PORTUGUESE FINANCIAL REGULATORY REFORM: AN ASSESSMENT

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ACKNOWLEDGEMENTS

DECLARATION

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ABSTRACT

The main objective of this thesis is to test whether the financial regulation put in place in Portugal with the aim of bringing stability to the banking system has contributed to that aim.

This question is examined not by considering the incidence of failures before and after the regulations were put in place for, as will be set out, that approach would be inappropriate in the particular case of Portugal. Rather what is examined is whether the regulations have contributed to stability by reducing the volatility of profits or by increasing their level.

Financial regulatory reform is usually characterised as a move from macroeconomic, allocation and structural controls to prudential, protective and organisational controls. The history of these changes in Portugal is set out, and their effects on profitability then examined.

The following questions on the behaviour of profitability were addressed. What happened to profitability? How did it change as between before and after the reforms, and were the changes, if any, significant?

Next the effect of regulation on profitability in a model of profitability, which also allows for the effects of real and nominal macroeconomic stability, interest rates, management, market structure, and ownership, is examined.

Finally, the evolution of risk in the course of financial regulatory reform is examined. The main findings from the econometric tests are as follows. They show that profits, the R.O.A. and R.O.E. behave differently with financial regulation changes. Average profitability measured by profits increased but became more volatile, while average profitability measured by return on assets (R.O.A.) and return on equity (R.O.E.) fell. It is also found that regulation is statistically significant in explaining profits and R.O.A. behaviour but the influence of regulation on R.O.E. is statistically not significant. Output from these models is used to build a Regime Switching Model of Risk for the Banking System that allows risk to be determined simultaneously by regulation and by all the other banking performance determinants that are significant. According to these results, risk has decreased with full liberalisation of the banking market.

CHAPTER 1- INTRODUCTION

1.1. - MOTIVATION FOR THIS RESEARCH: IMPORTANCE AND RELEVANCE OF THE SUBJECT

"A constant process of evaluation and adjustment may be required to maximise the benefits (and minimised the costs) of financial regulation"

Vittas, Dimitri. *Financial Regulation: Changing the Rules of the Game*

Portuguese financial regulation changes have their roots in the 1980's. Notwithstanding that, only now can their full impact begin to be assessed. For in reality, although credit controls and administrative interest rates were abolished in the late 80's, barriers to entry were dismantled only in the early 1990's. The right of establishment, and complete liberalisation of capital movements, were only achieved in 1993.

The financial sector, and therefore financial liberalisation, encompasses the banking system, capital markets and the insurance sector. During her experience as a senior economist at a Portuguese banking group, the author noticed that the path of liberalisation has introduced several changes in the banking decision-making process related to the allocation of funding resources. Hence, the field of the present research is confined to banking activities.

The aim of this thesis is to look at the change in banks' performance as a consequence of financial liberalisation, and to draw some conclusions about the impact of liberalisation on financial stability in Portugal.

The framework of these regulatory changes in Portugal has several characteristics.

The most important ones are the solvency ratio and liberalisation of capital flows. The solvency ratio was introduced in 1991. Full capital movements' liberalisation was achieved at the end of 1992. These measures were followed by new sources of uncertainty, namely interest rate volatility and the cost of risk based capital. Interest rate volatility became a much more relevant issue to banking management and new approaches to capital allocation had to be adopted.

The degree of uncertainty introduced by financial liberalisation lay 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, had a negative effect on the profitability of banks' decisions about funding in money markets. Unanticipated increases in short term interest rates occurred in 1993 and 1995 to prevent speculation against the Portuguese Escudo. Simultaneously, banks that had a substantial proportion of their assets in securities suffered big losses.

The adoption of the solvency ratio led to a mistaken allocation of resources. Banks were undertaking sub-optimal decisions. Decisions were sub-optimal in the sense that they only had the cost of capital as guideline. Instead of being concerned with both revenues and costs, banks dropped this profit maximising principle and began to direct their funding to those transactions less demanding in terms of risk based capital.

Because of these new sources of uncertainty, the Portuguese banking system not only has improved its risk management techniques but also began the implementation of internal informational systems.

With the new approach of capital allocation, the evidence points to the banks' balance sheets having, perhaps, an excess weight of liquidity (money market lines),

securities and off-balance sheet transactions (because they required less amount of capital).

Therefore, financial liberalisation, as well as the new rules that followed, may have induced banks to conduct their business not in the best interests of the stability of the system. The new regulatory regime based on prudential rules and on credible supervision schemes, has as its objective a growing soundness and stability of the financial system. Nevertheless, we may be facing a perverse effect of regulation. The objective of this thesis is to investigate whether regulation designed to reduce risk may have the unintended effect of increasing risk and the vulnerability of regulated institutions.

1.2. - THE RESEARCH DESIGN

1.2.1. - THE APPROACH

The research will be focused on the study of the behaviour of 33[1] Portuguese banks. In 1997[2] 5 banking groups, in a total number of 16 banks[3], dominated the banking market. By themselves, they account for 4/5 of the retail market[4]. The Portuguese banking system is a concentrated market, with the above-mentioned groups holding 80%[5] of total assets. The ten biggest banks, when ranked by assets, hold around 70% of total assets.

Analysis will be carried on through the period 1975 – 1997. In 1975, in the aftermath of the Portuguese "Carnation" Revolution, all the Portuguese banks were nationalised. In 1997, after intense regulatory changes, the Portuguese banking system experienced a period of consolidation. The thesis presents an analysis of the

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[1] In a total amount of 51 banks operating in Portugal in 1997.
[2] Figures presented refer to 1997 year end.
[3] These groups are:
BPI Group, comprising 4 banks
BCP Group, comprising 3 banks
Espirito Santo Group, comprising 3 banks
Champalimaud Group, comprising 4 banks
C.G.D. group (the government group), comprising 2 banks.
[4] More precisely: 81.31%% on total credit and 86.19% of total deposits.

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regulatory changes experienced by the Portuguese banking system between 1975 and 1997.

For quantitative testing purposes, the period of this study will be reduced to 1985-1997. Between 1975 and 1984 the State was the market. Under a completely state owned banking system, banks weren't profit-maximising firms, but performed a social role instead.

The central hypothesis of this thesis relates to the correlation between regulatory changes and risk in banking activity. The research is aimed at testing the theoretical assumption that regulatory changes have increased risk on banks' performance, from the standpoint of banking system stability [6].

The questions to be answered are divided into two sets. The first group refers to steps one and two of the research process, of which explanation will follow. The second group comprises the hypothesis to be tested (third and last step of the research approach).

The first set of questions includes:
What is financial deregulation? How can we interpret the financial regulatory reform? Why do we explain the regulatory reform as a move from macroeconomic, structural and allocative controls to prudential, organizational and protective controls?
How can we explain changes in the regulatory framework?
How did financial regulatory reform occur in Portugal?

The second group comprises:
How to assess the merits and weaknesses of the regulatory reform using as criteria stability?
What is the best measure of banks profitability?
What have changes in regulation done to banks' profitability?

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[5] More precisely 79.86%.
[6] Banks' risks may also be assessed on the financial management standpoint (Gap Analysis; Durantion Analysis, Gap Duration Analysis, for instance).

A three-step research approach will be employed. The first one consists in an analytical framework of the financial regulatory reform, which is carried out in chapter 2. The second concerns the history of regulatory changes in Portugal and is developed in chapter 3. The third provides an assessment of Portugal's regulatory reform, where these research hypotheses are due to be tested, and encompasses chapters 4 to 7. The conclusion is presented in chapter 8.

The first step comprises the identification of the subject (financial deregulation or regulatory reform?), the regulatory reform's nature (its contents) and the reasons behind that regulatory reform (its causes).

"Deregulation became a very popular slogan in everyday discussions"[7]

Investigating the subject of this research, the author faced a contradiction between the use of the expression "financial deregulation" and the fact that banks are each time more regulated. Investigating what has been termed "financial deregulation", it is concluded that we are facing a financial regulatory reform rather than a financial deregulation process. Why? The answer lies in the nature of regulatory changes. We have several types of regulation[8], whose enforcement varies through time. Thus it is necessary to research those groups of regulation. This research leads to the corollary that the regulatory reform consists in moving the emphasis of regulation from type to type of regulation. Why? The answer lies in the causes of the regulatory reform. The analysis of regulatory changes' causes ends the first step of the approach.

It follows that the forces that drove, and still are driving, the regulatory reform in market economies are also present in the Portuguese financial regulatory framework.

In Portugal there is an additional cause: ideological transformation, which prompted the speed of changes. These changes occurred in only one decade. The examination of Portuguese financial regulatory reform provides the content of step two in the research approach.

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[7] Charles B. Blankart (1990). "Strategies of Regulatory Reform: An Economic Analysis with some remarks on Germany". In *Deregulation or Re-regulation?* By Giandomenico Majone, p.211.
[8] Macroeconomic Controls; Allocative Controls; Structural Controls; Prudential Controls; Organizational Controls and Protective Controls.

The third and last step in the research is the construction of the hypotheses to be tested. These hypotheses are an attempt to find out whether the banking system stability is threatened or not by financial regulatory reform. The idea behind it is that if banks' profitability become more volatile, banking has become more risky unless the level of profitability rise substantially. Under these circumstances, the empirical analysis will test significant changes in the level and volatility of profitability before and after liberalisation.

Although it is unclear whether profitability' volatility went up or down, the way banks have accommodated their management strategies to financial regulatory changes in Portugal suggests that something may have happened with profitability's volatility.

For instance the solvency ratio became effective by 1991. Banks reacted by increasing the volume of those lower weighted risk assets, such as interbank lines and financial assets portfolios (especially with public debt whose weight to the solvency ratio is 0%). While interbank lines may probably have reduced profits' volatility, a financial assets portfolio's increase adds volatility to profits[9] because financial assets are more prone to interest rate risk than traditional lending. Furthermore an explosion in personal credit followed the liberalisation of loans for consumer spending, effective in 1993. Although very attractive as a result of high intermediation margins, this may have brought more volatility to profitability. The same argument applies to credit card loans. In addition, the emergence of new financial instruments, like derivatives, induced banks into new off balance sheet transactions, increasing profitability's volatility. The proliferation of investment funds, nourished by the excellent performance of capital markets, may have given a positive contribution to profitability volatility as well. On the other hand, in the early 90's, commercial banks entered the previously forbidden mortgage loans, especially housing loans up to 20 years. This may have contributed to decreasing profitability volatility.

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The objective of this thesis is to research whether financial regulatory reform in Portugal has had a significant effect on profitability's volatility or whether the presumed increased volatility from securities portfolio, personal credit and financial derivatives has been offset by a presumed decreased volatility arising from interbank lines and mortgage loans.

1.2.2. - RESEARCH PROPOSITIONS

Several working hypotheses and propositions will be investigated. The main propositions are:

Proposition 1:   There hasn't been any financial deregulation of financial markets and institutions.

At the beginning of the research, there was some difficulty in understanding the dynamic process of changes in the financial sector. The expression "financial deregulation" did not seem to be compatible with changes in this economic sector. Although very commonly applied, the author thinks that this expression is less accurate to clarify the situation than the expression "financial regulatory reform". The argument is that, after all, banks are currently much more regulated then in the past. As a corollary, the author argues that the banking system is experiencing a process of financial regulatory reform.

Proposition 2:   The likelihood of bank failures has risen with changes in regulation.

The argument is that the soundness and stability of the banking system has worsened with the regulatory reform. Evidence suggests that bank practice since 1990 may have brought an increase in profitability's volatility. This performance is not incompatible with the possibility that average profitability rose.

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[9] Diversification, made possible by market liberalisation, decreases non systematic risk but not systematic risk.

Proposition 3: Profits are the best measure of banks' earnings.

There is no formal or institutional definition for banks' earnings. Profits seem to be the most suitable proxy for earnings. The suggestion is that either shareholders or managers look at profits to assess their investment profitability or their management performance, respectively.

Proposition 4: The regulatory reform has increased profitability volatility/risk in the Portuguese banking system.

The proposition will be tested against two assumptions. First, that the modern approach to prudential regulation, which emphasises risk-based capital requirements, may have differentiated in favour of some activities as a result of the risk weights that are applied to different types of assets. Secondly, that structural controls used to limit the range of activities of different types of financial institutions have been dismantled, allowing entry in new markets and trading with new instruments. As result of financial regulatory reform Portuguese banks have increased interbank lines, securities, off balance sheet transactions, personal credit and mortgage loans. More interest rate sensitive assets like securities and off balance sheet instruments, along with more prone to default assets, like consumption credit, seem to overweight those less riskier assets, like money market lines and mortgage loans. Hence, the author expects the results to show an increase on profitability's volatility. If the hypothesis is not rejected then the regulatory reform has not achieved its alleged end: the stability and soundness of the banking system.

1.2.3. - A REVIEW OF THE LITERATURE ON REGULATION AND ON THE PORTUGUESE BANKING SYSTEM

The rules of the game in the banking system are viewed as a dynamic process of change. This study aims to contribute to a better knowledge on both the nature of regulatory reform and its effect on banking motivated by regulatory changes.

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The main contributions are twofold:

1st: To improve the study of the process of regulatory change in the financial sector, with particular emphasis on assessing its consequences to the banking system.

2nd: To make a contribution to a better knowledge of the Portuguese banking system's performance.

When studying financial regulation, the central issues to address are the purposes of regulation, the specific nature of regulation, that is, its form and scope, and finally, to assess the merits of regulation.

The first of the above-mentioned issues, the objectives of regulation, are very well expressed in both *the Capture Theory of Regulation* and *the Public Interest Theory of Regulation*. The former was explained by Stigler (1971 and 1975) and formalised by Peltzman (1976), while Kay and Vickers (1988) set out very clearly the economic justifications for regulation sustained by the latter. The "Capture Theory" of regulation's basic proposition is that regulatory agencies are "captured" by the industry they are supposed to be regulating[10]. The "Public Interest Theory" is a normative theory of regulation that states what regulation "ought" to do: regulation "ought" to bring economic efficiency to markets by means of the identification and correction of market failures[11]. There is a considerable debate and a voluminous academic literature on the rationales of regulation.[12]

The second issue, the specific nature of financial regulation, will be developed later, in chapter 2 of this thesis. Yet, a brief explanation seems to be pertinent.

Gual and Neven (1992) distinguish between structure and conduct regulation. These authors explain financial deregulation as a move from structure regulation (when regulators are concerned with the way markets are organised) to conduct regulation

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[10] 'As a rule, regulation is acquired by the industry and is designed and operated primarily for its benefits". Stigler (1971), "The Economic Theory of Regulation", *Bell Journal of Economics*, 2/1, p.3

[11] Economic justifications for regulation range from consumer protection (asymmetric informational problems) to risks that are correlated across firms (externalities). The third rationale for regulation is the need to check the abuse of excessive concentration on the market place (market power).

[12] See, for instance: Llewellyn (1986); Capie and Wood (1991); Herring and Litan (1995); Hoenig (1996). Peacock (1984) presents an explanation on both The Public Interest Theory an The Capture Theory.

(when regulators are concerned with behaviour within the market). Llewellyn (1986), arguing that "regulation implies that the business operations, balance-sheet structure and pricing policies of financial institutions are different from what would emerge in a fully competitive, unconstrained market environment"[13], establishes six forms of regulation: environmental, legal, self-imposed, moral suasion, self-regulation and external agency. Concerning the scope of regulation, this author identifies six areas: geographical, functional, ownership, pricing, entry and establishment, and business operations. For Llewellyn the process of deregulation is about the "changing structure and operation of these (the above-mentioned) forms"[14] and "similarly relates to these (the above-mentioned scope) dimensions"[15]. Dimitri Vittas (1992), arguing that "(...) the ultimate goals of financial regulation are the achievement of efficiency, stability, and fairness, not only in the financial sector but also in the economy at large"[16], presents six categories of controls that are adopted by governments, depending on their particular objectives: macroeconomic controls, allocative controls, structural controls, prudential controls, organizational controls, and protective controls. Dimitri Vittas encompasses a wider range of regulatory fields than the previous authors. Under those circumstances the analysis of the regulatory reform's nature performed in this thesis opts for Vittas' types of regulation. Apart from this, Vittas' presentation is the most adequate to assess the Portuguese Financial Regulatory Reform, from a historical perspective, as it is carried out in chapter 3 of this thesis.

Finally, the third central issue is related to the assessment of the merits of regulation. Which will be carried out from chapter 4 onwards. Most studies only cover the objectives of the financial regulation and its form and scope stopping at this level. Discussions in the academic literature are over the best way to regulate financial markets and institutions rather than about assessing regulation. Some of those studies that outline the advantages and disadvantages of regulatory changes, like Blankart (1990), Benston (1991), Mayer (1995), and Mc Gowan and Seabright (1995), opt for descriptive analysis, lacking in both formalisation and applied economics. When

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[13] The Regulation and Supervision of Financial Institutions, p.15.
[14] Op. Cit. p. 16.
[15] Op. Cit. p. 17.
[16] "The Impact of Regulation on Financial Intermediation", in *Financial Regulation: Changing the Rules of the Game*, Dimitri Vitas, ed., The World Bank: Whashington, p. 62.

formalised, as in Mayer and Neven (1991)[17], the assessment of regulatory changes still lacks testing. However some empirical research has been carried out, especially on the macroeconomic area. Even so, there is a need for more research effort involving the assessment of financial regulatory changes. This study tries to shed some light on banking response to the financial regulatory reform, using profitability as a performance measure. If profitability became more variable with the introduction of new regulatory rules we may be facing a threat to financial stability.

Research fields may be microeconomic, macroeconomic or use combined micro and macroeconomic analytical tools[18].

Prior studies, like Heffernan (1995)[19], Goddhart and Schoenmaker (1995), Thakor (1996) and Cole and Gunther (1998) focus on the macroeconomic area. They research regulation and bank failures, regulation and conflict of interests between monetary policy and banking supervision, capital requirements and aggregate bank lending, on-site and off-site supervision and bank failure, respectively. Hoggarth, Milne and Wood (1998) examine the links between financial innovation and financial stability[20].

Studies in the microeconomic field are more rare. They should cover the issues of regulation and competition, regulation and operational efficiency, regulation and profitability. Heffernan (1987) sets out a research method to assess how regulatory changes affect the competitive structure of U.K. financial markets. Barros and Leite (1998) assess the impact of liberalisation in banking, testing for competition in both the deposits and loans markets.

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[17] Also published in Insead Working Papers n°90/54/BP
[18] When we insert the determinants of banking performance we have to link profitability and economic policy, for instance.
[19] Together with macroeconomic variables, Heffernan uses micro-management variables in the assessment of bank failure.
[20] These authors, although highlighting financial stability, assess innovation through the behaviour of loan losses and profits in German and UK banking systems.

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As far as the author's research permits[21] any conclusion, there are no studies on the impact of regulation on banking operational efficiency, that is, on the extent to which resources costs are minimised for any level of service provided. Although efficiency is another field worthy to be studied, this study tries to analyse how the financial regulatory reform has affected banking profitability, measured by profits, return on assets (R.O.A.) and return on equity (R.O.E.). The Portuguese banking system provides the required empirical evidence for this study.

It is the author's understanding that this study is conducted under the "umbrella" of combined micro and macroeconomic analysis. Banking performance provides the micro economic field. Thus, the study of regulation and profitability is clearly a microeconomic issue. The liaison between profitability volatility and banking stability bridges micro with macroeconomic issues. Banks offer a core banking service: liquidity to the economy. Asset Quality Transformation enables banks to finance the real sector of the economy. In providing investment-financing sources, the banking system plays a very important role in allocative efficiency. And last but not the least, if the entire banking system collapses there will be no mechanism for money transmission. A high level of profitability volatility is a source of instability in the banking system, augmenting the possibility of bank failures. The systemic issue is, with any doubt, in the macro economic field. On the other hand, the utilisation of this thesis' results will underpin the analysis of macroeconomic banking performance determinants such as fluctuations in real G.D.P. and in inflation rates, among other factors[22].

On the other hand, academic studies about the Portuguese banking system up to now fall in the industrial organisation field, while that of the financial behaviour of banks remains to explore. Risk[23] in banking is a fertile realm worthy to be researched.

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[21] The search has been carried on through Economic Literature Database, World Banking Abstracts and B.P.O.

[22] Other factors that may have had an impact on bank performance are on the micro level: misjudgement of interest risk; products incorrectly priced; lack of securitisation; oligopolistic market structure.

[23] We refer to risk measured through profitability's volatility. Another measure of risk in the banking system is the incidence of bank failure. As explained in Sérgio (1995), the last huge banking crises in Portugal occurred on the 20's first half and had monetary policy relaxation as cause. On the yearly 30's a couple of banks failed because they hold Brazilian debt. During the last twenty years only a small saving bank, on the islands, failed due to fraud and fraudulent mismanagement.

Pinho (1994) is concerned with banking markets imperfections, more especially with real resources costs and imperfect competition. Barros (1998) proposes a spatial competition model to explain price differences across banks in the deposit market. Barros and Leite (1998) assess the impact of Portugal's recent liberalisation on competition. Barros and Pinho (1995) explore the combined effect of privatisation and declining banking market concentration on the bargaining process between Portuguese banks and bankers.

This study aims to shed some light on the nature of regulatory reform in general, and on the history of regulatory reform in Portugal in particular. In short, it hopes to help understand Portuguese banks' performance since shareholders' equity moved from state ownership to private hands. Showing the speed of financial regulatory changes in Portugal, and studying the way banks reacted to these changes, the analysis hopes to contribute to the enrichment of Portuguese literature on this subject. The theoretical assumption that regulatory changes' have increased profitability volatility will be tested with Portuguese banking data. Therefore, the study attempts to give a contribution to a better knowledge of the Portuguese banking system.

The author first considers the relationship between financial regulatory reform and banking performance, concentrating in particular on profitability as a measure of bank performance. Results will be then displayed against a broader ground of financial stability, aiming to identify the relationship between the behaviour of profitability and changes on financial rules. If, as the evidence suggests, profitability volatility has increased, then regulation designed to reduce risk can have had the unintended effect of increasing risk and the vulnerability of regulated institutions.

1.3. - STRUCTURE OF THE THESIS

The next chapter "Regulatory reform. Transition towards New Rules of the Game in the Financial System" provides an overview of the research topics on the analytical framework of the financial regulatory reform. It corresponds to the research design approach's first step.

In this chapter, after explaining possible misleading interpretations of the expressions "deregulation" and "regulation" (section 2.1), the study will begin to examine the nature and objectives of each type of financial regulation (section 2.2). These types of financial regulation are: macroeconomic controls, allocative controls, structural controls, prudential controls and protective controls. Financial regulatory reform consists of moving the emphasis from type to type of regulation through time, according with the objectives that the financial rules aim to achieve. For the following reasons, this is the best way to study the nature of the financial regulatory reform when the criteria for evaluating financial regulation are stability. Aggregating financial rules in several types, according to their objectives, is the approach that clearly relates regulatory changes with the response of banking management. The regulatory reform consists of the adoption of prudential, organizational and protective controls, which follow the removal of macroeconomic, allocative and structure controls. Therefore this seems to be the approach that better links regulatory changes with risk. Finally, once economic integration and technological innovation are identified as the causes behind the regulatory reform (section 2.3), the above-mentioned approach is the one that is most easily identified with those causes. In order better to understand the financial rules' new scope and form, chapter 2 ends with the study of the reasons that forced changes in the regulatory framework of the financial system. Economic integration and technological innovation are incompatible with macroeconomic, allocative and structural controls. These controls were replaced by prudential, protective and organizational controls because banks and financial institutions are regulated for reasons of safety and soundness.

Chapter 3 "The History of the Financial Regulatory Reform in Portugal" (with its correspondence to step 2 in the research approach) discusses the main aspects that characterise the financial regulatory reform's form and scope in Portugal.

In this chapter will be analysed the regulatory transformation in the Portuguese Banking System during the last two decades. After presenting a brief historical perspective on the banking framework under Salazar's regime, the recent development on banking activities is split into three distinct periods: 1975 –1984, 1985-1989 and 1990-1997. The Portuguese Government nationalised the banking industry in 1975. The privatisation process of the sector began in 1984 when the

government allowed private banks to incorporate and new foreign banks to enter the system. Since 1989 the Portuguese government has embarked on a programme of re-privatising previously nationalised entities, which ended in 1996 when only two banks remained under state control. The first period (sec. 3.2) is dominated by macroeconomic, structural and allocative controls. As government directed financial institutions to lend to selected industries, interest rates were administrative priced and the amount of credit available was previously established by the government, the State acted as a substitute of the market. Deep structural controls' transformations occurred during the second phase (sec 3.3) aiming to design a more modern and flexible Portuguese banking system. These dramatic changes succeeded in rending the sector more in accordance with European patterns. Finally, the nature and participants of the Portuguese banking system changed significantly since 1990 as a consequence of the reprivatisation programme (sec.3.4). With special relevance to macroeconomic controls' changes and on a growing emphasis on prudential regulations, it can be proved how fast and deeply the regulatory financial reform took place in Portugal. In one decade the Portuguese banking system has been transformed from a state owned and regulated one (in the old fashion way) into a small but fit system, operating under market forces.

Chapters 4, 5, 6, and 7 (corresponding to the research design's third step) aim at assessing the merits of the financial regulatory reform in Portugal.

Dewatripont and Tirole argue that "the existing (banking, intermediation, industrial organization and natural monopolies regulation) theory is quite far from regulators concerns"[24] and they design a conceptual framework to embody a theory of regulation for the banking system. In the absence of such a theory, the research carried out through these chapters has as its objective to have a contribution to the stylised facts of a theory of regulation for the banking system.

These chapters will begin with an overall description of banks in the Portuguese banking system, followed by the presentation of available sources for financial statements data collection and the research methodology (chapter 4).

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[24] "La Reglementation Prudentielle des Banques" pp.9, 11 and 58

To assess the merits of the financial regulatory reform in Portugal the research method proposed encompasses three models (developed in chapters 5, 6 and 7, respectively), which are briefly explained as follows.

First, an analysis of variance will be carried out to study banks' profitability behaviour before and after liberalisation. The objective is to test whether average profitability have increased or not with financial liberalisation in Portugal. While Gual and Neven (1992) suggest that with deregulation in the European Community profits fall, Hoggarth et al. (1998) contrast higher recorded level of bank profits in the UK with lower bank profits recorded in Germany (a more regulated market). The researcher proposes two fixed effects ANOVA models with two factors: time and banks. In the first ANOVA model to be tested time has two levels, before and after financial liberalisation, and includes twenty-four banks. The second model differs in what concerns the factor time. Now time is divided into three levels: highly regulated banking market, less regulated market and liberalised market. The aim is to test for the significance of time on average profitability. Tukey's method will allow for the comparison between average profitability between any levels of time for any group (or groups) of banks.

The second model is an econometric unbalanced panel data model and aims to prove the statistical significance of regulation on profitability. The sample comprises all Portuguese banks with assets of more than 100 billions of escudos in December 1997. Three measures of profitability (profits, R.O.A. and R.O.E.) are regressed on several banking performance determinants. Macroeconomic bank performance determinants as explanatory variables used in the regressions are: G.D.P., for real stability (Wood et al (1998)), inflation rate, for nominal stability (Hoggarth et al.(1998)), and the mechanisms through which interest rates affect banking profitability, this is the spread and the endowment effect. Microeconomic determinants of bank performance used in the regressions are: regulation as a dummy variable, ownership as a binary variable, the structure of the sector (Miller and Noulas (1997), Bourke (1988), Arshadi and Lawrence (1987), Smirlock (1985)), and the quality of management (Hoggarth et al. (1998), Miller and Noulas (1997) and Boyd and Gertler (1994)).

The third model is a regime switching model of risk for the banking system, a model with restrictions on the coefficients that derives its structure from Finance Theory. Bekaert and Harvey (1995), assessing the degree of integration or segmentation of capital markets, estimate a regime switching model of expected returns that allows returns to be determined at different times by domestic factors or by world factors markets. This regime switching model is proposed in the current research to allow risk in the banking system to be determined at different times by regulation (dummy variable) or by a composite index constructed with all banking performance determinants that are statistical significant. These banking performance determinants are selected from the second model of the research. "Whether accounting or market data provide better measures of risk and return is a debatable issue: each has advantages and disadvantages"[25]. Faced with the impossibility of using market data (share prices) to compute a risk measure for the banking system in the context of this research (the floatation of Portuguese banks is very recent[26]), the author opted for the definition of risk provided in Uncertainty Theory: profitability volatility/ expected profitability. Both profitability volatility and expected profitability will be computed from the second model.

This regime switching model of risk for the banking system aims to test the hypothesis that the financial regulatory reform has increase risk in the banking sector.

1.4. - FUTURE RESEARCH TOPICS

According to the deficiencies found in the literature concerning the Portuguese Banking System, two future research topics deserve some attention: evidence of the Capture Theory in the Portuguese financial system, and research on the reasons that prevented a financial crisis in Portugal after an intensive period of financial reform (financial liberalisation).

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[25] Boyd, Graham and Hewitt (1993),p.47
[26] See appendix B to chapter 4.

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When studying regulation and the interest of the industry, it can be concluded that regulation also serves the interests of the industry, although reference is always made to the ultimate interests of the consumer. The author holds the opinion that it is worthwhile to study capture theory in Portugal because this important issue seems to have an impact on the regulatory reform.

It is the traditional view that liberalisation policy should serve to prevent decline and crisis in the economy. Another field of interesting research is to find out what prevented a financial crisis in Portugal. Scandinavian countries and Japan experienced severe systemic problems during the late 80's and early 90's. In recent years systemic banking crises even more severe than those of Scandinavia and Japan have occurred in a number of developing countries. Hoggarth Milne and Wood (1998) state that

A pre-condition for financial problems of these kinds appears to be recent prior liberalisation of the financial system, with relaxation of controls over interest rates and removal of legislative and regulatory restrictions on the business activities of credit institutions[27].

A comparative study between the above-mentioned countries and Portugal, where financial regulatory changes occurred very fast without there being any threat to systemic risk, may contribute to understanding "the precise mechanisms by which macroeconomic developments interact with financial instability (that) are poorly understood and merit further investigation"[28]

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[27] "Financial Innovation and Financial Stability: some lessons from Germany and the UK", p. 6.
[28] Op. Cit. p. 3.

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CHAPTER 2.- REGULATORY REFORM: TRANSITION TOWARDS NEW RULES OF THE GAME IN THE FINANCIAL SYSTEM.

2.1. - INTRODUCTION: AN INTERPRETATION OF FINANCIAL REGULATORY REFORM

As the study of financial regulation is undertaken, expressions like such as "regulation", "deregulation", "re-regulation" or "supranational regulation with domestic liberalisation" become very familiar. What is the meaning of "regulation"? What can be understood as "deregulation" or "re-regulation"? What is "supranational regulation with domestic liberalisation"? Commenting on these questions is the task carried out in this chapter.

In the task of explaining what is financial regulation, the study of financial regulatory reform illuminates the above-mentioned questions. The central issue is that, while some financial rules have been abolished, the upshot is not a "laissez-faire" financial market, but one in which new financial rules have been erected.

There are several approaches to the study of changes in financial regulatory framework. One approach is to examine the use of the expression "financial deregulation". This chapter starts by explaining the use of this expression. It is argued that, although very commonly utilised, the expression "financial deregulation" is less accurate in explaining changes on regulation than the expression "financial regulatory reform". After all, financial institutions are currently much more regulated than in the past. Facing this fact it seems pertinent to explore the reasons for this paradox. That is the reason why this chapter proceeds with an

analysis of the meaning of financial regulatory reform. This analysis permits a full interpretation of the expression "financial deregulation".

Webster's dictionary defines regulation as the act of reducing to order; of disposing in accordance with rule or established custom. For purposes of this thesis, by regulation is meant "a body of specific rules or agreed behaviour, either imposed by some government or other external agency or self-imposed by explicit or implicit agreement within the industry, that limits the activities and business operations of financial institutions"[29].

Following this definition, does deregulation mean the adoption of a "laissez-faire" policy in the financial sector of the economy?[30]. The answer is no. Yet, the expression "financial deregulation" remains in use to characterise the environment where financial systems operate in market economies. Paradoxically, the question is not between regulation and non-regulation, but rather what exactly is implied by a change in regulation that is identified in this chapter as a regulatory reform in the financial system.

In late 1970's, older, informal regulatory structures began to break down[31] under the pressure of powerful economic and technological forces[32], and began to be officially dismantled. This process is sometimes called "deregulation", but that is a misleading term because, as often as not, new and generally more explicit regulatory structures have been simultaneously erected in place of what went before. This apparent paradoxical combination of deregulation and re-regulation, which is very clear and evident in the financial services industries, is what Kay and Vickers (1988) mean by regulatory reform. This is the content of the expression "regulatory reform" that is adopted in this thesis.

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[29] Llewellyn, D. (1986), p. 9.

[30] For a very interesting study of a "laissez-faire" regime see George Selgin and Lawrence White (1994).

[31] In the U.K. informal regulation was replaced by statutory regulation with the enforcement of the 1979 Banking Act, that followed the secondary crisis of British fringe banks that occurred in the early 1970's.

[32] These trends will be explained in section 3 of this chapter and will be dealt as the causes for regulatory reform.

For a full interpretation, when the expression "financial deregulation" is employed it is needed to bear in mind that this expression is underpinned by two core ideas.

First, time changes the appeal of rules and laws. Regulatory measures that have been necessary for the banking system in the past become obsolete. Given that the banking business is dynamic and changing, past regulatory orders and directives may become too restrictive and have needed to be replaced by new regulations.

Secondly, research has evolved. Traditionally, theoretical and empirical studies of regulation in economics have focused on the control of prices and entry (quantities) in particularly industries[33]. "This type of regulation has become known as "old style" regulation"[34]. To talk of a process of "financial deregulation" is not inappropriate if, and only if, we understand regulation as "old style". In fact, administrative controls of prices and quantities, which were a blueprint in the financial market for many years, are incompatible with the 90's financial world environment. Presented below are a set of rules that can be viewed as "old style" regulation and which have meanwhile been dismantled. This is the process behind the expression "financial deregulation".

Following the Great Depression, a "new economic order" was established in which banking became one of the industries most protected by virtually all levels of government. Historical reasons for comprehensive legislation concerning prices and quantities in financial markets can be found in the 1930's. As examples of the old style legislation that has been dismantled (financial deregulation) it can be presented the following instances:

- Banks were legislated out of capital markets[35]
- The Bretton Woods accord saw to it that for nearly 30 years after the World War II exchange rates were fixed

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[33] See the books by Kahn (1970, 1971), Bonbright (1961), Philips (1969), Bailey (1973), Sheperd and Wilcox (1979), and Crew and Kleindorfer (1979) for overviews of the vast theoretical and applied literature.
[34] Spulber (1989) p.22.
[35] While in Europe the concept of Universal Bank has already been adopted, in the U.S.A. the Glass-Steagall Act is still under discussion.

- Interest rates in both sides of banks balance sheets were administratively established until the 1970s
- In the U.S.A. interstate banking was forbidden
- In some countries such as Portugal, governments had the arbitrary power to authorise the entry of new institutions in a particular national market
- Credit ceilings were used as a tool of monetary policy, to control the stock of money
- Barriers to capital movements between nations persisted in Europe until the advent of the Single Market in 1993

This process of regulatory change created new markets but also new risks. These new risks led to a new regulatory framework, sometimes called "re-regulation process", other times as "supranational regulation with domestic liberalisation". In order to avoid misunderstandings, it is argued in the current study that the best designation is "regulatory reform". Before defending the expression "regulatory reform" as the most suitable to characterise the state of the art on regulation, it is pertinent to describe what the current regulatory framework attempts to achieve.

The economic justifications, or rationale, for financial regulation is the existence of market failure in financial systems arising from externalities, market power, and information problems.

Externalities include the risk of systemic failure (i.e., the risk of failure of one or more institutions as a result of the actual or threatened failure of another), the infection effect (i.e., the general lowering of standards and prices caused by excessive competition), and network effects (i.e., the costs and benefits of linking together competing institutions to a common network). Other externalities are the achievement of macrostability (to avoid the distortion in relative prices, incentives, and expectations caused by high and volatile inflation) and the enhancement of the allocative efficiency of the financial system (to ensure the financing of projects and sectors, including small firms, that have dynamic efficiency benefits).

