25). In this case H is again significant (while MSH not) but with negative coefficient (the t-statistic is –2.9047 and the coefficient –0.006).

Table 56: Within (fixed effects) estimates (independent variables: Gap, EA, LLP/TL, MSH, H, lnassets, LA, OA)

Dependent variable: *return on assets*				
Sum of squared residuals 1555.87 *69.0122* **156.864**		*R-squared* 0.7348 *0.8291* **0.6822**		
Variance of residuals 1.0988 *0.1158* **0.2949**		*Adjusted R-squared* 0.6668 *0.7838* **0.5974**		
Standard error of regression 1.0482 *0.3403* **0.5430**		*LM heteroscedasticity test* 367.314 [.000] *27.1379 [.000]* **47.7512 [.000]**		
		Durbin-Watson test 1.9048 [.011, .030] *1.4331 [.000, .000]* **1.6530 [.000, .000]**		
Variance	***Estimated Coefficient***	***Standard error***	***t-statistic***	***p-value***
Lnassets	0.9441 *0.3808* **0.6339**	0.1278 *0.1279* **0.2096**	7.3854 *2.9768* **3.0245**	[.000] *[.003]* **[.003]**
LA	-0.0193 *-0.0044* **-0.0129**	0.0046 *0.0038* **0.0060**	-4.1694 *-1.1796* **-2.1496**	[.000] *[.239]* **[.032]**
Gap	3.3717 *5.9283* **9.9892**	1.3681 *1.2201* **1.7819**	2.4645 *4.8591* **5.6059**	[.014] *[.000]* **[.000]**

EA	0.2416	0.0192	12.5986	[.000]
	0.0557	*0.0190*	*2.9242*	*[.004]*
	0.0988	**0.0318**	**3.1075**	**[.002]**
OA	-0.0865	0.0494	-1.7506	[.080]
	0.1071	*0.0483*	*2.2158*	*[.027]*
	-0.3593	**0.0712**	**-5.0457**	**[.000]**
LLP/TL	-0.2353	0.0100	-23.5415	[.000]
	-0.3079	*0.0245*	*-12.5835*	*[.000]*
	-0.0784	**0.0308**	**-2.5502**	**[.011]**
MSH	-0.0242	0.0258	-0.9367	[.349]
	-0.2335	*0.0956*	*-2.4437*	*[.015]*
	0.0013	**0.1084**	**0.0117**	**[.991]**
H	0.0000	0.0003	-0.1388	[.890]
	-0.0005	*0.0003*	*-1.8849*	*[.060]*
	-0.0001	**0.0003**	**-0.7469**	**[.455]**

F (355, 1416) = 4.8235, p-value = [.0000]
F (150, 596) = 4.8851, p-value = [.0000]
F (134, 532) = 3.9764, p-value = [.0000]
Hausman test H0: RE vs. FE: CHISQ(8) = 110.77, P-value = [.0000]
Hausman test H0: RE vs. FE: CHISQ(8) = 14.409, P-value = [.0717]
Hausman test H0: RE vs. FE: CHISQ(8) = 79.266, P-value = [.0000]

Note: normal letters = commercial banks, italics = cooperative banks, bold = savings banks

Finally, we introduce the macroeconomic variables in the model (Table 57). The R-squared has improved significantly for savings banks, and considerably for cooperative banks. The variance of the residuals is decreased for all types of financial institutions. What we observe is a significant positive effect of the level of interest rates on profitability, while the variability of interest rates is significant but positive for the savings banks (the t-statistic is 6.0219). Finally, the GDP growth is significant and negative in the case of commercial and savings banks, and the GPI growth significant and positive for co-operative banks.

Table 57: Within (fixed effects) estimates (independent variables: Gap, EA, LLP/TL, MSII, H, lnassets, LA, OA, IR, DEV, dGDP, dGPI)

Dependent variable: *return on assets*	
Sum of squared residuals	*R-squared*
1532.7500	0.7387
60.4499	*0.8503*
115.794	**0.7654**
Variance of residuals	*Adjusted R-squared*
1.0855	0.6708
0.1021	*0.8093*
0.2193	**0.7006**
Standard error of regression	*LM heteroscedasticity test*
1.0419	362.459 [.000]
0.3195	*11.8097 [.001]*
0.4683	**51.6042 [.000]**
	Durbin-Watson test
	1.8926 [.004, .021]
	1.3540 [.000, .000]
	1.6120 [.000, .000]

Variance	***Estimated Coefficient***	***Standard error***	***t-statistic***	***p-value***
Lnassets	0.9098	0.1288	7.0633	[.000]
	0.3680	*0.1421*	*2.5898*	*[.010]*
	-0.1228	**0.2095**	**-0.5863**	**[.558]**
LA	-0.1838	0.0048	-3.8642	[.000]
	0.0011	*0.0038*	*0.0029*	*[.769]*
	-0.0050	**0.0059**	**-0.8451**	**[.398]**
Gap	3.1965	1.3632	2.3449	[.019]
	5.9262	*1.1648*	*5.0879*	*[.000]*
	7.6268	**1.5675**	**4.8655**	**[.000]**
EA	0.2369	0.0191	12.4000	[.000]
	0.0428	*0.1851*	*2.3144*	*[.021]*
	0.2383	**0.0300**	**0.7951**	**[.427]**
OA	-0.1042	0.0494	-2.1096	[.035]
	0.0328	*0.0474*	*0.6921*	*[.489]*
	-0.4077	**0.0700**	**-5.9119**	**[.000]**

LLP/TL	-0.2340	0.0100	-23.4980	[.000]
	-0.3246	*0.0231*	*-14.0561*	*[.000]*
	-0.1123	**0.0272**	**-4.1303**	**[.000]**
MSH	-0.0231	0.0260	-0.8862	[.376]
	-0.3222	*0.0995*	*-3.2377*	*[.001]*
	0.0216	**0.0943**	**0.2290**	**[.819]**
H	0.0001	0.0003	0.2803	[.779]
	0.0017	*0.0004*	*3.9094*	*[.000]*
	0.0005	**0.0002**	**1.9307**	**[.054]**
IR	0.0447	0.0213	2.0983	[.036]
	0.1140	*0.0226*	*5.0430*	*[.000]*
	0.0511	**0.0203**	**2.5157**	**[.012]**
DEV	-0.0339	0.0253	-1.3417	[.180]
	0.0173	*0.0702*	*0.2462*	*[.806]*
	0.5405	**0.0898**	**6.0219**	**[.000]**
DGDP	-0.0067	0.0015	-4.5156	[.000]
	-0.0074	*0.0038*	*-1.9402*	*[.053]*
	-0.0121	**0.0010**	**-11.5570**	**[.000]**
DGPI	0.0183	0.0172	1.0670	[.286]
	0.0309	*0.0086*	*3.6073*	*[.000]*
	-0.0022	**0.0117**	**-0.1881**	**[.851]**
F (355, 1412) = 4.8050, p-value = [.0000]				
F (150, 592) = 5.5600, p-value = [.0000]				
F (134, 528) = 4.9983, p-value = [.0000]				
Hausman test H0: RE vs. FE: CHISQ(12) = 112.78, P-value = [.0000]				
Hausman test H0: RE vs. FE: CHISQ(12) = 33.066, P-value = [.0005]				
Hausman test H0: RE vs. FE: CHISQ(12) = 85.120, P-value = [.0000]				

Note: normal letters = commercial banks, italics = cooperative banks, bold = savings banks

8.4.3. Year-by-year cross-sectional regressions

In this section, we are seeking to exploit the time series dimension of the data in order to achieve more powerful tests than are available based on pure cross sectional estimations. So, in addition to the pooled time series cross sectional regressions, the models also were estimated as a series of five year-by-year cross-sectional regressions, If the results are similar, this suggests that the findings are robust with respect to the pooling approach, the sample composition, and the period estimated.

From Table 58 we can conclude that the Gap and EA variables are significant positive for all the examined years, while LLP/TL is significantly negative.

Table 58: Year-by-year cross-sectional estimates (independent variables: Gap, EA, LLP/TL)

Dependent variable: *return on assets*			
Sum of squared residuals		*R-squared*	
496.491		0.3032	
475.997		0.4045	
1133.66		0.4289	
626.715		0.3301	
610.746		0.4303	
Variance of residuals		*Adjusted R-squared*	
0.7291		0.3001	
0.6989		0.4019	
1.6647		0.4263	
0.9203		0.3272	
0.8968		0.4278	
Standard error of regression			
0.8539			
0.8360			
1.2903			
0.9593			
0.9470			
Variance	***Estimated Coefficient***	***Standard error***	***t-statistic***
Gap	3.8447	1.0323	3.7242
	2.0038	0.9801	2.0444
	2.5816	1.3562	1.9036
	2.6744	1.0415	2.5678
	2.7885	0.9767	2.8549
EA	0.0367	0.0124	2.9497
	0.1405	0.0122	11.5292
	0.1484	0.0170	8.7068
	0.0838	0.0126	6.6553
	0.1030	0.0123	8.3691

LLP/TL	-0.2484	0.0183	-13.5469
	-0.1280	0.0138	-9.2759
	-0.3784	0.0213	-17.7765
	-0.1599	0.0116	-13.7665
	-0.2045	0.0111	-18.5004
C	0.5354	0.0775	6.9086
	0.0062	0.0719	0.0857
	0.1028	0.1128	0.9118
	0.2642	0.0843	3.1327
	0.2488	0.0815	3.0536

Note: results are presented by ascending order from year 1994 to 1998.