Concern about market power steams from the fear that dominant firms may undermine both allocative and dynamic efficiency (the forming by charging high

prices and earning excessive profits and the latter by avoiding competitive pressures). Finally, information problems arise from poor price and product information, from the free rider problem, and from informational asymmetries between the suppliers and users of financial services[36].

Exploiting the accuracy of the expression "financial deregulation", it may be concluded that what the system is facing is a financial regulatory reform. Why? The answer is in the nature of regulatory changes. We have several types of regulation the enforcement of which varies over time, according to the relevance assigned to each type's particular objectives. Thus it is necessary to research these types of regulation. This research is presented in section 2.2.

The gradual substitution of one type of regulation by another is the result of economic and technological pressures experienced by western economies. The 1980's have witnessed an internationalisation of capital flows and trade. At root, financial instruments are claims on real resources, goods, or services. Efforts to restrict flows of financial instruments therefore hinder exchanges of goods and services, thus impending the transfer of resources to their best uses. On the other hand, new communications technologies have been especially significant for financial activity. Technological innovation has increased the knowledge of potentially profitable international exchanges and of economic opportunities abroad. Financial regulation was bound to change along with such innovations. The causes of financial regulatory reform are analysed in section 2.3.

The current chapter concludes with an analysis of the incompatibility between economic integration and informational innovation on the one hand, and constraints on prices and quantities in the financial industry on the other. Whether the same reasons for regulatory reform have been present in the Portuguese Financial System is also investigated.

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[36] For a discussion of the rationale for financial regulation, see Kay and Vickers (1988).

2.2. - TYPES OF FINANCIAL REGULATION

In this section, the nature of financial regulatory reform is specified, that is, it's content.

As stated earlier in chapter 1 (section 1.2.3.), Dimitri Vittas (1992) presents six categories of controls that are adopted by governments, depending on their particular objectives: macroeconomic controls, allocative controls, structural controls, prudential controls, organizational controls, and protective controls.

In the remaining chapters of this thesis, the term consistently used is financial regulatory reform and Dimitri Vittas's types of regulation support it. The reason for this analytical framework follows.

Among several approaches to financial regulatory analysis presented in the academic literature, that approach is chosen which classifies financial regulation in terms of its objectives. For the following reasons this seems to be the best way to study the nature of financial regulatory reform when the criterion for evaluating financial regulation is stability[37].

When financial rules are classified in several types in terms of their objectives (such as controlling aggregate economic activity, favouring priority activities, preventing undue concentration, and protecting users of financial services), this seems the approach that clearly relates regulatory changes to the resultant bank behaviour's response. Regulatory reform consists of the gradual adoption of prudential, organizational and protective controls, following the removal of macroeconomic, allocative and structure controls. Therefore this seems to be the approach that better links regulatory changes to risk. Finally, once economic integration and technological innovation are identified as the causes that triggered financial regulatory reform, the chosen approach is the one that is most easily identified with these causes.

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[37] Other possible criteria for evaluating financial regulation are efficiency and fairness.

The ultimate goals of financial regulation are the achievement of efficiency, stability, and fairness[38], not only in the financial sector but also in the economy at large.

To achieve these goals, governments adopt various controls and interventions that can be classified in six categories, depending on their particular objectives:

- Macroeconomic Controls
- Allocative Controls
- Structural Controls
- Prudential Controls
- Organizational Controls
- Protective Controls

The objectives of each category vary as we proceed to explain.

Macroeconomic Controls

Governments are motivated to maintain the overall control over the level of aggregate economic activity and to avoid major internal and external imbalances. Special importance is given to controlling the expansion of credit and to maintaining price stability. As examples of Macroeconomic Controls we can present:

- Reserve requirements
- Direct credit and deposit ceilings
- Interest rate controls
- Restrictions on foreign investment

Allocative Controls

Applying allocative controls, governments are motivated by the desire to favour priority activities. By the utilisation of several tools that are listed below, the

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[38]The author is aware that while "efficiency" and "stability" are positive objectives, the "fairness" of the financial sector is a normative matter. The normative bias of fairness in the financial system is presented on the debate about the degree of competition the banking sector should achieve.

objective is to reallocate financial resources in the economy in favour of priority activities. Governments, therefore, try to compensate for the tendency of banks, especially commercial banks, to finance either low risk activities, such as short term trade finance, or high risk speculative projects with short pay-back periods, such as real estate development.

Examples of allocative controls can be found in the utilisation of:

- Selective credit programs
- Compulsory investment requirements
- Preferential interest rates

Structural Controls

Structural controls are motivated mainly by economic and political considerations. These kind of controls, for instance separating commercial and investment activities or imposing restrictions on the type of financial assets that can be managed, are undertaken with the aim of preventing undue concentration of economic and financial power. Structure control can be achieved through:

- Entry and merger controls
- Geographic restrictions
- Limits on the range of activities of different types of financial institutions

Prudential Controls

Prudential controls aim to reduce the risk of systemic failure and to avoid the disruptions caused by financial crises. To preserve the safety and soundness of individual financial institutions and sustain public confidence in the stability of the financial system as a whole, several requirements may be implemented:
- Authorisation criteria
- Minimum capital requirements
- Limits on the concentration of risks
- Reporting requirements

Organisational Controls

Organisational controls aim at ensuring the smooth functioning and integrity of financial markets and information exchanges. These organisational controls try to cope with externalities caused by the existence of networks such as stocks and other trading exchanges, payment clearing systems, and information networks. By setting out the rights and obligations of market participants by objective criteria, such as technical competence and financial standing, they promote the efficiency and integrity of networks without discriminating against new institutions. Organisational controls can be found in:

- Rules of market making and participation
- Disclosure of market information
- Minimum technical standards

Protective Controls

Protective controls deal with the information problems that affect the relations of financial institutions with their customers, especially small ones. These arise from the existence of informational asymmetries between the suppliers and users of financial services, and from poor price information. In accordance, protective controls have the aim of providing adequate protection to users of financial services, especially consumers and non professional investors. As examples of protective controls we have:

- Information disclosure to consumers
- Compensation funds
- Ombudsmen to investigate and resolve disputes

At a very simple level, financial regulatory reform consists of the move from Macroeconomic, Allocative, and Structural Controls to Protective, Prudential and Organisational controls. Similarities can be found with the analyses presented in the introduction to the present chapter. The "old style regulation" (price and quantity

constraints) has its correspondence in Allocative, Macroeconomic and Structural Controls. In modern market economies, the financial regulatory framework is based on Prudential, Protective and Organizational Controls. The proposition that the financial world is facing a process of regulatory reform instead of a process of financial deregulation is, therefore, reinforced. Indeed, the upshot of financial deregulation is not a "laissez-faire" market.

The regulatory types that have just been analysed are not separately enforced. In the financial world, we face an interlap and overlap of financial regulation with different degrees of intensity. We have several types of financial regulation, for which enforcement varies through time. The analysis of the nature of financial regulation leads to the conclusion that the financial regulatory reform consists in moving the emphasis of financial regulation from one type of regulation to another. Why? The answer lies in the causes of regulatory reform. International economic integration and technological innovation have pressured for changes in financial regulation.

Due to the importance and magnitude of the economic and technological forces that have triggered changes in financial regulation, these forces deserve to be carefully analysed. This is the task that is proposed to be undertaken in the next section.

Once quantity and price constraints have been abolished, the research's concern is that, in their quest to harmonise capital standards and other prudential and protective regulations, regulators may compromise the central objective of strengthening the financial system. This is the hypothesis of this thesis, which attempts to evaluate modern financial regulation against the criterion of stability.

2.3. - CAUSES OF THE REGULATORY REFORM

Two fundamental sources of the transformations in financial regulation that the world has been experiencing in the last decades are identified: international economic integration and technological innovation. They can be included in a broader band of economic transformations.

Let us examine the economic transformations that changed the rules of the game in the financial sector of the economy.

While researching the causes of regulatory reform, we became familiar with expressions such as "globalisation", "internationalisation", and "information technology revolution". Whatever the causes are, and we will explain them carefully, the benefits of international economic integration are the main cause of financial regulatory reform, as we proceed to explain.

The Second World War was followed by substantial economic and political transformations. With these transformations, the old method of regulation (direct control on prices and quantities in the market) became untenable.

After World War II, most national governments began – sometimes unilaterally, more often collaboratively – to lower their separation fences, making them more permeable, or sometimes even tearing down parts of them[39]. The lowering of fences for financial transactions began later and was less dramatic. Nonetheless, by the 1990s, government restrictions on capital flows, especially among the industrial countries, were much less important and widespread than at the end of World War II and into the 1950's. Despite the time gap between liberalisation in the market for goods and in the market for financial services, the latter change was also motivated by the benefits of economic integration.

The achievement of economic integration implies the removal of barriers to capital flows. This removal of barriers raises a variety of new regulatory issues. In the absence of other specific changes, firms, which in the past developed their activities under different regulatory structures, come into competition with each other. This puts all forms of regulation under pressure. With a much wider range of financial institutions transacting between themselves, and increasing amounts of capital flowing from country to country, the rules of financial regulation had to change.

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[39] The most prominent examples of fence lowering for trade in goods are the multilateral negotiations under the auspices of the General Agreement on Trade and Tariffs (GATT).

Although regulatory reform in financial services is largely the product of the internationalisation of capital markets, other specific changes contributed to the need to improve the traditional bank regulatory framework. One of the changes is in the field of technology.

The technology revolution has changed the way people see the world.

Technological advances have reduced the costs of cross-border transactions in all sectors of the economy. Spectacular reductions in the costs of transportation, telecommunications, and computation have greatly increased the ease with which firms can bridge the natural barriers of time and space that separate national markets, especially in financial services.

A symptom of the increasing world economic integration, the new communications technology has been especially significant for financial activity. Computers and telecommunications satellites have slashed the cost of transmitting information internationally, of confirming transactions, and of paying for transactions. In the 1950s, for example, foreign exchange could be bought and sold only during conventional business hours in the initiating party's time zone. Such transactions can now be carried out instantaneously twenty-four hours a day. Large banks pass the management of their worldwide foreign exchange positions around the globe from one branch to other, staying continuously ahead of the setting sun.

The information technology revolution has enhanced competition in the financial sector. New databases and information-producing agencies, such as rating agencies and news services, have reduced the advantage held by banks in being more informed about clients than anyone else.

Companies have become sufficiently well known and analysed to tap markets directly.

Faster data processing has made the markets themselves more liquid, enabling companies to raise large pools of money. The revolution has affected individual customers too. They now have credit histories, which they can take to any potential

lender and automatic teller machines, further reducing their dependence on the local branch.

The information technology revolution has given traditional bank clients a choice of service provider. Without a regulatory reform, some large clients could simply by-pass what can be called archaic regulations, eventually forcing them to change.[40]

Such technological innovations have increased the knowledge of potentially profitable international exchanges and of economic opportunities abroad. The need to obtain more flexibility in the environment (domestically and internationally) in which banks perform their activities can be identified as one source of regulatory reform.

The economic integration that has just been presented, based on the free movement of capital and on the technology revolution, has led to significant structural changes in financial markets around the world in recent years.

Among the more important of these changes are the growing importance of capital markets in credit intermediation, the emergence of markets for intermediating risks (a very fertile field for product innovation), changes in the activities and the risk profiles of financial institutions, and the increasingly global nature of financial intermediation. These changes, permitted by the liberalisation of capital movements, have been spurred largely by a technological revolution that has reduced the cost of information gathering, processing and transmission. More than ever before, banks face greater competition from other financial institutions. As this information revolution continues, there is little doubt that the changes in the financial markets will also continue. As the changes occur, financial activities are increasingly taking place outside the traditional bank regulatory framework. Financial regulatory reform is a living process that, although influencing the structure of the financial sector,

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[40] For example, Japanese companies' access to domestic bond markets was severely restricted until the early 1980's. As a result, large firms started tapping the Eurobond markets. Faced with the risk of losing their best clients to foreign underwriters , banks relented and the domestic bond markets were freed up.

must be able to follow the changes in the world of international finance that evolve at a rate which seems to accelerate with each passing year.

This is the reason why the search for the most important and fundamental regulatory action, called by Dimittri Vittas[41] "basic financial constitution" of a country, has been carried out on a basis of international co-operation.

This basic financial constitution should cover several types of financial regulation, namely structural, prudential, organizational, and protective regulation, and should govern what financial institutions are permitted to do, when they can operate, who is allowed to own or manage them, and what basic conditions they have to meet.

In the present international environment, as previously characterised, a sound regulatory action would not impose arbitrary entry, branching and merger restrictions on individual financial institutions, but would encourage them both to diversify their risks and to accumulate substantial capital reserves to absorb losses. The most important and fundamental regulatory action for the financial system should play a decisive part in the soundness and robustness of the banking system.

2.4. - CONCLUSION

Economic and technological forces are behind the dramatic changes incurred by the financial system in the last decades. These forces represent the reasons that compelled the dismantling of old style regulation because economic integration and financial innovation on one hand are incompatible with limits on market quantities and prices on the other. Instead of a "laissez-faire" regime where banks were left unregulated, a regime guided by market discipline in which banks would have an incentive (survival) to create ways of preventing bank failures, the concern with both the stability and the soundness of the financial system gave birth to a new regulatory framework, the so-called prudential regime. This is the interpretation of financial regulatory reform used throughout this thesis.

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[41] In "Financial Regulation: changing the rules of the Game" p.68.

Were the above-mentioned forces present in Portugal as well?

Forces behind Portuguese Financial Regulatory Reform have two origins: adherence to E.E.C. and political changes in the country. These two sources of financial regulatory changes cannot be analysed separately because they are inter-related.

Political changes, that began in the second half of the 70's, played an important role in Portugal's E.E.C. membership's negotiations. In 1986, nine years after the request for adherence, Portugal became a full European Member State. This event called for new rules in the Portuguese Banking System. Portugal had to adopt the E.E.C. financial regulation framework into internal law. 1985, as will be shown in the next chapter, was the threshold of substantial changes in the Portuguese Financial System.

Therefore, though indirectly via E.E.C. membership, the causes that are driving financial regulatory reform in Western Countries are the same as those that forced changes in the rules of the game in Portugal. The evidence of Portuguese financial reform is provided in the next chapter.

CHAPTER 3 – HISTORY OF FINANCIAL REGULATORY REFORM IN PORTUGAL

3.1. - INTRODUCTION: FINANCIAL REGULATORY REEFORM IN PORTUGAL

Over the past decades, the Portuguese Banking System has undergone profound transformation from being an almost completely state owned system to a fully privatised one with only two banks[42] still belonging to the state.[43] [44]

These changes occurred not only in the legal property (ownership) and regulatory framework of the banking system, but also in its function, organisation and activity.

There are two possible approaches to the study of regulatory reform in the Portuguese Banking System (as well as in any applied study of other financial systems).

One of these approaches consists in the analysis of the transition from macroeconomic, structural and allocative controls to protective, prudential, and organisational controls.[45]

The other approach focuses on movement from structural regulation (when regulators are concerned with the way a market is organised) to conduct regulation

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[42] Caixa Geral de Depósitos (C.G.D.) and Banco Nacional Ultramarino (B.N.U.)
[43] Table 4.1, chapter 4, presents the evolution in the number of banks in The Portuguese Banking System.
[44] Annex II (vol.II) presents the name of banks in Portugal in 1975, 1984,1989, 1992 and 1997. In this annex banks are split into three categories: Portuguese commercial banks, foreign commercial banks and investment banks.
[45] Types of Regulation presented by Dimitri Vittas (1992).

(when regulators are concerned with the behaviour within the market)[46]. The analysis carried out in this chapter will emphasise the former.

Until 1974 the Portuguese Banking System consisted of a number of private banks that operated in an almost closed economy under Salazar's regime. Decree Law 41,403/1957 and Decree Law 42,641/1959 strictly regulated financial activities. These Decree Laws were still binding when the revolution occurred in April 1974. The current analysis encompasses the period that began with nationalisation in 1975 and ended in 1997, when the programme of re-privatisation in the Portuguese banking system was completed. The beginning of a concentration process, which, by itself, deserves a separate study, followed this programme.

In the historical perspective, the army sized power during the so-called "Carnation Revolution" in 1974[47] and a democratic regime was reinstated. All the banks and financial institutions were then placed under government control and formally nationalised in March 1975 – with the exception of foreign institutions[48], namely the Credit Franco Portugais (now called Credit Lyonnais), the Bank of London and South America (now Lloyds Bank) and the Banco do Brasil. Both mainland and offshore activities were nationalised under the Decree Laws 450-2/1974 and 132-A/1975 provisions. Nationalisation was made irreversible in Portugal's 1976 Constitution, a principle that was upheld in the 1982 revision, but which was omitted in subsequent revisions. Thus there may be found in the fundamental legal framework (that is, the one stipulated in the Portuguese Constitution) reasons for dividing the temporal analysis of this study into three distinct evolutionary phases.

The first phase relates to the nationalisation of banks and financial institutions in 1975. The second phase begins with the reopening of the banking sector to private banks in 1984/85 when Law 11/83 reintroduced the principle of private enterprise[49]. This period is characterised by the simultaneous existence of state owned banks and

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[46] See Kay and Vickers p.224, and Gual and Niven (1992).
47 Dated April the 25th.
[48] 19 "Caixas Económicas" (regional saving banks) and some 200 "Caixas de Crédito Agrícola" (Agricultural Credit Saving Banks) were not nationalised either, they had (and still have) very little weight in the system.
49 Made possible after the first revision of the Portuguese Constitution.

new private banks. In fact, Law 11/83 was the outcome of the political impossibility of withdrawing from the Constitution the statement "irreversibility of nationalisations" in its first revision dated 1982. State owned banks remained stated owned, but the Government succeeded in making it possible for new private banks to enter the market[50]. The re-privatisation process that began in 1989 when political parties succeeded in withdrawing from the constitution, in its second revision, the expression "irreversibility of nationalisations", marks the start of the third phase. During this third phase all state owned banks but two were successively re-privatised. The final re-privatisation occurred in 1996[51].

3.2. - THE STATE INSTEAD OF THE MARKET: 1975-1984. THE DOMINANCE OF MACROECONOMIC, STRUCTURAL AND ALLOCATIVE CONTROLS

The history of Portuguese Financial Regulatory Reform begins in 1975 when all Portuguese banks were nationalised. For the decade, which followed, macroeconomic, allocative and structural controls dominated the banking system.[52]

As will be explained below, the reasons for strong macroeconomic controls, such as credit ceilings, interest rate limits and restrictions on capital flows, were rooted in the macroeconomic imbalances experienced by the Portuguese economy after the revolution of April 1974. A further consequence of this revolution, that installed a communist government in the country, was that the strong allocative and structural controls had ideological causes. These controls endured in the industry until 1984.

Banking activities were constrained by macroeconomic imbalances. During the late seventies, the Portuguese economy experienced high inflation rates, huge budget deficits and a growing foreign debt, together with a chronic negative balance on the

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[50] The first private commercial bank was founded in 1984 (November). Private banking activities began to make a difference in the market from 1985 onwards.

[51] A comprehensive list of the most important steps in Portuguese financial regulatory legislation is presented in appendix to this chapter, the source being all the Portuguese monetary and financial legislation since 1974 until 1997.

[52] A list with macroeconomic, allocative and structural controls during this period is presented in appendix to this chapter.

current account. The main function of the banking system was to finance the budget deficit together with all non-financial companies belonging to the state that came close to insolvency[53]. Banks fulfilled a social function, in the sense that by preventing state owned companies going bankrupt they mitigated unemployment.

Meanwhile, however, banking activities were carried on under very strict rules, the most important of which were direct credit ceilings. The resulting scarcity of funds available to the private sector brought bankruptcy to private companies, contributing to a rising unemployment rate.

Interest rates were also subject to macroeconomic control. Administrative interest rates, in both loans and deposits, gave banking management little margin of manoeuvre in following government directives. Among other things, the government determined average expected growth rates on demand deposits, time deposits, total domestic credit and credit to the public sector.

Finally, still in the field of macroeconomic controls, all inflows and outflows of capital required government authorisation. No foreign exchange market was present in the banking environment, exchange rates being administratively priced by the Portuguese Central Bank[54]. As restrictions on foreign investment were binding, even an increase of capital shareholder capital in the few foreign banks in the economy required government authorisation.

In order to influence the allocation of financial resources in favour of priority activities, allocative controls, several selective programs and preferential interest rates were set in place. Because Portugal was considered a developing country[55] these schemes favoured the primary sectors of the economy. With the industrial sector debilitated, the foundations of the economy were agriculture, fishing and tourism [56]. As one might have expected, the priority sectors benefiting from selective

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[53] The Portuguese Constitution didn't permit state owned companies to go bankrupt.
[54] The Portuguese Central Bank was a policy vehicle of the Minister of Finance.
[55] Portugal was considered by O.E.C.D. as a developed country only in 1989.
[56] Active population in each economic sector in the first semester of 1979 was:
-   agriculture and fishing: 30.9%
-   industry: 35%

credit programmes and preferential interest rates were: agriculture, fishing, cattle raising, tourism, and the production of canned fish together with housing and small and medium size enterprises. Special loans were also available to state owned companies.

The third kind of controls was structural. In fact, the whole structure of the financial system was directly controlled by the state, in accordance with the constitutional principle of the "way to the socialism" implemented by 1974's revolution. For instance, entry to the market by private banks was forbidden and the government determined which state owned banks were allowed to merge or to be acquired by other banks. In the same way, geographic expansion needed a government authorisation. On the other hand, the range of banking activities was circumscribed to traditional lending and deposit taking transactions, and no financial institutions other than banks were authorised. There was only one investment bank, in the sense that its task was to grant long term loans to the industrial sector. Two saving banks and a dozen commercial banks formed the rest of the system. The Lisbon stock exchange, which closed in the aftermath of the revolution[57], reopened some months later[58] but remain torpid throughout the period.

A very timid structural transformation took shape in the beginning of the 80's with the authorisation of leasing, factoring and investment companies. Once more, this change was forced by macroeconomic imbalances. The economic situation was so catastrophic that Portugal presented its first Letter of Intention to the IMF in 1979[59]. IMF medicine, characterised by high interest rates and strict credit ceilings to fight inflation, made loans to firms almost impossible. Faced with this very strong credit constraint, firms barely could survive. Leasing, factoring and investment companies emerged as a substitute for banking financing of firms[60][61][62].

- services: 34.1%
I.N.E. (the National Statistics Institute) doesn't give disaggregated numbers for tourism.
[57] The Lisbon Stock Exchange Market was closed in 29th April 1974.
[58] The reopening of the Lisbon Stock Exchange Market was authorised in December 1975, transactions formally began on January the 12th 1976.
[59] The Macroeconomic situation was so dramatic that in 1983 Portugal presented its second Letter of Intention to the IMF.
[60] Between 1981 and 1983 they were authorised 8 leasing companies and 5 investment companies. At present there exist 24 leasing companies in the Portuguese financial system.
61 They played a complementary role in the banking system.

To conclude, the banking system was a state owned monopoly. With Portugal outside the European Economic Community, and with this kind of market structure, organizational, protective and prudential controls were, as one might expect, absent from the financial system.

With the approach of the EEC integration[63], some reforms were gradually introduced in the banking system. The one with the greatest impact was the decision, in 1983, to allow private banks to enter the market. In the next section the analysis of these reforms is carefully pursued. They aimed at modernising the banking system and at bringing more flexibility to the financial environment.

3.3 - MODERNISATION AND FLEXIBILITY: 1985 –1989. THE DOMINANCE OF STRUCTURAL CONTROLS' CHANGES

Portugal, as a western country, didn't escape the dramatic changes in its financial system that most other countries have experienced. These changes began in 1985 as a consequence of the opening of the banking industry to the private sector and the entry of Portugal into the E.E.C.. Since then, non-bank financial intermediaries and the financial markets emerged as significant competitors to the commercial banks that had long dominated the financial system.

Between 1985 and 1989, when the re-privatisation process began, the Portuguese financial system moved towards greater liberalisation and deregulation of the monetary, financial and foreign exchange markets. As it will be explained in this section[64], this movement can be interpreted as one dominated by changes in structural controls.

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62 From 1993 onwards banks are authorised to perform leasing and factoring transactions.

[63] Portugal became a European Member in January 1986. The request for membership was presented to the EEC in 1977.

[64] A list containing changes on structural controls is presented in appendix to this chapter.

In 1984, the first private bank to enter into the market was inaugurated[65] and signalled the beginning of a fundamental restructuring of the sector. New private banks rapidly increased, with seven being established[66] in 1985.

In 1986, Portugal joined the European Union. The creation of a single market in financial services in the European Community has proved an important factor in the evolution of the Portuguese banking system. Decree Laws 23/1986 and 24/1986, took Portuguese regulations for licensing credit institutions closer to European Union Directive 77/780/CEE, marking the transition to European regulations.[67]

In order to foster a more efficient promotion of savings and investments, in line with the then current international trends and within the limits set by the overall economic situation, these changes pointed towards more intense competition, diversification, disintermediation and internationalisation of the Portuguese financial system.

We can consider this second period as one in which the framework of the financial system was re-shaped. It was then, in fact, that regulatory reform focussed on transformations in the field of structural controls.

This dominance of structural controls is emphasised because, throughout the process, Monetary Authorities (the Ministry of Finance and the Banco de Portugal) were active in producing intensive and innovative legislation, creating new financial institutions and instruments, and changing the framework of the relevant markets.

Some elements that contributed to enlarging the range of activities in the market and to modifying the different types of institutions are:

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[65] Manufacturer Hannovers in November.

[66] Banco Português do Investimento (Portuguese Investment Bank) and Chase Manhattan in March. Barclays Bank in October. City Bank, Banco Comércio e Indústria (Portuguese commercial bank) and Banque Nationale de Paris in November. General Bank in December.

[67] The changes introduced with the aim of adjusting the Portuguese legal framework to the EEC, but still within the scope set up by the Treaty of Accession, were characterised by two types of restrictions to the activity of Commercial Banks, those relating to the whole system and those relating to each bank operation. The establishment of new credit institutions in Portugal had been conditioned, until the end of 1992, on a previous authorisation, on a case-by-case basis, subject to the non discrimination rule. This authorisation needed to be given by legal order signed by the Prime Minister and the Minister of Finance, after consulting the Banco de Portugal, and had to be based on the "market economic needs" criterion at the national, regional or local level.

- The surge of new institutions, either Portuguese or foreign, and of new financial instruments
- The introduction of new rules governing the money market and the creation of the spot and forward exchange markets
- The growing autonomy of the banks in fixing interest rates
- The growing automation of Banking Services
- The dynamism of the capital market

The growing number of institutions operating in the market, and the development of non-banking financial activities, were factors contributing to structural changes through their role in stimulating competition.

The tendency towards the diversification and expansion of the financial system was particularly evident in the non-credit sub-sector. Along with insurance companies, by then authorised to carry out new operations, new institutions emerged, namely Venture Capital Companies, Investment Fund Companies and Pension Fund Companies.

These institutions, aiming either to promote investment and innovation (Venture Capital Companies) or to foster and attract savings (Investment Funds and Pension Funds), acted as important regulators for the capital market, thus making a relevant contribution to the balanced development of the whole financial system.

Among the non-banking credit institutions, Investment Companies and Leasing Companies underwent a rapid expansion, contributing significantly to the diversification of the financial market and the promotion of investment[68].

At the same time, the type and volume of services and products offered by the system has increased.

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[68] Non-banking credit institutions experienced the following growth of the credit market share:1985-1%; 1986-3.4%; 1987-6.4%; 1988-8.7%. Between December 1988 and December 1989 credit granted by non-banking institutions grew 77.1%.(Source: Banco de Portugal – Annual Reports).

Changes in the situation were particularly felt in the application of households' savings and companies' cash surplus. In fact, for ten years, time deposits were almost the only application of savings. Between 1985 and 1989 many alternatives for savings emerged such as Treasury Bonds, Investment Funds, profit-sharing bonds, other types of bonds, shares, Certificates of Deposits (CD's), and specifically featured bank deposits.

The switch in the Public Sector financing from bank resources to Treasury Bills, issued as from August 1985, was particularly relevant in the whole process of the changes in structural controls. In this context, the transfer of an increasing proportion of the Government Debt from the banking system to the public was one of the first steps towards the creation of an open market. The open market, along with an adequate policy for bank's reserve requirements[69], created the necessary conditions for replacing the then current credit ceilings system by an indirect management of the money supply. This indirect control of money supply, as shall be seen, came into existence at the beginning of the 90's.

During the 80's, the management of money supply in Portugal was still based on the direct control of some policy aggregates, namely the targeted evolution of the exchange rate, the fixing of some interest rates and, as basic device, the amount of outstanding credit allowed to every bank on a monthly base. Credit rationing, with interest rates and exchange rates controls, was only possible because of controls on capital flows.

Connected with the movement towards the indirect control of the money supply, a more flexible interest rate policy was progressively introduced in order to let market forces adjust in a gradual way. The definitive abolition of administrative interest rates on lending was effective by September 1988, while credit constraints remained in the market until 1991. The rationing of quantities with liberalisation on prices

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[69] Cash reserve requirements in 1988:
Credit institutions were deemed to observe the following minimum cash reserves:
  The average amount of (domestic currency) cash assets should be, each week, not less than the sum of the following figures:
- 15%, 12%, 3% and 1%, respective to the amounts of demand deposits, deposits from 30 days up to 180 days, deposits from 180 days up to one year and deposits over one year.

allowed banks to benefit from abnormal margins of net interest. On one hand, this phenomenon strengthened the delicate financial condition of state owned banks (preparing them for re-privatisation), while on the other hand it created grounds for the success of the infant private banks.

In general, macroeconomic controls were gradually lifted from 1985 onwards. Interest rates were gradually liberalised between 1985 and 1988. Foreign exchange rates floated in 1987. From 1986, the purchase of Portuguese shares/bonds and direct investment by non-residents was permitted. The acquisition of unlisted companies by non-residents was allowed in 1989[70]. Quantitative credit ceilings were the most important macroeconomic control that prevailed in the economy during this period[71].

Another important structural change that characterised Portuguese financial regulatory reform during this period was the evolution of capital markets. After a long period of stagnation, the capital market began to show a dramatic revival from 1985 onwards. This revival was a joint effect of actions taken by banks and by the Government. Major banks gave incentives to their clients to buy units in investment funds because they wanted to reduce costs with time deposit liabilities. On the other hand, the Government implemented a package of fiscal incentives on both sides of demand and supply in bonds and shares. Finally, an improved overall economic situation, particularly in terms of inflation rate, also made its contribution to the dynamism of the capital market.

The revival in the capital market was first felt in the private bond market in 1985, with a significant expansion of the amounts either bought or subscribed by the public. The share market registered a similar evolution only in 1986, with 30 issues offered to public subscription. These 30 issues followed a twelve-year period during which only one issue had occurred in 1983. The capital market began to show an

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[70] The resulting large inflow of international capital created some problems in achieving the targeted level of inflation and keeping the escudo stable against Portugal's main trading partners. In 1990 and 1991, as we shall see, the Banco de Portugal reintroduced some restrictions on international capital flows, including blocking non residents' access to the money market and short term securities, in an attempt at extending some control over funds. These restrictions were completely lifted by the end of 1992 as agreed in the timetable laid out at the time of Portugal's European Union membership negotiations and revised in 1988 (Directive 88/361/EEC).
71 See appendix to this chapter.

appreciable dynamism, channelling a growing volume of savings towards business investment.

To conclude, the Portuguese Banking System in the second half of the 80's reflected a certain balance between the specialisation induced by the traditional legislation that regulated the sector, and the trends that emerged internationally and that pointed towards "universal banking".

Until liberalisation and re-privatisation become a reality, banking was essentially low risk, being powerfully controlled by the Blanco de Portugal and the Ministry of Finance. As a result of financial regulatory reform in Portugal, it will be seen in the next section how prudential, organisational and protective controls were introduced in the system and how they have affected its behaviour.

3.4. - CONSOLIDATION: 1990 – 1997. ADOPTION OF PRUDENTIAL, ORGANIZATIONAL AND PROTECTIVE CONTROLS

After the first private bank was founded in 1984, signalling the beginning of a fundamental restructuring of the Portuguese financial system, another very important step towards consolidation of the sector arose through the process of re-privatisations. After 1990 a substantial number of the state banks were re-privatised[72], and the structure of the competitive environment changed completely, along with the adoption of European standard measures for depositors' protection, prudential behaviour and market discipline[73].

The most important structural control for this period is represented by the "Banking Law" (Law 298/1992, dated 31 December) that aimed to design the structure of the financial system, settling entry and merger conditions, establishing the range of activities in the sector, and defining the different types of financial institutions.

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[72] All state owned banks, but two, have already been re-privatised. See footnote number one.
[73] Regulatory rules changes during this period are presented in appendix to this chapter.

The "Banking Law" abolishes the distinction between commercial and investment banks and introduces, in accordance with European Union legislative practice, the concept of "universal banking".

This Law defines two broad categories of financial entities: credit institutions, those whose activities involve taking deposits from the public and the provision of credit[74], and financial companies, which are involved in a wide range of specialist financial activities but are not allowed to accept deposits from the public. These financial companies raise funds through bond issues, through bank loans, and by means of their shareholders' equity. Figures 3.1 and 3.2 show the institutional structure of the Portuguese Financial System before and after January the 1st 1993 respectively.

The procedures for establishing a new credit institution, or a branch, in Portugal were also adjusted to reflect European Union requirements. These include prudential regulations regarding "own funds" and solvency. The principle of home country control has also been adopted, in line with European Union Statements.

Macroeconomic controls were dismantled during this third phase, especially during its first years, just on the eve of the Single Market. In this context, it is convenient to address the issue of the link between monetary policy in the early 90's and its effect on banking activity. This central matter fostered macroeconomic transformations.

Monetary policy objectives were to restrain the excessive growth of aggregate demand, to restrain inflation, and to prepare the financial sector for full integration into the Single Market.

Policy measures undertaken between 1990 and 1992 had as their objective a smooth transition from direct money supply control to an indirect control system of liquidity in the economy[75]. Accordingly, in March 1990, the regime of credit ceilings was abandoned. However, as a result of the emergence of inflationary pressures, the

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[74] Portugal adopted the definition of credit institution following the First Banking Directive dated December 12 1977 (Directive 77/780/EEC).
[75] As it has been explained in section 3.3. conditions for open-market operations were established since 1985 and interest rates liberalisation began in 1985 as well.

complete removal of credit constraints was effective only at the beginning of 1991[76], confirming the transition to an indirect control regime of liquidity 1991 was the year banks began their financing in the inter-bank monetary market. Another main step in this transition process was accomplished with a new legal reserve requirement system implemented in 1992, covering a wide range of institutions and financial instruments.

The gap between interest rate liberalisation on lending, effective from 1987, and credit ceiling abolition in 1991, was responsible for one of the most remarkable phenomena in the Portuguese banking system. This gap performed the role of a medicine for financial institutions. Clearly, an environment characterised by quantities rationing, in which players were free to establish prices, made its contribution to an upward trend in credit interest rates. As a result, until 1991, net interest margins remained very high. The outcome was twofold. On the one hand, high interest margins explain some of the success of the private banks newly arrived in the market. On the other hand, increasing interest margins became a source of profitability for state owned banks that were due to be re-privatised, making possible a slight recovery from the structural financial imbalance inherited from the previous years of government oriented banking activity.

The trend of increasing interest margins was inverted in 1991. Beyond the end of credit ceilings, other factors contributed to their fall. Competition has augmented, the Banco de Portugal began, in its turn, a downward trend on key interest rates, while interest rates on bank deposits remained high in order to capture clients.

The drop in interest rates on lending became manifest by the second half of 1991, beginning the process by which interest margins decreased. Since than, interest margins have gradually fallen to values very similar to those prevailing in other European countries.

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[76] International capital flows were fully liberalised in 1992. Although allowed before 1992, a large inflow of international capital, attracted by high interest rates, created some problems in achieving the targeted level of inflation and keeping the escudo stable. In 1990 and 1991 the Banco the Portugal re-introduced some restrictions that were lifted in 1992.