In Table 59 the variables Gap, EA, and LLP/TL continue to have the expected signs for all the examined years. Lnassets is significant and positive only for years 1997 and 1998 (t-statistics are 2.4290 and 2.1322 respectively). The proportion of loans to total assets is positive, except year 1996, but is significant only for 1994, 1997, and 1998. The OA variable is positive (contrary to what is expected). The MSH is positive but insignificant at the 5% level, with the exception of 1995. The sign of the H variable tends to be unstable and is found to be negative in some regressions.

Table 59: Year-by-year cross-sectional estimates (independent variables: Lnassets, LA, Gap, EA, OA, LLP/TL, MSH, H)

Dependent variable: *return on assets*	
Sum of squared residuals	*R-squared*
489.346	0.3123
442.643	0.4462
1121.51	0.4350
603.372	0.3551
596.782	0.4434
Variance of residuals	*Adjusted R-squared*
0.7239	0.3051
0.6548	0.4397
1.6590	0.4283
0.8926	0.3475
0.8828	0.4368

Standard error of regression			
0.8509			
0.8092			
1.2880			
0.9448			
0.9396			
Variance	***Estimated Coefficient***	***Standard error***	***t-statistic***
Lnassets	0.0093	0.0227	0.4078
	-0.0219	0.0223	-0.9804
	-0.0132	0.0357	-0.3705
	0.0632	0.0260	2.4290
	0.0545	0.0256	2.1322
LA	0.2771	0.0018	1.5445
	0.0051	0.0017	2.9736
	-0.0021	0.0026	-0.7929
	0.0054	0.0019	2.8226
	0.0053	0.0020	2.8140
Gap	3.8969	1.1085	3.5155
	2.0138	1.0051	2.0037
	2.9167	1.4273	2.0436
	2.4370	1.0861	2.2439
	2.3654	1.0170	2.3258
EA	0.0352	0.0150	2.3435
	0.1275	0.0143	8.9009
	0.1405	0.0214	6.5700
	0.0893	0.0157	5.6920
	0.1170	0.0152	7.7244
OA	0.0547	0.0275	1.9899
	0.0795	0.0269	2.9579
	0.0152	0.0410	0.3698
	0.0897	0.0318	2.8227
	0.0401	0.0286	1.4053
LLP/TL	-0.2486	0.0189	-13.1757
	-0.1311	0.0136	-9.6692
	-0.3776	0.0220	-17.1551
	-0.1559	0.0117	-13.3576
	-0.2005	0.0112	-17.8840

MSH	0.0042	0.0030	1.3687
	0.0078	0.0036	2.1558
	0.0065	0.0054	1.1995
	0.0007	0.0034	0.2071
	0.0025	0.0036	0.6891
H	-0.0001	0.0001	-0.1762
	0.0003	0.0001	4.9000
	0.0023	0.0001	2.1330
	0.0002	0.0001	2.2512
	0.0000	0.0001	-0.0314
C	0.0911	0.4160	0.2189
	-0.3165	0.4040	-0.7834
	0.2072	0.6515	0.3180
	-1.3765	0.4743	-2.9023
	-1.0594	0.4678	-2.2644

Note: results are presented by ascending order from year 1994 to 1998.

If we introduce the macroeconomic variables, the results are the same for the above mentioned variables (Table 60). The level of interest rates has mixed effects on profitability, although in the last two years it seems to be positive but insignificant at the 5% level. The same mixed picture is observed for the variability of the interest rates. The growth of the GDP rates is negative in all the examined years, while the growth of GPI is positive but insignificant.

Table 60: Year-by-year cross-sectional estimates (independent variables: Lnassets, LA, Gap, EA, OA, LLP/TL, MSH, H, INT, DEV, dGDP, dGPI)

Dependent variable: *return on assets*			
Sum of squared residuals		*R-squared*	
475.076		0.3333	
412.688		0.4837	
1113.13		0.4392	
588.876		0.3706	
593.955		0.4460	
Variance of residuals		*Adjusted R-squared*	
0.7070		0.3214	
0.6141		0.4745	
1.6564		0.4293	
0.8763		0.3593	
0.8839		0.4361	
Standard error of regression			
0.8408			
0.7836			
1.2870			
0.9361			
0.9401			
Variance	***Estimated Coefficient***	***Standard error***	***t-statistic***
Lnassets	0.0004	0.0233	0.0151
	0.0069	0.0223	0.3097
	-0.0188	0.0365	-0.5145
	0.0479	0.0264	1.8171
	0.0591	0.0258	2.2921
LA	0.0012	0.0019	0.6026
	0.0055	0.0017	3.1920
	-0.0028	0.0028	-1.0016
	0.0049	0.0020	2.4874
	0.0051	0.0019	2.6315

Gap	4.0875 0.9923 3.1918 3.8410 2.4568	1.1067 0.9917 1.4757 1.1523 1.0436	3.6934 1.0006 2.1630 3.3334 2.3542
EA	0.0394 0.1205 0.1357 0.0715 0.1129	0.0155 0.0145 0.0218 0.0166 0.0164	2.5365 8.2994 6.2280 4.3145 6.8881
OA	0.0787 0.0699 0.0201 0.0934 0.0379	0.0286 0.0279 0.0416 0.0327 0.0290	2.7531 2.5039 0.4842 2.8596 1.3049
LLP/TL	-0.2490 -0.1318 -0.3761 -0.1565 -0.2004	0.0188 0.0132 0.0212 0.0116 0.0112	-13.2554 -10.0068 -16.9590 -13.5264 -17.8562
MSH	0.0026 0.0039 0.0050 0.0006 0.0017	0.0031 0.0036 0.0056 0.0035 0.0038	0.8537 1.0728 0.8990 0.1848 0.4481
H	0.0000 0.0001 0.0002 -0.0001 0.0000	0.0000 0.0001 0.0001 0.0001 0.0001	-0.3515 1.7390 1.3421 -0.6323 -0.5521
INT	-0.1052 0.1075 -0.0046 0.0219 0.0610	0.0375 0.0367 0.0521 0.0383 0.0491	-2.8046 2.9300 -0.0878 0.5707 1.2372
DEV	0.0713 -0.4655 0.5459 0.0175 -0.1868	0.0309 0.1530 0.3503 0.1151 0.2135	2.3094 -3.0418 1.5585 0.1517 -0.8752

DGDP	-0.0077	0.0023	-3.3101
	-0.0155	0.0025	-6.2510
	-0.2522	0.0269	-0.9392
	-0.0166	0.0098	-1.6908
	-0.0290	0.0342	-0.8590
DGPI	0.1318	0.0527	2.5027
	-0.1094	0.0401	-2.7250
	0.0932	0.0521	1.7897
	0.2000	0.0592	3.3788
	0.0372	0.0236	1.5770
C	0.4869	0.4364	1.1159
	-0.1642	0.4250	-0.3864
	-0.1189	0.6747	-0.1763
	-1.9164	0.5269	-3.6370
	-1.3710	0.5056	-2.7118

Note: results are presented by ascending order from year 1994 to 1998.

8.5. Concluding Remarks

This chapter quantifying how internal changes ("within effects" changes) due to changes in balance composition and external factors ("dynamic reallocation" effects) due to market share changes and the macroeconomic environment contribute to the performance of the EU banking industry as a whole from 1994 to 1998. The decomposition identifies and measures both of these two broad factors that jointly determine the performance of the EU banking industry. This distinction is important as failure to count for the dynamic reallocation effects can create mistaken impressions about the underlying strength of the industry.

We perform cross-sectional time series regressions and year-by-year cross sectional regressions. The use of pooled data allows us better to control for the effects of missing or omitted variables. Rather than including other bank-varying variables, a comparison of the results for the OLS regressions with the fixed-effect models over banks can indicate whether the omission of bank-varying variables in the pooled OLS regressions produce biased results, and whether these biases arises.

The estimation results suggest that the profitability of European banks is influenced not only by factors related to their management decisions but also to changes in the external macroeconomic environment.

Equity to assets ratio has consistently the same sign and level of significance suggesting that banks with greater levels of equity are relatively more profitable. The loans to assets ratio appears to be inversely related to banks return on assets. This implies that banks which have large non-loan earning assets are more profitable than those which depend more heavily on assets. The funds gap ratio is significantly positive, and the proportion of loan loss provisions to total loans significantly negative. Also, the results are in contrast to studies that have examined the structure-performance relationship for European banking and find a positive effect of the concentration and/or market share variables on bank profitability. In our case, not only the traditional structure-conduct-performance hypothesis, but also the efficient hypothesis are not supported. The MSH variable is not significantly different from zero in either regression. In fact, its sign tends to be unstable and is found to be negative in some regressions. However, if we exclude the loan loss reserves' variable the concentration ratio seems to be significant but negative. The level of interest rates have a positive effect, while the variability of the interest rates and the growth of GDP rates negative.

We have to point out that there are some measurement issues with the MSH variable, since it takes the share of the value of assets of bank over the total market value of the banks in each country, which are included in the Bankscope dataset. It therefore is influenced by how many banks in each country are reporting balance sheet data to Fitch-IBCA. This issue should be addresses in future work.

Concerning the size categories and the different types of financial institutions the following conclusions can be drawn:

- The t-statistics are much higher for small banks
- LA positive for large banks and negative for small banks

- Negative lnassets for large and positive for small banks, this has to do with diseconomies from a size upwards
- The market share variable is positive and significant for small banks, supporting the efficient hypothesis
- The funds gap ratio is much more significant for savings banks
- The equity to assets ratio is more significant for commercial banks
- The concentration ratio is significant only for co-operative banks.

A limitation of the analysis may be related to the specification of the functional form of the estimating equation. Linear functions may mispecify the nature of the relationship between profitability and the several internal and external determinants and bias the results.

The type of explanation for the level of profitability would determine possible policy implications and ought to be taken seriously. Since very little empirical work has been undertaken investigating the competitive behaviour of European banking systems, an empirical investigation like the one conducted above may yield insights that could be of interest to academics, bankers, and policy makers.

Chapter 9

"Concluding Remarks and Policy Implications"

Chapter 9: Concluding Remarks and Policy Implications

In recent years new economic forces have swept through financial markets and have caused major changes in the way financial intermediaries operate. While changes have occurred virtually everywhere and in all phases of the business, we can trace them in three fundamental factors: macroeconomic changes that resulted in more sophisticated and demanding customers, financial innovations that broke down barriers to competition, and the internationalisation of financial markets. Those economic changes had two key effects: they intensified competition among financial intermediaries and non-depository institutions, and they undercut the effectiveness of traditional regulation. Disintermediation has been favoured by the introduction of new technologies, financial liberalisation and European Economic and Monetary Union, which allow new market participants to perform tasks previously largely reserved for banks.

In general, banks dominate the financial system of the European Union more than that of the US. Thus bank assets were worth more than 240% of euro-area GDP in 1998, while the comparable figure in the US was only 60%. Moreover, bank assets are rising in relation to GDP in Europe, having been worth only 176% of GDP in 1985, while the comparable US ratio is declining. Banks are not only adapting a more market-oriented financial structure, but are also contributing to the general development of such a structure through their trading activities or by initiating securitisation operations. Over recent years the value of banks' trading books has increased in almost all countries.

Structural differences in Europe (asset and liability composition, ownership etc.) are not a concern in themselves. They reflect the impact of a range of country-specific factors and may be sustainable for some time into the future. But differences in the asset size, portfolio allocation, and liability structure will affect how banks respond to monetary union and changes in financial markets. An important challenge will be the very substantial level of excess capacity in most countries' banking systems, which will come under pressure as cross-border competition increases.

Banks responses to the changing financial systems have been most clearly visible in their financial accounts. Data from the comprehensive OECD publication and the Fitch-IBCA database of bank income statements and balance sheets show that there are substantial performance variations across countries. The use of two data sets stems from the fact that data provided by the national authorities were not sufficient enough to capture past years' trends in income structure and volatility of income sources. Second, different approaches may exist across the different countries to accounting procedures and supervisory reporting schemes limiting the effectiveness of cross-country comparisons. Moreover, it should be noted that the reference period (1994-1998), for which a more detailed description of the components of non-interest income is available, has been characterised by specific market conditions (decrease of interest rates and a generally favourable financial climate for high level profits on financial operations).

Generally speaking net interest income has declined over time. This has been due mainly to the fall in nominal interest rates and the consequent fall in banks "endowment" income on non-interest bearing liabilities, and only to a small extent to increased competition in lending and deposit markets. From the analysis it seems that there is a direct (level and variability) or indirect (through the balance sheet structure) influence of nominal interest rates on the net interest margin of the banks. Rising rates increase the demand for rate sensitive assets relative to that of rate sensitive liabilities, while falling rates have the opposite effect. However, although interest rates are the most significant factor determining net interest margin, there are also some other variables that have a great influence on that ratio, as are the concentration measure of the banking industry in an EU country and the asset size of the financial institution.

Meanwhile there has been substantial rise in non-interest income. The competition from non-bank financial institutions and the resulting pressure on intermediation margins has led banks to offset the decrease in their interest income by shifting to other sources of income, such as fees and commissions. The relative importance of non-interest income (as a percentage of total operating income) increased in the EU throughout the observation period. This trend has been confirmed by the existing data for the entire period 1983-1999, which is long enough to verify a structural change in the EU banks' income composition. The increase in its relative importance could, however, signal either the intrinsic dynamism of non-interest income or an ongoing reduction in interest income. In fact, both patterns are at work. The increase of non-interest income seems to be accompanied by a decrease of banks' profitability in recent years, maybe due maybe to increased costs associated with the development of non-interest income activities and the reduction of net interest income. However, the evolution of non-interest income may indicate that although the growth of that source of income did not fully offset the reduction in the interest margin, the growth nevertheless helped to consolidate the banks' overall profitability at the 1995 level and, moreover, given the favourable economic conditions, to achieve a remarkable improvement in the overall profitability of the EU banking system for the last year of the observation period (1999).

Also we try to find the correlation between interest income and non-interest income. If the two components of banks' income demonstrate a different cyclical behaviour, non-interest income could exert a stabilising influence on banks' results by offsetting the fluctuations in interest income. Compared with a recent report of the European Central Bank (April, 2000) which is based on aggregate country data presented on the OECD publication, we conduct an empirical search for the correlation between interest and non-interest income, both expressed as a percentage of the average balance sheet total, for individual banks in the period 1994-1998. A correlation coefficient significantly lower than one would indicate a stabilising influence, while a negative correlation would even imply that any decreases in interest income (e.g. due to a reduction in interest margins, increased competition etc.) could be expected to be compensated by an increase in non-interest income. With regard to the empirical evidence, only in few cases the correlation is negative.

Additionally we present the empirical findings with regard to volatility of interest and non-interest income for EU countries. If the measure of volatility is the standard deviation, the results are heterogeneous but conclude with s significant increase of non-interest variability in the recent period. However, if the statistical indicator used to measure volatility is the coefficient of variation, the results indicate much higher variability for non-interest income for most of the EU countries and the examined years.

The dramatic changes in the financial services industry have had a profound effect on profitability, forcing financial institutions to change their management focus. Increased competitive pressures, tightening interest-rate spreads and declining deposit balances have made financial goals even more difficult to achieve. This environment creates an increased and urgent need for quality information on profitability management. The challenge posed by the decline of traditional banking is twofold: we need to maintain the soundness of the banking system while restructuring the banking industry to achieve long-term financial stability.

Performance measurement is above all a management tool, intended to support and assist management in tactical or strategic decision making. It follows that management understanding plays an important role in resolving the complex issues surrounding performance measurement and the successful use of the information. Performance measures are a quantitative assessment of progress toward achieving a particular goal or objective. Within the performance measurement system are many profitability measures, such as return on equity (ROE) and return on assets (ROA). With management's increased control of the components of return on assets, its use as a performance measure is more valid.

European bank profitability could have implications for financial stability. For example, high profitability could be the result of more pronounced risk-taking behaviour of European banks as they position themselves higher on the expected return-risk frontier. High profitability could also be the result of the anticipated bailout policy by the lender of last resort. If European banks are perceived to be "too big to fail", this will again induce risk-taking behaviour, but in addition, could lead to high credit ratings, reducing the funding costs. On the other hand, high profitability could be the result of superior operating efficiency of some European banks when compared with their European competitors.

After reviewing the empirical literature concerning bank performance and the main components of income sources, we can determine the several factors that influence bank profitability. We believe that testing for the robustness of banks' performance over time and space should shed light on policy debates, and on the assessment of banks' performance. In addition, we believe that our work has some relevance and importance for the ongoing wave of consolidation and restructuring in the European banking markets as an outcome of the Monetary Union. A linear function of a multiple regression equation, on a pooled cross section time series sample, is utilised to test the effects of firm and market specific variables on bank profitability. A number of studies have examined bank performance in an effort to isolate the factors that account for interbank differences in profitability. These factors are either internal or external. Individual bank characteristics such as the portfolio composition, and the scale and scope of operations, can affect the costs at which banks produce financial services. Market structure, measured by the relative size and number of firms, can influence the degree of local competition, and, by extension, the quality, quantity, and pricing of financial services ultimately available to bank customers.

Rather than including other bank-varying variables, a comparison of the results for the OLS regressions with the fixed-effect models over banks can indicate whether the omission of bank-varying variables in the pooled OLS regressions produce biased results, and whether these biases arises. The estimation results suggest that the profitability of European banks is influenced not only by factors related to their management decisions but also to changes in the external macroeconomic environment. The financial performance of any financial institution is largely determined by the behavior of its balance sheet. The balance sheet is a wonder of dynamism and inertia. How assets and liabilities perform individually and in combination is critical. Equity to assets ratio has consistently the same sign and level of significance suggesting that banks with greater levels of equity are relatively more profitable. The loans to assets ratio appears to be inversely related to banks return on assets. This implies that banks which have large non-loan earning assets are more profitable than those which depend more heavily on assets. The funds gap ratio is significantly positive, and the proportion of loan loss provisions to total loans significantly negative. Also, the results are in contrast to studies that have examined the structure-performance relationship for European banking and find a positive effect of the concentration and/or market share variables on bank profitability. In our case, not only the traditional structure-conduct-performance hypothesis, but also the efficient hypothesis are not supported. The MSH variable is not significantly different from zero in either regression. In fact, its sign tends to be unstable and is found to be negative in some regressions. However, if we exclude the loan loss reserves' variable the concentration ratio seems to be significant but negative. The level of interest rates have a positive effect, while the variability of the interest rates and the growth of GDP rates negative.

The foreseen structural changes require the need for adjustment to be taken seriously by all participants in the financial system. This adjustment appears to have intensified in recent years, as there has been an increase in merger activity, an establishment of alliances and an introduction of new products and services, often based on modern information technology. The process of structural change embodies an element of risk, but if these risks are identified early and analysed carefully, then they can be duly taken into account.