FIGURE 3.1.- THE PORTUGUESE FINANCIAL SYSTEM
BEFORE 1 JANUARY 1993

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                                                    ┌──────────────────┐
                                                    │   Central Bank   │
                                                    └──────────────────┘
                                    ┌──────────┐
                                    │ Banking  │    ┌──────────────────┐
                                    │Insitutions│───│ Commercial Banks │
                                    └──────────┘    └──────────────────┘
                                                                        ┌──────────────────┐
                                                                        │  Savings Banks   │
                                                                        └──────────────────┘
                                                    ┌──────────────┐    ┌──────────────────┐
                                                    │Special Credit│────│ Investment Banks │
                                                    │ Institutions │    └──────────────────┘
                                                    └──────────────┘    ┌──────────────────┐
    ┌────────────────────────┐                                          │Regional Develop- │
    │ Institutions legally   │                                          │ment Companies    │
    │authorized to grant     │                                          └──────────────────┘
    │       credit           │
    └────────────────────────┘                      ┌──────────────────┐
                                                     │Investment Companies│
                                                     └──────────────────┘
                                                     ┌──────────────────┐
                                                     │ Leasing Companies│
                                    ┌──────────┐     └──────────────────┘
                                    │Non-Banking│     ┌──────────────────┐
                                    │Insitutions│────│ Factoring Companies│
                                    └──────────┘     └──────────────────┘
                                                     ┌──────────────────┐
                                                     │Real Estate Management│
                                                     │    Companies     │
                                                     └──────────────────┘

                                    ┌──────────────────┐
                                    │    Insurance     │
                                    │    Companies     │
                                    └──────────────────┘
                                    ┌──────────────────┐
                                    │ Venture Capital  │
    ┌────────────────────────┐      │    Companies     │
    │Institutions not        │      └──────────────────┘
    │authorized to grand     │──────┌──────────────────┐
    │     credit             │      │ Investment Funds │
    └────────────────────────┘      │ Manag. Companies │
                                    └──────────────────┘
                                    ┌──────────────────┐
                                    │Pension Funds Manag.│
                                    │    Companies     │
                                    └──────────────────┘
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┌─────────────────────────┐
│   **Monetary Sector** │
└─────────────────────────┘

┌─────────────────────────┐
│ **Non-Monetary Sector**│
└─────────────────────────┘

FIGURE 3.2.-PORTUGUESE FINANCIAL SYSTEM AFTER 1 JANUARY 1993

FINANCIAL INSTITUTIONS

Monetary Authority Banco de Portugal

Credit Institutions

Financial Companies

Universal Banks

Specialized Credit Institutions

Caixa Geral Depósitos

Private Banks

Caixas Económicas

Caixas Crédito Agricola Mútuo

Financial Leasing Companies

Factoring Companies

Investment Companies

Crédit Purchase Financing Companies

- *Regional Development Companies*

- Dealers

- Risk Capital Companies

- Financial Holding Companies

- Mutual Funds Managing Comp.

- Mutual Funds

- Brokers

- Asset Managing Companies

- Foreign Exchange Broking Companies

- Credit Card Issuing or Managing Companies

- Foreign Exchange Trading Chambers

- Stock Exchange Trading Associations

- Other Financial Companies

As shown in figure 3.3, interest margins in the Portuguese banking industry have halved in the last five years of this study, after dropping at a rate previously unseen in Europe. They have now fully converged with the levels attained by the most competitive European banking systems. Interest margins are likely to stabilise at current levels, as no competitive or structural forces to prompt further reductions are expected[77].

Figure 3.3.- Net Interest Margin
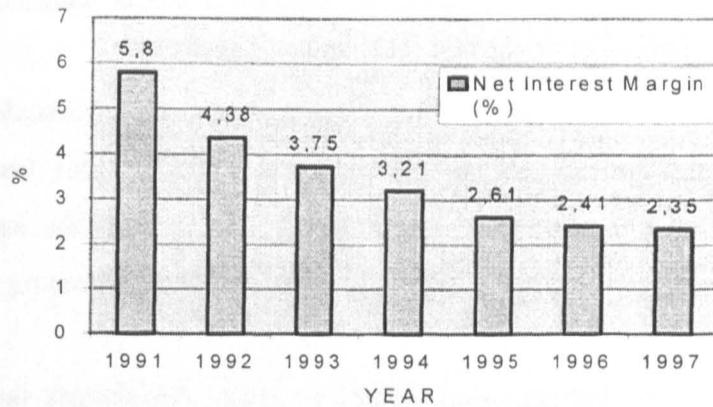
Source:Associação Portuguesa de Bancos(Portuguese Banking Association)

A decrease in interest margins is one of the symptoms of financial disintermediation. With the consolidation of the "cross-selling" concept, insurance and mutual funds are providing the major instruments of savings disintermediation.

This is a spreading situation in Portugal as is shown by table 3.1. Non-interest income is rising, and there should be ample room for its growth. In reality banks are switching with an increasing emphasis from traditional lenders to service providers.

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77 At present the trend is towards concentration.

Table 3.1 – Net interest income and net non-interest income as a percentage of gross income

Year	Net interest income	Net non-interest income
1991	82.80%	17.20%
1992	78.80%	21.20%
1993	75.50%	24.50%
1994	77.90%	22.10%
1995	73.20%	26.80%
1996	65.70%	34.30%
1997	64.40%	35.60%

Source: Associação Portuguesa de Bancos (Portuguese Banking Association).

Besides the abolishment of the remaining macroeconomic controls, such as credit ceilings and interest rates[78], financial regulatory reform during this period was characterised by the adoption of a set of prudential controls, and by a flavour of organizational and protective controls[79].

The new prudential regime has been gradually implemented since 1990. From December of that year, banks were required to hold provisions to cover credit risk, pension funds liabilities[80] [81]and potential losses on equities. The solvency ratio was enforced in 1990, although the achievement of the 8% minimum level became compulsory only in 1993. Provisions for interest rate risk and exchange rate risk were implemented in May 1993, and provisions for country risk have been in force since December 1995. Since January 1997, the solvency ratio must cover market risk as well.

The study proceeds with an explanation of the impact that the above-mentioned prudential regime has had on the banks' operational environment. On the one hand, due to the accrued cost of capital caused by the solvency ratio, banks have diverted

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[78] See appendix to this chapter.
[79] A list with macroeconomic, structural, prudential, organizational, protective and allocative controls is presented in appendix.
[80] Until banks were reprivatised, pensions burden was supported by each year profits.
[81] Banco de Portugal settled a period of five years to allow banks to fully cover their liabilities with pensions, until 31 December 1995. In 1993 this period was extended for a further two years.

the allocation of their funds to less weighted transactions such as money market lines, securities portfolios, mortgage lending[82], and off balance sheet transactions. On the other hand, the effort required to make provisions for effective risks on credit and securities portfolio, as well as on pensions, has put the profitability of banks under stress. The latter effect occurred when former state owned banks were revising their financial structure in order to recover from the squizophrenic centralised management of the 70's and early 80's, which indeed they succeeded in doing.

In reality, between 1991 and 1994, provisions had a significant impact on profits. The increase in the level of provisions, together with a slowdown on economic activity[83] (and the subsequent increase on defaults as evidenced in figure 3.4), made previous levels of profitability unattainable. This was an asymmetric situation, with the continuing state owned banks evidencing a weak level of solvability and provisions insufficiency, and private and re-privatised banks managing to accommodate fully the new prudential rules.

Figure 3.4.- Ratio: Default Credit/Total Credit
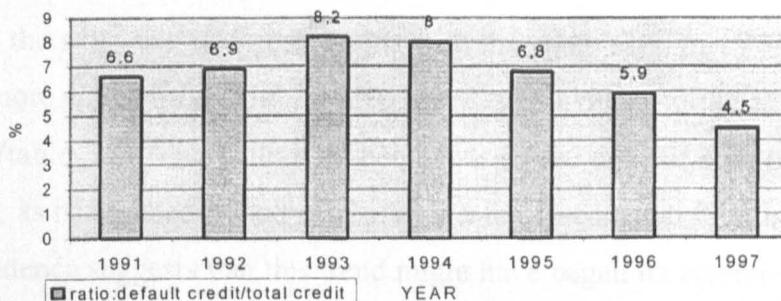
Source: Associação Portuguesa de Bancos (Portuguese Banking Association)

After 1995, once the operational problems posed by the prudential regime were overcome, a process of bank concentration accompanied the re-privatisation programme still in progress. The banking sector's re-privatisation gave some of the re-privatised banks an opportunity to increase their market share. In fact, the main banks and their core shareholders engaged in a contest for acquiring those remaining banks to be privatised.

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[82] Although weighted by 50% mortgage lending is seen as a lower risk allocation of funds.
[83] Recession hit the Portuguese economy in 1993.

The trend towards concentration was triggered by the acquisition of two big Portuguese banks by other two Portuguese private banks[84] (one of them recently re-privatised) in 1995. The acquisition of one more state owned bank[85] by another private bank in 1996[86] further concentrated the banking sector. As a result, in the end of 1997, the five main Portuguese banking groups[87] controlled about 82% of the total assets of the whole banking system.

Following the re-privatisation programme designed by the Portuguese Government[88], it is the common belief that foreign competition does not pose a threat to the Portuguese banking system. The acquisition process experienced since 1995 seems to have as its objective either to prevent hostile take-overs or to exclude foreign competition from the market, or both. In support of this idea is the fact that acquisitions in the Portuguese banking system were accompanied by organic growth.

However, the concentration process in Portugal is not incompatible with competition in the banking market. The Herfindahl Index of concentration[89] shows a steady decrease in the credit side from 1990 until 1997, which evidences an increase on competition. At the beginning of this period concentration in the market was equivalent to the existence of 9 institutions with the same size. In 1997 the banking market was more competitive, and its structure was equivalent to the existence of 13 equal banks (table 3.2). The pattern of behaviour in the deposit side of the market was different, as is depicted by table 3.2. After a fall in concentration between 1987 and 1993, evidence suggests that this trend might have began its inversion from 1993 onwards. Nevertheless, this fall in competition by deposits might also be explained

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[84] Banco Totta & Açores and Banco Português do Atlântico were acquired by Banco Pinto & Sotto Mayor and Banco Comercial Português respectively .
[85] The last to be sold.
[86] Banco Português de Investimento acquired Banco de Fomento e Exterior.
[87] The five portuguese banking groups are as follows:
-    Banco Português de Investimento, Banco Fonsecas e Burnay, Banco Borges e Irmão, Banco de Fomento e exterior
-    Banco Comercial Português, Banco Portugês do Atlântico, Expresso Atlântico
-    Banco Pinto e Sotto Mayor, Banco Totta e Açores, Banco Chemical, Crédito Perdial Português
-    Banco Espirito Santo, Banco Internacional de Crédito, Banco Essi.
-    Caixa Geral de Depósitos, Banco Nacional Ultramarino (the only one state owned).
[88] Which forbidden foreign participation on newly re-privatised banks above a minimum level.
[89] The Herfindhal Index is the sum of the squared market shares of the firms in the market. The inverse of the Herfindhal Index corresponds to the hypothetical number of firms in the market that are

by the diversion of savings for other financial instruments, such as mutual funds and insurance services. As a main feature, this analysis permits the conclusion that competition is greater on the credit side of the banking market than on the deposit one. That is, competition grew faster for lending than for funding. The banking sector, in 1997, was as concentrated as if there were only 13 institutions[90] of the same size on the lending market (against 8 institutions in 1985), and 9 institutions of the same size on the deposits market (against 7 in 1985). Table 3.2 evidences other relevant features. On the one hand, the resistance of the banking system towards greater competition for lending between 1986 and 1989, the explanation of which lies in credit rationing, accompanied by interest rates liberalisation (earlier explained in the current chapter). On the other, a slightly more substantial drop in concentration, in the credit side as well, between 1989 and 1994, which resulted from the removal of legal barriers to entry.

Table 3.2 – Herfindahl Index of Market Concentration

	Herfindahl Index		1/ Herfindahl Index	
Year	Credit	Deposits	Credit	Deposits
1985	0.1229	0.1294	8.13	7.73
1986	0.1250	0.1370	8.00	7.29
1987	0.1365	0.1362	7.33	7.34
1988	0.1239	0.1195	8.07	8.37
1989	0.1303	0.1137	7.67	8.80
1990	0.1094	0.1219	9.14	8.20
1991	0.1002	0.1088	9.98	9.19
1992	0.0871	0.0980	11.48	10.20
1993	0.0782	0.0940	12.78	10.64
1994	0.0755	0.0953	13.25	10.49
1995	0.0756	0.0976	13.22	10.25
1996	0.0730	0.1011	13.69	9.89
1997	0.0744	0.1012	13.44	9.88

Source: The author's research shown in annexes I and II (volume II)

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characterised by having hall the same size. This number is equivalent to each value of the Herfindahl Index of concentration.
[90] 1/herfindhal index.

In conclusion, the year 1997 was the consolidation year for the largest financial groups in the banking sector as a result of the acquisitions made over the previous two years. In the current scenario, these institutions are undergoing an internal restructuring, which has resulted in the unavoidable integration of the operations of affiliated companies at both the national and international levels. Rationalisation of costs and efficiency gains through the adequate allocation of human resources, the implementation of information and technology systems and the integration of accountancy methods, are in the field of priority concerns within these financial groups. Together with the implementation of more accurate risk management methods, these are the trends that characterise the Portuguese financial system at present.

Finally, a flavour of organizational and protective controls arose with the adoption by the banking sector of financial accounts on a consolidated basis (1992), and a deposit guarantee scheme in 1995. In November 1997 government representatives began to declare the necessity of ombudsmen offices for the financial sector.

3.5 - CONCLUSION

In summary, the Portuguese financial system has progressed to the point where it is now in line with the highest standards within the European Union. After nationalisation in 1975, the opening of the banking sector to private initiative in 1984, the re-privatisation initiated in 1990, and concentration since 1995, together with the regulatory reform measures, presented in this chapter, have produced what is believed to be a small but fit banking system in Portugal.

APPENDIX – REGULATORY REFORM IN THE PORTUGUESE FINANCIAL SYSTEM

1ST PHASE 1975 – 1984

DOMINANCE of MACROECONOMIC, STRUCTURAL and ALLOCATIVE CONTROLS

STRUCTURAL CONTROLS

1974 April – closing of Lisbon's capital market

1974 September – nationalisation of the Banco de Portugal (Central Bank)

1975 March – nationalisation of the banking system

1975 June – extinction of "Grémio Nacional dos Bancos e Casas Bancárias", corporative body under Salazar's Regime, in charge of the decision-making process in the banking system

1975 June – extinction of "Inspecção Geral de Crédito e Seguros", entity in charge of supervision in banking and insurance

1977 February – extinction of a state owned bank

1977 August – creation of an interbank money market, but the way banks exchange among them reserves in excess is administrative.

1978 February – creation of an interbank securities market

1979 May – creation of Parageste (latter called Paraempresa) with the aim of helping state owned companies in financial difficulties

1979 May – authorization to the establishment of leasing companies

1979 May – authorization to the establishment of investment companies

1979 August – four state owned banks merged into other three state owned banks

1980 October - authorization of the establishement of regional development companies

1981 January – creation of an equity market in Oporto

1983 November – Approval by the Counsel of Ministers of the new Law that opens to the private initiative activities on banking and insurance

ALLOCATIVE CONTROLS

In order to influence the allocation of financial ressources in favor of priority activities, several selective credit programs and preferential interest rates were authorized in the following fields:

fishing

agriculture

cattle raising

housing

imports and exports

tourism

manufacture of canned fish

small and medium size enterprises

special loans to state owned companies

MACROECONOMIC CONTROLS

- Direct credit ceilings

- Interest rate controls

- Restrictions on foreign investment, capital imports and exports require government authorisation

2nd PHASE 1985 – 1989

DOMINANCE of STRUCTURAL CONTROLS' CHANGES

STRUCTURAL CONTROLS

1984 February – the reopening of banking to the private sector

1985 May – the launching of fiscal incentives both on the supply and demand sides of capital market, namely to bonds

1985 May to July – regulation laws concerning Investment Funds (on both securities and real estate) and the associated Management Companies.

1985 July – authorisation to Credit Institutions to do spot operations (buying and selling) of foreign currencies against escudos, among themselves, with their clients and with Banco de Portugal

1985 August – creation of treasury bills

1985 August – regulation of the issue of Profit-Sharing Bonds

1985 August – greater flexibility in the functioning in the Interbank Money Market – Institutions are authorised to negotiate directly among themselves interest rates. And maturities of up to 90 days were liberalised (in May 1987 the maximum maturity was extended to 180 days)

1985 August – regulation of the issue of Pension Funds

1986 January – lauching of TRM's – Bonds for money regulation

1986 February – Decree Law 23/86 (and its complementary legislation), lays dawn the rules on the establishment and functioning of Credit Institutions in Portugal, and on the opening and operating of offices and branches of foreign Credit Institutions. That is, the Legal framework authorising Banking Institutions is change to comply with EEC Law.

1986 February – laws on the issue of Venture Capital Companies

1986 March – regulation of special deposits (creation of new and more flexible type of deposits)

1986 March – regulation of securities' accounts with buying guaranteed price

1986 June – regulation of intermediary Companies operating in the Money Markets

1986 October – creation of Automatic Compound "Fixed Interest Bonds" and Treasury Bonds without coupon

1986 December – regulation of Subordinated Funds

1986 December – greater flexibility on the access of Portuguese Credit Institutions to the international money market, as well as to forward exchange operations they may carry out among themselves, with their clients and with Banco de Portugal.

1987 – February – regulation of Certificates of Deposit (CDs)

1987 February – beginning of operations in the forward exchange market

1987 June – previous legal rules restraining the participation of a single shareholder in the equity of Financial Institutions are revoked

1987 November – creation of Treasury Bonds, medium term assets, with maturities between 18 and 36 months, with fixed interest rates, in the auction system (market mechanisms)

1988 July – creation of closed Investment Funds

1988 July – regulation of Asset Management Companies

1988 July – money market intermediary companies are allowed to operate in the exchange market

1988 July – regulation on brokers and dealers

1988 September – banks are no longer required by the Government to open a branch on a less desirable region for each opening request of a branch on a desirable one.

1989 January – abolishment of the compulsory acquisition of bad loans from state owned banks as a legal requirement for new banks to enter the market

MACROECONOMIC CONTROLS

1985 August – beginning of interest rates liberalisation. Credit Institutions are authorised to fix interest rates except on Time Deposits over 180 days and on loans with maturities of from 90 to 180 days and over two years

1987 March – further liberalisation of some interest rates – only maximum lending rates and minimum deposit rates over 180 days remain subject to administrative pricing

1987 October – transformation in the way exchange rates are determined. Beginning of daily "fixing" sessions at the Portuguese Central Bank. Exchange rates ceased to be

unilaterally and administratively priced by Banco de Portugal.

1988 September – abolition of the maximum interest rate in credit operations

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3rd PHASE 1990 – 1997

ADOPTION of PRUDENCIAL, ORGANISATIONAL and PROTECTIVE CONTROLS

PRUDENTIAL CONTROLS

1990 July – large risks exposure controls

1990 December – minimum provisions requirements to cover: credit risk, general credit risks, pension funds liabilities provisions and losses of value in equities

1990 December – implementation of the solvability ratio

1993 May – provision for interest rate risks and exchange rate risks

1995 January– the risk provisions' coefficient for general credit risks decreased from 2% to 1%

1995 March – distinction in the portfolio from negotiation equities, investment equities and equities held until maturity. Investment equities are required to be provisioned against potential losses

1995 December – provisions for country risk

1997 January – the solvability ratio covers, from now on, market risk as well as credit risk

MACROECONOMIC CONTROLS

1990 March – ending of credit ceilings. Macroeconomic imbalances required its substitution by "recommended credit"

1990 – new system of reserve requirements encompassing a larger number of institutions and financial instruments

1991 January – definitive abandon of credit ceilings

1990 and 1991 – Bank of Portugal reintroduce some restrictions on international capital inflows, including blocking non residents' access to the money market and short term securities, and a compulsory non interest bearing deposit on external financing, in an attempt at extending some control over funds inflows

1992 May – all interest rates become free market determined. Previously, banks did not compete for demand deposits on the basis of interest rates (loan interest rates were liberalised in 1987)

1992 December – restrictions on international capital flows, introduced between 1990 and 1991, are completely lifted

1992 December – liberalisation of foreign financing

1993 January– liberalisation of the credit to consumption

1995 January – minimum reserve requirements are reduced from 17% to 2%

ORGANIZATIONAL CONTROLS

1990 January – new official accounting planning for the financial sector

1992 March – presentation of financial accounts on a consolidated basis

STRUCTURAL CONTROLS

1992 December – New General Regime of Banking and Financial Entities "The Banking Law". Law 298/1992, dated 31st of December, "The Banking Law", establishes "universal banking" and presents the procedures to establish new credit institutions or branches in Portugal.

PROTECTIVE CONTROLS

1994 August – Compulsory information disclosure to the public

1995 September - Deposit funds guarantee is implemented

1997 November – government representatives begin to declare the necessity of ombudsmen offices for the financial sector

ALLOCATIVE CONTROLS

Preferential interest rates in housing financing

CHAPTER 4.- RESEARCH METHOD, DATA COLLECTION AND SAMPLE CONSTRUCTION

4.1. - INTRODUCTION

There is no theory of regulation for the banking system. Neither Banking theory, nor Financial Intermediation theory provides a theoretical framework to study the merits of financial regulation for banking stability. Nor does Industrial Organisation theory.

Dewatripont and Tirole (1993) designed a conceptual framework to embody a theory of regulation for the banking system. For these authors

> *The existing (banking and financial intermediation) theory is quite far from regulators' concerns. The objective of this (their) monograph is to bring a start of prudential regulation's analysis of the banking system* [91] [92]

Combining banking theory, industrial organisation theory and natural monopolies regulation in the study of banking, Dewatripont and Tirole attempt to bridge the gap between theory and the concerns of regulators.

Industrial organisation theory together with natural monopolies regulation is the usual approach where competition in the banking industry is under discussion.

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[91] "La theory existante est assez eloigné des préocupations des régulateurs. L'objet de cette monographie est d'apporter un début d'analyse de la reglementation prudentielle", p.9
[92] Bringing it closer to regulators concerns (author comment).

Dewatripont and Tirole argue that industrial economics as applied to the banking system is "far more useful for the understanding of some banks behaviours than for the study of current regulators' apprehensions"[93].

State of the art banking theory does not enable us to assess the merits of regulation for the banking system. In fact, Banking Theory does not embrace a Theory of Regulation for the Banking System. For Dewatripont and Tirole (1993), "this literature (the literature on banking theory) has been very useful in the understanding of certain behaviours and banking peculiarities, but has not applied a conceptual framework that allows an assessment of traditional prudential regulation"[94].

In the absence of a theory of regulation for the banking system this research makes a contribution to forming the stylised facts of a theory of regulation for the banking system.[95][96]

George Benston's paper (1991) focuses on regulation. It distinguishes two aspects of stability in the banking system: systemic stability and the stability of individual banks. We may, therefore, conclude that there are two measures of risk in the banking system:

- Incidence of banking failure
- Level and behaviour of profitability

Empirical studies, like Heffernan (1995), Cole and Gunther (1998), Hoggarth Milne and Wood (1998), are concerned with the first measure. The current study refers to the second measure of risk. In this context, while Hoggarth et al. (1998) analyse the

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[93] p.58
[94] Author's translation. "Cette littérature (littérature théorique sur la banque) a été fort utile pour comprendre certains comportements et spécifités bancaires, mais n'a pas utilisé un cadre conceptuel permettant d'évaluer la reglementation prudentielle traditionnelle" p.11 in the original
[95] Clive W. J.Granger (1992) provides a interesting discussion of the importance of the role of the theorist, the econometrician and the applied economist in building a theory.
[96] A discussion about differences and similarities between banks and other industries can be found in Benston (1986). Chant (1987) and Giannini (1986) provide a detailed review about the literature focused in the nature of financial intermediation as an attempt to provide a theoretical foundation to the uniqueness of banks, denied by the "new view" and by the so called "Legal Restrictions Theory", in connection with the issues of banking regulation and supervision. Hewllig (1991), Battacharya (1991), and Fama (1980 and 1985) provide a detailed discussion of banks and non-financial firms.

importance of the level and volatility of profits for financial stability and hence for systemic risk, this research aims at empirically testing that importance by examining the stability of individual banks. The research is aimed at testing the general assumption that volatility/risk has increased with financial liberalisation, using data from Portuguese Banks. An assessment of the volume and behaviour of profitability in the banking system is undertaken. If volatility/risk has increased then, David Llewellyn's statement that "in a context (that of deregulation) where the evidence suggests that, if anything, risks in financial systems have increased not least (...) because of the eroding of traditional demarcations"[97] holds good. Prudential regulation, aimed at bringing soundness and stability to the banking system, has as its outcome a perverse effect.

To assess the merits of financial regulatory reform, the research method proposed is as follows.

An Analysis of Variance, which allows a comparison between the level of profits before and after liberalisation, developed in chapter 5, is followed by the estimation of a linear regression model of unbalanced panel data, which is the content of chapter 6. The objective of this model is to analyse the statistical significance of regulation on profitability. Finally, a modelling of the functional/institutional relation between regulation and volatility/risk is carried out in chapter 7. This third model derives its structure from Finance Theory. This model is combined with uncertainty theory principles. The research design is, therefore, a compilation of different theoretical and practical methods and methodologies. The research models are used for describing and analysing profitability behaviour as response to changes in the regulatory rules. This is a framework that allows an assessment of the merits of financial regulatory reform. Therefore, some conclusions can be drawn about the consequences of this reform for banking stability.

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[97] "The Regulation and Supervision of Financial Institutions", *Gilbart Lectures on Banking 1986*, p.7.

4.2. - SOURCES OF INFORMATION AND DATA COLECTION

4.2.1. - COMPLEMENTARY APPROACH TO THE ISSUE OF FINANCIAL REGULATORY REFORM: INTERVIEWS

While proceeding with the required research in the literature about financial regulation, a complementary approach to the problem of changes in financial regulatory rules has been adopted. Several interviews were conducted aiming at complementing the framework of the research design. A list of these interviews is presented in Annex III (Vol. II) together with a brief commentary on the contents of each. The objectives of these interviews are multifold, namely, to be aware of the concerns of the monetary and supervisory authorities, to acknowledge the way some Chairman of Portuguese Banks are reacting to changes in the financial sector, to have a more accurate perception about changing mentalities in the Portuguese financial system, to understand what attention has been paid to several kinds of risk either by banks or by monetary authorities, to learn about accounting methodologies and the main problems posed by changes in accounting procedures, and finally to learn to what extent banks have diversified their activities following the process of liberalisation.

4.2.2. - NUMBER OF BANKS IN THE PORTUGUESE BANKING SYSTEM AND MEASUREMENT OF THEIR PERFORMANCE

Table 4.1.- Number of banks in the Portuguese System

	1975	1984	1989	1992	1993	1997
Portuguese Commercial Banks	20	13	17	19	20	26
Foreign Commercial Banks	3	4	11	12	11	11
Investment Banks	0	0	1	4	11	14
Total	23	17	29	35	42	51

Source: APB (Portuguese Banking Association) and Banco de Portugal (Portuguese Central Bank)

Empirical testing begins in 1985. Before that year, all Portuguese banks were state owned (the first phase of Financial Regulatory Reform) and financial statements must be analysed with caution.

Between 1975 and 1984, six banks have disappeared as result of administrative Government decisions. From 13 state owned banks in 1984, the number of banks has increased to 50 in 1997. This is the consequence of the financial liberalisation process in Portugal[98]. We may distinguish two sub-periods: 1985-1989 (the second phase of financial regulatory reform) and 1990-1997 (the third phase of financial regulatory reform). During the first sub-period foreign commercial banks are the origins of expansion. During the second sub-period, the jump from 29 institutions in 1989 to 51 in 1997 is mainly the result of the transformation of investment companies already in the market into investment banks. These Investment Companies were operating in the market from the yearly 80's[99]. The increase in Portuguese commercial banks after 1992 is the result of a surge of banks specialised in credit for consumption.

Annex IV (Vol. II) displays the institutional evolution of banks in the Portuguese system. This Annex was drawn up with information collected from APB (The Portuguese Banking Association founded in 1985) and complemented by the dates banks registered with the Banco de Portugal. The Annex gives the name of each bank, the date each bank began operations (or was registered with the Portuguese Central Bank), and the date each bank withdrew from the market[100]. Simultaneously, from Annex II, one can discern the number of banks annually operating in the Portuguese system.

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[98]The removal of barriers to entry is behind the increase in the number of players in the market. Constitutional barriers to entry were partially lifted in 1984 and were definitely abolished in 1989. Some legal and administrative barriers, such as compulsory purchase of default credit, compulsory opening of branches in non-desirable locations and establishment of joint venture companies were still binding by the end of the 80's. All administrative barriers were finally dismantled by January 1993.
[99] They were not banks due to barriers to entry. Namely: level of minimum capital requirement, compulsory purchase of default credit from state-owned banks and necessity to establish a joint venture company. See chapter 3, figure 3.1 – "The Portuguese Financial System before 1 January 1993".
[100] This was the case of Chase Manhattan Bank when, in 1993, this American Bank decided to reorganise its international strategy, and of Banco Comercial de Macau (BCM) which ceased its activities after Banco Comercial Português (BCP) bought Banco Português do Atlântico (BPA).

As explained below, the performance measurement of the Portuguese banks will be pursued in terms of their profitability.

Heffernan (1996) gives a review of the methods used to measure bank performance. Value added is "perhaps the best method for assessing the performance of any institution"[101]. A bank's generation of wealth seems to be a fair measure when the banking system stability is under scrutiny. Unfortunately "value added (...) is not affected by difference in regulatory regime."[102] Therefore the choice for this study falls on profits, R.O.A. (Return on Assets) and R.O.E. (Return on Equity), as the best measure of banking performance. R.O.A. is the ratio of earnings to total assets, while R.O.E. is the ratio of earnings to equity (being equity the sum of capital with reserves). Profits will be computed as "net profits"[103]. These measures of banking performance have been chosen because the subject of this research is the assessment of banking system stability. In this sense, stability can be viewed as synonymous with profitability.

All profitability and risk measures are computed using accounting data instead of market (stock price) data. Whether accounting or market data provide better measures of risk and return is a debatable issue: each has advantages and disadvantages. A well-recognised problem with accounting data is the smoothing of profits stemming in part from marking assets and liabilities at historical cost rather than at market value (e.g., Greenawalt and Sinkey (1988)). This is a particularly undesirable property when estimating measures of volatility as it will be done in chapter 7. Stock prices, on the other hand, quickly reflect all material information about a firm, as it becomes known; thus, market returns are not smooth as are accounting returns. However, "no one has yet provided a totally satisfactory explanation as to why equity returns are so volatile relative to other economic time-series"[104]. Nevertheless, using accounting data in a semi-annual basis and a measure of volatility coming from uncertainty theory instead of finance theory, the study of

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[101] Heffernan, S.(1996) *Modern Banking in Theory and Practice,* p.31.
[102] Op. Cit. p.32.
[103] For a discussion about the meaning of earnings in the banking system and about the use of "gross profits" vs. "net profits" in the study of stability, see Appendix A. This appendix also develops an analysis about the different approach of R.O.A. and R.O.E. on both North American and O.E.C.D. studies.

volatility carried out in chapter 7 tries to mitigate the smoothing on returns problem. On the other hand, in this study this issue is largely overcome because Portuguese banks only began floating in the early 90's (with very few exceptions as shown in *table 4.2*), which hinders the use of market data.

Table 4.2- Portuguese Banks Listed in the Lisbon Stock Exchange

Name of the Bank	Date of Admission	Date of exclusion	B.V.L. code
CPP	30 – December – 1992		121 65 000 302
BCP	03 – September – 1987		121 65 003 502
Crédit Lyonnais	14 – December – 1989		121 65 006 302
BES	15 – July – 1991		121 65 007 802
BANIF	25 – March – 1992		121 65 008 802
BPSM	22 – June – 1995		121 65 009 302
BPA	21 – December – 1990		121 65 009 402
BTA	30 – October – 1989		121 65 009 502
Central B.I.	06 – October – 1997		121 65 011 902
Banco ESSI	01 – June – 1993		121 65 062 802
BPI	19 – September – 1986	28 – December – 1995	121 65 000 702
BPI – SGPS[105]	28 – December – 1995		121 65 096 902
BIC	18 – December – 1989	13 – December – 1996	121 65 003 602
BFE	02 – January – 1995	25 – June – 1997	121 65 000 202
UBP	20 – April – 1993	13 – September – 1996	121 65 009 602
B.Mello(de invest°)	03 – April – 1992	25 – September – 1996	121 65 033 102
B. Mello Comercial	13 – September – 1996	10 – February - 1997	121 65 098 302
B. Mello (current)	10 – February - 1997		121 65 098 502

Source: B.V.L.- Bolsa de Valores de Lisboa (Lisbon Stock Exchange)

4.2.3. - SOURCES OF DATA COLLECTION

There are five sources for banking financial data in Portugal. These sources are: A.P.B. (the Portuguese Banking Association), the Stock Exchange Market Official Journal, "Diário da República" (the Republic of Portugal Official Law Journal), Individual Annual Banking Reports and, finally, the Banking Supervision Department of the Portuguese Central Bank.

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[104] Boyd, Graham and Hewitt (1993), p.47.

The Portuguese Banking Association has published its semi-annual bulletin since June 1988 with information covering all the banks in the system. Table 4.3 presents the publication's year, the nature of financial information (Balance Sheet and/or Profit and Loss Account), the basis of financial information (individual or consolidated), the frequency of this financial information (annual or semi-annual), and the base date.

Table 4.3-Sources of Data Collection

Source	Year	Nature of information	Basis	Frequency	Base date
APB[106]	N° 1–Jun.1988	B.S./P&L	Individual	Annual	Dec.87
APB	N° 2-Dec.1988	B.S.	Individual	Annual	Dec.82–Dec.87
		B.S.	Individual	Semi-Annual	Jun. 88
APB	N° 3-Jun.1989	B.S./P&L	Individual	Annual	Dec.88
		B.S./P&L	Individual	Annual	Dec.82-Dec88
APB	N° 4-Dec.1989	B.S.	Individual	Annual	Dec83-Dec.88
		B.S.	Individual	Semi-Annual	Jun. 89
APB	N° 5-Jun.1990	B.S./P&L	Individual	Annual	Dec.89
		B.S./P&L	Individual	Annual	Dec.83-Dec.89
APB	N° 6-Dec.1990	B.S	Individual	Semi-Annual	Jun. 90
APB	N° 7-Jun.1991	B.S./P&L	Individual	Annual	Dec. 90
APB	N° 8-Dec.1991	B.S.	Individual	Semi-Annual	Jun 90-Jun.91
APB	N°9-Jun.1992	B.S./P&L	Individual	Annual	Dec.91
		B.S./P&L	Individual	Annual	Dec.90-Dec.91
		B.S./P&L	Individual	Semi-Annual	Jun.90-Jun.91
APB	N°10-Out.1992	B.S.	Individual	Semi-Annual	Jun.90-Jun.92
APB	N°11-Jun.1993	B.S./P&L	Consolidated	Annual	Dec. 92
APB	N°12-Dec.1993	B.S.	Consolidated	Semi-Annual	Jun. 93
APB	N°13-Jun.1994	B.S/P&L	Consolidated	Annual	Dec. 93
		B.S/P&L	Consolidated	Annual	Dec.92-Dec.93
		B.S.	Consolidated	Semi-Annual	Jun. 93
APB	N°14-Dec.1994	B.S.	Consolidated	Semi-Annual	Jun.93-Jun.94
APB	N°15-Jun.1995	B.S/P&L	Consolidated	Annual	Dec.92-Dec.94
APB	N°16-Dec.1995	B.S/P&L	Consolidated	Semi-Annual	Jun.94-Jun.95
APB	N°17-Jun.1996	B.S/P&L	Consolidated	Annual	Dec.92-Dec.95
APB	N°18-Dec.1996	B.S.+P&L	Consolidated	Semi-Annual	Jun.95-Jun.96
APB	N°19-Jun.1997	B.S/P&L	Consolidated	Annual	Dec.92-Dec.96
APB	N°20-Dec.1997	B.S./P&L	Consolidated	Semi-Annual	Jun.97
		B.S./P&L	Consolidated	Semi-Annual	Jun.96-Jun.97
		B.S./P&L	Consolidated	Annual	Dez.92-Dez.96
APB	N°21-Jun.1998	B.S./P&L	Consolidated	Annual	Dec.97
		B.S./P&L	Consolidated	Annual	Dez.93-Dez.97

The Stock Exchange Market Official Journal, as a disclosure requirement, publishes the Balance Sheets and the Profits and Loss Accounts for all listed banks. Table 4.2 displays the Portuguese Banks that are listed in the Lisbon Stock Exchange as well as the date they went public. Financial statement disclosure is semi-annual and

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[105] SGPS – holding company.
[106] APB –Associação Portuguesa de Bancos (Portuguese Banking Association).

statements are presented on both individual and consolidated basis.