In order for European banks to prosper in rapidly changing markets, the major strategic issue that they must address in governance, not consolidation. As we have outlined, banks face declining volumes and margins in core corporate and some retail deposit markets. At the same time they have considerable opportunities in newer markets and can maintain profits by widening some margins and reducing costs. The key to success in the European banking industry will therefore be learning, adapting, and exploiting new profit opportunities and appropriately reducing costs. Mergers and acquisitions will be beneficial only as a means to this end. Ultimately the test of each new initiative will be whether it delivers increased shareholder value. The discipline on corporate governance provided by a clear commitment to delivering shareholder value is not yet fully established in European banking. There are differing patterns of both bank governance and of financial reporting across Europe.

Greater emphasis on delivering profits and shareholder value will coincide with a dramatic squeeze on traditional sources of bank income. Assuming that the possibility of state support is no longer available, many banks will be forced to take vigorous action to reduce costs and avoid losses. However, many banks may try to maintain profit levels by diversifying into new activities and by taking greater risks. Some banks may take riskier, higher-yielding loans. In particular, they may place a greater percentage of their funds in commercial real estate loans, historically a riskier type of loans. They may also increase lending to support corporate takeovers and highly leveraged buyouts, and expanded their lending to less creditworthy borrowers. They may expand off-balance sheet activities and provide a wider array of nontraditional financial products, such as underwriting, securities, and derivatives market services, some of which may be quite risky. That strategy has raised questions about what the proper activities for banks should be, and about whether nontraditional activities might result in banks' taking excessive risk.

According to the ECB report the development of non-interest income could lead banks to bear additional market risks. If this could mitigate the sensitivity of banks to the credit cycles linked to downturns in economic activities, it could, at the same time, reinforce their sensitivity to market cycles related to fluctuations in interest rates, stock exchanges or foreign exchange markets. Operational risks have also several facets. To develop complex new products, banks need to upgrade the level of skills of their employees. They also have to organise good follow-up of their new activities, which necessitates an adequate internal control mechanism. This is particularly important when banks diversify their range of services and enter new geographic areas, such as emerging markets, which present political and country risks. Finally, in order to react to the changing nature of banking and financial services in an adequate way, banks have to take strategic risks. In particular, they have to redefine their objectives in order to safeguard a substantial level of profitability in the future. For some banks, this will imply a greater specification, based on a correct assessment of their specific strength, with the risk of making wrong choices of adopting herding behaviour. Indeed, in some products (e.g. private banking and asset management) seem to be a promising area for future profits, too many banks could be tempted to focus on the same non-interest income related activities.

Creditors and depositors would almost certainly demand to have more and better information about what banks do, about the current values of banks' assets and liabilities, and about the risks that banks are taking. Requiring banks to make public disclosures about their operations and financial performance could in principle reinforce regulators as monitors of banks. Banks should make available to the public market value based risk disclosure statements that provide a reasonably accurate picture of the risks to which they are exposed. Such disclosures will enhance economic efficiency and may help to deter excessive risk-taking by providing better information to regulators, customers, creditors, and stockholders.

The changes in the banks' income structure deriving from developments in the banking business also have implications for the activity of banking supervision in two respects: prudential regulation and current supervision. As banks expand into increasingly complex and opaque activities, it will become more and more difficult for regulators to determine appropriate capital standards and to monitor and police the activities of banks. For policy makers, the key goals are to ensure that the benefits of the single market in banking are fully realised, and that the ongoing consolidation of the banking industry does not result in financial instability or excessive social and fiscal costs.

With regard to prudential regulation, the main reference is to the capital adequacy regime. This regime, initially designed to cover credit risks on the basis of the solvency ratio, was later extended to cover market risks. As a subsequent step, the development of sophisticated risk management techniques by banks was taken into account by supervisors through the acceptance of internal risk management models to measure market risk for capital requirement purposes. One of the areas in which this process is being undertaken is the determination of specific capital requirements for categories of risks other than credit and market risk. Requiring banks to hold adequate capital promotes financial stability in two ways. First, it provides a greater cushion with which banks can absorb losses, lessening the likelihood of failure. Second, with more capital at risk, banks have less incentive to take excessive risk. To ensure that banks hold the requisite amount of capital and do not engage in either excessively risky or illegal activities, supervision and field examinations of banks would continue to be necessary.

Effective regulatory monitoring and supervision are key elements in a system of risk-based capital requirements. Regulators must be willing and able to take early corrective action to prevent losses from escalating to levels greater than the capital held by the bank. Among other things, effective monitoring requires that the net worth of a bank be frequently (if not continually) reassessed and that a bank's activities be monitored to ensure that the bank does not take inappropriate risks. A precondition for successful monitoring is that regulators be able to measure accurately both a bank's capital and its potential risk exposure.

In general terms, banking supervisors have to ensure that all risks stemming from the changes in the banks' income structure are properly controlled by banks. To that end, banking supervisors have already adapted or are in the process of adapting their monitoring process in order to take account of the developments in banking activities. Bank supervision has traditionally focused on the assessment of the quality of a bank's balance sheet at a specific point of time –and on whether it complies with capital requirements and restrictions on portfolio composition. This approach is no longer adequate in a world in which banks are active players in the capital markets and can be driven into insolvency extremely rapidly from trading losses. In today's financial environment effective supervision requires shorter monitoring intervals than in the past, which substantially increases supervisory costs. For example, derivatives (futures, forwards, options, and swaps) can be useful in reducing a bank's risk but can also be used to increase risk exposure quickly and dramatically. A bank can change its risk exposure substantially within minutes by simply altering its trading position in derivatives. Thus, we are moving toward a financial system where effective monitoring will require regulators to reassess the market value of a bank's capital as well as the bank's risk exposure on a continuous basis. If banks were to take excessive risks, for example, depositors and creditors could demand higher risk premiums or leave the bank entirely and thereby provide an incentive for banks to operate more prudently. At a minimum, therefore, banks should be required to adopt market-value accounting and disclosure principles.

References

ABDULA, J. (1994). An empirical analysis of commercial banks' performance in Bahrain. Giorgano Dell' Amore Foundations Savings and Development 18 (3): 307-321.

AGGELER, H. and FELDMAN, R. (1998). Record bank profitability: how, who and what does it mean? Federal Reserve Bank of Minneapolis, Fedgazette.

AGUILAR, L. (1995). A current look at foreign banking in the U.S. and Seventh District. Federal Reserve Bank of Chicago, Economic Perspectives 19: 20-28.

ALCHIAN, A. and KLEIN, B. (1973). On a correct measure of inflation. Journal of Money, Credit, and Banking 5: 173-191.

ALLEN, L. (1988). The determinants of bank interest margins: A note. Journal of Financial and Quantitative Analysis 23 (2): 231-235.

ALTUNBAS, Y. and MOLYNEUX, P. (1993). Scale and scope economies in European banking. Institute of European Finance, University College of North Wales, Bangor.

ANDERSON, P. (1979). Costs and profitability of bank functions. New England Economic Review: 43-61.

ARSHADI, N. and LAWRENCE, E. (1987). An empirical investigation of new bank performance. Journal of Banking and Finance 11: 33-48.

ARTHUR ANDERSEN and ANDERSEN CONSULTING (1993). European banking and capital markets: A strategic forecast. (The Economist Intelligence Unit, London)

BAGLIANO, F., DALMAZZO, A., and MARINI, G. (2000). Bank competition and ECB's monetary policy. Journal of Banking and Finance 24: 967-983.

BANDT, O. and DAVIS, E. (2000). Competition, contestability and market structure in European banking sectors on the eve of EMU. Journal of Banking and Finance 24: 1045-1066.

BANK OF INTERNATIONAL SETTLEMENTS (1982). Structural implications of high and variable interest rates. BIS Fifthy Second Annual Report: 78-80.

BARRY, L. (1988). District bank performance in 1987: bigger is not necessarily better. Federal Reserve Bank of St. Louis 70 (2): 39-48.

BARTH, J. and BENNETT, J. (1975). Cost-push versus demand-pull inflation: some empirical evidence. Journal of Money, Credit, and Banking 7: 391-397.

BAUER, P. (1989). The effect of bank structure and profitability on firm openings. Federal Reserve Bank of Cleveland, Economic Review 4: 29-39.

BERGER, A. (1995). The profit-structure relationship in banking – tests of market-power and efficient-structure hypotheses. Journal of Money, Credit, and Banking 27 (2): 404-415.

BERGER, A. (1995). The relationship between capital and earnings in banking. Journal of Money, Credit and Banking 27 (2): 432-456.

BERGER, A. and HANNAN, T. (1988). The price-concentration relationship in banking. The Review of Economics and Statistics: 291-299.

BERGER, A. and HANNAN, T. (1992). The price-concentration relationship in banking: a reply. The Review of Economics and Statistics 74: 376-379.

BERGER, A. and HANNAN, T. (1998). The efficiency cost of market power in the banking industry: A test of the "quiet life" and related hypotheses. Review of Economics and Statistics (80): 454-465.

BERGER, A., BONIME, D., COVITZ, D., and HANCOCK, D. (1999). Why are bank profits so persistent? The roles of product market competition, informational opacity, and regional/macroeconomic shocks. In: CHICAGO FEDERAL RESERVE CONFERENCE ON BANK STRUCTURE AND COMPETITION.

BERGER, A. and MESTER, L. (1999). What explains the dramatic changes in cost and profit performance of the US banking industry? University of Pennsylvania, Working Paper 99-10.

BOND, R. (1971). Deposit composition and commercial bank earnings. Journal of Finance 26: 39-50.

BOORMAN, J. (1974). The prospects for minority-owned commercial banks: a comparative performance analysis. Journal of Bank Research 4 (4): 263-279.

BOOT, A. (1999). European lessons on consolidation in banking. Journal of Banking and Finance 23: 609-613.