From the Republic of Portugal Official Law Journal ("Diário da República"), we are able to collect only Balance Sheet information. Although this information is quarterly, it is presented only on an individual and not on a consolidated basis.

The fourth source of data collection is the Annual Report of each bank. On the basis of these reports we can analyse either individual or consolidated information, covering both Balance Sheet and Profit and Loss Accounts.

All the above-mentioned financial statements are audited.

Very particular and careful attention must be paid to the problem of consolidation, given the different meanings applied to the concept in the U.S.A. and Europe. While in the United States consolidated financial statements mean information covering domestic activities as well as activities carried out abroad, in Europe consolidation refers to the aggregate activities of the parent bank and all its subsidiaries. An explanation of the importance of consolidation to this research follows in the next section.

4.2.4. - FINANCIAL STATEMENTS CONSOLIDATION: TECHNICAL PROBLEM POSED BY CHANGES ON ACCOUNTING PROCEDURES: HOW TO OVERCOME IT

The most comprehensive Portuguese banking database is A.P.B. because it publishes information about all Portuguese banks. As it will be explained below, this database is not the only one necessary. A problem arises from changes in the way financial information is presented by this source. As demonstrated in Table 4.3, up to 1991 information was disclosed in an individual basis. From 1992[107] onwards, financial statements have been consolidated. That means that consolidated financial information incorporates the activities of subsidiary banks, fund management

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[107] In Portugal consolidation was enforced by the end of 1992 (Decree-Law 36 dated march 28 1992).

companies, leasing companies, factoring companies, asset management companies, dealers and joint venture companies, where relevant.

The changes in accounting procedures seem, at the first glance, a problem for the consistency of data collection. In reality, a noise is introduced when the horizon of this research ranges from 1985 to 1997. This technical problem posed by changes in accounting procedures required special attention and a search for the best approach to overcome it.

From 1985 until the first half of 1992 this research collects its financial information from A.P.B.[108].

From the second half of 1992 onwards, to avoid duplication of profits and other assets or liabilities items in the sample construction, the following steps have been pursued:

1st: From the APB bulletins it was possible to differentiate banks that consolidated from those that didn't consolidate (Appendix B to this chapter[109])

2nd: When a bank consolidates its financial statements, its annual report has been consulted. Consultation of these annual reports made it possible to know whether or not another bank was included in that consolidation (Appendix B).

3rd: Where there is a case of consolidation, a consolidated statement of the parent bank is replaced by individual financial statements from that parent bank. The source for these individual financial statements is the Stock Exchange Market Official Bulletin. As shown in Appendix B, when the parent bank consolidated with subsidiary banks, the parent bank was already quoted in the stock exchange market. The only exceptions are C.G.D., the State owned bank, and Banco de Fomento

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[108] Complemented by Balance Sheets (B.S.) published in the Portuguese Official Law Journal when required (B.S. for June 1985,1986,1987).
[109] Banks listed on this appendix are the banks included in the sample construction: this is, banks whose assets worth more than 100 billion escudos in December 1997, plus Banco do Brasil and Generale Bank.

Exterior – B.F.E, that floated only between January 1995 and June 1997. In both cases, individual financial statements were obtained from each bank annual report.

The above procedure in managing consolidation aims at mitigating the problem of the duplication of data. With individual data from the parent bank, the only information lost is related to non-bank subsidiary companies. Profits from these companies may be considered negligible when compared to the core activities of banks. We may add that, before consolidation techniques were implemented, the banks' financial statements did not capture these companies' profits. Therefore, we assume that the way consolidation is managed in the current research will not introduce biased results in estimation procedures or inconsistency of hypothesis testing in the models that will be developed in next chapters.

APPENDIX A – HOW TO MEASURE EARNINGS IN THE BANKING SYSTEM: DIFFERENCES IN TERMINOLOGY BETWEEN THE O.E.C.D. AND THE UNITED STATES

<u>Axiom</u>: profitability is the best measure of banks' performance.

The standard measures of profitability are:

1) Profits
2) R.O.A.
3) R.O.E.

1) Gross Profits (profits before taxes) or Net Profits (profits after taxes)?

When analysing profitability, profits should be seen as Gross Profits (profits before taxes). Government intervention, through fiscal policy, is independent of banks' performance. In other words, the fiscal regime should not be interpreted as one of the determinants of banks' performance (whose volatility is the subject of this study). On the other hand, studying the banking system's stability from the profitability standpoint implies that profits are net of taxes. Stability is viewed as soundness and solvency of the banking system, which are analysed both in liquidity and capital adequacies terms. The wealth structure of a bank is thus evaluated by means of its financial ratios. These ratios are obtained from a bank's balance sheet where net profits instead of gross profits are registered.

It may be argued that stability is positively correlated with gross profits, instead of net profits, because taxes are administrative procedures. It seems to be a weak argument. Financial fragility is installed well before it can be detected through accounting data collection. Exempting financial institutions from taxation, although

improving capital equity (bringing net profits close to gross profits), cannot be viewed as a remedy for financial fragility.

Corollary 1: This study uses net profits (profits after taxes) to measure banks' profitability.

How to measure R.O.A. and R.O.E.?

Heffernan (1996)[110] defines R.O.A. and R.O.E. :

R.O.A. = earnings/total assets

R.O.E. = earnings/total equity

No matter how "earnings" are measured, and it will be discussed below, their value is registered on banks' income statement covering the entire year. Total assets and total equity comes from balance-sheet data. Thus, while "earnings" are a flow of funds, total assets and total equity are stocks of funds measured at mid and year-end. The first step in data analysis converts balance-sheet data by a simple average to semi-annual mid levels.

R.O.A. = earnings/ $\{$(total assets$_{n-1}$+ total assets$_n$) /2)$\}$

R.O.E. = earnings/ $\{$(total equity$_{n-1}$+ total equity$_n$) /2)$\}$

There is no formal or institutional definition for "earnings" in the banking system. The Financial Report defines earnings. Nevertheless banks are not included in this report.

Frame and Holder (1994)[111] present the following computation of R.O.A. and R.O.E.:

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[110] "Modern Banking in Theory and Practice", p.30.
[111] "FYI-Commercial Bank Profits in 1993", *Economic Review (Federal Reserve Bank of Atlanta)*.

R.O.A.= Net Income / average assets

R.O.E.= Net Income/ average equity capital

When looking at the O.E.C.D. definition of net income[112] (table A.4.1) it was possible to believe that earnings were the sum of profits before taxes with net provisions (e.g. gross income less operating expenses). But looking at an American bank's income statement[113] (table A.4.2) it becomes apparent that net income is synonymous with net profits, e.g. profits after taxes. Therefore it is possible to conclude that earnings are viewed as net profits in the U.S.A where the bulk of studies about bank profitability have been carried on. It is also possible to conclude that the technical expression "net income" has different meanings in the U.S.A and in the O.E.C.D.

There is a strong argument in favour of net profits as earnings instead of net income (O.E.C.D.'s definition). If earnings were measured as the sum of net interest and non-interest income less operating expenses we would lose information about the impact of provisions on earnings. In accordance, allowing earnings to be affected by the level of provisions this study is better able to capture the effects of regulation on profitability.

Corollary 2: (Net) Profits are the best measure of banks' earnings.

Corollary 3: R.O.A and R.O.E will be measured as follows:[114]

R.O.A.= Net Profits/ Average Assets   R.O.E.= Net Profits / Average Equity

Corollaries 2 and 3 stress the importance of corollary 1.

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[112] Bank Profitability – 1997.

[113]Nelson and Reid (1996), "Profits and Balance-Sheet developments at U.S. Commercial Banks in 1995", *Federal Reserve Bulletin*, 82,6, 483-505.

[114] In spite of the utilisation by O.E.C.D. of "net income", "net provisions" and "profits before taxes" in its publication "Financial Markets Trends" (chapter on bank profitability).

Table A.4.1.-Income Statement. O.E.C.D. structure.

- Interest income
- Interest expenses
- Net interest income (item 1 minus item 2)
- Non-interest income (net)
- Gross income (item 3 plus item 4)
- Operating expenses
- Net income (item 5 minus item 6)
- Provisions (net)
- Profit before tax (item 7 minus item 8)
- Income tax
- Profit after tax (item 9 minus item 10)

Source: O.E.C.D. Bank Profitability – 1997

Observation: Nelson and Reid (1996) state that "... profits were lifted last year by 6 2/3 percent increase in total revenue – non-interest income plus net interest income."[115] In accordance the best translation for O.E.C.D.'s "gross income" is "total revenue".

Table A.4.2.- Report of Income. U.S. structure.

1	- Gross interest income
2	- Gross interest expenses
3	- Net interest income (item 1 minus item 2)
4	- Loss provisioning
5	- Non-interest income
6	- Non-interest expense
7	- Net non-interest expense (item 6 minus item 5)
8	- Realised gains on investment account securities
9	- Income before taxes and extraordinary items (item 3 minus item 4 minus item 7 plus item 8)
10	- Taxes
11	- Extraordinary items
12	- Net Income (item 9 minus item 10 plus item 11)

Source: Nelson and Reid (1996), "Profits and Balance Sheet Developments at U.S. Commercial Banks in 1995", *Federal Reserve Bulletin*, 82, 6, p. 495

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[115] "Profits and Balance Sheet Developments at U.S. Commercial Banks in 1995", *Federal Reserve Bulletin*, 82 ,6 , p.490.

APPENDIX B: PORTUGUESE BANKS AND CONSOLIDATE ACCOUNTS

	1992	1993	1994	1995	1996	1997	Banks included in the consolidation	Date of flotation
	2nd half	2nd half	2nd half	2nd half	2nd half	2nd half		
ABN	N	N	N	N	N	N		
BBV/Lloyds	Y	Y	Y	Y	Y	Y	No other banks	
BBI	N	N	N	N	N	N		
Chem/Man	Y	Y	Y	Y	Y	Y	No other banks	
BCA	Y	N	N	N	Y	N	No other banks	
BCP	Y	Y	Y	Y	Y	Y	Consolidates BPA since 1992	Is quoted since Set.87, individual accounts audited and published in the stock exchange official journal
BFE	Y	Y	Y	Y	Y	Y	Consolidates BBI since Dec. 92	Is quoted since Jan. 95, individual accounts audited and published in the stock exchange official journal
BII		N	N	N	Y	Y	No other banks	
BCI	N	N	Y	Y	Y	Y	No other banks	
BES	Y	Y	Y	Y	Y	Y	Consolidates BIC since July 95 and BESSI July 1997	Is quoted since July 91, individual accounts audited and published in the stock exchange official journal
B.Finantia		Y	Y	Y	Y	Y	No other banks	
BFB	Y	Y	Y	Y	Y	Y	No other banks	
BIC	N	N	N	N	N	N		
BANIF	Y	Y	Y	N	Y	Y	Consolidates BCA since the 2nd half of 1996	Is quoted since March 92, individual accounts audited and published in the stock exchange official journal
BMI/B.Mell	Y	Y	Y	Y	Y	Y	No other banks	
BNCI	N	Y	Y	Y	Y	Y	No other banks	
BNU	Y	Y	Y	Y	Y	Y	No other banks	
BPSM	Y	Y	Y	Y	Y	Y	Consolidates BTA and CPP since the 1st half of 1995 and Chemical since the 2nd half of 1996	Is quoted since June 95, individual accounts audited and published in the stock exchange official journal
BPI	Y	Y	Y	Y	Y	Y	Consolidates BFB since Dec.92 and BFE and BBI since Dec. 96	Is quoted since Set. 86, individual accounts audited and published in the stock exchange official journal
BPA	Y	Y	Y	Y	Y	Y	Consolidates UBP since 93	Is quoted since Dec. 90, individual accounts audited and published in the stock exchange official journal
BSN		Y	Y	Y	Y	Y	No other banks	
BTA	Y	Y	Y	Y	Y	Y	Consolidates CPP since the 2nd half of 1992	Is quoted since Oct. 89, individual accounts audited and published in the stock exchange official journal
BNP	N	N	N	N	N	N		

	1992	1993	1994	1995	1996	1997	Banks included in the consolidation	Date of flotation
	2nd half	2nd half	2nd half	2nd half	2nd half	2nd half		
Barclays	N	N	N	N	N	N		
CGD	Y	Y	Y	Y	Y	Y	Consolidates BNU since the 2nd half of 1992	State owned bank
CISF		Y	Y	Y	Y	Y	No other banks	
Citi	N	N	N	N	N	N		
CL	Y	Y	Y	Y	Y	Y	No other banks	
CPP	Y	Y	Y	Y	Y	Y	No other banks	
DBI	Y	Y	Y	Y	Y	Y	No other banks	
Finibanco		Y	Y	Y	Y	Y	No other banks	
MG	N	N	N	N	N	N		
BMell/UBP	Y	Y	Y	Y	Y	Y	Consolidates B. Mello Inv. Since 1st half 96	Is quoted since April 1993, individual accounts audited and published in the stock exchange official journal
B.Brasil	N	N	N	N	N	N		
Generale	N	N	N	N	N	N		

"Y" (Yes) for consolidated financial statements

"N" (No) for non-consolidated financial statements

Sources:

-A.P.B. (Portuguese Banking Association) for consolidated or non-consolidated financial statements

-Individual annual reports to depict which banks are included in the consolidation

-Lisbon Stock Exchange Market to know the date of flotation

Obs.: Banco Mello changed its name to Banco Mello de Investimentos in the 2nd half of 96

Obs.:UBP changed its name to Banco Mello in the 2nd half of 1996

CHAPTER 5- LEVEL AND BEHAVIOUR OF BANKING PROFITABILITY IN THE COURSE OF THE FINANCIAL REGULATORY REFORM

5.1. - INTRODUCTION: PROPOSITIONS TO BE TESTED

George Benston's paper (1991) focuses on regulation and distinguishes two aspects of stability in the Banking System: systemic and the stability of individual banks. We may, therefore, conclude that there are two measures of risk in the banking system:

Incidence of banking failure

Level and behaviour of profitability

Empirical studies like Heffernan (1995), Cole and Gunther (1998) are related to the first measure of risk. Bourke (1989) states that the literature has never adequately examined the consequences (for profitability) of changes in the intensity of regulation[116]. To assess the merits of financial regulatory reform from the profitability standpoint, this chapter develops several models with the purpose of studying the behaviour of average banking profitability in the course of financial regulatory reform in Portugal.

While Gual and Neven (1992) suggest that in the European Community profits fall with deregulation, Hoggarth et al. (1998) contrast higher recorded levels of bank profits in the UK with lower but more stable bank profits recorded in Germany (a

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[116] "Concentration and other Determinants of Bank Profitability in Europe, North America and Australia".

more regulated market). The objective of this chapter is to test whether average profitability has increased or not with the financial liberalisation process in Portugal.

The propositions to be tested are:

1.- Average profitability is significantly different after regulatory reform
2.- Average profitability is significantly higher after regulatory reform

To test these propositions, three different approaches are adopted in this chapter.

First, the aggregate behaviour of banking profitability is analysed. This analysis focuses on regressing aggregate profits, R.O.A. and R.O.E (each one at its turn) on time "t". The objective is to draw some conclusions about how profitability, in average terms, rose or fell during financial regulatory reform.

Secondly, two Multifactor ANOVA models are tested, their importance in this context arising from the fact that they explain the effect of the explanatory variables ("the factors") on the average behaviour of a response variable of basic interest, the explained variable. Thus, the reason for developing these models is that they allow studying the effect of time as well as the effect of banks (the "factors") on average profitability (the response variable of basic interest). In synthesis, both multifactor ANOVA models have two factors: "time" and "banks". In both models the factor "banks" has 24 levels (the number of banks included in the sample). What distinguish these models are the levels assigned to the factor "time". In the first model "time" has only two levels, 1986-1991 and 1992-1997. In the second model "time" has three levels: 1986-1989, 1990-1993 and 1994-1997. This different division of time, as will be explained later in this chapter, allows accounting for the effect of the abolishment of barriers to entry, during the change of the rules in the banking system.

Finally, the third and last approach of this chapter consists of performing a One Way ANOVA study which aims at analysing how average profitability differs (or does not differ) between the different periods of financial regulatory reform in Portugal. These periods are 1986-1988, 1989-1992 and 1993-1997, the same periods that will be

considered on chapter six where regulation, a banking profitability determinant, is introduced as a dummy variable in an unbalanced panel data model.

All the required input data for models developed in this chapter are presented in annex V, Vol. II.

5.2. - THE REGRESSION OF AGGREGATE BANKING PROFITABILITY ON TIME

The study encompasses 24 banks whose profitability, measured by profits, R.O.A and R.OE., is tracked from the first half of 1986 until the second half of 1997. In each semi-annual period these profitability measures are aggregated. The aim of this approach is to study how aggregate banking profitability has evolved during the life span of the analysis. Figures 5.1, 5.2 and 5.3 concerning profits, R.O.A and R.O.E., respectively, give evidence of this evolution.

Table 5.1.- Legend for Charts 1, 2, and 3, matching the variable time with the semi-annual periods that are considered in the analysis.

TIME	1	2	3	4	5	6	7	8
PERIOD	1^{ST}half 86	2^{nd}half 86	1^{ST}half 87	2^{nd}half 87	1^{ST}half 88	2^{nd}half 88	1^{ST}half 89	2^{nd}half 89
TIME	9	10	11	12	13	14	15	16
PERIOD	1^{ST}half 90	2^{nd}half 90	1^{ST}half 91	2^{nd}half 91	1^{ST}half 92	2^{nd}half 92	1^{ST}half 93	2^{nd}half 93
TIME	17	18	19	20	21	22	23	24
PERIOD	1^{ST}half 94	2^{nd}half 94	1^{ST}half 95	2^{nd}half 95	1^{ST}half 96	2^{nd}half 96	1^{ST}half 97	2^{nd}half 97

FIGURE 5.1.- Semi-annual Profits in the Portuguese Banking System
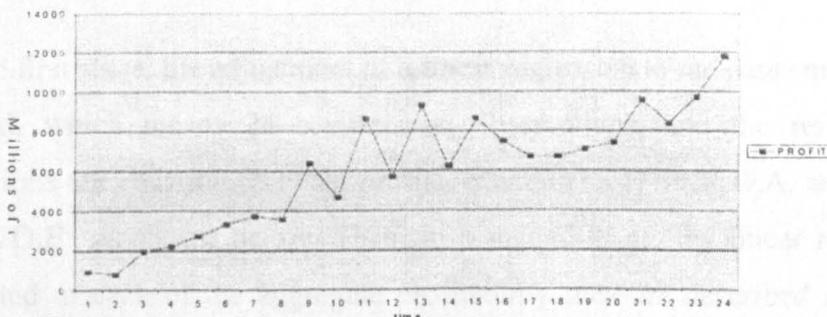
(1986 to 1997)

FIGURE 5.2.- Semi-annual R.O.A. in the Portuguese Banking System
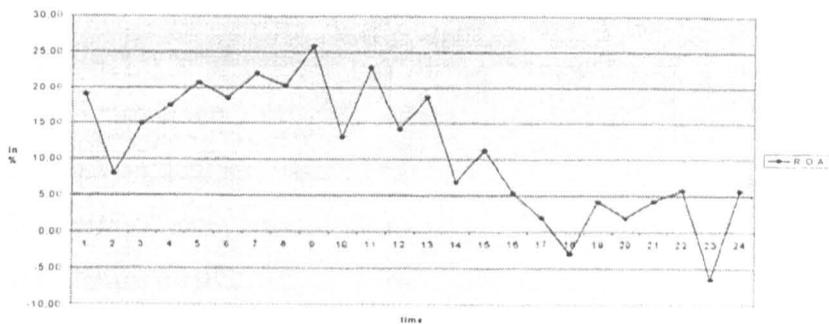
(1986 to 1997)

FIGURE 5.3.- Semi-annual R.O.E. in the Portuguese Banking System

(1986 to 1997)
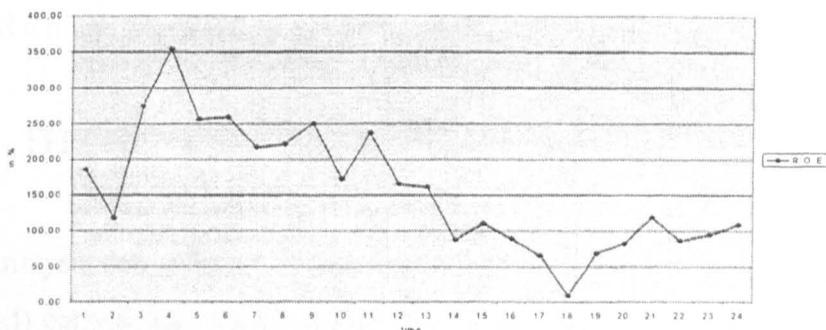
Next, the empirical analysis is conducted on a semi-annual basis and all the conclusions are interpreted in average terms of profitability behaviour. This empirical analysis consists of estimating several linear regressions having time "t" as regressor. The study of how profitability, in average terms, grew or fell between 1986 and 1997 is split into two stages, for each profitability regressant, as follows.

In the first stage, the adjustment of a linear regression to the data embraces the whole period, which means 24 semi-annual observations, and the resulting estimated equations are equation (5.1) for profits, equation (5.4) for R.O.A. and equation (5.7) for R.O.E., as shown below. Then, in a second stage, the linear regression that is adjusted to each of the aggregate profitability measure described above is divided into two periods of 12 semi-annual observations each. The first period ranges from

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the first half of 1986 until the second half of 1991, and the second one from the first half of 1992 until the second half of 1997. The reason for this cut-off lies in the fact that the most significant financial regulatory changes occurred at this time, such as:

a) The minimum level of 8% for the solvency ratio was enforced in 1992.

b) Credit ceilings were definitively abandoned in 1991.

c) Full capital movements' liberalisation became effective in 1992.

d) Interest rates on deposits were liberalised in 1992

e) The barriers to entry that still remained in the banking system were finally abolished in January 1993.

This second stage estimation results are presented below by equations (5.2) and (5.3) for profits, equations (5.5) and (5.6) for R.O.A., and equations (5.8) and (5.9) for R.O.E.. The analysis of these results allows drawing some conclusions about the effect of time on aggregate banking profitability when a liberalised market has replaced a more restricted environment activity for the banking system.

5.2.1. - THE GENERAL FUNCTION SPECIFICATION

In the analysis that follows, the comparison between the angular coefficients (that is, the trend) carried out in both regressions in the second stage of the study, provides information about the acceleration of average banking profitability in the course of financial regulatory reform.

The general function to be estimated has the following specification:

$$Y_t = \alpha + \beta t + \varepsilon_t$$

With $\varepsilon_t \sim N(0, \sigma_e)$

All the information pertaining to the issue under analysis is contained in the angular coefficient (the trend); this is the estimator for β. In the first stage of the current study the angular coefficient shows whether profitability, in average terms, is increasing or decreasing and its respective magnitude. In the second stage, the

comparison between the angular coefficient carried out in both regressions for each profitability measure, provides information about the acceleration on average profitability after the most significant changes in regulatory rules, as described earlier in this chapter, have occurred.

The estimation procedure is the traditional OLS one and all "t" statistics are shown in parenthesis.

For each of the nine estimated regressions that follow, Table 5.2 displays the "F" statistics, the R-squared, the number of observations, the Durbin Watson test for autocorrelation, the Kolmogorov-Smirnov test to test whether the normal distribution fits the data adequately, and the estimated parameters of the normal distribution fitted to the sthocastic terms.

The Kolmogorov-Smirnov (K-S) test is employed to test if the stochastic term in each of the linear regressions follows a normal distribution.

The Kolmogorov-Smirnov non-parametric test is a procedure that allows testing the overall goodness-of-fit between the distribution of the data and the assumption of normality of the disturbance terms that underlies this study[117]. The test calculates the maximum vertical distance between the cumulative distribution function of the two samples (the data sample and the sample with a theoretical normal distribution). If this distance is large enough, the hypothesis that the two samples come from the same distribution is rejected. For each linear regression, the results of the Kolmogorov-Smirnov test immediately follows the analysis of the statistically significance of each coefficient estimator.

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[117] The Kolmogorov-Smirnov test, undertaken to determine whether residuals can be adequately modelled by a normal distribution, is described later in this chapter, in section 5.3.3..

Table 5.2.- Time as Explanatory Variable for Banking Profitability. Some Results

	PROFITS			R.O.A.			R.O.E.		
	equation (5.1)	equation (5.2)	equation (5.3)	equation (5.4)	equation (5.5)	equation (5.6)	equation (5.7)	equation (5.8)	equation (5.9)
"F"statistics	95,46	44,51	4,19	26,19	0,88	5,42	26,81	0,12	0,23
d.f. ; prob. Value	[1,22] ;1.84E-09	[1,10] .5 56E-05	[1,10] . 0.067	[1,22] .3 89E-05	[1,10] . 0.371	[1,10] . 0 042	[1,22] .3 43E-05	[1,10] . 0.735	[1,10] . 0 641
R-squared	0,8127	0,8166	0,2951	0,5463	0,081	0,3519	0,5492	0,012	0,0223
number of observations	24	12	12	24	12	12	24	12	12
Durbin-Watson statistic-d-	1,88	3,27	1,41	1,45	2,31	2,00	1,07	1,54	1,16
dL / dU	1 037 / 1 199	0 697 / 1 023	0 697 / 1 023	1 037 / 1 199	0 697 / 1 023	0 697 / 1 023	1 273 / 1 446	0 697 / 1 023	0 697 / 1 023
significance points of dL & dU	1%	1%	1%	1%	1%	1%	5%	1%	1%
4-d		0,73				1,69			
dL / dU		0 971 / 1 331							
significance points of dL & dU		5%							
estimated mean of the residuals*	-2,13E-07	-8,67E-07	-5,00E-07	1,25E-10	0.0	0 0	-3 29E-09	5,83E-09	0 0
estimated standard deviation of the residuals*	13130,3	9920.42	13661,4	5,9392	4,70518	5,11377	57,1265	61,0956	35,7968
Kolmogorov-Smirnov test									
estimated Kolmogorov statistic DPLUS	0,226019	0,190097	0,206904	0,0506353	0,150204	0 0971793	0 0838325	0,16342	0,0993746
estimated Kolmogorov statistic DMINUS	0,132871	0,125343	0,149554	0,0637644	0,201902	0,0807859	0 10346	0 125088	0,152247
estimated overall statistic DN	0,226019	0,190097	0,206904	0,0637644	0,201902	0 0971793	0 10346	0,16342	0,152247
Aproximate p-value	0,172288	0,778708	0,683222	0,99598	0,712217	0,999861	0,959396	0,90574	0,943677

* for the fitted normal distribution

5.2.1.1.- Aggregate profits behaviour during the life span of the analysis, 1986-1997:

$$\hat{profits}_t = 11524.39 + 3867.98\,t \quad \textbf{(5.1.)}$$
$$\quad\quad\quad\quad (2\,988) \quad\quad (13\,960)$$

In equation 5.1. both estimators of α and β are statistically significant at the 1% level of significance.

K-S test:

In this case the maximum distance is 0.226019. The p-value equals 0.172288. Because the P-value for this test is greater than or equal to 0.10, the idea that residuals come from a normal distribution cannot be rejected with 90% or higher confidence.

5.2.1.1.1.Aggregate profits behaviour when the banking market was still regulated with several kinds of "old style regulation": 1986-1991.

$$\hat{profits}_t = -548.8636 + 5804.941\,t \quad \textbf{(5.2.)}$$
$$\quad\quad\quad\quad (-0.085) \quad\quad (6\,672)$$

The angular coefficient of equation 5.2. is statistically significant at the 1% level of significance while the intercept is statistically non-significant.

K-S test:

In this case the maximum distance is 0.190097. The p-value equals 0.778708. Because the P-value for this test is greater than or equal to 0.10, the idea that residuals come from a normal distribution cannot be rejected with 90% or higher confidence.

5.2.1.1.2. Aggregate profits behaviour during the period where the banking market was already liberalised: 1992-1997.

$$\hat{profits}_t = 37210.26 + 2451.612t \quad \textbf{(5.3.)}$$
$$\underset{(1.650)}{} \quad \underset{(2.046)}{}$$

The angular coefficient in equation 5.3. is statistically significant at the 10% level of significance while the intercept is statistically non-significant.

K-S test:

In this case the maximum distance is 0.206904. The p-value equals 0.683222. Because the P-value for this test is greater than or equal to 0.10, the idea that residuals come from a normal distribution cannot be rejected with 90% or higher confidence.

5.2.1.2.- R.O.A. behaviour in the banking system during the life span of the study: 1986-1997

$$\hat{r.o.a.}_t = 22.91471 - 0.921\,t \quad \textbf{(5.4.)}$$
$$\underset{(8.956)}{} \quad \underset{(-5.147)}{}$$

Both the intercept and the angular coefficient shown in equation 5.4. are statistically significant at the 1% level of significance.

K-S test:

In this case the maximum distance is 0.0837644. The p-value equals 0.99598. Because the P-value for this test is greater than or equal to 0.10, the idea that residuals come from a normal distribution cannot be rejected with 90% or higher confidence.

5.2.1.2.1. R.O.A. behaviour in the banking system when structural controls and some macroeconomic controls still dominated the banking market: 1986-1991.

$$\hat{r.o.a.}_t = 15.588 + 0.386\, t \qquad \textbf{(5.5.)}$$
$$\quad\;\;\; {\scriptstyle(5.132\,)} \quad\;\; {\scriptstyle(0.936\,)}$$

This equation's constant is statistically significant at the 1% level of significance. However the angular coefficient is statistically non-significant.

K-S test:

In this case the maximum distance is 0.201902. The p-value equals 0.712217. Because the P-value for this test is greater than or equal to 0.10, the idea that residuals come from a normal distribution cannot be rejected with 90% or higher confidence.

5.2.1.2.2. R.O.A. behaviour in the banking system after prudential and protective controls were implemented in the banking market: 1992-1997.

$$\hat{r.o.a.}_t = 24.019 - 1.045\, t \qquad \textbf{(5.6.)}$$
$$\quad\;\;\; {\scriptstyle(2.845\,)} \quad {\scriptstyle(-2.330\,)}$$

Both the intercept and the angular coefficient are statistically significant at the 5% level of significance.

K-S test:

In this case the maximum distance is 0.0971793. The p-value equals 0.999861. Because the P-value for this test is greater than or equal to 0.10, the idea that residuals come from a normal distribution cannot be rejected with 90% or higher confidence.

5.2.1.3.- R.O.E. behaviour in the banking system during the life span of this study: 1986-1997

$$r.\hat{o}.e._t = 269\ .591\ -\ 8\ .918\ t \quad \textbf{(5.7.)}$$
$$\scriptsize (10\ 954\ ) \quad (-5\ 177\ )$$

In equation 5.7. both the constant term and the angular coefficient are statistically significant at the 1% level of significance.

K-S test:

In this case the maximum distance is 0.10346. The p-value equals 0.959396. Because the P-value for this test is greater than or equal to 0.10, the idea that residuals come from a normal distribution cannot be rejected with 90% or higher confidence.

5.2.1.3.1. R.O.E behaviour in the banking system before the process of liberalisation in the banking market was accomplished: 1986-1991.

$$r.\hat{o}.e._t = 238\ .106\ -\ 1\ .865\ t \quad \textbf{(5.8.)}$$
$$\scriptsize (6\ 038\ ) \quad (-0\ 348\ )$$

The intercept is statistically significant at the 1% level of significance and the angular coefficient is statistically non-significant.

K-S test:

In this case the maximum distance is 0.16342. The p-value equals 0.90574. Because the P-value for this test is greater than or equal to 0.10, the idea that residuals come from a normal distribution cannot be rejected with 90% or higher confidence.

$$\hat{r.o.e._t} = 118\underset{(2.001)}{.222} - 1\underset{(-0.481)}{.512}\, t \quad \textbf{(5.9.)}$$

The intercept is statistically significant at the 10% level of significance while the angular coefficient is statistically non-significant.

K-S test:

In this case the maximum distance is 0.152247. The p-value equals 0.943677. Because the P-value for this test is greater than or equal to 0.10, the idea that residuals come from a normal distribution cannot be rejected with 90% or higher confidence.

5.2.2. - TESTING FOR AUTOCORRELATED DISTURBANCES

Supposing that in a general model of the matrix form:

$$y = X\beta + \mu \,,$$

one suspects that the disturbances follow an AR(1) scheme, namely,

$$\mu_t = \varphi\mu_{t-1} + e_t \,,$$

the null hypothesis of zero autocorrelation is then: $H_0 : \varphi = 0$, and the alternative hypothesis is: $H_1 : \varphi \neq 0$.

The hypothesis is about the μ's, which are unobservable. One therefore looks for a test using the vector of OLS residuals, $e = y - Xb$. This raises several difficulties: $e = M\mu$, where $M = I - X(X'X)^{-1} X'$ is symmetric, idempotent of rank n-k. Thus the variance-covariance matrix of the e's is: $var(e)=E(ee')=\sigma^2_\mu M$. So, even if the null hypothesis is true, in that $E(\mu\mu')= \sigma^2_\mu I$, the OLS residuals will display some autocorrelation, because the off-diagonal terms in M do not vanish. "More importantly, M is a function of the sample values of the explanatory variables, which

vary unpredictably from one study to another"[118]. This variation makes it impossible to derive an exact finite-sample test on the e's that will be valid for any $\mathbf{X}$ matrix that might ever turn up. In conclusion, hypothesis testing associated with an AR(1) process for the disturbances μ are not very reliable in testing the presence of autocorrelation.

Durbin and Watson treated these problems in a pair of classic articles[119]. The Durbin-Watson test statistics is computed from the vector of OLS residuals $\mathbf{e} = \mathbf{y} - \mathbf{Xb}$. It is denoted as d and is defined as:

$$d = \frac{\sum_{i=2}^{n} (e_i - e_{i-1})^2}{\sum_{i=1}^{n} e_i^2}$$

Durbin and Watson established upper (d_U) and lower (d_L) bounds for the critical values. These bounds depend only on the sample size and the number of regressors. They are used to test the hypothesis of zero autocorrelation against the alternative hypothesis of positive first order autocorrelation.

The testing procedure is as follows:

1.- If $d < d_L$, the null hypothesis of non-autocorrelated disturbances is rejected in favour of the hypothesis of positive first-order autocorrelation.

2.- If $d > d_U$, the null hypothesis of zero autocorrelation is not rejected.

3.- If $d_L < d < d_U$, the test is inconclusive.

There are two important qualifications, which are fulfilled in this study, to the use of the Durbin-Watson test. First, it is necessary to include a constant term in the regression. Second, it is strictly valid only for a non-stochastic $\mathbf{X}$ matrix.

If the value of "d" exceeds 2, the study tests the null hypothesis of zero autocorrelation against the alternative hypothesis of negative first order autocorrelation. This test is done by calculating "4-d" and comparing this statistic

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[118] Johnston and Dinardo (1997), p.179.
[119] J. Durbin and G. S. Watson, "Testing for Serial Correlation in Least Squares Regression", *Biometrika*, 37, 1950, 409-428; 38, 1951, 159-178.

with the tabulated critical values, as if one were testing for positive autocorrelation.[120].

As it is shown in Table 5.2, the null hypothesis of zero autocorrelation is not rejected in respect of equations (5.1), (5.3), (5.4), (5.5), (5.6), (5.8) and (5.9). Since in equation (5.2), "4-d" is lesser than d_L with 5% significance points, the null hypothesis of non-autocorrelated disturbances is rejected in favour of the alternative hypothesis of negative first order autocorrelation. Referring to equation (5.7), the Durbin-Watson statistic allows the conclusion that the null hypothesis is rejected in favour of the hypothesis of positive first order autocorrelation, because $d < d_L$.

5.2.3. - ESTIMATION RESULTS[121]

The analysis pursued in sub section 5.2.2 makes possible the following conclusions.

Aggregate profits in the Portuguese Banking system have increased in average terms 3,868 millions of escudos per half year between 1986 and 1997 (equation 5.1). Comparing equations (5.2) and (5.3), the analysis of the β estimator gives evidence of a slow down on profits evolution between the periods 1986-1991 and 1992-1997. In fact, while in the first period average profits grew by 5,805 millions of escudos per half a year, between 1992 and 1997 this growth fell to 2,562 millions of escudos. Finally, in what concerns profits behaviour, the explanatory capacity of equations (5.2) and (5.3) allows the conclusion that growth in the first period was mainly due to inertia because time explains 81.66% of profits behaviour against only 29.51% in the second period. Thus, other factors than time are required to explain the evolution of profits in the banking system between 1992 and 1997.

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[120] Johnston and Dinardo (1997) prove that the range of "d" is from 0 to 4. They prove that $d < 2$ for positive autocorrelation of the e's, $d > 2$ for negative autocorrelation of the e's, and $d \cong 2$ for zero autocorrelation of the e's, as well (p. 180).

[121] Although there is the presence of autocorrelation of first-order in equations (2) and (7), the study is carried out with the OLS estimators. Nevertheless it is worthwhile mentioning the following. In eq. (2) the more classical iterative Cochrane-Orcutt estimator of β is 6,190.048 (15.115), while the more recent maximum likelihood estimator of Beach and Mackinnon of β is 6,189.987 (19.362). In eq. (7) the Cochrane-Orcutt estimator of β is -10.03 (-3.307), while the MLE of Beach and Mackinnon of β is -7.904 (-3.083).

The trend of aggregate R.O.A. behaviour in the Portuguese banking system is downward from 1986 until 1997, with a decrease of 0.921 percentage points on average R.O.A. per half a year (equation 5.4). Although no conclusions can be drawn from the angular coefficient between 1986 and 1991 (equation 5.5), equation 5.6 shows that R.O.A. has decreased, on average, 1.045 percentage points per half a year between 1992 and 1997. But the explanatory capacity of equation 5.6 is only 35.19%, which leads to the earlier conclusion about profits that factors other than time are more important in explaining profitability behaviour after 1991.

Finally, the study carried out about aggregate R.O.E. in the Portuguese banking system is less conclusive than the study of the previous profitability measures. Between 1986 and 1997 aggregate R.O.E in the Portuguese Banking system has decreased, on average terms, 8.918 percentage points per half a year (equation 5.7), a substantial drop when compared to aggregate R.O.A. behaviour in the same period (equation 5.4). In addition, from 1986 to 1997 time explains 55% of both the behaviour of aggregate R.OA. and R.OE. (equations 5.4 and 5.7 respectively). Since the angular coefficient in equations 5.8 and 5.9 is statistically non-significant, nothing can be state about changes in R.OE. behaviour from 1986-1991 to 1992-1997.

Looking at the propositions to be tested in the current chapter, which are:

1.- Average profitability is significantly different after regulatory reform
2.- Average profitability is significantly higher after regulatory reform

The explained results allow only the conclusion that profitability measured by profits has increased in average terms during the period of the regulatory reform, while, during the same period, profitability measured both by R.O.A. and by R.O.E. has decreased in average terms.

The weakness of this approach is derived from the fact that the study considers time alone as the explanatory variable for banking profitability. In other terms, the analysis is based on a trend model rather than on an explanatory model. To overcome this weakness, two multifactor ANOVA models are developed in the next section.

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The reason is that these models allow the study of the effect of other factors than time on average banking profitability. The second factor that is introduced in the study as affecting banking profitability behaviour is the factor "banks".

5.3. - MULTIFACTOR ANOVA MODELS

In this section two Fixed Effect ANOVA Models with two factors are tested. Both models add to the factor time the factor "banks" to capture the influence that banks also have on profitability behaviour. The study of each model begins with some empirical facts concerning average and volatility of the banking profitability measures: profits, R.OA. and R.O.E.. This analysis is followed by empirical tests related to the same banking profitability measures. The objective is to test whether average banking profitability is significantly different in the several moments of the course of financial regulatory reform. If so, the study concludes with the analysis of the direction of these average differences. The several periods considered in the course of financial regulatory reform will be explained below, and they match the most important moments of financial regulatory reform. In addition, these moments match the ANOVA models with balanced cells that are tested.

5.3.1. - A FIXED EFFECTS ANOVA MODEL WITH TWO FACTORS: "TIME" AND "BANKS", WHERE THE FACTOR "TIME" HAS TWO LEVELS, 1986-1991 AND 1992-1997

The Analysis of Variance carried out in this section considers a fixed effects model with two factors, time and banks, and aims at testing the hypothesis that average banking profitability is significantly higher after financial regulatory reform in Portugal.

The factor time has two levels: $i=1$ and $i=2$. Thus, in a table of double entry, the factor "line" is $I=2$.
The factor bank has 24 levels : $j= 1......24$. Thus, in a table of double entry, the factor column is $J=24$.

The first level of time, which is "i=1", relates to the period before financial liberalisation, that is from the first half of 1986 until the second half of 1991. The second level of time, which is "i=2", refers to the period after financial liberalisation, that is from the first half of 1992 until the second half of 1997. The year of 1992 has been chosen because, as has been explained in the previous section, the most significant regulatory changes occurred during this period such as:

The minimum level of 8% for the solvency ratio was enforced in 1992.

Credit ceilings were definitively abandoned in 1991.

Full capital movements' liberalisation became effective in 1992.

Interest rates on deposits were liberalised in 1992

Barriers to entry were finally abolished in January 1993

The sample of banks consists of the same 24 banks that were considered when the regression of each banking profitability measure on time was estimated in section 5.2.. These were the banks operating in the banking market over all the period and for which data are available (table 5.3.).

Table 5.3.- -Sample of Banks for the ANOVA MODELS

BBV-Banco Bilbao Viscaya (Lloyds Bank until 1990)
BBI-Banco Borges &Irmão
BCA-Banco Comercial dos Açores
BCP-Banco Comercial Português
BFE-Banco de Fomento & Exterior
B.Brasil-Banco do Brasil
BCI-Banco Comércio e Indústria
BES-Banco Espirito Santo
BFB-Banco Fonsecas & Burnay
BIC-Banco Internacional de Crédito
BPSM-Banco Pinto & Sotto Mayor
BPI-Banco Português de Investimentos
BPA-Banco Português do Atlântico
BTA-Banco Totta & Açores
BNP-Banque Nationale de Paris
Barclays-Barclays Bank
CGD-Caixa Geral de Depósitos
Citi-Citibank
CL-Crédit Lyonnais
CPP-C-édito Predial Português
Generale B.-Generale Bank
Chemical-Banco Chemical (Manufacturers until 1992)
MG-Montepio Geral
B.Mello-Banco Mello (União de Bancos Portugueses until 1996)

5.3.1.1.- MODEL SPECIFICATION

With semi-annual information on profits, R.O.A. and R.O.E., the model[122] is designed with forty-eight cells with twelve observations in each cell (K=12), totalling 576 observations concerning profits, and the same number of observations in respect of R.O.A. and R.O.E. The functional relation between each observation and the factors that affects its behaviour has the following form:

$$ X_{ijk} = \mu + \alpha_i + \beta_j + \gamma_{ij} + E_{ij} $$

With $E_{ij} \sim IN\ (0, \sigma^2_E)$

Where:

X_{ijk} – observation "k" in cell (i,j)

μ - global parameter

α_i - factor time's effect on profitability

β_j - factor bank's effect on profitability

γ_{ij} – interaction

$E_{i,j}$ – disturbance in cell(i,j)

5.3.1.2 - HYPOTHESIS TESTING

5.3.1.2.1.- Test for interaction between factors:

$H_0: \gamma_{ij} = 0$ (for all "i" and all "j")

$H_1:$ some $\gamma_{ij} \neq 0$

$$ "F" - ratio = \frac{MS \text{ of interaction}}{MS \text{ of residuals}} \approx F_{(I-1)*(J-1),(I*J)*(K-1)} $$

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[122] In reality three models are tested: one for profits as the response variable, one for R.OA. as the variable whose behaviour is explained, and a third model for the banking profitability measure R.O.E.

Where "MS" is the "Mean Square" that equals the "Sum of Squares"(SS) divided by the correspondent degrees of freedom.

5.3.1.2.2.- To test if the effects "time", α_i, is significantly different from zero, the structure of the ANOVA test is as follows:

H_0: $\alpha_i = 0$ (for all "i")

H_1: some $\alpha_i \neq 0$

$$" F " - ratio \quad = \quad \frac{MS \quad of \quad factor \ tim \quad e}{MS \quad of \quad the \quad residuals} \approx F_{(I-1),(I*J)*(K-1)}$$

Where "MS" is defined as above.

5.3.1.2.3.- Test for the significance of the factor "banks" on average profitability:

H_0: $\beta_i = 0$ (for all "i")

H_1: some $\beta_i \neq 0$

$$" F " - ratio \quad = \quad \frac{MS \quad of \quad factor \quad bank}{MS \quad of \quad the \quad residuals} \approx F_{(J-1),(I*J)*(K-1)}$$

Where "MS" is defined as above.

The descriptive statistics of this ANOVA model and the analysis of variance tables for "profits", "R.O.A." and "R.OE" follows.

TABLE 5.4 – Descriptive Statistics. ANOVA-Two-Factor with replication

SUMMARY	PROFITS(millions escudos) TOTAL	R.O.A (%) TOTAL	R.O.E.(%) TOTAL
First Period: June 86 to December 91			
Count	288	288	288
Sum	438997	220.0918	2668.523
Average	1524.295	0.764208	9.265704
Variance	9751509	0.738259	148.4849
Standard Deviation	3123	0.85922	12.185
Second Period: June 92 to December 97			
Count	288	288	288
Sum	991141	56.25581	1083.162
Average	3441.462	0.195333	3.760981
Variance	41401846	1.378959	52.34554
Standard Deviation	6434	1.1743	7.2350

TABLE 5.5. – Profits. ANOVA TABLE: Two-Factor with replication

Source of Variation	Sum of Squares	Df	Mean Square	F-ratio	P-value	F crit
Time	5.29E+08	1	5.29E+08	68.06381	1.27E-15	3.859128
Banks	8.8E+09	23	3.82E+08	49.17853	2.7E-115	1.549761
Interaction	1.78E+09	23	77370226	9.949652	5.68E-29	1.549761
Residual	4.11E+09	528	7776174			
Total	1.52E+10	575				

TABLE 5.6 – R.O.A. ANOVA TABLE: Two-Factor with replication

Source of Variation	Sum of Squares	Df	Mean Square	F-ratio	P-value	F crit
Time	46.60113	1	46.60113	62.87532	1.32E-14	3.859128
Banks	97.07551	23	4.220674	5.694632	5.62E-15	1.549761
Interaction	119.2296	23	5.183896	6.994232	2.42E-19	1.549761
Residual	391.3363	528	0.741167			
Total	654.2425	575				

TABLE 5.7 – R.O.E. ANOVA TABLE: Two-Factor with replication

Source of Variation	Sum of Squares	Df	Mean Square	F-ratio	P-value	F crit
Time	4363.485	1	4363.485	59.18685	7.08E-14	3.859128
Banks	11888.43	23	516.8884	7.011139	2.13E-19	1.549761
Interaction	6852.38	23	297.9296	4.041154	2.02E-09	1.549761
Residual	38926.21	528	73.72389			
Total	62030.51	575				

The above ANOVA Tables decompose the variability of profits, R.O.A and R.O.E into contributions due to two factors: "time" and "banks". The contribution of each factor is measured having removed the effects of all the other factors.

5.3.1.3.- THE RESULTS

Some empirical facts resulting from the analysis of descriptive statistics (table 5.4) are enlightening. This analysis focuses its attention on averages, and on the volatility of the banking profitability measures: profits, R.O.A. and R.O.E.. It can be stated that average profits rose from 1 524 millions of escudos to 3 441 millions of escudos, after the most important new regulatory rules were implemented. but that they also became more volatile. Average R.O.A. and average R.O.E. decreased between the same period, from 0.76% to 0.20% and from 9.27% to 3.76% respectively. Nevertheless, while R.O.A. became more volatile, R.O.E. was less volatile from 1992 to 1997 than from 1986 to 1991.

Three tests have been performed to test whether average banking profitability was significantly different between the two periods that are considered. The first test concerns the significance of financial regulatory reform on average profits, whose results are shown in the ANOVA Table 5.5. The ANOVA Table 5.6 depicts the significance of the effect of the financial regulatory changes on average R.O.A. and, finally, the ANOVA Table 5.7 conducts the same analysis having R.O.E. as the response variable.

These ANOVA models are models with interaction, where the effects "time" and "banks" are statistically significant in explaining the behaviour of average profits, R.O.A. and R.O.E., at a level of significance of 5%, as we proceed to explain.

Assuming normality of the disturbances, both tests performed emphasise the statistical significance of "time" on average profitability in the Portuguese Banking System. Therefore average profitability was significantly different, before and after the more important changes of financial regulatory reform. Yet, following the changes in financial rules, the behaviour of average profits was different from the behaviour of both the average R.O.A. and the average R.O.E..

We will look first at the ANOVA model concerning the behaviour of average profits, and then draw some conclusions from the Analysis of Variance when the response variable is the behaviour of R.O.A. and R.OE.

Following the ANOVA Table 5.5, we have an ANOVA model with interaction and, at a level of significance of 5%, the null hypothesis for both factor "time" and "banks" is rejected. Hence factors "time" and "banks"[123] affect significantly the behaviour of average profits with a level of confidence of 95%. Therefore, on average, profits in the Portuguese Banking System have increased by, 1 917 millions of escudos from the first to the second period of this analysis (table 5.4). The ANOVA results (table 5.5) prove that this difference is statistically significant. The very low level for the "p-value" reinforces our confidence in the statistical significance of the results obtained from the analysis of variance.

Analysis of Variance results for average R.O.A. and R.O.E. are shown in tables 5.6 and 5.7, respectively. Both factors "time" and "banks" are statistically significant in explaining R.OA. and R.O.E. behaviour. As a result, it can be stated that, with a level of significance of 5%, average R.O.A. have decreased by 0.57% while R.O.E. have decreased by 5.5.% between 1986-1991 and 1992-1997 (table 5.4).

It can, therefore, be argued that, when compared with average profits behaviour, average R.O.A. and average R.O.E. moved in the opposite direction with financial regulatory reform. The disinflationary process that began in Portugal in the early 1990's explains this movement (table 5.8).

Table 5.8 -Portuguese Inflation Rate (1985-1997)

1985	19.60%
1986	11.80%
1987	9.30%
1988	9.70%
1989	12.60%
1990	13.40%
1991	11.40%
1992	8.90%
1993	6.50%
1994	5.20%
1995	4.10%
1996	3.10%
1997	2.20%

Source:Banco de Portugal

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[123] As the effect of factor "banks" is not the core subject of this analysis, the study will not pursue this approach. Nevertheless the ANOVA models allows the conclusions about which bank (or group of banks) are statistically significant in explaining average profitability.

With decreasing inflation rates, along with the need to balance the corresponding squeeze in net interest margins, banks were forced to increase their assets more than proportionally to the growth of profits in order to mantain the levels of these profits. On the other hand, the behaviour of average R.O.A. and R.O.E. provides evidence that the growth of off-balance sheet transactions, experienced in the Portuguese Banking System during the second period, and feeding net income with commissions, has not been sufficient to maintain the levels of R.O.A. and R.O.E..

In conclusion, analysis of variance applied to the performance of the Banking System in Portugal reinforces the argument presented by Hoggarth et al. (1998) that more liberalised financial markets induce higher but more variable level of banking profits. But the current study also allows the conclusion that profitability measured by R.O.A. and R.O.E. is lower after liberalisation, despite the fact that R.O.E. becomes more stable. On the other hand, the tests performed on average profitability in the Portuguese Banking System weaken Gual and Neven's (1992) suggestion that, with deregulation in the European Community, profits have fallen.

The next step is to test a fixed effects ANOVA model with the same two factors, "time" and "banks", but assigning to the factor "time" three levels. The objective is to account for the effect on banking profitability of lowering fences and of the progressive abolishment of barriers to entry in the Portuguese Banking market.

5.3.2. - A FIXED EFFECTS ANOVA MODEL WITH TWO FACTORS: "BANKS" WITH 24 LEVELS AND "TIME" WITH THREE LEVELS: 1986-1989, 1990-1993 AND 1994-1997

5.3.2.1.- THE FACTOR TIME AND THE ABOLISHMENT OF BARRIERS TO ENTRY IN THE BANKING MARKET

In this second ANOVA Model, time is split in three levels, while the same 24 banks of the previous model are used in the sample. Thus the study refers to an ANOVA Model with two factors, "time" and "banks", "time" having 3 levels and "banks" 24 levels. The object of this study is to analyse the effect on banking profitability

behaviour, resulting from lowering fences and from the progressive abolishment of barriers to entry in the Portuguese Banking market. To account for the effect of lifting barriers to entry, three distinct periods are assigned to the factor time. The first period is from the first half of 1986 until the second half of 1989, the second from the first half of 1990 until the second half of 1993, and the last from the first half of 1994 until the second half of 1997. The reason for this division is to be found in the following facts, that add the treatment of barriers to entry to the already mentioned more important changes in regulatory rules:

a) Until 1988, banks were required by the government to open a branch in a less desirable region for each request to open a branch in a desirable one.

b) In September 1988, the maximum interest rate on credit operations was lifted.

c) The re-privatisation programme in the banking system began in 1989.

d) From 1989 onwards, the compulsory acquisition of bad loans from state owned banks as a legal requirement for new banks to enter the market was abolished.

e) From 1989 onwards, banks were no longer required to form joint venture capital firms if they wanted to enter into the banking market.

f) The minimum level of 8% for the solvency ratio was enforced in 1992.

g) Credit ceilings were definitely abandoned by the end of 1991.

h) The liberalisation of full capital movements became effective in 1992.

i) Interest rates on deposits were liberalised in 1992

j) Barriers to entry were definitely abolished in January 1993

Hence, the ANOVA Model herein developed has 72 cells with 8 observations in each cell, totalling the same 576 observations from the previous ANOVA Model. This structure of the model is applied separately to both the behaviour of profits, the behaviour of R.O.A. and the behaviour of R.OE. As in section 5.3.1., this design of the model allows the matching of the decisive steps in financial regulatory reform with a balanced ANOVA Model, that is, a model with the same number of observations per cell.

5.3.2.2.- METHODOLOGICAL DIFFERENCES BETWEEN THE TWO FIXED EFFECTS ANOVA MODELS

Comparing this model specification and the resulting hypothesis testing, with the ANOVA Model studied in the previous section, there are a few differences to be considered. Switching from one model, where "time" has two levels, to another where the factor "time" has three levels, the model specification is the same. The hypothesis tests for the significance of the main effects, "time" and "banks", and for interaction is also the same, except in what concerns the number of degrees of freedom in the statistic of each test. This is so because, now, the factor "line" is $I=3$ and the number of observations per cell is $K=8$.

These differences are summarised as follows:

Test for interaction between factors:

The "F-ratio" under the null hypothesis follows an "F" distribution with 46 and 504 degrees of freedom. This is, $(I-1)*(J-1)$ d.f. in the numerator and $(I*J)*(K-1)$ in the denominator.

Test for the statistical significance of the effect "time":

The "F-ratio" under the null hypothesis follows an "F" distribution with 2 and 504 degrees of freedom. This is, $(I-1)$ d.f. in the numerator and $(I*J)*(K-1)$ d.f. in the denominator.

Test for the statistical significance of the factor "banks":

The statistic of the test, that is the "F-ratio", under the null hypothesis follows an "F" distribution with 23 and 504 degrees of freedom. This is, $(J-1)$ d.f. in the numerator and $(I*J)*(K-1)$ d.f. in the denominator.

Another difference lies in the method to test whether the means are statistically

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different between each level of time. In the ANOVA Model where "time" has two levels, once the statistical significance of time on the explanation of average profitability behaviour is tested (tables 5.5, 5.6, and 5.7), it is enough to look at each one of the two means and compute the difference between them. Now, with an ANOVA Model where the factor "time" has more than two levels, multiple range tests must be performed using the joint definition of confidence intervals by the Tukey Method, whose explanation follows.

Joint Definition of Confidence Intervals by the Tukey Method

The confidence intervals' limits for $(\mu_{i1\bullet} - \mu_{i2\bullet})$, with "$i_1 \bullet \neq i_2 \bullet$", and where $(\mu_{i1} \bullet - \mu_{i2} \bullet)$ is the difference between the expected values of lines, at the level of confidence of $(1 - \alpha)*100\%$ are given by:

$$\left(\overline{X_{i_1\bullet}} - \overline{X_{i_2\bullet}}\right) \pm q_{I,Df}(\alpha) * \sqrt{RMS / J * K}$$

Where:

"I" is the number of lines, that is the number of levels of factor "time"

"J" is the number of columns, that is the number of levels of the factor "banks"

"K" is the number of observations per cell,

"RMS" is the Residual Mean Square (which equals the Residual Sum of Squares divided by the correspondent degrees of freedom)

"α" is the level of significance, and

"Df" is the number of Degrees of freedom that equals "I*J*(K-1)", and

$q_{I,Df}(\alpha)$ – is a tabulated factor

The study of the current two factors ANOVA Model is pursued through several approaches. The study begins with some findings related with descriptive statistics (table 5.9), followed by the analysis of the ANOVA TABLES (tables 5.10, 5.11 and 5.12) from which some conclusions can be drawn related to the statistical

significance on profitability behaviour of both factors "time" and "banks". Finally, the multiple range tests based on the Tukey Method provide information on the means that are statistically different between the three periods of time that are considered (tables 5.13, 5.14, and 5.15).

TABLE 5.9 – Descriptive Statistics. ANOVA-Two-Factor with replication (time with three levels)

SUMMARY	PROFITS(millions escudos) TOTAL	R.O.A (%) TOTAL	R.O.E.(%) TOTAL
First Period: June 86 to December 89			
Count	192	192	192
Sum	192235	143.4453	1843.706
Average	1001.224	0.747111	9.602634
Variance	4956903	0.714844	200.9484
Standard Deviation	2226.41	0.8454845	14.175627
Second Period: June 90 to December 93			
Count	192	192	192
Sum	563614	118.7237	1274.132
Average	2935.49	0.618353	6.636103
Variance	23734773	0.674467	36.2859
Standard Deviation	4871.83	0.8212594	6.023777
Third period: June94 to December1997			
Count	192	192	192
Sum	674289	14.17863	633.8477
Average	3511.922	0.073847	3.30129
Variance	47466147	1.779255	67.55268
Standard Deviation	6889.57	1.3338872	8.2190

TABLE 5.10 – Profits. ANOVA TABLE: Two-Factor with replication (time with three levels)

Source of Variation	Sum of Squares	Df	Mean Square	F-ratio	P-value	F crit
Main effects						
Time	6.64E+08	2	3.32E+08	47.31092	1.48E-19	3.013611
Banks	8.8E+09	23	3.82E+08	54.48415	1.1E-120	1.550738
Interactions						
Time/Banks	2.21E+09	46	48107005	6.853888	9.37E-31	1.391189
Residual	3.54E+09	504	7018937			
Total	1.52E+10	575				

TABLE 5.11 – R.O.A.ANOVA TABLE: Two-Factor with replication (time with three levels)

Source of Variation	Sum of Squares	Df	Mean Square	F-ratio	P-value	F crit
Main effects						
Time	49.04636	2	24.52318	35.31353	4.44E-15	3.013611
Banks	97.07551	23	4.220674	6.077797	3.59E-16	1.550738
Interactions						
Time/Banks	158.1222	46	3.437438	4.949932	2.2E-20	1.391189
Residual	349.9985	504	0.694441			
Total	654.2425	575				

TABLE 5.12 – R.O.E. ANOVA TABLE: Two-Factor with replication (time with three levels)

Source of Variation	Sum of Squares	Df	Mean Square	F-ratio	P-value	F crit
Main effects						
Time	3816.260	2	1908.103	30.18658	4.15E-13	3.013611
Banks	11888.43	23	516.8884	8.177282	4.41E-23	1.550738
Interactions						
Time/Banks	14467.88	46	314.5192	4.975758	1.58E-20	1.391189
Residual	31857.99	504	63.2103			
Total		575				

TABLE 5.13 – Multiple Range Tests for Profits by Time. Method of Tukey (level of confidence: 95%)

Time	*Count*	*LS Mean*		
1	192	1001.19		
2	192	2971.13		
3	192	3511.92		
Contrast			*Difference*	*+/– limits*
1-2			*– 1969.93	773.55
1-3			*– 2510.73	773.55
2-3			– 540.797	773.55

*denotes a statistically significant difference

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TABLE 5.14 – Multiple Range Tests for R.O.A. by Time. Method of Tukey (level of confidence: 95%)

Time	Count	LS Mean		
1	192	0.747187		
2	192	0.618021		
3	192	0.0735417		
Contrast			Difference	+/– limits
1-2			0.129167	0.230503
1-3			*0.673646	0.230503
2-3			*0.544479	0.230503

*denotes a statistically significant difference

TABLE 5.15 – Multiple Range Tests for R.O.E. by Time. Method of Tukey (level of confidence: 95%)

Time	Count	LS Mean		
1	192	9.60255		
2	192	6.63562		
3	192	3.30129		
Contrast			Difference	+/– limit
1-2			*2.96693	2.20117
1-3			*6.3013	2.20117
2-3			*3.33437	2.20117

*denotes a statistically significant difference

5.3.2.3.- THE RESULTS

While several barriers to entry were dismantled together with the implementation of the most important new financial regulatory rules, the descriptive statistics shown in table 5.9 allow us to reach some conclusions regarding the empirical facts of profitability behaviour in the Portuguese Banking System.

In this context, average profits grew in the course of financial regulatory reform, but this growth was followed by higher volatility as well. This result reinforces the findings of the ANOVA Model where the factor "time" had only two levels. This conclusion is contrary to Gual and Neven's suggestion that, with liberalisation, profits have decreased. At the same time, Hogarth et al's statement that more

liberalised markets produce higher but more volatile profits is, once more, reinforced.

On the other hand, average profitability behaviour measured by R.O.A. and R.O.E. exhibits an opposite trend with both the R.O.A. and the R.O.E decreasing with the market's liberalisation. R.O.E. steady decreased from the period 1986 to 1989 to the period 1990 to 1993, and from the latter to the period 1994 to 1997. It is worth mentioning that average R.O.A. dropped abruptly from the period 1990 to 1993 to the period 1994 to 1997, that is when the market was completely liberalised. This fall went along with a substantial increase in R.O.A. volatility, which may suggest increasing difficulty management strategies to cope with the new financial regulatory environment. Another interesting result lies in the fact that, what seemed to be a positive behaviour in terms of R.O.E.'s volatility[124] turns out to be a more realistic result when barriers to entry abolishment are included in this study. In reality, R.O.E.'s volatility remarkably decreased during the period 1990/1993 and only suffered a slightly improvement after 1994.

Assuming that the disturbances of the model are independent and normally distributed, findings from ANOVA TABLES 5.10, 5.11 and 5.12 are in line with the conclusions of the analysis of variance previously carried out when to the factor "time" was assigned only two levels. Because the "F-RATIOS" are greater than the "F" critical value in all the above-mentioned tables (together with very low probability values), it can be stated that both the factors "time" and "banks" are statistically significant to explain average profitability behaviour, at the 1% level of significance.

Finally, tables 5.13, 5.14 and 5.15, apply a multiple comparison procedure to determine which means are significantly different from which others. As already mentioned, when the Tukey Method is followed, the bottom half of the output shows the estimated difference between each pair of means.

Following table 5.13, where multiple range tests for profits by time are evidenced, it

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[124] As it is demonstrated by table 5.2 and by the corresponding analysis carried out on page 102.

can be stated that the pairs of means 1 and 2 and 1 and 3 show statistically significant differences at the 95.0% confidence level[125]. Because the sign of the difference is negative, it can be stated as well that average profitability increased from period 1 to period 2, and from period 1 to period 3, which reinforces the descriptive analysis. It must be added that, according to the Tukey Method, there are no statistically significant differences between average profits in period 2 and 3.

The analysis of table 5.14, representing multiple range tests for R.O.A. by time, allows the conclusion that the differences between the pairs of means referring to periods 1 and 3 and 2 and 3 are statistically significant at the 95.0% level of confidence. Because the sign of difference is positive, it means that average R.O.A. have decreased from period 1 to period 3 and from period 2 to period 3. This is in accordance with table 5.9. Table 5.14 also shows that there are no statistically significant differences in average R.O.A. between periods 1 and 2.

Finally, following the study of the statistically significant differences between averages R.O.E. in each pair of time depicted in table 5.15, it can be stated, at the 95.0% level of confidence, that average R.O.E. is statistical significantly different from period 1 to period 2, from period 1 to period 3, and from period 2 to period 3. As above, the positive sign of the difference means that average R.O.E. is significantly decreasing. Once more, the multiple range tests analysis is in accordance with conclusions drawn from table 5.9.

In conclusion, Multifactor Anova Models have been chosen in this chapter because they are an accurate method to study the effect of a factor on the average behaviour of a response variable, which in the current study is average profitability measured by profits, by R.O.A. and by R.O.E..

The above analysis of variance assumes that the models' disturbances follow a normal distribution with mean zero and constant variance. This is a crucial assumption in building the confidence intervals that enclose the true value of each mean. The study developed in the next section refers to testing whether or not a

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[125]With this method, there is a 5% risk of calling one or more pairs of means significantly different

normal distribution fits the stochastic term of each model. After performing a residual plot, it will be applied a non parametric test, the Kolgomorov-Smirnov test for the goodness of fit for residuals in each model. The objective is to test whether the assumption of normality underlying the analysis of variance holds, that is, is not violated by the data.

5.3.3. - TESTING FOR THE NORMALITY OF THE RESIDUALS IN THE ANOVA MODELS.

One of the assumptions underlying the Analysis of Variance is that the residuals follow a normal distribution with mean zero and constant variance. In this section, a test is performed to confirm that the assumption of normality of the disturbances holds. The test is the non-parametric Kolmogorov-Smirnov the aim of which is to test the goodness-of-fit of a normal distribution fitted to the residuals of the ANOVA Models developed in this chapter. As explained earlier in the current chapter, the Kolmogorov-Smirnov (K-S) is a procedure that allows testing the overall goodness-of-fit between the distribution of the data and the assumption of normality of the disturbance terms that underlies this study. The test calculates the maximum vertical distance between the cumulative distribution function of the two samples (the data sample and the sample with a theoretical normal distribution). If this distance is large enough, the hypothesis that the two samples come from the same distribution, that is that residuals follow a normal distribution, is rejected.

A plot of each sample's residuals is shown in figures 5.4 to 5.9. In these figures the presence of outliers is obvious. These outliers may be the reason for rejecting the null hypothesis of residuals normally distributed.

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when their actual difference equals zero.

Figure 5.4.- Residuals Plot – Multifactor ANOVA MODEL for Profits. Time with two levels
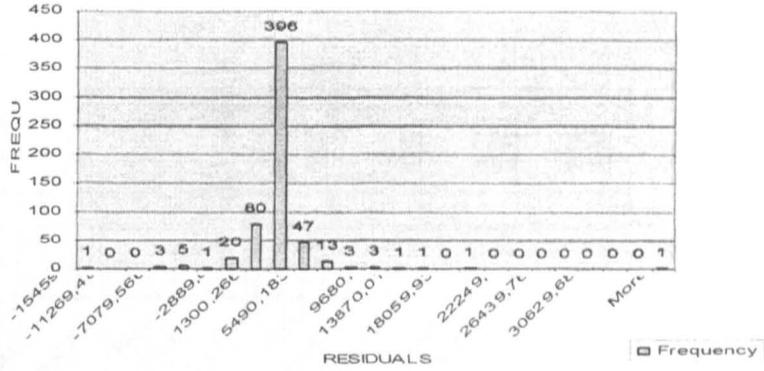
Figure 5.5.- Residuals Plot – Multifactor ANOVA MODEL for R.O.A.. Time with two levels
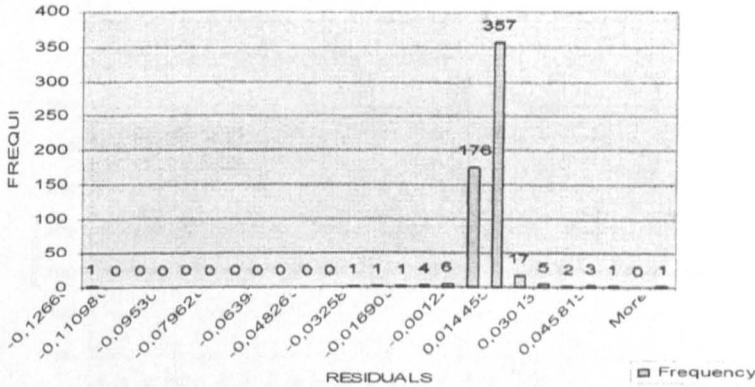
Figure 5.6.- Residuals Plot – Multifactor ANOVA MODEL for R.O.E.. Time with two levels

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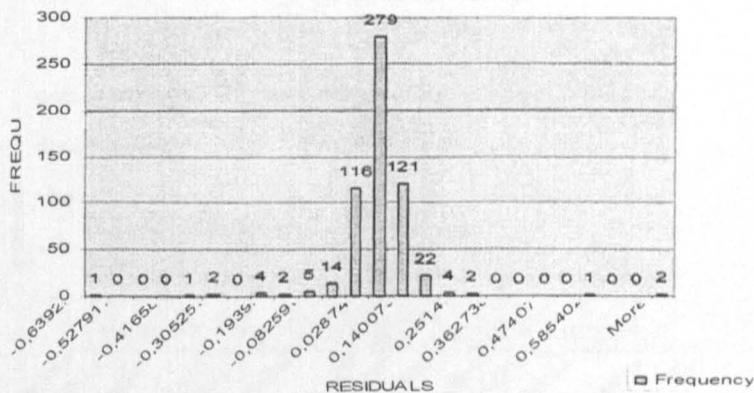
Figure 5.7.- Residuals Plot – Multifactor ANOVA MODEL for Profits. Time with three levels
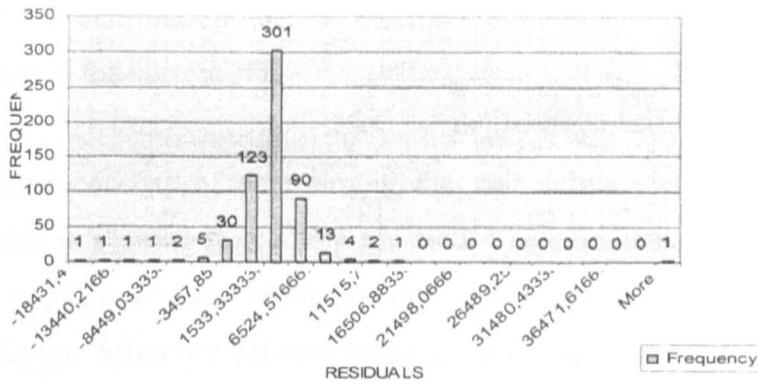
Figure 5.8.- Residuals Plot – Multifactor ANOVA MODEL for R.O.A.. Time with three levels
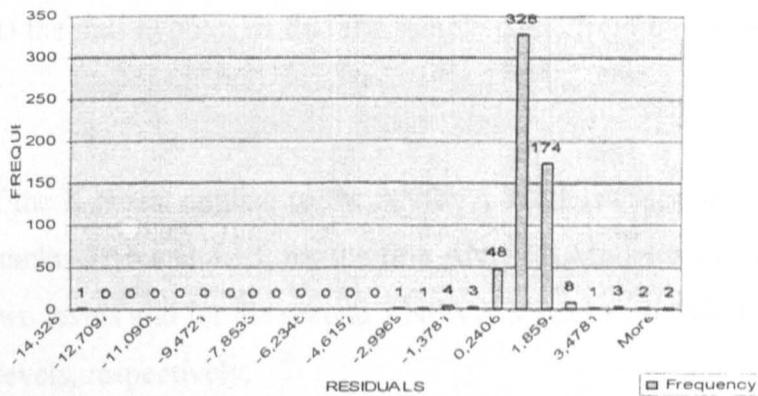
Figure 5.9.- Residuals Plot – Multifactor ANOVA MODEL for R.O.E.. Time with three levels
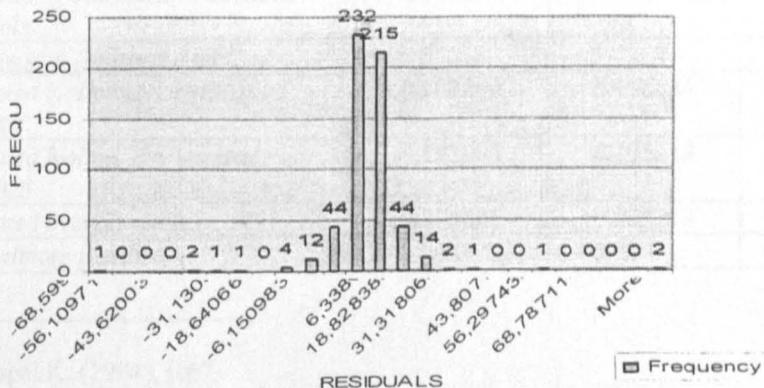
Formalisation of the Kolmogorov-Smirnov test follows:

The objective of this test is to investigate the significance of the difference between an observed distribution and a specified population distribution[126], the normal distribution in the current study.