BOURKE, P. (1989). International comparisons of commercial banks profitability. (Institute of European Finance Monographs 7, University of Wales, Bangor).

BOURKE, P. (1989). Concentration and other determinants of bank profitability in Europe, North America and Australia. Journal of Banking and Finance 13: 65-79.

BOYD, J., HANWECK, G. and PITHYACHARIYAKUL, P. (1980). Bank holding company diversification. Federal Reserve Bank of Chicago, Proceedings from a Conference on Bank Structure and Regulation, May: 105-120.

BOYD, J. and GENTLER, M. (1994). Are banks dead? Or are the reports greatly exaggerated? Federal Reserve Bank of Minneapolis, Quarterly Review 18 (3): 2-19.

BOYD, J. and GRAHAM, S. (1986). Risk, regulation, and bank holding company expansion into nonbanking. Federal Reserve Bank of Minneapolis, Quarterly Review: 2-17.

BOYD, J., GRAHAM, S. and HEWITT, R. (1993). Bank holding company mergers with nonbank financial firms: Effects on the risk of failure. Journal of Banking and Finance 17: 43-63.

BOYD, J. and RUNKLE, D. (1993). Size and performance of banking firms: Testing the predictions of theory. Journal of Monetary Economics 31: 47-67.

BREWER, E. (1989). Relationship between bank holding company risk and non-bank activity. Journal of Economics and Business 41: 337-353.

BRIMMER, A. (1978). The black banks: An assessment of performance and prospects. Journal of Finance 26: 379-405.

BROZEN, Y. (1982). Concentration, mergers and public policy. (MacMillan, New York).

BRYAN, W. (1972). The determinants of bank profits: A study of medium sized banks. Department of Research and Planning, The American Bankers Association, Research Paper 8.

BRYAN, M. and CECCHETTI, S. (1993). The consumer price index as a measure of inflation. Federal Reserve Bank of Cleveland, Economic Review 29: 15-24.

CANALS, J. (1993). Competitive strategies in European banking. (Oxford University Press, Oxford).

CHAN-LEE, J. and SUTCH, H. (1985). Profits and rates of return. OECD Economic Studies 5: 127-167.

CHOATE, G.M. and ARCHER, S. (1975). Irving Fisher, inflation, and the nominal rate of interest. Journal of Financial and Quantitative Analysis 10: 675-685.

CLARK, J. (1986). Single-equation, multiple-regression methodology: Is it an appropriate methodology for the estimation of the structure-performance relationship in banking? Journal of Monetary Economics 18: 295-312.

CLARK, M. (1994). New horizons in the measurement of bank performance. Coopers and Lybrand Deloite Digest, UK, Spring: 39-42.

CLARK, J. and SIEMS, T. (1997). Competitive viability in banking: Looking beyond the balance sheet. Federal Reserve Bank of Dallas, Working Paper: web-site.

COLE, R.T. (1981). Financial performance of small banks, 1977-80. Federal Reserve Bulletin 67 (6): 480-485.

CROCKETT, A. (1997). Why is financial stability a goal of public policy in maintaining financial stability in a global economy, Federal Reserve Bank of Kansas City: 7-36.

CURRY, T.J. and ROSE, J.T. (1984). Bank holding company presence and banking market performance. Journal of Bank Research 14 (4): 259-265.

DASKIN, A. and WOLKEN, J. (1989). An empirical investigation of the critical Herfindahl Index in banking. Journal of Economics and Business 41: 95-105.

DAVIS, E. (1999). Institutionalization and EMU: Implications for European financial markets. International Finance 2 (1): 33-61.

DAVIS, E., GOUZOULI, C., SPENCE, M. and STAR, J. (1993). Measuring the performance of banks. Business Strategy Review 4 (3): 1-14.

DEMSETZ, R. and STRAHAN, P. (1995). Diversification, size, and risk at bank holding companies. Federal Reserve Bank of New York, Research Paper 95-06.

DERMINE, J. (1985). The measurement of interest-rate risk by financial intermediaries. Journal of Bank Research 16 (2): 86-90.

DE YOUNG, R. and HASSAN, I. (1998). The performance of de novo commercial banks: A profit efficiency approach. Journal of Banking and Finance 22: 565-587.

DE YOUNG, R. and ROLAND, K. (1999). Product mix and earnings volatility at commercial banks: Evidence from a degree of leverage model. Federal Reserve Bank of Chicago, Working Paper 99-6.

DUNKELBERG, W.C. and SCOTT, J.A. (1984). Rural versus urban bank performance: an analysis of market competition for small bank loans. Journal of Bank Research 15 (3): 167-178.

EDWARDS, F. (1977). Managerial objectives in regulated industries: Expense-preference behaviour in banking. Journal of Political Economy 85: 147-162.

EDWARDS, F. (1996). The new finance: regulation & financial stability. (The American Enterprise Institute Press).

EDWARDS, F. and HEGGESTAD, A. (1973). Uncertainty, market structure, and performance: The Galbraith-Caves hypothesis and managerial motives in banking. Quarterly Journal of Economics: 455-473.

EISEMANN, P. (1976). Diversification and the congeneric bank holding company. Journal of Bank Research 7: 68-77.

EISENBEIS, R., HARRIS, R. and LAKONISHOK, J. (1984). Benefits of bank diversification: The evidence from shareholder returns. The Journal of Finance XXXIX (3): 881-892.

ELLIOTT, J.W. (1972). Control, size, growth, and financial performance in the firm. Journal of Financial and Quantitative Analysis VII (1): 1309-1320.

EMERY, J. (1971). Risk, return, and the morphology of commercial banking. Journal of Financial and Quantitative Analysis VI: 763-776.

ERNST & YOUNG (1995). Performance measurement for financial institutions: methods for managing business results (McGraw-Hill).

EUROPEAN CENTRAL BANK (2000). EU banks' income structure. (European Central Bank).

EUROPEAN CENTRAL BANK (2000). EU banks' margins and credit standards. (European Central Bank).

EUROPEAN CENTRAL BANK (2000). Mergers and acquisitions involving the EU banking industry – facts and implications. (European Central Bank).

EUSKE, K.J., JACKSON, D.W. and REIF, W.E. (1980). Performance and satisfaction of bank managers. Journal of Bank Research 11 (1): 36-42.

EVANOFF, D. and FORTIER, D. (1988). Re-evaluation of the structure-conduct-performance paradigm in banking. Journal of Financial Service Research 1: 277-294.

FLANNERY, M. (1981). Market interest rates and commercial bank profitability: An empirical investigation. The Journal of Finance XXXVI (6): 1085-1101.

FLANNERY, M. (1983). Interest rates and bank profitability: Additional evidence. Journal of Money, Credit, and Banking 15 (3): 355-362.

FLANNERY, M. and JAMES, C. (1984). Market evidence of the effective maturity of bank assets and liabilities. Journal of Money, Credit and Banking 16 (4): 435-445.

FRAME, S.W. and HOLDER, C. (1994). FYI: commercial bank profits in 1993. Federal Reserve Bank of Atlanta, Economic Series 79 (4): 22-41.

FRANCIS, J.C. (1978). Portfolio analysis of asset and liability management in small-, medium- and large-sized banks. Journal of Monetary Economics 4: 459-480.

FRASER, D. and ROSE, P. (1971). More on banking structure and performance: the evidence from Texas. Journal of Financial and Quantitative Analysis VI (1): 601-614.

FRASER, D. and ROSE, P. (1972). Bank entry and bank performance. The Journal of Finance 27: 65-78.

FRASER, D., PHILLIPS, W. and ROSE, P. (1974). A canonical analysis of bank performance. Journal of Financial and Quantitative Analysis 9: 287-295.

FRIEDMAN, B. (1980). The determination of long-term interest rates: Implications for fiscal and monetary policies. Journal of Money, Credit, and Banking 12 (2): 331-352.

GALLO, J., APILADO, V. and KOLARI, J. (1996). Commercial bank mutual fund activities: Implications for bank risk and profitability. Journal of Banking and Finance 20: 1775-1791.

GERTLER, M. (1988). Financial structure and aggregate economic activity: an overview, Journal of Money, Credit, and Banking 20 (3): 559-587.

GILBERT, R. (1984). Bank market structure and competition. Journal of Money, Credit, and Banking 16 (4): 617-660.

GILBERT, G. and PETERSON, M. (1975). The impact of changes in Federal Reserve membership on commercial bank performance. The Journal of Finance XXX (3): 713-719.

GOLDBERG, L. and RAI, A. (1996). The structure-performance relationship for European banking. Journal of Banking and Finance 20: 745-771.

GOLDSCHMIDT, A. (1981). On the definition and measurement of bank output. Journal of Banking and Finance 5: 575-585.

GRADDY, D. and KYLE, R. (1979). The simultaneity of bank decision-making, market structure, and bank performance. The Journal of Finance XXXIV (1): 1-18.

GRADDY, D. and KYLE, R. (1980). Affiliated bank performance and the simultaneity of financial decision-making. The Journal of Finance XXXV (4): 951-957.

GRADDY, D. and KARNA, A. (1984). Net interest margin sensitivity among banks of different sizes. Journal of Bank Research 14 (4): 283-290.

GREENBAUM, S., ALI, M. and MERRIS, R. (1976). Monetary policy and banking profits. The Journal of Finance XXXI: 89-101.

GUJARATI, D. (1995). Basic Econometrics. (McGraw-Hill International Editions, Third Edition).

GUNTHER, J. and ROBINSON, K. (1999). Industry mix and lending environment variability: What does the average bank face? Federal Reserve Bank of Dallas, Economic and Financial Review, Second Quarter.