The method consists of determining the cumulative distribution $S_n(x)$ from the sample. and in plotting it as a step function. The cumulative distribution $F(x)$ of the assumed population is also plotted on the same diagram.

The maximum difference between these two distributions:

$$D= |F-S_n|,$$

provides the test static and this is compared with the value $D(\alpha)$ which is tabulated, and the source of the table is Massey (1951)[127]

If $D > D(\alpha)$ the null hypothesis that the sample came from the assumed population is rejected.

Results of the K-S test applied to the ANOVA Models described in this chapter are shown in tables 5.16 and 5.17, for the first ANOVA Model with Two Factors where time has two levels and for the second ANOVA Model with Two Factors where time has three levels, respectively.

Table 5.16- The Kolmogorov-Smirnov Test.Multifactor Anova Model with two factors, where time has two levels

	PROFITS	R.O.A.	R.O.E
Estimated mean of the residuals	-0.000216493	1.4276E-10	-5.42569E-09
Estimated standard deviation of residuals	2672.51	0.00825098	0.0822786
Kolmogoron-Smirnov Test			
Estimated Kolmogorov statistic DPLUS	0.203066	0.195834	0.132911
Estimated Kolmogorv statistic DMINUS	0.193005	0.205219	0.160658
Estimated overall statistic DN	0.203066	0.205219	0.160658
Approximate p-value	0.0	0.0	0.0

[126] Kanji, Gopal K. (1994), p.67.
[127] Kanji, Gopal K. (1994), p.186.

Table 5.17 - The Kolmogorov-Smirnov Test. Multifactor Anova Model with two factors, where time has three levels

	PROFITS	R.O.A.	R.O.E
Estimated mean of the residuals	0.000799337	5.40278E-8	9.94568E-7
Estimated standard deviation o residuals	3154.32	0.939925	8.97576
Kolmogoron-Smirnov Test			
Estimated Kolmogorov statistic DPLUS	0.153564	0.170716	0.143231
Estimated Kolmogorv statistic DMINUS	0.167013	0.177374	0.145146
Estimated overall statistic DN	0.167013	0.177374	0.145146
Approximate p-value	0.0	0.0	0.0

In conclusion, the above tables show the results of the Kolmogorov-Smirnov test run to determine whether residuals, in each ANOVA study, can be adequately modelled by a normal distribution. Because the "p-value" for these tests is less than 0.01 (which means that $D>D(0,01)$), the idea that residuals come from a normal distribution can be rejected with 99% confidence. The results of these goodness-of-fit tests mean that the assumption underlying the analysis of variance is violated by the data.

As mentioned above, the reason for these results may lie in the presence of outliers, so common in financial data.

One way to overcome the conclusions from the Kolmogorov-Smirnov test is to apply a random number generation function, which aims at randomly chosen observations of profitability in each cell of the ANOVA Models. However, even choosing at random two observations per cell, the hypothesis of normality of the disturbances is still rejected.

Despite this, several arguments in favour of the ANOVA Models developed in this chapter are presented:

a) The method developed in this chapter 5 gives its contribution to the stylised facts for a Theory of Regulation for the Banking System, which is one of the contributions of this research. These stylised facts can be found in the analysis pursued from section 5.3.1. to section 5.3.2.2.

b) The study is carried out assuming the normality of the residuals. This procedure

is methodological correct when modelling in economics, provided that the models' results are always interpreted with the assumptions in mind.

c) No one has so far modelled and empirically tested how profitability behaves in the course of financial regulatory reform. Thus, the current research is an attempt to find the best methodology for doing it.

d) Both Multifactor ANOVA Models herein developed can give path and open ground to further research applied to different realities. That is, the analysis allows us to study the level and behaviour of banking profitability in different banking systems experiencing reforms in financial regulation.

e) Even with residuals that are not normally distributed, both the descriptive statistics and the "F" statistics still hold. One of the objectives of this study is to give its contribution to the stylised facts of a Theory of Regulation for the Banking System.

Since the introduction of the factor "banks", which had the purpose of enriching the analysis of section 5.2. where only time was considered in a linear regression adjustment, and since this approach poses the problem of non-normality on the disturbances distribution, a final approach will be considered in this chapter 5.

The final approach in this chapter consists of running a One Way ANOVA Model where the factor is "time", divided into three levels. Once more, this model aims at analysing how average profitability varies (or not) in the course of financial regulatory reform in the Portuguese Banking System. In the model that follows, if the non-normality of the stochastic term distribution persists, assuming that this phenomenon comes from the existence of outliers, the problem will be overcome by choosing the non-parametric Kruskal-Wallis test.

5.4. - A FIXED EFFECTS ANOVA MODEL WITH ONE FACTOR: "TIME"

In this section a comparison between the means of three samples is pursued. Each sample consists of profitability behaviour in three distinct periods: 1986-1988, 1989-1992 and 1993-1997. And profitability is measured by profits, R.O.A. and R.O.E..

The banks whose profitability behaviour is studied remains the same 24 banks, and the reasons for time cut-off are those explained for the ANOVA Model, with two factors having time three levels.

The reason for the adjustment on the limits in the range of time when compared with the whole analysis carried out in the current chapter is twofold:

First, a One Way Analysis of Variance does not required balanced cells, as is the case with the previous ANOVA models. Therefore the number of observations varies from sample to sample. The model is estimated with 144 observations in the first period, 192 observations in the second period and 240 observations in the third period. Second, with an even number of observations per sample, the division of time in this model coincide with the division of time applied in the succeeding chapter. In chapter 6, where the statistical significance of regulation on banking profitability is estimated, regulation is treated as a qualitative variable and assumes three classes, each one corresponding to the periods herein considered.

The objective of this model remains the same: to test the assumption that profitability has increased with regulatory reform. This new approach has the advantage, as will be demonstrated, of overcoming the problem of sample disturbances that, in the event, do not follow a normal distribution. The disadvantage lies in the fact that the current model is based only on one factor "time". Thus, the influence of banks on average profitability is absent, which does not invalidate the analysis since what is under research is profitability behaviour over time. Nevertheless, it is worth mentioning that the weakness of the absence of the factor "banks" is mitigated in the next chapter where bank-specific explanatory variables are introduced to estimate banking profitability behaviour.

Considering the factor time alone, the study proceeds with the explanation of the model specification followed by the correspondent hypothesis testing. Next, the multiple range tests to be conducted with samples of different sizes are explained. In fact, the Scheffé Method, to analyse whether the means from different samples are statistically different, is used instead of the Tukey Method employed earlier. This section ends with the Kruskal-Wallis non-parametric test that follows both the

analysis of the results and the Kolmogorov-Smirnov test for the normality of the residuals.

5.4.1. - MODEL SPECIFICATION

When the purpose is to test whether the means from different samples (or groups) are statistically different the model has the following specification:

$$X_{ij} = \mu_i + E_{ij} = \mu + \alpha_i + E_{ij}$$

With: $E_{ij} \sim IN(0, \sigma^2)$

Where:

- "i" is the index related to the group of observations (the sample) where profitability is studied, in the model of this analysis "i" = 1,2,3.

- "j" is the index related to a specific observation within each group, in the model of this analysis "j" = 1,2,3,.....,J (where J = 144 for the first group of observations, J = 192 for the second group of observations and J = 240 for the third group of observations).

- "X_{ij}" is observation "j" in the "i" group.

- "μ_i" is the expected value of group "i" of observations.

- "μ" is a fixed global parameter

- "α_i" is a parameter that describes the effect of group "i".

The model just described is called a Fixed Effects ANOVA Model with one factor since it allows to distinguish observations from one group to the other.

5.4.2. - HYPOTHESIS TESTING

What the model intends on the one hand is to estimate the expected value "μ_i", that is average profitability in each group (sample). On the other hand, the model aims at testing whether expected values associated with each group are significantly different among them.

The fundamental test of this analysis of variance is specified by the following assumptions:

$H_0 : \mu_1 = \mu_2 = \mu_3 = \mu$ (which is equivalent to: $\alpha_1 = \alpha_2 = \alpha_3 = 0$, there is no time effect)

$H_1 :$ Not all μ_i are equal   (which is equivalent to some $\alpha_i \neq 0$, there is a time effect)

The test statistic is:

"F" – Ratio" which is a ratio of the between-group estimate to the within group estimate. Under the null hypothesis the test has an "F" distribution with (I-1), and '$\left(\sum_i J_i \right) - I$ 'degrees of freedom.

The between-group estimate is given by the variation explained by the difference between the means, divided by the correspondent degrees of freedom (the mean square between groups), this is:

$$\frac{\sum_i J_i * \left(\overline{X_i} - \overline{X} \right)^2}{I - 1}$$

The within-group estimate is given by the residual variation (non-explained variation), divided by the correspondent degrees of freedom (the mean square within groups), this is:

$$\frac{\sum_i \sum_j \left(X_{ij} - \overline{X_i} \right)^2}{\left(\sum_i J_i \right) - I}$$

5.4.3. - MULTIPLE RANGE TESTS

When the dimensions of the samples corresponding to each group are different, the confidence intervals for the difference between means are defined by the Scheffé Method and have the following presentation:

$$\left(\overline{X_{l_1}}-\overline{X_{l_2}}\right)\pm\sqrt{(I-1)*F_{DF_1,DF_2}}\,(\alpha)\text{ within - group estimate }*\left(\frac{1}{J_{l_1}}+\frac{1}{J_{l_2}}\right)$$

Where:

The within-group estimate is defined as above.

"I" is the number of groups.

$F_{DF1,DF2}(\alpha)$: $F_{(I-1),\ (\Sigma Ji-I)}(\alpha)$ is a tabulated value.

Findings from the ANOVA Model with one factor are shown in tables 5.18 to 5.21, that are related with descriptive statistics, ANOVA table for profits by time, ANOVA table for R.O.A. by time and ANOVA table for R.O.E. by time, respectively.

TABLE 5.18 – Descriptive Statistics. One Way Analysis of Variance: factor "time" with three levels

SUMMARY	PROFITS(millions escudos) TOTAL	R.O.A (%) TOTAL	R.O.E.(%) TOTAL
First Period: June 86 to December 88			
Count	144	144	144
Sum	119246	101.0375	1405.183
Average	828.0972	0.701649	9.758213
Variance	4348355	0.731339	257.9692
Standard Deviation	2085.271	0.8551836	16.06142
Second Period: June 89 to December 92			
Count	192	192	192
Sum	475060	144.4914	1513.003
Average	2474.271	0.752559	7.880225
Variance	17720053	0.756992	38.53359
Standard Deviation	4209.52	0.8700529	6.207543
Third period: June 93 to December 97			
Count	240	240	240
Sum	835832	30.81879	833.4995
Average	3482.633	0.128412	3.472915
Variance	44224820	1.481465	57.26974
Standard Deviation	6650.1744	1.2171545	7.56767

TABLE 5.19 ANOVA TABLE for Profits by Time: factor "time" with three levels

Source of variation	Sum of Squares	Df	Mean Square	F-ratio	P-value	F crit
Between groups	6.34E+08	2	3.17E+08	12.46575	5.02E-06	3.011451
Within groups	1.46E+10	573	25438180			
Total	1.52E+10	575				

TABLE 5.20 - ANOVA TABLE for ROA by Time: factor "time" with three levels

Source of variation	Sum of Squares	Df	Mean Square	F-ratio	P-value	F crit
Between groups	51.00531	2	25.50266	24.22434	7.96E-11	3.011451
Within groups	603.2372	573	1.05277			
Total	654.2425	575				

TABLE 5.21 - ANOVA TABLE for ROE by Time: factor "time" with three levels

Source of variation	Sum of Squares	Df	Mean Square	F-ratio	P-value	F crit
Between groups	4093.537	2	2046.768	20.24266	3.2E-09	3.011451
Within groups	57936.98	573	101.1117			
Total	62030.51	575				

5.4.4. - THE RESULTS

The facts shown in the descriptive statistics table (table 5.18), are very similar to the empirical conclusions drawn from the descriptive statistics table (table 5.9), where a two factor fixed effects ANOVA Model, with time with three levels, was under scrutiny. These facts can be summarised as follows:

a) When profitability is measured by net profits, both the average profitability and the profitability volatility have increased in the course of financial regulatory reform.

b) When profitability is measured by R.O.A., profitability decreases substantially

after liberalisation, that is after 1993, and this big drop on average R.O.A. is followed by a very substantial increase in volatility.

c) Average profitability measured by R.O.E. steady decreases with financial regulatory reform, but, while its volatility diminishes until 1993, from this date onwards R.O.E. suffers a substantial increase in volatility.

Assuming that the residuals of the model are independent, and that they follow a normal distribution, findings from the ANOVA tables for Profits by time (table 5.19), for R.O.A by time (table 5.20) and for R.O.E. by time (table 5.21) are that there is a statistically significant difference between the mean of profits, R.O.A. and R.O.E. from one level of time to another at the 95 % confidence level. The explanation follows.

Each ANOVA table decomposes the variance of the response variable into two components: a between-group component and a within component. The "F-Ratio" (which equals 12.46 for profits, 24.22 for R.O.A. and 20.24 for R.O.E.) is a ratio of the between-group estimate to the within-group estimate. Since the probability value of each "F-test" is less than 0.05, the conclusion from this analysis is that average profitability is statistically significant from one level of time to another at the above-mentioned 95% confidence level. Furthermore, because the "P-value" of each test is less than 0.01, the tests' level of confidence raises to 99%.

To determine which means are significantly different from which others, the study follows multiple range tests, the results of which are shown in tables 5.22, 5.23 and 5.24 for profits, R.O.A. and R.O.E., respectively.

TABLE 5.22 – Multiple Range Tests for Profits by Time.
Method of Scheffé (level of confidence: 95%)

Time	Count	Mean		
1	144	828.097		
2	192	2511.78		
3	240	3481.13		
Contrast			Difference	+/– limits
1-2			*– 1683.68	1361.78
1-3			*– 2653.04	1302.11
2-3			– 969.352	1196.07

*denotes a statistically significant difference

TABLE 5.23 – Multiple Range Tests for R.O.A. by Time. Method of Sheffé (level of confidence: 95%)

Time	Count	Mean		
1	144	0.701597		
2	192	0.752396		
3	240	0.128125		
Contrast			**Difference**	**+/– limits**
1-2			-0.0507986	0.276856
1-3			*0.573472	0.264725
2-3			*0.624271	0.243165

*denotes a statistically significant difference

TABLE 5.24 – Multiple Range Tests for R.O.E. by Time. Method of Sheffé (level of confidence: 95%)

Time	Count	Mean		
1	144	9.18576		
2	192	7.87984		
3	240	3.47279		
Contrast			**Difference**	**+/– limits**
1-2			1.30592	2.71774
1-3			*5.71297	2.59865
2-3			*4.40705	2.38702

*denotes a statistically significant difference

The confidence intervals for the difference between the means are constructed with the Scheffé Method because the number of observations differs from one time-based group to another.

In accordance with the results from tables 5.22 to 5.24, profitability behaviour in the course of financial regulatory reform in Portugal presents the following patterns:

a) Average profits are statistically significantly different from 1986/1988 to 1989/1992 and from 1986/1988 to 1993/1997. Because the difference has a negative sign, the analysis concludes that the growth on average profits is statistically significant. Furthermore, average profits between 1989/1992 and 1993/1997 are not statistically different. These findings allow the conclusion that growth in average profits was greater at the beginning of the process of liberalisation. It is worth mentioning that these results are the same as those obtained in the Two Factor ANOVA Model (with time with three levels) estimated in section 5.3.2..

b) Average R.O.A. is statistically significantly different from 1986/1988 to 1993/1997 and from 1989/1992 to 1993/1997. Because the difference has a

positive sign, it means that average R.O.A. fell in the course of financial regulatory reform. Since average R.O.A. is not statistically significantly different from 1986/1988 to 1989/1992, it is possible to conclude that the drop in average R.O.A. is greater at the end of the process of liberalisation. Again, it is worth mentioning that these results are the same as those obtained in the Two Factor ANOVA Model (with time with three levels) estimated in section 5.3.2..

c)   The same pattern of behaviour is found on the study of average R.O.E.. That is, average R.O.E. is statistically significantly different from 1986/1988 to 1993/1997 and from 1989/1992 to 1993/1997, the difference showing a positive sign. The confidence interval for the difference between the mean of R.O.E. in 1989/1992 and in 1986/1988 includes the value 0 (zero). Thus, the respective means are not significantly different. Hence, although average R.O.E. did not experience any substantial changes in the beginning of the process of liberalisation in the Portuguese financial system, average R.O.E. dropped substantially when the market became liberalised, that is, after 1993. As proven in b) this is the case with R.OA. as well.

5.4.5. - TESTING FOR THE NORMALITY OF RESIDUALS ON THE ONE WAY ANALYSIS OF VARIANCE. THE KRUSKAL-WALLIS TEST

The non-parametric Kolmogorv-Smirnov test for the goodness of fitting a normal distribution to the residuals is performed in this section and its results are shown in table 5.25.

Table 5.25 – The Kolmogorov-Smirnov Test. One Way Analysis of Variance: factor "time" with three levels.

	Profits	R.O.A.	R.OE.
Data Variable	Residuals	Residuals	Residuals
576 values ranging from	-13957.1 to 57463.9	-15.2781 to 4.0676	-71.7028 to 98.6642
Fitted Normal Distribution:			
Mean	0.00220934	-2.57448E-7	0.00000205035
Standard Deviation	5037.86	1.02422	10.0542
Kolmogorov-Smirnov test:			
Estimated Kolmogorv statistic DPLUS	0.249464	0.154681	0.148946
Estimated Kolmogorv statistic DMINUS	0.195502	0.193006	0.146417
Estimated overall statistic DN	0.249464	0.193006	0.148946
Approximate P-Value	0.0	0.0	0.0

Table 5.25 shows the results of the Kolmogorov-Smirnov test run to determine whether residuals can be adequately modelled by a normal distribution. In the case of Profits, the maximum distance between the cumulative distribution of residuals and the CDF of the fitted normal distribution is 0.249464, this maximum distance is 0.193006 for R.O.A. and 0.148946 for R.O.E.. Because the "P-value" for each test is less than 0.01, the idea those residuals comes from a normal distribution is rejected with a level of confidence of 99%.

Again, one possible reason[128] for this conclusion is the presence of outliers so common in financial data.

In the presence of outliers, the procedure performed to compare the mean values of profits, R.O.A and R.OE. for the three different levels of time, is the Kruskal-Wallis non-parametric test, which compares medians instead of means[129]. The Kruskal-Wallis Test is a non-parametric method that tests the assumption that the medians of samples are equal. With observations arranged in order from smallest to largest, the sample median, or 50th percentile, is the number halfway between the smallest and the largest observation. The 50th percentile is a measure of the central tendency of the data.

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[128] The same reason as the one expressed in section 5.3.3, p.123.
[129] Kanji, Gopal K. (1994), p.89.

The Kruskal-Wallis method consists of the following procedure. The results of the three samples are combined and arranged in order of increasing size and given a rank number. In cases where equal results occur, the mean of the available rank numbers is used. The rank sum for each of the K, that is, three samples in the current study, is calculated.

The test statistic is:

$$H = \left\{ \frac{12}{N(N+1)} * \sum_{j=1}^{3} \frac{R_j^2}{n_j} \right\} - 3(N+1)$$

Where:

- R_j is the rank sum of the jth sample,

- n_j is the size of the jth sample, and

- N is the size of the combined sample.

The test statistic follows a χ^2 distribution with (K-1) degrees of freedom, 2 degrees of freedom in the current research. The null hypothesis of equal means is rejected when "H" exceeds the critical value that is tabulated, the source for this table is Neave (1978)[130].

The results from the performance of the Kruskal-Wallis Test for profits by time, for R.O.A. by time and for R.O.E. by time are depicted in tables 5.26, 5.27, and 5.28 respectively.

Table 5.26.-Kruskal-Wallis Test for Profits by Time

TIME	SAMPLE SIZE	AVERAGE RANK
1	144	209.41
2	192	325.333
3	240	306.488
Test Statistic = 44.7321		P-Value = 1.93444E-10

Table 5.27 -Kruskal-Wallis Test for ROA by Time

TIME	SAMPLE SIZE	AVERAGE RANK
1	144	318.472
2	192	346.169
3	240	224.381
Test Statistic = 63.3597		P-Value = 0.0

Table 5.28 -Kruskal-Wallis Test for ROE by Time

TIME	SAMPLE SIZE	AVERAGE RANK
1	144	321.5
2	192	342.396
3	240	225.583
Test Statistic = 60.1017		P-Value = 0.0

Because the "P-values" are less than 0.01, the null hypothesis that the medians of the samples are equal is rejected at the 1% level of significance. Therefore, it can be stated that there is a statistically significant difference between the medians of both the profits, the R.O.A. and the R.O.E., at the 99% confidence level.

5.5. - CONCLUSION

Although the disturbances for profits, R.O.A and R.O.E. are not normally distributed in each of the ANOVA Models estimated in this chapter, the Kruskal-Wallis Test allows some findings concerning the hypotheses tested, namely that:

1. "Average profitability is significantly different after regulatory reform", and
2. "Average profitability is significantly higher after regulatory reform".

Kruskal-Wallis assumes symmetry when he uses the median instead of the mean. Assuming symmetry of each sample distribution, profits, R.O.A. and R.O.E., the findings from table 5.22 (multiple range tests for profits by time), table 5.23 (multiple range tests for R.O.A. by time) and table 5.24 (multiple range tests for R.O.E. by time) hold good. That is, these results are valid to test for the significant differences between means, although they are not valid for the estimated value of these differences.

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[130] Kanji, Gopal K. (1994), p.193.

The main conclusion is that the study carried out in this chapter proves that average profitability, measured both by profits, R.O.A. and R.O.E., is statistically significantly different after financial regulatory reform in Portugal.

The analysis carried out, also allows the conclusion that average profitability measured by profits has increased in the course of financial regulatory reform and that average profits are statistically significantly different during the first steps of liberalisation, that is between 1986 and 1992. These are the results of both the Fixed Effects One Factor ANOVA Model and the Fixed Effects Two Factor ANOVA Model (factors "banks" and "time" where "time" has three levels).

In what concerns profitability measured by R.O.A., the study finds that average R.O.A. has decreased and that average R.O.A. is statistically significantly different during the final steps of liberalisation, that is between 1989 and 1997. Again, these are the results of both the Fixed Effects One Factor ANOVA Model and the Fixed Effects Two Factor ANOVA Model (factors "banks" and "time" where "time" has three levels).

Finally, average R.O.E. has statistically significantly decreased from the beginning until the end of financial regulatory reform in Portugal. Even so, average R.O.E. is not statistically significantly different during the first steps of the reform, that is, from 1986 until 1992. These are the results of the Fixed Effects One Factor ANOVA Model.

CHAPTER 6.- THE STATISTICAL SIGNIFICANCE OF REGULATION ON BANKING PROFITABILITY. THE SIGNIFICANCE OF OTHER PERFORMANCE DETERMINANTNS

6.1. - INTRODUCTION: THE PROPOSITION TO BE TESTED

The proposition to be tested in the model developed in this chapter is:

"Regulation significantly affects banking profitability".

This chapter tests the relationship between banking profitability determinants as defined below and the following banking performance measures: profits after taxes, R.O.A. and R.O.E..

Regulation is tested as an explanatory variable for banking profitability together with all the other banking profitability determinants: inflation rate, G.D.P. growth, interest rates, management quality, and ownership and market structure. The objective of this analysis is to test the significance of regulation for profitability.

Empirical econometric tests of banking performance determinants have been, so far, partial, and have studied only one variable or group of variables that affect banking profitability. The effect of regulation on banking profitability has never been empirically tested, despite the common belief that profitability responds (or reacts) to changes in the regulatory framework. This widespread belief results from non-statistical considerations, such as experience together with analyses of how banking strategies accommodate changes in regulatory rules.

In the 70's several studies, such as Jordan (1972) Tucillo (1973) and Edwards (1977), suggested that regulation had an impact on banking profitability. Bourke (1989) states that "the literature has never adequately examined the consequences of changes in the intensity of regulation"[131]. He argues that the most promising approach to access the consequences of changes in the intensity of regulation on banking profitability was a Delphi/Jury of Expert Opinion ranking of the intensity of regulation, but he proved unable to do this in a time series study extending over ten years. Thakor and Beltz (1994) make a strong contribution to the literature, using an explicit economic model to weigh the costs and benefits of seemingly unrelated bank regulations based on a "barter" idea. Meanwhile, Lucas (1994) contributed to the current policy debate over the net effect of regulation on profitability, extending the arguments underlined by Thakor and Beltz. Research on the impact of liberalisation on U.K. and German banking sectors was carried out by Hoggarth et al. (1998).

Several papers have studied market structure and profitability. Heggestad and Mingo (1976), Kwast and Rose (1982), Gilbert (1984), Bourke (1989), Gup and Walter (1989), Heffernan (1994), Hoggarth et al. (1998) are examples.

Larry (1985), Claire (1987), Gup and Walter (1989) and Miller and Noulas (1997) have approached management quality as a banking performance determinant. While Swamy et al. (1996) identify important determinants of the performance of commercial banks, such as: Construction Real Estate Loans-to-Assets, Family Real Estate Loans-to-Assets, Commercial Real Estate Loans-to-Assets, Commercial and Industrial Loans-to-Assets, Average Bank size in relation to Assets, and Unemployment rates and some location restrictions in the United States

Hoggarth et al. (1998), in their examination of the key features that have contributed to the stability of UK and German banking systems, emphasised the impact of inflation, G.D.P. growth, monetary policy and ownership. This latest variable has also been analysed by Short (1979) and Bourke (1989).

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[131] P.67

While testing for the statistical significance of regulation on banking profitability, the proposed unbalanced panel data model, developed in the current study, treats banking performance determinants together. This analysis is carried out in several stages, because the model aims at testing the effect of all banking performance determinants on banking profits on R.O.A. and on R.OE. Simultaneously, both bank specific omitted variables and the effect of time on profitability are tested.

6.2. - THE MODEL

The specification of the estimated empirical model is based upon the general notion that bank-specific variables and variables in general economic and market conditions all affect bank performance. There are, however, several issues that arise in specifying such a model. First, one has to decide upon an appropriate estimation technique. Second, one has to decide upon the specific variables to be included in the model. Third, one has to decide how to measure these variables. Each of these issues will be discussed in turn.

An unbalanced panel data model has been chosen because it is a tool very well suited to the purpose of this study, as we proceed to explain[132].

The reasons for using an unbalanced panel data are threefold:

On the one hand, panel data is used to specify a model that will adequately allow for differences in behaviour over cross-sectional units as well as any differences in behaviour over time for a given cross-sectional unit. The first group of exogenous variables comprises management quality, ownership and market structure (when no collusion is involved). In the second group ranges inflation rate (that is, nominal stability), G.D.P. growth (that is, real stability) and regulation.

On the other hand, an unbalanced panel data allows for an even number of observations in each period. Therefore it is the most suitable model given that several

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[132] Besides the reasons considered in the current analysis, " the analysis of panel or longitudinal data is the subject of one of the most active and innovative bodies of literature in econometrics (...). The panel data literature rivals the received research on unit roots in econometrics in its rate of growth". Green(1997), *Econometric Analysis*, p.613.

banks entered into the market once liberalisation began in the Portuguese Banking System in 1985. Because new banks have emerged in the market during the life span of this analysis, each bank specific variable is inserted in the model only after a period of six months has elapsed.

Finally, the use of pooled data allows us better to control the effects of missing or omitted variables.

The dependent variable in the empirical model will be a measure of bank performance. Since there is no single measure of performance found in the literature, three measures to capture performance will be employed in this study. These three measures, all of which have been used either individually or in different combinations in the literature, are profits after tax, the rate-of-return on assets and the rate-of-return on equity.

6.3. - DESIGN OF THE MODEL

6.3.1. - THE SAMPLE

The data are a pooled time-series cross section. Parent banks and subsidiaries are both included in the data. The unconsolidated results from the parent banks are used to avoid duplication in the information collected.

The data are based on the financial statements of 33 Portuguese banks (table 6.1). Accounting measurement of profitability have been reported twice in each year (in June and December), over the 13 years from the first half of 1985 to the second half of 1997, a period during which banks had significant time to adjust to the financial regulatory reform. Very gently at first, Portuguese Financial Regulatory Reform began in 1985 with the relaxation of some barriers to entry. After the removal of controls on interest rates and capital movements, during the late 80's and early 90's, the Portuguese Financial System became by the end of the century fully integrated with the European standard financial regulatory rules.

Table 6.1-Sample of Banks for the Unbalanced Panel Data Models

BBV-Banco Bilbao Viscaya (Lloyds Bank until 1990) : June 85-December 97
BBI-Banco Borges & Irmão : June 85-December 97
BCA-Banco Comercial dos Açores : June 85-December 97
BFE-Banco de Fomento e Exterior : June 85-December 97
BES-Banco Espírito Santo : June 85-December 97
BFB-Banco Fonsecas & Burnay: June 85-December 97
BPSM-Banco Pinto & Sotto Mayor: June 85-December 97
BPA-Banco Português do Atlântico : June 85-December 97
BTA-Banco Totta & Açores : June 85-December 97
CGD-Caixa Geral de Depósitos: June 85-December 97
CL-Crédit Lyonnais : June 85-December 97
CPP-Crédito Predial Português : June 85-December 97
Chemical-Banco Chemical (Manufacturers Hanover until 1992): June 85-December 97
MG-Montepio Geral : June 85-December 97
B.Mello-Banco Mello (União de Bancos Potugueses until 1996) : June 85-December 97
BPI-Banco Português de Investimentos : December 85-December 97
Barclays-Barclays Bank : June 86-December 97
BNP-Banque Nationale de Paris: June 86-December 97
Citi-Citibank : June 86-December 97
BCP-Banco Comercial Português : December 86-December 97
BCI-Banco Comércio e Indústria : December 86-December 97
BIC-Banco Internacional de Crédito : December 86-December 97
BANIF-Banco Internacional do Funchal : December 88-December 97
BNU-Banco Nacional Ultramarino : December 88-December 97
ABN-AMRO Bank N.V. : June 90-December 97
DBI-Deutsche Bank de Investimento : December 90- December 97
BMI-Banco Mello de Investimentos (Banco Mello until 1996) : June 91-December 97
BNCI-Banco Nacional de Crédito Imobiliário : June 92-December 97
BII-Banco de Investimento Imobiliário : December 93-December 97
Finantia-Banco Finantia : December 93-December 97
CISF- CISF-Banco de Investimento : December 93-December 97
FINIBANCO : December 93-December 97
BSN-Banco Santander de Negócios :June 94-December 97

The banks included in the sample are every bank in the Portuguese banking system with assets worth 100 billions of escudos or more in December 1997.

All balance sheet data are calculated as an average of beginning-of-the-year, mid-year, and year-end financial statements figures. The reason lies in the fact that while semi-annual data are employed from 1985 until 1997, balance sheets itemise mid-year and end-of-year stocks, while profits are a flow covering the entire semi-annual period.

6.3.2. - EXPLANATORY VARIABLES AND THEIR MEASUREMENT

The regressors used in the model are those banking performance determinants more or less widely explored in the literature: real stability measured by G.D.P. growth, nominal stability measured by the inflation rate, and interest rates, studied through two mechanisms of influence on profitability, management quality, market structure, ownership, and regulation. With respect to the measurement of both the bank-specific variables, such as management quality and market structure, and the dependent variables, all data are obtained from audit reports as explained earlier in chapter 4. The sources of data for general economic conditions, such as nominal stability, real stability and the effect of interest rates, are described together with the explanation of these variables. The sources of data for regulation and ownership are also given when these variables are introduced.

In what concerns economies of scale, the American literature is reasonably clear that larger banks do not experience economies of scale [Benston, Hanweck and Humphrey (1982)]. Although beyond the scope of this thesis, the lack of information about economies of scale in European banks would be worth exploring. As will be explained, this study considers economies of scale as one of the omitted bank-specific variables captured by the unbalanced panel data model. The presentation of the explanatory variables follows.

G.D.P. growth

The use of G.D.P. growth as a variable does not feature extensively in the literature. However, Hoggarth et al. (1998) conclude that the behaviour of real GDP fails to explain the greater variability of banking sector profits in Britain than in Germany. In the former country, average profitability is higher then in the latter. But they do not say that G.N.P. variability did not affect profits, only that they could not use it to explain different UK/German banks performance. If this variable is not statistically significant in explaining profitability, then the conclusions of Hoggart et al. are reinforced. Otherwise, the expected sign should be positive since higher growth

implies both lower probabilities of individual and corporate default and an easiest access to credit (in the sense that either individual or corporate credit ratings from banks are improved)

Annual real G.D.P. growth rates, measured in June and December, are introduced in the model and their source is the National Statistics Institute (Quarterly National Accounts).

Inflation rate

Revell (1979) has suggested that inflation may be a factor causing variation in bank profitability. Bourke (1989) argues that this phenomenon is not widely discussed elsewhere in the literature. According to Hoggarth et al. (1998), nominal macroeconomic (in)stability appears to be more relevant to banking performance than real macroeconomic (in)stability. They argue that high and variable inflation has a major impact on bank earnings. When comparing banking profitability in UK and German they suggest that lower and more stable inflation is a reason why bank loan losses have been lower in German than in the UK.

The annual growth in the consumer price index, measured twice a year (in June and December) is used as an independent variable in the model. The sign is expected to be positive. Economic intuition suggests that a higher rate of inflation, because it goes along with higher interest rates, favours the intermediation spread. Lower inflation rates, and the correspondent squeeze in interest margins, may deepen profits. This relation between inflation and profitability reinforces the findings of Hoggarth et al. that a greater commitment to monetary discipline in Germany is the cause for lower but more stable profits in Germany than in the UK.

The source for the Portuguese inflation rate is The Portuguese Central Bank Quarterly Bulletin since 1985 and the Monthly Statistical Bulletin from 1995 onwards.

The mechanisms through which interest rates affect banking profitability

Literature in which the effect of monetary policy on banking profitability is tested is scarce. Short (1979) found a positive relation between nominal interest rates and return on capital, interest rates being used as a proxy for capital scarcity (an analysis in terms of opportunity costs). Bourke (1989) assumed that interest rates had a direct influence on profitability and tested this influence in the context of return on assets as the dependent variable. He found a positive correlation between interest rates (the long-term bond rate) and the return on assets. Considering the interest rate alone as a banking performance determinant (that is, the use of an interest rate as an exogenous variable in the model) is a much too simple approach to the impact of monetary policy on banking performance. Monetary policy affects bank profitability in many ways, examining the effect of interest rates changes captures only one aspect of this issue.