GUP, B. and WALTER, J. (1989). Top performing small banks: Making money the old-fashioned way. Federal Reserve Bank of Richmond, Economic Review 75: 23-31.

GUPTA, K. (1991). Interest rates, inflation expectations and the inverted Fisher hypothesis. Journal of Banking and Finance 15: 109-116.

GUPTA, K. (1992). Interest rates, income taxes and anticipated inflation: some new evidence. Journal of Banking and Finance 16: 973-981.

HANCOCK, D. (1985). Bank profitability, interest rates, and monetary policy. Journal of Money, Credit, and Banking 17 (2): 189-202.

HANNAN, T. (1979). Expense-preference behaviour in banking: a reexamination. Journal of Political Economy 87 (4): 891-895.

HANNAN, T. (1991). Foundations of the structure-conduct-performance paradigm in banking. Journal of Money, Credit, and Banking 23 (1): 68-84.

HARKER, P. and ZENIOS, S. (1998). What drives the performance of financial institutions? The Wharton School, University of Pennsylvania, Working Paper 98-21.

HASLEM, J. (1968). A statistical analysis of the relative profitability of commercial banks. Journal of Finance 23: 167-176.

HASLEM, J. (1969). A statistical estimation of commercial bank profitability. Journal of Business 42: 22-35.

HEFFERNAN, S. (1996). Modern banking in theory and practice. (Wiley, Chichester).

HEGGESTAD, A. (1977). Riskiness of investments in nonbank activities by bank holding companies. Journal of Economics and Business: 219-223.

HEGGESTAD, A. (1977). Market structure, risk and profitability in commercial banking. The Journal of Finance XXXII (4): 1207-1216.

HEGGESTAD, A. (1979). A survey of studies on banking competition and performance. (Chapter 9 in F.R.Edwards, Issues in Financial Regulation, McGraw-Hill, New York: 449-490).

HEGGESTAD, A. and MINGO, J. (1976). Prices, nonprices, and concentration in commercial banking. Journal of Money, Credit, and Banking 8: 107-117.

HEMPEL, G., SIMONSON, D. and COLEMAN, A. (1994). Bank management. (John Wiley & Sons Ltd., Fourth Edition, New York).

HESTER, D. (1982). Innovations and the portfolios of weekly reporting banks. Journal of Banking and Finance 6: 89-112.

HESTER, D. and ZOELLNER, J. (1966). The relationship between bank portfolios and earnings: an econometric analysis. Review of Economics and Statistics: 372-386.

HO, T. and SAUNDERS, A. (1981). The determinants of bank interest margins: theory and empirical evidence. Journal of Financial and Quantitative Analysis XVI (4): 581-600.

HOGGARTH, G., MILNE, A. and WOOD, G. (1999). Financial innovation and financial stability: Some lessons from Germany and the UK. Bank of England, Financial Stability Review.

HONG, H. (1977). Inflation and the market value of the firm: Theory and tests. The Journal of Finance XXXII (4): 1031-1048.

HONOHAN, P. and KINSELLA, R. (1982). Comparing bank concentration across countries. Journal of Banking and Finance 6: 255-262.

HOWELLS, P. and BAIN, K. (1998). The economies of Money, Banking and Finance: A European text (Pearson Education Limited).

HUBBARD, R. and PALIA, D. (1995). Executive pay and performance: Evidence from the US banking industry. Journal of Financial Economies 39: 105-130.

HUMPHREY, D. and PULLEY, L. (1997). Banks' responses to deregulation: Profits, technology, and efficiency. Journal of Money, Credit, and Banking 29 (1): 73-93.

JAFFE, D. and LEVONIAN, M. (2000). The structure of banking systems in developed and transition economies. European Financial Management Association Conference.

JAMES, C., and HOUSTON, J. (1996). Evolution or extinction: Where are banks headed? Bank of America, Journal of Applied Corporate Finance 9 (2).

JAYARATNE, J. and STRAHAN, P. (1998). Entry restrictions, industry evolution, and dynamic efficiency: evidence from commercial banking. Journal of Law and Economics XLI: 239-270.

JOHNSON, R. and MEINSTER, D. (1974). Bank holding companies: diversification opportunities in nonbank activities. Eastern Economic Journal: 316-323.

JORDAN, W. (1972). Producer protection prior market structure and effects of government regulation. Journal of Law and Economics 15: 151-176.

KANNIAINEN, V. (1979). The redistribution of wealth in inflation. Journal of Banking and Finance 3: 177-185.

KARNA, A. (1979). Bank holding company profitability: nonbanking subsidiaries and financial leverage. Journal of Bank Research 10 (1): 28-35.

KAUFMAN, G. (1965). Bank market structure and performance: the evidence from Iowa. Southern Economic Journal 32: 429-439.

KAUFMAN, G. (1998). Central banks, asset bubbles, and financial stability. Federal Reserve Bank of Chicago, Working Paper 12.

KAUFMAN, G. and MOTE, L. (1994). Is banking a declining industry? A historical perspective. Federal Reserve Bank of Chicago, Economic Perspectives 18: 2-21.

KENNEDY, P. (1999). A guide to econometrics. (Blackwell Publishers, Fourth Edition).

KESSEL, R. and ALCHIAN, A. (1962). Effects of inflation. The Journal of Political Economy LXX (6): 521-537.

KIMBALL, R. (1997). Innovations in performance measurement in banking. New England Economic Review: 23-37.

KIMBALL, R. (1998). Economic profit and performance measurement in banking. New England Economic Review: 35-53.

KOCH, T. (1995), Bank management (The Dryden Press; Third Edition).

KOLARI, J., McINISH, T. and SANIGA, E. (1989). A note on the distribution types of financial ratios in the commercial banking industry. Journal of Banking and Finance 13: 463-471.

KWAN, S. (1997). Securities activities by commercial banking firms' Section 20 subsidiaries: Risk, return, and diversification benefits. Federal Reserve Bank of San Francisco, Economic Research Paper: web-site.

KWAST, M. (1989). The impact of underwriting and dealing of bank returns and risks. Journal of Banking and Finance 3: 101-125.

KWAST, M. and ROSE, J. (1982). Pricing, operating efficiency, and profitability among large commercial banks. Journal of Banking and Finance 6: 233-254.

LAHIRI, K. and ZAPOROWSKI, M. (1984). A note on the variability of real interest rates, business cycles, and the Livingston data. Journal of Banking and Finance 8: 483-490.

LANG, W. and NAKAMURA, L. (1995). 'Flight to quality' in banking and economic activity. Journal of Monetary Economics 36. 145-164.

LARRE, R. (1977). Global inflation and international banking. Bank of International Settlements (BIS), Forty Eight Annual Report: 43-46.

LEEMPUTE, P. and KEARNEY, M. (1990). Where is the value created in your retail business? Journal of Retail Banking 7 (4): 7-18.

LIOYD-WILLIAMS, M., MOLYNEUX, P. and THORNTON, J. (1994). Market structure and performance in Spanish banking. Journal of Banking and Finance 18: 433-443.

LOZANO-VIVAS, A. (1998). Efficiency and technical change for Spanish banks. Applied Financial Economics 8: 289-300.

LYNGE, M. and ZUMWALT, K. (1980). An empirical study of the interest rate sensitivity on commercial bank returns: A multi-index approach. Journal of Financial and Quantitative Analysis 15: 731-742.

MACFARLANE, H. and MORTIME-LEE, P. (1974). Inflation over 300 years. Bank of England Economic Bulletin, May.

MAGNAN, M. and St-ONGE, S. (1997). Bank performance and executive compensation: A managerial discretion perspective. Strategic Management Journal 18 (7): 573-581.

MAISEL, S. and JACOBSON, R. (1978). Interest rate changes and commercial bank revenues and costs. Journal of Financial and Quantitative Analysis 13: 687-700.

MARGAN, M. and ST-ONGE, S. (1997). Bank performance and executive compensation: a managerial discretion perspective. Strategic Management Journal 18 (7): 573-581.

MARRIOT, A. and MOLUNEUX, P. (1991). Determinants of large banks profitability in Europe. Mimeo: 1-7.

MATTEN, C. (1996). Managing bank capital: capital allocation and performance measurement (London: Willey).

MAYNE, L.S. (1976). Management policies of bank holding companies and bank performance. Journal of Bank Research 7 (1): 37-48.

McCALL, A. and PETERSON, M. (1977). The impact of de novo commercial bank entry. Journal of Finance XXXII (5): 1587-1604.

McCALL, A. and WALKER, D. (1973). The effects of control status on commercial bank profitability. Journal of Financial and Quantitative Analysis 8: 637-645.

McCAULEY, R. and WHITE, W. (1997). The euro and European financial markets. Bank of International Settlements, Working Paper 41.

MEINSTER, D. and ELYASIANI, E. (1988). The performance of foreign owned, minority owned, and holding company owned banks in the U.S. Journal of Banking and Finance 12: 293-313.

MESTER, L. (1992). Traditional and non-traditional banking: An information-theoretic approach. Journal of Banking and Finance 16: 545-566.

MILLER, S. and NOULAS, A. (1996). The technical efficiency of large bank production. Journal of Banking and Finance 20: 495-509.

MILLER, S. and NOULAS, A. (1997). Portfolio mix and large-bank profitability in the USA, Applied Economics 29: 505-512.

MINGO, J. (1975). Capital management and profitability of prospective holding company banks. Journal of Financial and Quantitative Analysis 10: 191-203.

MITCHELL, K. (1989). Interest rate risk at commercial banks: An empirical investigation. The Financial Review 24 (3): 431-455.