Although not impossible, it is very difficult to find an accurate measure or proxy for monetary policy.

Facing the problem of measuring monetary policy, an option is to explore mechanisms through which movements in interest rates affect banking profitability. Nevertheless, the importance of the response of banking profitability to changes in monetary policy deserves further theoretical and empirical research.

The above mechanisms that affect banking profitability can be divided into two types. One type, which is bank specific and affects each bank in a different way over each period, is called the "endowment effect". This effect captures the opportunity cost of holding reserves with the Central Bank and the benefits from having low interest cost deposits as a source of funding. The second type of mechanism relates to the spread, and is introduced in the model as a variable that affects all the banks in the same way over each period. The spread is considered as a general market and economic condition because it is measured in weighted aggregate terms.

The "endowment effect" is based on the idea that, the more interest rates rise, the lower, in relative terms, becomes the cost of non-bearing interest rate funds and other

cheap banking resources. Hence, a rise in interest rates can be viewed as a "saving" for banks, enhancing profitability. That is, interest rates in the market rises but the cost of funding remains unchanged.

In its most simple form, a bank's balance sheet can be represented as shown in figure 6.1:

Figure 6.1 – Simple Form of a Bank's Balance Sheet

| A | F^H |
| | F^L |

Where:

A stands for total assets.

$\mathbf{F^H}$ stands for high interest cost funding resources (such as wholesale deposits saving).

$\mathbf{F^L}$ stands for low interest cost funding resources (such as demand deposits, capital and reserves).

The bank specific "endowment effect" depends on its ratio:

$$\frac{F^L}{A}$$

With $\mathbf{F^L = DD + C}$

Where **DD** represents demand deposits and **C** represents capital and reserves.

A is defined as above.

Assuming constant interest costs of $\mathbf{F^L}$, that is assuming that demand deposits are a non-bearing interest rate resource and that there is no policy of dividend distribution, then the expected improvement (worsening) on profits- π^e -from a rise (decrease) on interest rates can be measured as follows:

$$\Pi^e = \frac{F^L}{A} * i \quad \text{(6.1.)}$$

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Where "i" is the nominal interest rate of higher costly resources of funds such as wholesale saving deposits - F^H.

The expected sign of the "endowment effect" on banking profitability is positive since if nominal interest rates increase, everything else being equal, the bank has a relatively cheap source of funding in demand deposits and capital and reserves, therefore enhancing profitability.

The "endowment effect" on profitability must be adjusted to account for the effect of the opportunity cost arising from non-bearing interest reserves held at the Central Bank. As interest rates rise, the opportunity cost of holding reserves at the Central Bank rises as well and, "ceteri-paribus", it therefore deepens profitability.

Although it is impossible to measure this opportunity cost in accounting terms (financial statements don't reflect these costs), it is possible to improve equation 6.1 in order to capture the effect of opportunity costs. Thus we have equation 6.2:

$$\Pi^e = \frac{F^L - R^N}{A} * i \qquad (6.2.)$$

Where R^N stands for non-bearing interest reserves held at the Central Bank

The mandatory reserve system in Portugal, and its changes through the life span of this study[133], does not allowed for the inclusion of R^N in the model. Therefore the unbalanced panel model developed in this chapter is built with equation 6.1.

The proxy used for the nominal interest rate of higher costly sources of funds is the three months interbank money market interest rate [134].

Concerning the second type of mechanism through which interest rates affect banking profitability, the spread is measured in aggregate terms because this analysis

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[133] During a certain period part of compulsory reserves bearded interests and other part didn't. Portuguese Banks' financial statements don't discriminate between these two kinds of reserves.
[134] From 1991 onwards. Between 1985 and 1990, since there was no efficient interbank money market, the proxy is the Central Bank's discount rate.

looks at banking profitability as a whole so far as stability is concerned. Assuming that the banks' credit policy reacts to the differential between lending interest rates and the cost of their funding (their refinancing sources being either the Central Bank or the interbank monetary market), we have a second approach to the way interest rates may affect banking profitability. It can be argued that banking profitability is positively correlated with the spread between lending rates and refinancing rates.

The availability of data for aggregate lending and refinancing interest rates allows the insertion in the model of the spread as a general market and economic condition variable, which is assumed to affect all the banks over each period in the same way.

The explanation of the spread measurement in aggregated terms follows.

Variables and sources of data collection:

Lending interest rates: lending operations with maturities ranging from 91 to 180 days. From June 1985 (more precisely since 1965) until the first half of 1988, interest rates were administratively set by the Portuguese Central Bank in accordance with The Ministry of Finance monetary policy. Source of data collection: Banco de Portugal Long Time Series (1993). Since the second half of 1988, the maximum interest rate on loans has been lifted (with exception of housing credit and loans granted under housing-saving accounts).

The source of data collection is the "Banco de Portugal Quarterly Bulletin" replaced in 1995 by the "Monthly Statistical Bulletin". With the liberalisation of lending interest rates, the values presented are weighted averages for all the banking system.

Refinancing interest rates: The Portuguese Central Bank discount rate between the first half of 1985 and the second half of 1990, plus the three months interbank money market interest rates from the first half of 1991 onwards (weighted average rates for all the banking system).

There are two reasons for choosing 1990 as a turning point and for using interbank money market rates instead of the repo rate:

Firstly the smooth transition from direct money supply controls to an indirect control system of liquidity in the Portuguese economy took place between 1990 and 1992. During this period the rules for the interbank market were settled and the repo-rate replaced the discount rate as a tool of monetary policy. The repo-rate performs the role of an upper limit to interbank rates. Consequently, if banks price their lending to each other at higher levels, they simple cannot find a counterparty. When refinancing their liquidity deficit, banks prefer to go to the interbank market than to the Central Bank where they have to pay the repo rate.

Secondly, the Portuguese Central Bank Annual Report (1991) states that "the economy faced during 1991 a growing and stronger interrelation between interbank money market and the banking credit market with its clients (...) money market interest rates began their function (or began to act, or began to operate) as a lower limit to lending operations with banking best clients (the prime-rate)"[135].

For the central bank's discount rate the source of data collection is "Banco de Portugal Long time series (1993)".

For the three months interbank money market rates (operations with maturities between 86 and 96 days), the source of data collection is both the "Banco de Portugal Quarterly Bulletin" since 1991 up to 1994 and the "Monthly Statistical Bulletin" from 1995 onwards.

These interest rates are weighted average rates according to the formula:

$$\frac{\sum C * t * r}{\sum C * t}$$

Where:

"C" stands for capital

"t" stands for maturity

"r" stands for interest rate

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[135] p.184

Regulation

The statistical significance of regulation as a banking performance determinant has never been empirically tested. In the unbalanced panel data model herein developed, regulation is tested as a qualitative variable with three classes. These three mutually exclusive levels of regulation are:

- The less liberalised banking market between 1985 and 1988;
- The more liberalised banking market between 1989 and 1992;
- The liberalised banking market between 1993 and 1997.

These cut-off dates were chosen because between 1988 and 1989 further barriers to entry in the banking market were lifted, and between 1992 and 1993 a very important range of prudential rules were implemented together with the abolishment of the remaining barriers to entry and the remaining administrative controls:

a) Until 1988 banks were required by the government to open a branch on a less desirable region for each opening request of a branch in a desirable one.

b) In September 1988 the maximum interest rate on credit operations was lifted.

c) The re-privatisation programme in the banking system began in 1989.

d) From 1989 onwards the compulsory acquisition of bad loans from state owned banks as a legal requirement for new banks to enter the market was abolished.

e) From 1989 onwards banks weren't anymore required to form a joint venture capital firm if they wanted to enter into the banking market.

f) The minimum level of 8% for the solvency ratio was enforced in 1992.

g) Credit ceilings were definitely abandoned by the end of 1991.

h) Full capital movements' liberalisation became effective in 1992.

i) Interest rates on deposits were liberalised in 1992

j) Barriers to entry were definitely abolished in January 1993

Following the rule that the number of dummies be one less than the number of categories of the variable, two dummies are introduce in the model to take care of the three levels of regulation.

The first dummy is REG and the second one is REG1, where:

REG = 1 if the market is liberalised (that is between 1993 and 1997)

REG = 0 otherwise

And,

REG1 =1 if the market is more liberalised (that is between 1989 and 1992)

REG1 = 0 otherwise

With the preceding assignment of the dummy variables the category of "less liberalised market" is treated as the base category, and its effect is captured by the intercept of the linear regression unbalance panel data.

If regulation is statistically significant for the explanation of banking profitability, and the estimated coefficients show a positive sign, then the study allows for the conclusion that profitability has increased along with financial regulatory reform in Portugal.

Next follows the analysis of management quality and of market structure as banking performance determinants. Studies of the impact of these variables on performance, are generally carried out to explain performance in differentiated groups of banks where banks are separated into different size categories. Nevertheless, some conclusions are useful in explaining the statistical significance of the above-mentioned explanatory variables on profitability. First, prior research on quality management will be reviewed. Secondly, prior conclusions over the effect of market structure on profitability will be analysed..

Management Quality

Hoggarth et al. (1998) suggest that differences in risk management, and especially in the proclivity to take risk, is one possible factor that affects bank performance.

Swamy et al. (1996) identify important determinants of the performance of commercial banks.[136]

Gup and Walter (1989), aiming at studying the determinants of high performance small banks, made a non-econometric study encompassing several measures of management quality: interest income to assets, interest expense to assets, noninterest income to assets, noninterest expense to assets, loan loss provision to assets, securities gains to assets, return on assets, loans to assets, securities to assets; equity to assets and total assets.

Miller and Noulas (1997) conduct the most comprehensive econometric study related to the effect of management quality on banking profitability. The measures of management quality variables they have adopted and the respective results on performance response (R.O.A. = net income/total assets) are shown in table 6.2. The results shown relate to a fixed-effects model over banks and time. In the current research, Miller and Noulas's measurement of management quality will be followed and will be extended to explain profits and R.O.E. as well. Even so, some adjustments are required because audited and published Income Statements, on a semi-annual basis, are only available from June 1990. Therefore, using financial ratios that measure productivity and efficiency would bias the results of the study. It should be added that only after 1993 were banks allowed to grant real estate loans (until then only two banks were legally authorised to perform this kind of operation), which means that the ratio of real estate loans to total loans must be disregarded. The ratio net loan charge-offs to total loans will be disregarded as well, because information concerning loan charge-offs and recoveries is not available. The results obtained will be compared with the analysis of both Miller and Noulas and of Gup and Walter.

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[136] Bank-specific variables (ratios: construction real estate loans to assets; 1-4 family real estate loans to assets; multi-family real estate loans to assets; commercial real estate loans to assets; commercial and industrial loans to assets; consumer loans to assets; other loans to assets, equity capital to assets and average bank size). A general economic condition variable: unemployment rate. And, finally, locational restrictions such as Southeast Compact Member, National, National reciprocal, Regional reciprocal and statewide branching.

To conclude, the proposed unbalanced panel model measures management quality by means of the following ratios: total securities to total assets, Portuguese Government securities to total securities, total loans to total assets, total deposits to total assets, demand deposits to total deposits, time deposits to total deposits and provisions for loan losses to total loans.

Table 6.2- Management Quality and Banking Performance

Ratios	Effect on R.OA.
Financial ratios that measure asset management (lending and investing)	
Total securities/total assets	Positive and significant at the 5% level
U.S. Government securities/total securities	Statistically non-significant
Total loans/total assets	Positive and significant at the 1% level
Real estate loans/total loans	Statistically non-significant
Financial ratios that measure liability (funding) management	
Total deposits/total assets	Positive and significant at the 1% level
Transaction deposits/total deposits	Positive and significant at the 1% level
Large time deposits/total deposits	Statistically non-significant
Financial ratios that measure productivity and efficiency	
Total non-interest expenses/total expenses	Negative and significant at the 1% level
Total non-interest income/total income	Positive and significant at the 1% level
Salaries and benefits/total employees	Positive and significant at the 1% level
Financial ratios that measure quality of assets	
Provisions for loan losses/total loans	Negative and significant at the 1% level
Net loan charge-offs/total loans	Negative and significant at the 5% level

Source: Miller and Noulas (1997)

Knowledge of the Portuguese Banking System does not provide enough ground to anticipate the sign of this determinant. However, incipient asset/liability management techniques emerged during the life span of this study. Let it just be noticed that the first and simplest strategy (or technique) of risk management consists in securitisation. The existing void in the Portuguese legal framework prevented banks from applying this technique. It makes us believe either that variables are not statistically significant or that they will present either a negative or a positive sign.

Market Structure

Several studies pursued in the 80's, like Kwast and Rose (1982) Wall (1985) and Gup and Walter (1989), reached the conclusion that collusion was not an explanatory

variable for high profitability. Kwast and Rose used the Herfindahl Index on deposits as a proxy of market concentration. So did Wall (1985).

Although in these previous researches, market structure is considered with the aim of studying profitability behaviour among banks of different sizes, the results obtained by these authors will be compared with the results obtained with the unbalanced panel data model.

Gilbert (1984) conducted a comprehensive survey on the evaluation of the structure-performance relationship in the banking industry. He concluded that concentration in local market areas is the relevant measure of market structure. Thirty-two studies, out of the forty-four studies surveyed, report some evidence of significant association between market structure and measures of bank performance, with the direction of influence of market structure as indicated by the structure-performance hypothesis[137].

In the banking literature, tests for competition typically look at only one of the markets, loans or deposits, where banks operate. The traditional approach has overlooked the fact that banks may exercise market power in both the deposits and loans markets. In fact, competition may increase in one market and decrease in the other. That is, ignoring one of the markets while analysing the other may induce misleading conclusions about the degree of competition within the industry. This is why the Herfindahl Index of market concentration is included in the unbalanced panel data model developed in this chapter as measuring both the degree of competition in the deposits market and in the loans market[138].

Barros and Leite (1998) assess the impact of liberalisation in the Portuguese banking market, testing for competition in both the deposits and loans markets. These authors focus on the period after interest rate liberalisation, showing that competition increased mainly as a result of the changes in the deposits market. Furthermore, they show that, in the loans market, bank conduct was significantly more collusive than Nash behaviour.

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[137] A positive correlation between the measure of concentration in local markets and the interest paid on several categories of retail deposits.
[138] For more evidence on the merits of this global approach see Barros and Leite (1998).

The shape of the market structure of the Portuguese Banking Industry results from the overlap of three distinct influences, namely barriers to entry, and banks' behaviour on both credit and deposit sides of the balance sheet. Barriers to entry were gradually lifted between 1985 and 1993. The effects of liberalisation on deposits and on credit were different.

The abolishment of quantitative restrictions on deposits was more rapid then those on credit. Firstly deposits were never subject to a corset while restrictions on the quantities of credit granted to the economy remained in the system until 1991. Secondly, while from 1985 onwards credit institutions were authorised to fix interest rates on deposits (except on time deposits over 180 days), interest rate controls in credit operations were only lifted in 1988.

With the abolishment of barriers to entry, the number of competitors in the market is expected to increase. Portugal had 50 credit institutions in 1997 compared with 17 at the end of 1984. That is, market concentration is expected to decline. But, because of the different behaviour on the credit and deposits sides of the balance sheet, as explained below, tests will be carried out for the Herfindahl Index as a measure of market structure on both the credit and on the deposits markets. It is expected that structure of the credit market will have a positive effect on profitability (the market was characterised by price liberalisation with quantities rationing). On the contrary, the market structure of the deposit side is expected to have a negative influence on banking profitability because competition was fiercer over deposits than over credit. Kwast and Rose (1982) and Wall (1985) included in their studies only the deposit market's Herfindhal Index of concentration.

The sources of data, when computing the Herfindahl Index, are all balance sheet information concerning deposits and credit for the whole Portuguese banking system from the first half of 1985 until the second half of 1997[139]. The Herfindahl Index measures the banking market structure at the middle and the end of each year.

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[139] See annexes I and II (Vol. II) (Source: the author's research).

On the credit market, the Herfindhal Index of market concentration is based on gross loans instead of net loans. The reason is simple, market power arising from the amount of credit granted as a whole regardless whether it is in default or not.

In the deposits market, total deposits are used to compute the Herfindhal Index. Again the reason for doing this is simple. The ability of banks to operate with this cheap source of funds derives from the global amount of liquidity they are able to attract (not only demand deposits but time deposits as well). In other words, the greater the amount of the deposits, the cheaper will be the bank's funding.

Ownership

There is a considerable debate and a voluminous academic literature on the implications of differing forms of ownership structure for corporate behaviour, both in relation to financial institutions and to companies in general. 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 goals such as the allocation of resources to less developed sectors of the economy. State-owned banks may also be more risk averse than profit-maximising banks. Short (1979) and Bourke (1989) both tested for the effects of ownership on banking profitability but they reached opposite results. While Short found that ownership was statistically significant and that government ownership presented an inverse relationship with profitability, Bourke's work concluded there was no statistical significance for the effect of ownership on banking profitability.

In the current research, the effect of ownership on banking profitability is analysed assuming ownership is a binary variable where "1" stands for state-owned banks and 0 (zero) for private banks. In the Portuguese Financial System there are no co-operative banks. Increased profitability with the re-privatisation process in Portugal, as it is commonly assumed, together with conventional wisdom that private banks are profit-maximising firms while state owned banks may pursue other goals, favours the conclusion that the expected sign of this explanatory variable will be negative.

Methodology: The ownership of a bank is assumed to shift to the private sector when a stake of at least 51% has been sold by the state. The qualitative explanatory

variable "ownership ' assumes 0 (zero) only after an entire period of 6 months under private management took place. The moments of Portuguese Banks privatisations included in our sample is presented in table 6.3.

Table 6.3- Privatisations in the Portuguese Banking System (50%+1%)

BANK	DATE
BBI	AUG. 1996
BCA	DEC. 1996
BFE	AUG. 1996
BES	FEB. 1992
BFB	AUG. 1991
BPSM	NOV. 1994
BPA	MAY 1992
BTA	JULY 1990
CPP	DEC. 1992
BMELLO/UBP	FEB. 1993

When re-privatised, BES, BPSM, BPA, BTA, CPP and UBP returned to the former owners.

Sources of data collection: The schedule of the Portuguese Reprivatisation Programme for the Banking System has been obtained at the Ministry of Finance for reprivatisations occurred between 1989 and the first half of 1995. The source for the remaining dates is the Portuguese Central Bank.

6.3.3. - DEPENDENT VARIABLES

The aim is to study banking stability from the profitability standpoint. Hence, banking performance measurement is related to profitability measurement. Profits after taxes, R.O.A. and R.O.E. are the measures inserted in the model as dependent variables. The significance of the effects of the determinants of banking performance, as explained above, will be tested first on profits after taxes and afterwards on R.O.A. and R.O.E. separately.

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6.3.4. - FUNCTIONAL FORM OF THE EQUATIONS TO BE ESTIMATED

Finding the best functional form for the equations to be estimated is a crucial step in the research process. Under a wrong model specification, results are less reliable and may provide evidence for less accurate conclusions. Bourke (1989), in respect of carrying out banking profitability tests, recognises that "the literature generally, in so far as it is discussed, comes to the conclusion that the appropriate functional form for testing is a linear function although there are dissenting opinions"[140]. Swamy et al. (1996) identify important determinants of the performance of commercial banks. These authors suggest that it may be the case that the specific linear functional forms considered in previous studies might be false. They propose a class approach for the functional forms of the relationship between banking performance determinants and banking profitability. This class approach is adopted to estimate the significance of banking performance determinants on profitability in the model herein performed. To avoid the risk of misspecifying the functional form of the relationship, a wide class of functional forms is employed in order to embody the true functional form. The effects of excluded variables and of errors in measurement are also accounted for in the class approach. Although testing for linear regression unbalanced panel data, the class approach is used because modelling in this setting calls for some complex stochastic specification that the author proceeds to explain.

Modelling the statistical significance of regulation on banking profitability, together with other banking performance determinants, is carried out in two stages, each of them with the correspondent stochastic specification. In the first stage, only bank-specific explanatory variables are introduced into the model. In the second stage, general economic and market conditions are added to the model, replacing the effects of time on banking profitability.

In the first stage the model has the following general functional relation:

$$Y_{it} = \sum_{j=1}^{9} \beta_j X_{jit} + \mu_{it} \qquad \textbf{(first stage)}$$

Where Y_{it} are the three profitability regressants: profits, R.O.A. and R.O.E.

The explanatory variables of this general model are defined as follows:

X_1 – Total Securities /Total Assets (TSTA)

X_2 – Government Securities/Total Securities (GSTS)

X_3 – Total Loans (net)/Total Assets (TLTA)

X_4 – Total Deposits/Total Assets (TDTA)

X_5 – Demand Deposits/Total Deposits (DDTD)

X_6 – Time Deposits/Total Deposits (TDTD)

X_7 – Provisions for Loan Losses/Total Loans (gross) (PLLTL)

X_8 – Ownership as a dummy variable were: OWNER=1   for state owned banks
ONWER=0   otherwise

X_9 – "Endowment Effect" (ENDOW), and

μ_{it} is the stochastic term.

Model 1 is the pooled regression defined by:

$$\mu_{it} = \alpha + \varepsilon_{it}$$

With:

$E(\varepsilon_{it}) = 0$

And:

$E(\varepsilon_{it}\ \varepsilon_{js}) = \sigma^2$ if i = j and t = s

$E(\varepsilon_{it}\ \varepsilon_{js}) = 0$ otherwise

Therefore the model is:

$$Y_{it} = \alpha + \sum_{j=1}^{9} \beta_j\ x_{jit} + \varepsilon_{it} \qquad \textbf{(Model 1)}$$

Model 2 is the one way error component model, with the classical error component disturbance given by:

$$\mu_{it} = \alpha_i + \varepsilon_{it}$$

[140] P.73

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Therefore the specification of model 2 is:

$$Y_{it} = \alpha_i + \sum_{j=1}^{9} \beta_j X_{jit} + \varepsilon_{it} \qquad \textbf{(Model 2)}$$

With α_i capturing bank specific omitted variables (economies of scale among others). In this model, α_i can be taken to be a group specific constant term in the regression model or it might be more appropriate to view individual specific constant terms as randomly distributed across cross-sectional units. In the first case the linear regression unbalanced panel model is a fixed effects model (Model 2.a) where the α_i's are assumed to be parameters to be estimated and the remainder disturbances stochastic with ε_{it} independent and identically distributed $IID(0,\sigma^2_\varepsilon)$. The X_{it} are assumed independent of the ε_{it} for all i and t. In the second case the unbalanced panel data model is a Random Effects Model (Model 2.b), where $\alpha_i \sim IID(\alpha^-, \sigma^2_\alpha)$, $\varepsilon_{it} \sim (0,\sigma^2_\varepsilon)$ and the α_i are independent of the ε_{it}. In addition, the X_{it} are independent of the α_i and ε_{it} for all i and t.

Model 3 is the Two Way Error Component Model. The disturbance captures both the bank specific omitted variables and the time effects, and is given by:

$$\mu_{it} = \alpha_i + \lambda_t + \varepsilon_{it}$$

Thus the specification of model 3 is:

$$Y_{it} = \alpha_i + \lambda_t + \sum_{j=1}^{9} \beta_j X_{jit} + \varepsilon_{it} \qquad \textbf{(Model 3)}$$

Where α_i denotes the unobservable individual effect referred in model 2, λ_t denotes the unobservable time effect and ε_{it} is the remainder stochastic disturbance.

As in Model 2, both α_i and λ_t can be either fixed or randomly distributed. If the α_i and λ_t are assumed to be fixed parameters to be estimated and the remainder disturbances stochastic with $\varepsilon_{it} \sim (0,\sigma^2_\varepsilon)$, then model 3 represents a Two Way Fixed Effects Error Component Model (Model 3.a). The X_{it} are assumed independent of the ε_{it} for all i and t. If $\alpha_i \sim IID(\alpha^-, \sigma^2_\alpha)$, $\lambda_t \sim (\lambda^-, \sigma^2_\lambda)$ and $\varepsilon_{it} \sim (0,\sigma^2_\varepsilon)$ independent

of each other, then Model 3 is the Two Way Random Effects Model (Model 3.b). In addition, X_{it} is independent of α_i, λ_t and ε_{it} for all i and t.

In the Two Way Error Component Models, λ_t is bank-invariant and it accounts for any time-specific effect that is not included in the regression.

The second stage of the analysis' model estimation differs from the previous one because, now, time is singled out by the general market and economic conditions: nominal stability, real stability, the spread between lending and refinancing interest rates, regulation, and market structure measured by the Herfindhal Index of concentration in both the deposit and the credit markets.

Therefore, in the second stage of the analysis, the model's general functional relation is:

$$Y_{it} = \sum_{j=1}^{9} \beta_j X_{jit} + \sum_{p=1}^{7} \gamma_p X_{pt} + \mu_{it} \qquad \text{(second stage)}$$

Where Y_{it} and X_j are defined as above and the general market and economic conditions are represented by:

X_{1t} – Inflation Rate (INFL)

X_{2t} – G.D.P. growth (GDP)

X_{3t} – Interest Spread between lending and refinancing rates (SPREAD)

X_{4t} – Regulation as a dummy variable (REG), where:

        REG=1   for a liberalised market (since 1993 until 1997)

        REG=0   otherwise

X_{5t} – Regulation as a dummy variable (REG1), where:

        REG1=1   for a lesser liberalised market (since 1989 until 1992)

        REG1=0   otherwise

X_{6t} – Herfindhal Index of concentration in the deposits market (HIDEP)

X_{7t} – Herfindhal Index of market concentration in the credit market (HICRE), and

μ_{it} is the stochastic term.

The Pooled Regression is defined by the following disturbance structure:

$$\mu_{it} = \alpha + \varepsilon_{it}$$

In accordance, Model 1' has the following specification:

$$Y_{it} = \alpha + \sum_{j=1}^{9} \beta_j X_{jit} + \sum_{p=1}^{7} \gamma_p X_{pt} + \varepsilon_{it} \qquad \textbf{(Model 1')}$$

The One Way Error Component Model (Model 2'), but with time effects as described above instead of unrestricted time effects as in Models 3.a. and 3.b., is given by the following shape of the disturbance:

$$\mu_{it} = \alpha_i + \varepsilon_{it}$$

Therefore Model 2' has the following specification:

$$Y_{it} = \alpha_i + \sum_{j=1}^{9} \beta_j X_{jit} + \sum_{p=1}^{7} \gamma_p X_{pt} + \varepsilon_{it} \qquad \textbf{(Model 2')}$$

Accordingly to the behaviour assigned to α_i, and earlier described, this model is estimated as a Fixed Effects Model (Model 2'a) and a Random Effects Model (Model 2'b).

The first stage estimation results are shown on tables 6.4, 6.5 and 6.6 for profits, R.O.A and R.O.E. respectively. Tables 6.7, 6.8, and 6.9 present the results of the second stage modelling estimation for the same regressants.

6.3.5. - ESTIMATION PROCEDURES

The standard OLS (Ordinary Least Squares) estimation technique is used for the Pooled Regression estimators. The LSDV (Least Squares Dummy Variable) approach is the procedure employed to estimate the Fixed Effects Models, where, given the assumed properties of ε_{it}, the OLS estimator is the best linear unbiased estimator (BLUE). In the Two Way Fixed Effects Model the Least Squares Dummy Variable approach is extended to include the time-specific effect as well[141]. For the Random Effects Models the Generalized Least Squares (GLS) estimation procedure

produces more efficient estimators then the OLS[142]. The estimation of the Random Effects Models using GLS produces consistent and asymptotically unbiased estimators.

6.3.6. - HYPOTHESIS TESTING

The analysis encompasses two broad groups of hypothesis testing. The first group refers to testing for fixed effects, in both the one way and the two-way models, and allows for the non-rejection of the Pooled Regression (null hypothesis) as the best model specification. The second group relates to the Hausman's specification test, which under the null hypothesis allows the non-rejection of the random effects model. This hypothesis testing is also applied to both the one way and the two-way models. In conclusion, performing a test for fixed effects permits the choice between the pooled regression and the fixed effects model as the best model's specification, while the Hausman's test gives the best model specification between the fixed effects and the random effects models.

Testing for fixed effects:

The objective is to test the joint significance of the dummy variables in the LSDV model.

The null hypothesis is:

$H_0: \alpha_1 = \alpha_2 = \ldots\ldots\ldots = \alpha_{(N-1)} = \alpha_N$

Where N is the number of banks that are observed and (N-1) is the number of dummies included in the regression.

An *F-test* is performed and the "F" statistic, which under the null hypothesis has an F distribution with (N-1) and [N(T-1)-K] degrees of freedom, has the following form

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[141] See, for instance, Green (1997) and Baltagi (1999).
[142] See Green (1997), p.625.

$$F = \frac{(RRSS - URSS)/(N-1)}{URSS/(NT - N - K)}$$

Where:

RRSS stands for restricted residual sums of squares, being that of OLS on the pooled model.

URSS stands for unrestricted residual sums of squares, being that of the LSDV regression.

N is the number of banks.

T is the number of periods.

K is the number of explanatory variables.

As in the above One Way Error Component Model, a test for fixed effects can be performed for the Two-Way Error Component Model. In this case the test for the joint significance of the dummy variables has the following null hypothesis:

H_0: $\alpha_1 = \alpha_2 = \ldots = \alpha_{(N-1)} = \alpha_N$ and $\lambda_1 = \lambda_2 = \ldots \ldots \ldots = \lambda_{(T-1)} = \lambda_t = 0$

The "F-statistics" is given by the following form, which under the null hypothesis has an F distribution with (N+T-2) and [(N-1) (T-1)-K] degrees of freedom:

$$F = \frac{(RRSS - URSS)/(N + T - 2)}{URSS/(N-1)(T-1) - K}$$

Where the restricted residuals sums of squares (RRSS) is that of pooled OLS, and the unrestricted residual sums of squares (URSS) is the one from the extended LSDV regression.

The Hausman's specification test

A critical assumption in the error component regression model is that E (μ_{it} / X_{it})=0. Given that the disturbances contain individual effects (α_i) which are unobserved but may be correlated with the X_{it}, this assumption is very important because, with correlation between α_i and X_{it}, the GLS estimators become biased and inconsistent. Hausman suggests comparing the GLS estimators with the within estimators[143], both

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[143] Baltagi (1999), p.68 gives a detailed description of the Hausman's specification test.

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of which are consistent under the null hypothesis, but which will have different probability limits if the null hypothesis is not true.

The null hypothesis for the Hausman test is given by:

H_0: α_i and X_{it} are uncorrelated

The Hausman test statistic is given by:

$$m_1 = \hat{q}'_1 \left(var(\hat{q}_1) \right)^{-1} \hat{q}_1$$

Where $\hat{q}'_1 = \beta_{GLS} - \beta_{Within}$

The Hausman statistic, m_1, under the null hypothesis is asymptotically distributed as a χ^2 distribution with K (the number of explanatory variables) degrees of freedom.

If the null hypothesis is rejected it is not possible to use the random effects model, because the idea that unobservable individual invariant effects contained in the disturbances are uncorrelated with individual specific explanatory variables is rejected. Thus, the best specification model is the fixed effects model.

6.4. - THE RESULTS

Findings on the empirical results of this study are reported on tables 6.4, 6.5, 6.6, 6.7, 6.8, and 6.9. These results are interpreted as the results of a linear regression, despite the complexity of the methodology that is applied[144].

For the reasons explained just below, of the various models' specification discussed the best is the Two Way Error Component Model with Fixed Effects in what concerns the first stage of the analysis. When the behaviour of time is less unrestricted, what happens in the second stage of the study where time effects are known, the One Way Fixed Effects Error Component Model is the best model's specification. As mentioned, the justification follows.

In the first stage of the analysis, and when profits behaviour is explained, the test for fixed effects rejects the pooled regression specification. The Haussman's specification test rejects the random effects model, which means that α_i and X_{it} are not uncorrelated.

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[144] Annexes VI to XIII (Vol. II) show the data files that feed the unbalanced panel data models.