MOLYNEUX, P. (1993). Market structure and profitability in European banking. Institute of European Finance, University College of North Wales, Research Paper 9.

MOLYNEUX, P. (1999). Increasing concentration and competition in European banking: the end of anti-trust? Federal Reserve Bank of Chicago, Economic Perspectives 4 (1): 127-133.

MOLYNEUX, P., ALTUNBAS, Y. and GARDENER, E. (1996). Efficiency in European banking (John Wiley & Sons).

MOLYNEUX, P. and FORBES, W. (1993). Market structure and performance in European banking. Institute of European Finance, Research Paper 5.

MOLYNEUX, P., REMOLONA, E. and SETH, R. (1998). Modeling foreign bank performance and lending behavior, Financial Markets, Institutions & Instruments 7 (4): 22-36.

MOLYNEUX, P. and THORNTON, J. (1992). Determinants of European bank profitability: A note. Journal of Banking and Finance 16: 1173-1178.

MOORE, R. (1998). Concentration, technology and market power in banking: Is distance dead? Federal Reserve Bank of Dallas, Financial Industry Studies: 1-18.

NEELY, M.C. and WHEELOCK, D. (1997). Why does bank performance vary across states? Federal Reserve Bank of St. Louis 79 (2): 29-40.

NEUBERGER, J.A. (1991). Risk and return in banking: evidence from bank stock returns. Federal Reserve Bank of San Francisco, Economic Review: 18-30.

OLSON, R. and SIMONSON, D. (1982). Gap management and market rate sensitivity in banks. Journal of Bank Research 13 (3): 53-58.

OPPER, B. (1981). Profitability of insured commercial banks. Federal Reserve Bulletin 67 (9): 657-669.

OSBORNE, D. and WENDEL, J. (1983). Research in structure-conduct and performance in banking 1964-1979, College of Business Administration, Oklahoma State University, Research Paper 3.

PADHI, M. (1999). Banks selling insurance: Risky business? Federal Reserve Bank of Atlanta, Financial Update 12 (4): 1-3.

PEEK, J., ROSENGREN, E. and KASIRYE, F. (1998). The poor performance of foreign bank subsidiaries: Were the problems acquired or created? Federal Reserve Bank of Boston: Web-site.

PENATI, A. (1986). The sources of the movements in interest rates. Journal of Banking and Finance 10: 343-360.

PERISTIANI, S. (1997). Do mergers improve the X-efficiency and scale efficiency of US banks? Evidence from the 1980s. Journal of Money, Credit and Banking 29 (3): 326-337.

PERRY, P. (1992). Do banks gain or lose from inflation? Journal of Retail Banking XIV (2): 2530.

PRASAD, B., and HARKER, P. (1997). Examining the contribution of information technology toward productivity and profitability in U.S. retail banking. The Wharton School, University of Pennsylvania, Financial Institutions Center 97-09.

RADECKI, L. (1999). Banks' payments-driven revenues. Federal Reserve Bank of New York, Economic Policy Review: 53-69.

RAVENSCRAFT, D. (1983). Structure-profit relationships at the line of business and industry levels. Review of Economics and Statistics 65: 22-31.

REMOUNDOS, P. (1995). Determinants of Greek commercial banks profitability, 1989-1993. MSc Dissertation, Banking and Finance, University of Wales, Bangor.

REVELL, J. (1979). Inflation and financial institutions. (The Financial Times Ltd., London).

REVELL, J. (1980). Costs and margins in banking: An international survey. (Organisation of Economic Co-operation and Development, Paris).

RHOADES, S. (1977). Structure-performance studies in banking: A summary and evaluation. US Federal Reserve Board Staff Economic Papers 92.

RHOADES, S. (1982). The relative size of banks and industrial firms in the United States and other countries: A note. Journal of Banking and Finance 6: 579-585.

RHOADES, S. (1985). Market share as a source of market power: Implications and some evidence. Journal of Economics and Business 37: 343-363.

RHOADES, S. and RUTZ, R. (1981). A re-examination and extension of the relationship between concentration and firm rank stability. The Review of Economics and Statistics 63 (3): 446-451.

RHOADES, S. and RUTZ, R. (1982). Market power and firm risk: A test of the "Quiet Life" hypothesis. Journal of Monetary Economics 9: 73-85.

RICHETTS, D. and STOVER, R. (1978). An examination of commercial bank financial ratios. Journal of Bank Research 9 (2): 121-124.

ROLAND, K. (1997). Profit persistence in large US bank holding companies: An empirical investigation. Office of the Comptroller of the Currency, Economics Paper 97-2.

ROSE, J.T. (1982). Bank holding company affiliation and market share performance. Journal of Monetary Economics 9: 109-119.

ROTH, A.V., and JACKSON III, W.E. (1995). Strategic determinants of service quality and performance: evidence from the banking industry. Management Science 41 (11): 1720-1733.

RUTHENBERG, D. and ELIAS, R. (1996). Cost economies and interest rate margins in a unified European banking market. Journal of Economics and Business 48 (3): 231-249.

SAIDENBERG, M. and STRAHAN, P. (1999). Are banks still important for financing large businesses? Federal Reserve Bank of New York, Current Issues in Economics and Finance 5 (12).

SAMOLYK, K. (1994). Banking conditions and regional economic performance: Evidence of a regional credit channel. Journal of Monetary Economics 34: 259-278.

SAMOLYK, K. (1997). U.S. banking sector trends: Assessing disparities in industry performance. Journal of Money, Banking and Finance 30 (2): 2-17.

SAMUELSON, P. (1945). The effect of interest rate increases on the banking system. The American Economic Review XXXV (1): 16-27.

SANTONI, G.J. (1986). The effects of inflation on commercial banks. Federal Reserve Bank of St. Louis 68 (3): 15-26.

SAUNDERS, A. (1994). Banking and commerce: An overview of the public policy issues. Journal of Banking and Finance 18: 231-254.

SAUNDERS, A. and WALTER, J. (1994). Universal banking in the United States. (Oxford University Press, Oxford).

SAUNDERS, A. and YOUROUGOU, P. (1990). Are banks special? The separation of banking from commerce and interest rate risk. Journal of Economic Business 42: 171-182.

SAUNDERS, R. (1969). On the interpretation of models explaining cross sectional differences among commercial banks. Journal of Financial and Quantitative Analysis: 25-36.

SCHMIDT, R.H., HACKETHAL, A. and TYRELL, M. (1999). Disintermediation and the role of banks in Europe: an international comparison. Journal of Financial Intermediation 8: 36-67.

SCHRANZ, M. (1993). Takeovers improve firm performance: Evidence from the banking industry. Journal of Political Economy 101 (2): 299-326.

SCHUSTER, L. (1984). Profitability and market shares of banks. Journal of Bank Research 15 (1): 56-61.

SHORT, B. (1977). Bank concentration, market size, and performance: Some evidence from outside the United States. Mimeo, Washington.

SHORT, B. (1979). The relation between commercial bank profit rates and banking concentration in Canada, Western Europe, and Japan. Journal of Banking and Finance 3: 209-219.

SIEGEL, J. (1992). The real rate of interest from 1800-1900: A study of the U.S. and the U.K. Journal of Monetary Economics 29: 227-252.

SILVEIRA, A. (1973). Interest rate and rapid inflation: The evidence from the Brazilian economy. Journal of Money, Credit, and Banking 5: 794-804.

SIMONSON, D. and HEMPEL, G. (1982). Improving gap management for controlling interest rate risk. Journal of Bank Research 13 (3): 109-115.

SINKEY, J. (1983). The performance of First Pennsylvania bank prior to its ball out. Journal of Bank Research 14 (2): 119-133.

SINKEY, J. (1998). Commercial Bank Financial Management (Prentice Hall, Fifth Edition).

SINKEY, J. and NASH, R. (1993). Assessing the riskiness and profitability of credit card banks. Journal of Financial Services Research 7: 127-150.

SMIRLOCK, M. (1985). Evidence on the (non) relationship between concentration and profitability in banking. Journal of Money, Credit, and Banking 17 (1): 69-83.

SMIRLOCK, M., GILLIGAN, T. and MARCHALL, W. (1984). Tobin's q and the structure-performance relationship. American Economic Review 74: 1051-1060.

STEINHERR, A. and HUVENEERS, C. (1994). On the performance of differently regulated financial institutions: Some empirical evidence. Journal of Banking and Finance 18: 271-306.

STIROH, K. (1999). Compositional dynamics and the performance of the US banking industry. Federal Reserve Bank of New York Seminar: Web-site.

THE BANKER (2000). European retail banking. The Banker Supplement, March.

THISTLE, P., McLEOD, R. and CONRADS, L. (1989). Interest rates and bank portfolio adjustments. Journal of Banking and Finance 13: 151-161.

TIRTIROGLOU, D., and DANIELS, K. (2000). Does relaxing state-level regulations improve the productivity growth of US commercial banks? EFMA Annual Meeting, Athens 2000.

TUCILLO, J. (1973). Taxation by regulation: The case of financial intermediaries. Bell Journal of Economics.

UYEMURA, D., KANTOR, C., and PETTIT, J. (1996). EVA for banks: value creation, risk management, and profitability measurement. Journal of Applied Corporate Finance 9 (2): 156-175.

VENNET, R. (1996). The effect of mergers and acquisitions on the efficiency and profitability of EC credit institutions. Journal of Banking and Finance 20: 1531-1558.

VENNET, R. (1998). Cost and profit dynamics in financial conglomerates and universal banks in Europe. University of Ghent: Web-site.

WALL, L. (1985). Why are some banks more profitable than others? Journal of Bank Research 15 (4): 240-256.

WALL, L., and EISENBEIS, R. (1984). Risk considerations in deregulating bank activities. Federal Reserve Bank of Atlanda, Economic Review: 6-19.

WALL, L., REICHERT, A. and MOHANTY, S. (1993). Deregulation and the opportunities for commercial bank diversification. Federal Reserve Bank of Atlanta, Economic Review: 1-25.

WETMORE, J. and BRICK, J. (1998). The basic risk component of commercial bank stock returns. Journal of Economics and Business 50: 67-76.

WHALEN, G. (1987). Concentration and profitability in non-MSA banking markets. Federal Reserve Bank of Cleveland, Economic Review, Quarter 1: 2-9.

WHALEN, G. (1988). Actual competition, potential competition, and bank profitability in rural markets. Federal Reserve Bank of Cleveland, Economic Review, Quarter 3: 14-21.

WHITE, W. (1998). The coming transformation of continental European banking. Bank of International Settlements, Working Paper, No. 54.

WILLIAMS, B. (1998). Factors affecting the performance of foreign-owned banks in Australia: A cross-sectional study. Journal of Banking and Finance 22: 197-219.

WOOSLEY, L. and BAER, J. (1995). FYI: commercial bank profits in 1994. Federal Reserve Bank of Atlanta 80 (3): 11-31.

YEATS, A. (1974). Further evidence on the structure-performance relation in banking. Journal of Economics and Business 26: 95-100.

ZIMMERMAN, G. (1996). Factors influencing community bank performance in California. Federal Reserve Bank of San Francisco 1: 26-41.

Bibliography

AHARONY, J., SAUNDERS, A., and SWARY, I. (1986). The effects of a shift in monetary policy regime on the profitability and risk of commercial banks. Journal of Monetary Economics 17: 363-377.

BARRO, R.J. (1998). Determinants of economic growth: a cross-country empirical study (The MIT Press).

BASLE COMMITTEE ON BANKING SUPERVISION (1998). Enhancing bank transparency (Basle).

BERGER, A., DEMSETZ, R., and STRAHAN, P. (1999). The consolidation of the financial services industry: Causes, consequences, and implications for the future. Journal of Banking and Finance 23: 135-194.

BENSTON, G., HANWECK, G. and HUMPHREY, D. (1992). Scale economies in banking: A restructuring and reassessment. Journal of Money, Credit and Banking 14 (4): 435-456.

BLEJER, M. (1978). Money and the nominal interest rate in an inflationary economy: an empirical test. Journal of Political Economy 86 (3): 529-534.

BRANCH, B. (1974). Common stock performance and inflation: an international comparison. Journal of Business 47: 48-52.

CALVO, G. and VEGH, C. (1993). Fighting inflation with high interest rates: the small open economy case under flexible prices. Journal of Money, Credit, and Banking 25 (2): 49-65.

CAMPBELL, T. (1978). Monetary policy and bank portfolio composition: An empirical analysis of their impact on GNP. Journal of Money, Credit, and Banking X (2): 239-251.

CHANG, R. (1998). Policy credibility and the design of Central Banks. Federal Reserve Bank of Atlanta, Economic Review, First Quarter: 4-15.

CHOI, J., ELYASIANI, E. and KOPECKY, K. (1992). The sensitivity of bank stock returns to market, interest and exchange rate risks. Journal of Banking and Finance 16: 983-1004.

COSIMANO, T. (1988). The banking industry under uncertain monetary policy. Journal of Banking and Finance 12: 117-139.

DAY, T. (1985). Expected inflation and the real rate of interest: A note. Journal of Banking and Finance 9: 491-498.

DERMINE, J. (1985). Inflation, taxes and banks' market values. Journal of Business Finance and Accounting 12 (1): 65-73.

DERMINE, J. (1985). The measurement of interest-rate risk by financial intermediaries. Journal of Bank Research 16 (2): 86-90.

DEWENTER, K., and HESS, A. (1998). An international comparison of banks' equity returns. Journal of Money, Credit, and Banking 30 (3): 472-492.

EVANS, L.T., KEEF, S.P. and OKUNEV, J. (1994). Modelling real interest rates. Journal of Banking and Finance 18: 153-165.

FAMA, E. (1975). Short-term interest rates as predictors of inflation. American Economic Review 65: 269-282.

FAMA, E. and SCHWERT, W. (1977). Asset returns and inflation. Journal of Financial Economics 5: 115-146.

FAMA, E. (1980). Banking in the theory of finance. Journal of Monetary Economics 6: 39-57.

FAMA, E. (1981). Stock returns, real activity, inflation, and money. American Economic Review 71: 545-565.

FAMA, E. (1985). What's different about banks? Journal of Monetary Economics 15: 29-39.

FAMA, E. (1990). Term-structure forecasts of interest rates, inflation, and real returns. Journal of Monetary Economics 25: 59-76.

FELDSTEIN, M. (1980). Inflation and the stock market. American Economic Review 70: 839-847.

GESKE, R. and ROLL, R. (1983). The fiscal and monetary linkage between stock returns and inflation. The Journal of Finance XXXVIII (1): 1-33.

GORTON, G., and ROSEN, R. (1995). Corporate control, portfolio choice, and the decline of banking. The Journal of Finance L (5): 1377-1420.

GREEN, C.J. (1998). Banks as interest rate managers. Journal of Financial Services Research 14 (3): 189-208.

GULTEKIN, B. (1983). Stock market returns and inflation: evidence from other countries. Journal of Finance 38: 49-65.

HERCOWITZ, Z. (1983). Anticipated inflation, the frequency of transactions, and the slope of the Phillips Curve. Journal of Money, Credit, and Banking 15 (2): 139-154.

KARELS, G., and SACKLEY, W. (1993). The relationship between market and accounting betas for commercial banks. Review of Financial Economics 2 (2): 59-72.

KAUL, G. (1987). Stock returns and inflation. Journal of Financial Economics 18: 253-276.

LAHIRI, K., TEIGLAND, C. and ZAPOROWSKI, M. (1988). Interest rates and the subjective probability distribution of inflation forecasts. Journal of Money, Credit, and Banking 20 (2): 233-248.

LEVY-GARBOUA, V. and MAAREK, G. (1978). Bank behavior and monetary policy. Journal of Banking and Finance (2): 15-46.

LOMBRA, R. and STRUBLE, F. (1979). Monetary aggregate targets and the volatility of interest rates: a taxonomic discussion. Journal of Money, Credit, and Banking 11 (3): 284-300.

LYONS, D.D. (1994). Portfolio diversification: balancing benefits and costs. The Journal of Commercial Lending: 31-39.

MAKIN, J. (1978). Anticipated inflation and interest rates in an open economy. Journal of Money, Credit and Banking 10 (3): 275-289.

MATOLCSY, Z.P. (1986). The distributive nominal and real micro effects of inflation on security returns. Journal of Banking and Finance 10: 361-376.

MILLS, T. and WOOD, G. (1989). Money and interest rates in Britain from 1870 to 1913. City University Business School, Department of Banking and Finance, Midland Montagu Centre for Financial Markets 9.

MISCHIN, F. (1981). Monetary policy and long-term interest rates: An efficient markets approach. Journal of Monetary Economics 7: 29-55.

MOAZZAMI, B. (1990). Interest rates and inflationary expectations: long-run equilibrium and short-run adjustment. Journal of Banking and Finance 14: 1163-1170.

PEARCE, D. (1979). Comparing survey and rational measures of expected inflation: forecast performance and interest rate effects. Journal of Money, Credit, and Banking 11 (4): 447-456.

RAJAN, R.G. (1996). Why banks have a future: toward a new theory of commercial banking. Bank of America, Journal of Applied Corporate Finance 9: 114-135.

SCOTT, R.H. (1966). A conditional theory of banking enterprise. Journal of Financial and Quantitative Analysis 1: 520-542.

SILVEIRA, A. (1973). Interest rate and rapid inflation: the evidence from the Brazilian economy. Journal of Money, Credit, and Banking 5: 794-804.

SOTERIOU, A., and ZENIOS, S. (1997). Efficiency, profitability and quality of banking services. The Wharton School, University of Pennsylvania, Financial Institutions Center 97-28.

STOCKMAN, A. (1981). Anticipated inflation and the capital stock in a cash-in-advance economy. Journal of Monetary Economics 8: 387-393.

TOBIN, J. and BRAINARD, W. (1963). Financial intermediaries and the effectiveness of monetary controls. American Economic Review 53: 383-400.

TOWEY, R. (1974). Money creation and the theory of the banking firm. Journal of Banking and Finance 29: 57-72.

UNGAR, M. and ZILBERFARB, B. (1993). Inflation and its unpredictability - Theory and empirical evidence. Journal of Money, Credit, and Banking 25 (4): 709-720.

VIREN, M. (1989). The long-run relationship between interest rates and inflation: some cross-country evidence. Journal of Banking and Finance 13: 571-585.

WALSH, C. (1984). Interest rate volatility and monetary policy. Journal of Money, Credit, and Banking 16 (2): 133-149.

WALSH, C. (1993). Central bank strategies, credibility, and independence: A review essay. Journal of Monetary Economics 32: 287-302.

YUE, P. (1992). Data Envelopment Analysis and commercial bank performance: A primer with applications to Missouri banks. Federal Reserve Bank of St. Louis, Review 74 (1): 31-45.

YOUNG-SUP YAN (1984). The effects of inflation and income taxes on interest rates: Some new evidence. Journal of Financial and Quantitative Analysis 19 (4): 425-448.

ZWICK, B. (1979). Interest rate variability, government securities dealers, and the stability of financial markets. Journal of Monetary Economics 5: 365-372.