Table 6.4 – Profitability Regressant: Profits. First Stage of Model Estimation

MODEL	1)Pooled Regression	2) BANK		3) BANK AND TIME	
		a)Fixed effects	b)Random effects	a)Fixed effects	b)Random effects
constant	-97876,1	--------	-39856.53	--------	-21538.5
	(-0.531)		(-0.315)		(-0.170)
tsta	108.4801*	49.33239*	52.19151*	33.584!	51.355*
	(5.708)	(2.835)	(3.066)	(1.873)	(3.007)
gsts	3,61611	13.57206*	13.91714*	5,395135	13.2424**
	(0.571)	(2.677)	(2.784)	(0.850)	(2.389)
tlta	11,30582	-5.164520	-5,042338	8,780859	-2,139965
	(0.831)	(-0.410)	(-0.410)	(0.664)	(-0.172)
tdta	35.65542*	-14.50585	-3,68637	-22.71134!	1,572493
	(3.767)	(-1.185)	(-0.324)	(-1.693)	(-0.136)
ddtd	959,5123	344,8875	417,3842	-329,6602	231,6574
	(0.521)	(0.273)	(0.330)	(-0.256)	(0.183)
tdtd	963,2454	341,3665	412,2922	-322,968	222,3116
	(0.523)	(0.270)	(0.326)	(-0.250)	(0.175)
plitl	-60.645!!	-21.67675	-18.90436	-35.16883	-21.60719
	(-1.531)	(-0.641)	(-0.572)	(-1.030)	(-0.656)
owner	1085.792**	-2482.551*	-2099.023*	-1448.814*	-1908.819*
	(2.277)	(-4.746)	(-4.148)	(-2.587)	(-3.698)
endow	-286.404**	-78.7295	-110,1903	503.1259*	-62,27784
	(-2.304)	(-0.832)	(-1.175)	(3.055)	(-0.538)
DF	685	653		627	
R-squared	0,10262	0,60859		0,63896	
Estd. Autocorrelation of	0,145089	0,145089	0,150174	0,146374	0,1472
"F"-statistics		26,379		22,315	
d.f.		32;654		57;628	
prob. Value		0,00000		0,00000	
Haussman test			18,69		46,91
df; prob. Value			9 ; 0 02793		9; 0 00000

The *t-statistic* tests are reported in parentheses under each coefficient estimates
* Significant at the 1% level
**Significant at the 5% level
! Significant at the 10% level
!! Significant at the 20% level

Table 6.5 – Profitability Regressant: R.O.A. First Stage of Model

MODEL	1)Pooled Regression	2) BANK a)Fixed effects	2) BANK b)Random effects	3) BANK AND TIME a)Fixed effects	3) BANK AND TIME b)Random effects
constant	35.96368!!	--------------	18.75287	----------	12.4841
	(1.587)		(0.901)		(0.611)
tsta	0.01598*	0.00131	0.00599**	0.004217!!	0.007978*
	(6.837)	(0.464)	(2.272)	(1.468)	(3.063)
gsts	0.0001658	0.002202*	0.001324!	0.003192*	0.002171**
	(0.213)	(2.633)	(1.666)	(3.138)	(2.379)
tlta	0.008418*	0.006684*	0.00659*	0.009759*	0.008725*
	(5.029)	(3.217)	(3.468)	(4.604)	(4.600)
tdta	-0.008854*	-0.00314!!	-0.0061*	-0.00335!!	-0.00693*
	(-7.606)	(-1.555)	(-3.860)	(-1.560)	(-4.298)
ddtd	-0.3621!!	-0.12706	-0.1872	-0.05969	-0.127545
	(-1.598)	(-0.609)	(-0.900)	(-0.289)	(-0.624)
tdtd	-0.36101!!	-0.129557	-0.18842	-0.05911	-0.12576
	(-1.593)	(-0.620)	(-0.906)	(-0.286)	(-0.615)
plti	-0.006398!!	-0.003689	-0.002732	0.00035	0.00039
	(-1.314)	(-0.662)	(-0.532)	(0.064)	(0.078)
owner	-0.028179	-0.30582*	-0.19504**	-0.44694*	-0.30396*
	(0.481)	(-3.545)	(-2.575)	(-4.981)	(-3.907)
endow	0.1475867*	0.13359*	0.13637*	0.130706*	0.13806*
	(9.654)	-8.561	(9.025)	(4.954)	(6.719)
DF	685	653		627	
R-squared	0.28532	0.43927	0.24254	0.57912	0.2305
Estd. Autocorrelation of e(i,t)	0.202781	0.202781	0.215973	0.16634	0.175658
"F"-statistics		5.602		5.983	
d.f.		32;654		57;628	
prob. Value		0.00000		0.00000	
Haussman test			34.63		33.12
df ; prob. Value			9;0.000069		9;0.000127

The t-statistic tests are reported in parentheses under each coefficient estimates
* Significant at the 1% level
**Significant at the 5% level
! Significant at the 10% level
!! Significant at the 20% level

Table 6.6 – Profitability Regressant: R.O.E. First Stage of Model Estimation

MODEL	1)Pooled Regression	2) BANK a)Fixed effects	2) BANK b)Random effects	3) BANK AND TIME a)Fixed effects	3) BANK AND TIME b)Random effects
constant	-467.5102	---------	-505.703!!	---------	-730.331**
	(-1.216)		(-1.408)		(-2.065)
tsta	0.118*	0.02226	0.0418	0.08368!	0.08095!
	(2.976)	(0.449)	(0.917)	(1.684)	(1.793)
gsts	-0.02406!	-0.1294	-0.017	-0.003177	-0.011711
	(-1.820)	(-0.897)	(-1.244)	(-0.181)	(-0.739)
tlta	0.0754*	-0.01742	0.004643	-0.14935	0.0143
	(2.656)	(-0.486)	(0.141)	(-0.407)	(0.435)
tdta	0.04378**	0.07201**	0.0409!!	0.09142**	0.03237
	(2.217)	(2.067)	(1.491)	(2.458)	(1.154)
ddtd	4.6468	5.1391!!	5.08577!!	8.0278**	7.3075**
	(1.209)	(1.426)	(1.417)	(2.245)	(2.067)
tdtd	4.6676	5.1078!!	5.07666!!	8.0298**	7.3468**
	(1.214)	(1.417)	(1.414)	(2.245)	(2.077)
pitti	0.04435	0.01986	0.03813	0.08677	0.08453
	(0.537)	(0.206)	(0.429)	(0.917)	(0.970)
owner	-3.2092*	-3.5302**	-3.0419**	-7.0169*	-5.396*
	(-3.226)	(-2.371)	(-2.32)	(-4.52)	(-3.995)
endow	0.7476*	0.9356*	0.88727*	0.16444	0.06017!
	(2.883)	(3.474)	(3.4)	(0.360)	(1.682)
DF	685	653		627	
R-squared	0.141	0.3122	0.024237	0.43895	0.015251
Estd. Autocorrelation of e(i,t)	0.385631	0.385631	0.392246	0.35956	0.355997
"F"-statistics	4.722			4.686	
d.f.	32.654			57.628	
prob. Value	0.00000			0.00000	
Haussman test		12.57		12.11	
d.f ; prob. Value		9; 0.1831		9 ; 0.2042	

The *t-statistic* tests are reported in parentheses under each coefficient estimates
* Significant at the 1% level
**Significant at the 5% level
! Significant at the 10% level
!! Significant at the 20% level

Table 6.7 – Profitability Regressant: Profits. Second Stage of Model Estimation

MODEL	1') Pooled Regression	2') BANK+ECONOMIC AND MARKET GENERAL CONDITIONS	
		a) Fixed effects	b) Random effects
constant	-45934.45	------------	13669,44
	(-0.249)		(0.109)
tsta	99.72108*	33.1449!	35.2059**
	(5.187)	(1.889)	(2.037)
gsts	-7.797597	3,4384	3,4419
	(-1.069)	(0.592)	(0.598)
tlta	12,5448	3,2728	2,2564
	(0.910)	(0.254)	(0.178)
tdta	33.48759*	-19.728!!	-11.6195
	(3.358)	(-1.536)	(-0.952)
ddtd	424,5446	-173.949	-132.0489
	(0.231)	(-0.139)	(-0.106)
tdtd	427,3135	-171.151	-131.408
	(0.232)	(-0.137)	(0.105)
plltl	-72.97121!	-34.35317	-31.5794
	(-1.842)	(-1.030)	(-0.962)
owner	1617.606*	-1597.675*	-1357.46**
	(3.145)	(-2.904)	(-2.519)
endow	33,32362	392.188*	357.421**
	(0.187)	(2.639)	(2.429)
infl	-89.74163	-108.69**	-105.647**
	(-1.177)	(-2.022)	(-1.972)
gdp	-79.13590	50,2396	37,5254
	(-0.480)	(0.443)	(0.332)
spread	85,22568	47,775	46,7736
	(0.486)	(0.399)	(0.391)
reg	1145,267	1590.229!!	1579.667!!
	(0.654)	(1.346)	(1.337)
reg1	1486.074!!	1118.645!!	1178.009!!
	(1.338)	(1.487)	(1.568)
hidep	38794,51	12287,63	14642,55
	(0.876)	(0.409)	(0.448)
hicre	-33725.46!!	-17367.44	-18952.05
	(-1.286)	(0.958)	(-1.048)
DF	678	646	
R-squared	0,12622	0,62815	0,086469
Estd. Autocorrelation of e(i,t)	0,113882	0,113882	0,116872
"F"-statistics		27,25	
d.f.		32;647	
prob. Value		0,00000	
Haussman test df; prob. Value			15,32 / 16 ;0.5013
The *t-statistic* tests are reported in parentheses under each coefficient estimates			
* Significant at the 1% level			
**Significant at the 5% level			
! Significant at the 10% level			
!! Significant at the 20% level			

Table 6.8 – Profitability Regressant: R.O.A. Second Stage of Model Estimation

MODEL	1') Pooled Regression	2') BANK+ECONOMIC AND MARKET GENERAL CONDITIONS	
		a) Fixed effects	b) Random effects
constant	19,7654	....	4.07729
	(0.901)		(0.202)
tsta	0.01904*	0.004269!!	0.00847*
	(8.322)	(1.505)	(3.212)
gsts	0,001089	0.002635*	0.002042**
	(1.255)	(2.809)	(2.262)
tlta	0.009521*	0.008577*	0.00831*
	(5.804)	(4.119)	(4.337)
tdta	-0.00842*	-0.002172	-0.00488*
	(-7.098)	(-1.046)	(-2.910)
ddtd	-0.2228	-0.01837	-0.06233
	(-1.017)	(-0.091)	(-0.310)
tdtd	-0.21936	-0.01892	-0.0617
	(-1.001)	(-0.094)	(-0.306)
plltl	-0.00246	0,00038	0,001224
	(-0.552)	(0.072)	(0.243)
owner	-0.1588*	-0.4829*	-0.3780*
	(-2.594)	(-5.431)	(-4.709)
endow	0.11724*	0.09807*	0.10091*
	(5.528)	(4.084)	(4.404)
infl	-0.002384	-0.00747	-0.00571
	(-0.263)	(-0.861)	(-0.668)
gdp	0,005117	-0.0027	-0.00041
	(0.261)	(-0.148)	(-0.023)
spread	0,01344	0,006672	0,00783
	(0.644)	(0.345)	(0.408)
reg	0.4353**	0.4445**	0.4389**
	(2.087)	(2.328)	(2.303)
reg1	0.18479!!	0.3047*	0.26952*
	(1.398)	(2.507)	(2.227)
hidep	4,79126	4,9717	5,0231
	(0.909)	(1.024)	(1.039)
hicre	12.3894*	12.009*	11.98463*
	(3.970)	(4.101)	(4.124)
DF	678	646	
R-squared	0,34837	0,55964	0,291611
Estd. Autocorrelation of e(i,t)	0,162082	0,162082	0,171046
"F"-statistics		5,537	
d.f.		32;647	
prob. Value		0,00000	
Haussman test			34,43
df; prob. Value			16;0.00475

The *t-statistic* tests are reported in parentheses under each coefficient estimates
* Significant at the 1% level
**Significant at the 5% level
! Significant at the 10% level
!! Significant at the 20% level

Table 6.9 – Profitability Regressant: R.O.E. Second Stage of Model Estiamtion

MODEL	1')Pooled Regression	2') BANK+ECONOMIC AND MARKET GENERAL CONDITIONS	
		a)Fixed effects	b)Random effects
constant	-846.6831**	-------------	-839.41**
	(-2.310)		(-2.419)
tsta	0.174*	0.082941	0.101**
	(4.554)	(1.699)	(2.236)
gsts	-0.00879	-0.00145	-0.00383
	(-0.607)	(-0.090)	(-0.247)
tlta	0.0799*	-0.0176	0.00777
	(2.917)	(-0.493)	(0.237)
tdta	0.0589*	0.0798**	0.0541!
	(2.976)	(2.233)	(1.898)
ddtd	8.1394**	8.0496**	8.1336**
	(2.224)	(2.318)	(2.348)
tdtd	8.2011**	8.06**	8.1651**
	(2.240)	(2.318)	(2.356)
plltl	0.117!!	0.08878	0.0988
	(1.486)	(0.957)	(1.146)
owner	-6.278*	-7.061*	-6.4481*
	(-6.141)	(-4.613)	(-4.701)
endow	-0.1755	0.2087	0.13777
	(-0.495)	(0.505)	(0.350)
infl	-0.1163	-0.18365	-0.17735
	(-0.768)	(-1.228)	(-1.205)
gdp	-0.1864	-0.2466	-0.2054
	(-0.568)	(-0.782)	(-0.657)
spread	0,40388	0,3199	0,34214
	(1.159)	(0.961)	(1.034)
reg	0,04348	0,2826	0,226
	(0.012)	(0.086)	(0.069)
reg1	0,5847	1,0637	0,8385
	(0.265)	(0.508)	(0.403)
hidep	145.823!	172.259**	160.752!
	(1.657)	-2,06	(1.932)
hicre	116.15**	86.6765!	95.453!
	(2.229)	(1.719)	(1.909)
DF	678	646	
R-squared	0,25238	0,42934	0,134054
Estd. Autocorrelation of e(i,t)	0,331097	0,331097	0,334348
"F"-statistics		4,03	
d.f.		32;647	
prob. Value		0,00000	
Haussman test			13,15
df; prob. Value			16; 0.6614

The *t-statistic* tests are reported in parentheses under each coefficient estimates
* Significant at the 1% level
**Significant at the 5% level
! Significant at the 10% level
!! Significant at the 20% level

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Finally the goodness of fit is higher for the Two Way Error Component Model than for the One Way Error Component Model. Thus, the best model specification is the Two Way Fixed Effects Error Component Model and the estimated model is[145] (Model 3 a, table 6.4):

$$PROFITS = 33.584 \; TSTA + 5.395 GSTS + 8.781 TLTA - 22.711 \; TDTA - 329.660 \; DDTD - 322.968 \; TDTD$$
$$(17.930) \qquad (6.3491) \qquad (13.233) \qquad (13.418) \qquad (1290) \qquad (1290.3)$$

$$-35.169 \; PLLTL - 1448.814 \; OWNER + 503.126 \; ENDOW + \mu$$
$$(34.138) \qquad (560.07) \qquad (164.69)$$

Still in the first stage of the study but focusing attention on R.O.A. behaviour, the pooled regression is rejected, the random effects model is rejected at the 1% level of significance, as before α_i and $X_{i\,t}$ are not uncorrelated, and the R-squared is higher for the Two Way Error Component Model. The study concludes that the Two Way Fixed Effects Error Component Model (model 3 a, table 6.5) is the best model specification and the estimated model for R.O.A. is:

$$R.O.A. = 0.004 \; TSTA + 0.003 \; GSTS + 0.010 \; TLTA - 0.003 \; TDTA - 0.060 \; DDTD - 0.059 \; TDTD$$
$$(0.003) \qquad (0.001) \qquad (0.002) \qquad (0.002) \qquad (0.207) \qquad (0.207)$$

$$+ 0.0004 \; PLLTL - 0.447 \; OWNER + 0.131 \; ENDOW + \mu$$
$$(0.005) \qquad (0.090) \qquad (0.026)$$

Finally, when R.O.E. is the regressant in the first stage (table 6.6), testing for fixed effects rejects the pooled regression. The Hausman's specification test does not reject the null hypothesis that α_i and $X_{i\,t}$ are uncorrelated, pointing towards a random effects model as the best model specification. Nevertheless, the design of the unbalance panel data model suggests that the fixed effects model is the most appropriate specification. In fact, for several cross-sectional units the model does not have enough observations to assign a random distribution to both the omitted bank-specific variables and the time effects across each cross sectional unit[146]. In favour of the choice of a fixed effects model instead of a random effects model, lies the argument that the fixed effects model is an appropriate specification if the analysis is focussing on a specific set of banks not randomly drawn from a large population, as

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[145] The standard errors are reported in parentheses under each coefficient estimates.
[146] The evidence for this suggestion is shown in annex (number of banks for the unbalanced panel data).

is the case with this research. Opting for a fixed effects model, the statistical inference in this study is conditional on the particular 33 banks and over the specific 26 semi-annual time periods observed. In conclusion, the best model specification is the Two Way Fixed Effects Error Component Model and the estimated model is (Model 3 a, table 6.6):

$$R.O.E. = 0.084 \ TSTA - 0.003 \ GSTS - 0.149 \ TLTA + 0.091 \ TDTA + 8.028 \ DDTD + 8.030 \ TDTD$$
$$(0.0450) \qquad (0.018) \qquad (0.037) \qquad (0.037) \qquad (3.576) \qquad (3.577)$$

$$+ \ 0.0.87 \ PLLTL - 7.017 \ OWNER + 0.164 \ ENDOW + \mu$$
$$(0.095) \qquad (1.553) \qquad (0.457)$$

The justification for the best models' specification that follows apply to the second stage of the study (tables 6.7, 6.8 and 6.9) where profits, R.O.A. and R.O.E. are analysed respectively.

The test for fixed effects rejects the pooled regression for profits, R.O.A. and R.O.E.

In what concerns R.O.A. the Hausman's specification test is significant at the 1% level, which mean that α_i and $X_{i\ t}$ are not uncorrelated. Therefore the best model specification for ROA is the One Way Fixed Effects Error Component Model with known time effects and the estimated model is (Model 2' a, table 6.8):

$$R.O.A. = 0.004 \ TSTA + 0.003 \ GSTS + 0.001 \ TLTA - 0.002 \ TDTA - 0.018 \ DDTD - 0.019 \ TDTD$$
$$(0.003) \qquad (0.0001) \qquad (0.002) \qquad (0.002) \qquad (0.202) \qquad (0.202)$$

$$+ \ 0.0004 \ PLLTL - 0.483 \ OWNER + 0.098 \ ENDOW - 0.007 \ INF - 0.003 \ GDP + 0.007 \ SPREAD$$
$$(0.005) \qquad (0.089) \qquad (0.024) \qquad (0.009) \qquad (0.018) \qquad (0.019)$$

$$+ \ 0.445 \ REG + 0.301 \ REG1 + 4.972 \ HIDEP + 12.009 \ HICRE + \mu$$
$$(0.191) \qquad (0.122) \qquad (4.856) \qquad (2.929)$$

Table 6.10 shows the estimators for the bank-specific omitted variables α_i's. These estimators are estimated in each model together with the disturbances.

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Bank	Number of observations	Coefficient	Bank	Number of observations	Coefficient
BBV	26	-0.57199	BNP	24	-0.64346
BBI	26	-0.21432	Citi	24	-0.02390
BCA	26	0.00090	BCP	23	-0.31933
BFE	26	0.16431	BCI	23	-0.62961
BES	26	-0.20057	BIC	23	-0.55892
BFB	26	-0.39839	BANIF	19	-0.76532
BPSM	26	-0.30422	BNU	19	-0.39304
BPA	26	-0.15553	ABN	16	-0.52502
BTA	26	-0.26964	DBI	15	-0.07613
CGD	26	0.13801	BMI	14	-0.28489
CL	26	-0.76388	BNCI	12	-0.76183
CPP	26	-0.51018	BII	9	-0.45794
Chemical	26	0.51978	Finantia	9	0.62107
MG	26	-0.56370	CISF	9	-0.01187
B.MELL	26	-0.45622	Finibanco	9	-0.43510
BPI	25	0.30976	BSN	8	0.12511
Barclays	24	-0.69076			

In the case of measuring banking profitability by profits and R.O.E., Hausman's test null hypothesis that α_i and $X_{i\,t}$ are uncorrelated is not rejected. Nevertheless, due to the design of the data, the study does not have enough cross-sectional observations to make good estimation of $\alpha_i \sim$ IID ($\bar{\alpha}, \sigma^2_\alpha$). Therefore, instead of a random effects model, the analysis uses a One Way Error Component Fixed Effects Model with known time effects. This is the best models' specification chosen both for profits and R.O.E., this is models 2'a in tables 6.7 and 6.9, respectively. The resulting estimated models are:

PROFITS=33.144 TSTA+3.438GSTS+3.273TLTA−19.728 TDTA −173.949 DDTD −171.151 TDTD
(17.547)   (5.803)   (12.886)   (12.847)   (1249.1)   (1249.6)

−34.353PLLTL−1597.675OWNER+392.188ENDOW−108.69 INF + 50.240 GDP + 47.775 SPREAD
(33.337)   (550.24)   (148.60)   (53.759)   (113.30)   (119.71)

+ 1590.229 REG + 1118.645 REG1 + 12287.63 HIDEP − 17367.44 HICRE + μ
(1181.6)   (752.1)   (30049)   (18121)

R.O.E. = 0.083 TSTA − 0.001 GSTS − 0.018 TLTA + 0.080 TDTA + 8.050 DDTD + 8.060 TDTD
(0.049)   (0.016)   (0.036)   (0.036)   (3.475)   (3.477)

+ 0.089 PLLTL − 7.061 OWNER + 0.209 ENDOW − 0.184 INF − 0.247 GDP + 0.320 SPREAD
(0.093)   (1.531)   (0.041)   (0.150)   (0.315)   (0.333)

+ 0.283 REG + 1.064 REG1 + 172.259 HIDEP + 86.677 HICRE + μ
(3.288)   (2.093)   (83.602)   (50.415)

The bank-specific omitted variables' estimators are shown in tables 6.11 and 6.12 for profits and R.O.E., respectively.

Table 6.11- PROFITS-Estimated Fixed Effects-One Way Error Component Model with General Economic and Market Conditions

Bank	Number of observations	Coefficient	Bank	Number of observations	Coefficient
BBV	26	16365	BNP	24	16128
BBI	26	19296	Citi	24	15869
BCA	26	18071	BCP	23	20645
BFE	26	21388	BCI	23	15745
BES	26	23669	BIC	23	16540
BFB	26	18816	BANIF	19	16705
BPSM	26	19778	BNU	19	17291
BPA	26	23407	ABN	16	15823
BTA	26	22249	DBI	15	16595
CGD	26	35787	BMI	14	15414
CL	26	15704	BNCI	12	15345
CPP	26	18932	BII	9	16244
Chemical	26	15976	Finantia	9	15507
MG	26	18539	CISF	9	15220
B.MELL	26	18442	Finibanco	9	15319
BPI	25	16736	BSN	8	15834
Barclays	24	15738			

Table 6.12- R.O.E.-Estimated Fixed Effects-one Way Error Component Model with General Economic and Market Conditions

Bank	Number of observations	Coefficient	Bank	Number of observations	Coefficient
BBV	26	-832	BNP	24	-833
BBI	26	-832	Citi	24	-829
BCA	26	-827	BCP	23	-833
BFE	26	-826	BCI	23	-835
BES	26	-826	BIC	23	-831
BFB	26	-834	BANIF	19	-835
BPSM	26	-833	BNU	19	-832
BPA	26	-827	ABN	16	-828
BTA	26	-832	DBI	15	-829
CGD	26	-825	BMI	14	-831
CL	26	-835	BNCI	12	-833
CPP	26	-831	BII	9	-818
Chemical	26	-827	Finantia	9	-827
MG	26	-818	CISF	9	-825
B.MELL	26	-834	Finibanco	9	-832
BPI	25	-829	BSN	8	-825
Barclays	24	-835			

It is worthwhile mentioning the conclusion of the analysis that the shape assigned to time effects on banking profitability in the second stage of the study seems to explain time effects very closely. In fact, comparing models 3 a) with models 2'a) for each banking profitability measure, the explanatory capacity of the adjustment performed

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Table 6.13 – First Stage – Bank Specific Variables

		Effect on Banking Profitability Variables		
		Profits	**R.O.A**	**R.OE.**
Banking Performance Determinants	Total Securities / Total Assets	Positive and significant at the 10% level	Positive and significant at the 20% level	Positive and significant at the 10% level
	Government Securities/ Total Securities	Statistically non-significant	Positive and significant at the 1% level	Statistically non-significant
	Total Loans/Total Assets	Statistically non-significant	Positive and significant at the 1% level	Statistically non-significant
	Total Deposits/ Total Assets	Negative and significant at the 10% level	Negative and significant at the 20% level	Positive and significant at the 5% level
	Demand Deposits/Total Deposits	Statistically non-significant	Statistically non-significant	Positive and significant at the 5% level
	Time Deposits/Total Deposits	Statistically non-significant	Statistically non-significant	Positive and significant at the 5% level
	Provisions Loan Losses/ Total Loans	Statistically non-significant	Statistically non-significant	Statistically non-significant
	Ownership	Negative and significant at the 1% level	Negative and significant at the 1% level	Negative and significant at the 1% level
	"Endowment Effect"	Positive and significant at the 1% level	Positive and significant at the 1% level	Statistically non-significant

Table 6.14 – Second Stage – Bank Specific and Time Variables

		Effect on Banking Profitability Variables		
		Profits	**R.O.A**	**R.OE.**
Banking Performance Determinants	Total Securities / Total Assets	Positive and significant at the 10% level	Positive and significant at the 20% level	Positive and significant at the 10% level
	Government Securities/ Total Securities	Statistically non-significant	Positive and significant at the 1% level	Statistically non-significant
	Total Loans/Total Assets	Statistically non-significant	Positive and significant at the 1% level	Statistically non-significant
	Total Deposits/ Total Assets	Negative and significant at the 20% level	Statistically non-significant	Positive and significant at the 5% level
	Demand Deposits/Total Deposits	Statistically non-significant	Statistically non-significant	Positive and significant at the 5% level
	Time Deposits/Total Deposits	Statistically non-significant	Statistically non-significant	Positive and significant at the 5% level
	Provisions Loan Losses/ Total Loans	Statistically non-significant	Statistically non-significant	Statistically non-significant
	Ownership	Negative and significant at the 1% level	Negative and significant at the 1% level	Negative and significant at the 1% level
	"Endowment Effect"	Positive and significant at the 1% level	Positive and significant at the 1% level	Statistically non-significant
	Inflation	Negative and significant at the 5% level	Statistically non-significant	Statistically non-significant
	GDP	Statistically non-significant	Statistically non-significant	Statistically non-significant
	Spread	Statistically non-significant	Statistically non-significant	Statistically non-significant
	Regulation	Positive and significant at the 20% level	Positive and significant at the 5% level	Statistically non-significant
	Regulation 1	Positive and significant at the 20% level	Positive and significant at the 1% level	Statistically non-significant
	Herfindahl Index (deposits)	Statistically non-significant	Statistically non-significant	Positive and significant at the 5% level
	Herfindahl Index (credit)	Statistically non-significant	Positive and significant at the 1% level	Positive and significant at the 10% level

changes very slightly: 63.896% versus 62.815% for profits, 57.912% versus 55.964% for R.O.A. and 43.895% versus 42.934% for R.O.E..

The results of the Two Way Fixed Effects Error Component Models are summarised in table 6.13, while a synthesis of the One Way Fixed Effects Models with known time effects is shown in table 6.14.

The analysis discloses some main features that are worth highlighting immediately, namely, the strong evidence about the effect of ownership and the "endowment effect" on banking profitability (always with the expected sign). This clearly reinforces the idea that banks that act as profit maximising firms are more profitable than banks that fulfil other goals like the implementation of macroeconomic controls and/or allocative controls, which was the case of Portuguese state owned banks. The study also allows the conclusion that the downward trend in the Portuguese interest rates from 1985 onwards had a negative impact on Portuguese banking profitability, which explains the emphasis on raising income from the second margin (net non-interest income) as described in chapter 3[147].

Another important conclusion is the inability of the model to prove the statistically significant importance of the relationship between real stability and banking profitability. This fact, together with the results obtained with nominal stability, reinforces the idea expressed by Hoggarth et al (1998) that nominal macroeconomic stability appears to be more relevant to banking performance than real macroeconomic stability. The negative sign of the inflation rate as a determinant of banking profits in the Portuguese system is unexpected and difficult to explain, since a greater commitment to monetary discipline should have lowered banking profitability.

In what concerns management quality, Miller and Noulas (1997) researched the impact of several ratios on R.O.A.. As depicted in tables 6.13 and 6.14, these authors' results are confirmed to the following ratios: total loans to total assets and total securities to total assets. The ratio of Government securities to total securities is

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[147] P. 62.

found statistically significant while Miller and Noulas, on the contrary found it statistically non-significant. This ratio's significance and positive sign can be explained by the fact that until 1995 Portuguese debt held by banks was out of the legal provisioning rules.

Miller and Noulas studied the determinants of the banking performance measure R.O.A..The model developed in this chapter extends the statistical significance of several management quality ratios studied by Miller and Noulas to the other measures of banking profitability profits and R.O.E.. That is, in respect of: total securities over total assets, total deposits to total assets and demand deposits to total deposits. The ratio total securities to total assets is statistically significant and positive to explain profits, R.O.A. and R.O.E., which can suggest that, during the life span of the study, Portuguese banks were coping well with risk in capital markets, that is market risk.

According to the study's results, market concentration is only statistically significant in explaining R.O.E and with the expected positive sign in the credit market but with an unexpected positive sign in de deposits market. Unexpected because, during the life span of the study, competition has been fiercer on deposits than on credit. R.O.A. is also significantly affected statistically by concentration but only in the credit market, with the expected positive sign as well, while market structure is not statistically significant on explaining profits' behaviour. These conclusions suggest that entry in the banking market followed by increasing competition on deposits hasn't jeopardised the soundness and stability of the Portuguese Banking System.

Finally, under the assumption that average profitability has increased with financial regulatory reform in Portugal, not only regulation is statistically significant in explaining banking profitability when measured by profits and R.O.A., as regulation shows the expected positive sign. The study also finds that regulation is not statistically significant in explaining R.O.E. Models 2'a (table 6.7) and 2'a (table 6.8) allow some conclusions to be drawn concerning the behaviour of the average profitability as a consequence of changes on financial rules:

a) The average profitability estimation measured both by profits and by R.O.A. has increased with financial regulatory reform in Portugal.

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b) Comparing periods 1985-1988 with 1993-1997, the average profits' estimation has increased by 1,590 millions of escudos.

c) The comparison between 1985-1988 and 1989-1992 concludes that estimated average profits have increased 1,119 millions of escudos.

d) Between 1989-1992 and 1993-1997 the estimation of the average profits has increased by 471 millions of escudos (1,590 millions less 1,119 millions)

e) Average R.O.A. estimation has increased by 0.4445 percentage points between 1985-1988 and 1993-1997.

f) Comparing the period 1985-1988 with the period 1989-1992, the study allows the conclusion that average R.O.A. estimation has increased by 0.3047 percentage points.

g) Between periods 1989-1992 and 1993-1997 the average R.O.A. estimation has increased by 0.1398 percentage points.

Returning to the proposition to be tested in this chapter that "Regulation significantly affects banking profitability", the analysis concludes that this is not a false proposition in what concerns profits and R.O.A.. Furthermore the study carried out in this chapter suggests that average profitability has increased with financial regulatory reform in Portugal.

To conclude, differences in the profitability (and R.O.A.) across time and across banks are due to a number of "balance sheet" factors, notably the ratio of securities to total assets. The ratio of loans to total assets and the ratio of government securities to total assets also explain R.O.A. behaviour, while the ratio of total deposits to total assets explains profitability measured by profits. In addition, dummies for periods of greater liberalisation show that in these periods profits and R.O.A. were higher than they would otherwise have been, given the structure of banks balance sheets. The net effect of liberalisation is, however, hard to gauge. Some of the regulatory changes stimulated changes in the structure of banks balance sheets so the coefficients on Reg and Reg 1 do not capture all the effects.

The information contained in tables 6.14 is used to build what may be call a Regime Switching Model of Risk for the Banking System and this will be explained and developed in the next chapter.

CHAPTER 7. – A REGIME SWITCHING MODEL OF RISK FOR THE BANKING SYSTEM

7.1. - INTRODUCTION

In this chapter two models are developed which may be broadly termed a Regime Switching Model of Risk for the Banking System. These models derive their structure from finance theory and from econometric modelling and test the hypothesis that changes in profitability after liberalisation may have been accompanied by changes (increases) in risk. Risk is measured for each time period (half year) by the ratio of the standard deviation of profits to expected profits and by the ratio of the standard deviation of R.O.A. to expected R.O.A. These are the selected banking profitability variables used in this chapter, since as was proved in the preceding chapter, the effect of regulation on R.O.E. is not statistically significant. However, using the ratio of the standard deviation of the R.O.A. to the expected R.O.A. presents a limitation since the R.O.A. is already a percentage, and is potentially zero when the ratio would be infinite. Expected profits and expected R.O.A. are measured by the fitted values for each period from regressions on pages 172 and 173 of chapter 6, respectively. Similarly, the standard deviation in each period is measured by the standard deviation of the profits of each bank from this expected value and by the standard deviation of the R.O.A. of each bank from this expected value. An important limitation of this is that it measures differences across banks, rather than the likely volatility of profits and R.O.A. facing an individual bank. Therefore, there is an implicit assumption that all banks face similar risks (when this cross-sectional estimator would be valid).

The model based on finance theory is applied in section 7.2. and aims at testing the changes in risk resulting from changes in the banking performance determinants and

in regulation between 1985 and 1997. In this model, banking performance determinants are aggregated in a composite index and regulation is an index number as well. It must be stressed that the effect of these explanatory variables on risk is evaluated in relative terms. That means that the model presented is a model with restrictions on the coefficients. Thus, the model to be estimated is subject to the restriction that the sum of the coefficients is one.

The econometric concept of a multiplicative dummy variable is used in section 7.3., where a model that evaluates risk response to regulatory changes is proposed. In effect, values 1 and 0 are assigned to regulation in the model to be estimated allowing the question whether risk has increase or not with financial regulatory reform to be answered. The above composite indexes are multiplied, each in turn[148], by this dummy variable. In this way, it is possible to test the statistical significance of changes in banking performance determinants on risk, in the course of financial regulatory reform. Inferences are then made about risk behaviour in the industry resulting from the way banks have accommodated regulatory changes.

7.2. - THE EFFECTS ON RISK OF BOTH BANKING PERFORMANCE DETERMINANTS AND REGULATION, IN RELATIVE TERMS

7.2.1. - THE MODEL

A model that derives its structure from finance theory can estimate the relative effects on risk arising from both the banking performance determinants and from regulation. Bekaert and Harvey (1995), assessing the degree of integration or segmentation of capital markets, estimate a regime switching model of expected returns that allows returns to be determined at different times by domestic factors or by world factors markets. On one hand, the model presented herein replaces expected returns by a measure of risk from uncertainty theory – returns volatility/expected returns. On the other hand, risk is allowed to be determined by the banking

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[148] The first model inserts the composite index relating to performance measured by profits and, afterwards, the model is built with the composite index for R.O.A. significant determinants.

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performance determinants that are statistically significant[149] and by regulation. The only constrain in this model's specification is that it does not allow the coefficients to be time varying[150]. Nevertheless, this constrain is overcome in section 7.3. where the introduction of a multiplicative dummy allows assessing risk response in relation to changes on regulatory rules.

As mentioned before, banking performance determinants are aggregated in a composite index while regulation is measured by means of an index number. All the required information to build these indexes, whose explanation follows. is obtained from the unbalanced panel data models estimated in chapter 6.

Adapting Baekert and Harvey's model to the current research leads to a model with the following general form:

$$Y_t = \alpha \ X_t + \beta \ D_t \qquad (7.1)$$

Subject to: $\beta = 1-\alpha$

Where:

Y_t is a measure of risk coming from uncertainty theory. Y_t will be replaced by "profits volatility/expected profits" in the first model and by "R.O.A. volatility/expected R.O.A." in the second model. For estimation purposes the first dependent variable is termed RISKPROF and the second one RISKROA. The observed values of risk, obtained from unbalanced panel data models 2'a table 6.7[151] and 2'a table 6.8[152] are presented in table 7.1.

X_t is the composite index that encompasses all banking performance determinants for profits (first model) and for R.O.A. (second model), and D_t is regulation measured by an index number.

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[149] Obtained from unbalanced panel models that are estimated in chapter 6.
[150] Time varying coefficients would enable the study of the effect of regulation on risk through time.
[151] Chapter 6, page 172, for profits.
[152] Chapter 6, page 173, for R.O.A.

Table 7.1-Observed values of risk in the banking system.

Period	Time	RISKPROF	RISKROA
June 85	1	2.964734	1.554933
Dec 85	2	1.914772	1.517316
June 86	3	3.229609	1.347774
Dec 86	4	4.116963	1.729481
June 87	5	2.834150	1.081112
Dec 87	6	1.810701	0.955126
June 88	7	2.003789	0.908316
Dec 88	8	2.466033	3.004976
June 89	9	2.205727	1.026907
Dec 89	10	0.934524	1.035072
June 90	11	1.717593	0.932729
Dec 90	12	1.302731	0.948118
June 91	13	1.746238	0.938487
Dec 91	14	1.364969	0.856723
June 92	15	1.831480	1.143981
Dec 92	16	2.752197	1.744205
June 93	17	1.944763	0.968384
Dec 93	18	1.616748	1.595028
June 94	19	2.139778	1.049316
Dec 94	20	2.499336	6.194474
June 95	21	1.983943	1.305405
Dec 95	22	1.991582	1.032183
June 96	23	1.666897	1.154005
Dec 96	24	1.953676	1.978003
June 97	25	1.380262	0.876966
Dec 97	26	2.803286	1.069654

Source: Annex XIV (Vol. II)

Explanations of both X_t and D_t are provided below.

X is a composite index built with all the statistically significant banking performance determinants given by the unbalanced panel data models previously estimated. In this composite index, each variable's weight is the correspondent coefficient estimated in the above models and is presented in table 7.2 where XPROF is the composite index for profits and XROA is the composite index for R.O.A.. Table 7.2 also shows the banking performance determinants that integrate each index.

Table 7.2- Importance of banking performance determinants on risk. The Composite Index structure.

	XPROF	XROA
Significant explanatory variables	weights	weights
Total Securities / Total Assets	33.144	0.004269
Government Securities / Total Securities	------------------------	0.002635
Total Loans / Total Assets	------------------------	0.008577

Total Deposits / Total Assets	-19.728	----------------------
Ownership	-1597.675	-0.4829
"Endowment Effect"	392.188	0.09807
Inflation	-108.69	----------------------
Herfindhal Index of Concentration (Credit)	----------------------	12.009

Source: Unbalanced Panel Models 2'a table 6.7 for profits and 2'a table 6.8 for R.O.A. (chapter 6)

For the general market and economic conditions, each variable is the same for all cross-sectional units in each period (time affects the whole banking system in the same way in each period). Thus, there is no question of neutralising the cross-sectional effects for this kind of variables that are period individual invariant.

The problem of cross-sectional effects in the current model's specification, and more precisely related to the structure of the composite index, arises from the significant bank specific explanatory variables that are period individual variant variables. Aiming at neutralising the cross-sectional effects of these variables, the study of risk relative determinants uses the method of computing an average of these bank specific variables for the whole banking system in each period. The explanation for this choice lies in the fact that what is under research is the behaviour of banking stability and soundness in the context of changes in financial regulatory reform.[153]

Under these circumstances, the composite index has the following structure:

$$X_t = \left\{ \sum_{j=1}^{9} \hat{\beta}_j \left(\frac{\sum_{i=1}^{n} X_{jit}}{n} \right) + \sum_{p=1}^{5} \hat{\gamma}_p X_{pt} \right\}$$

With:

t = 1,2.......26

i = number of cross-sectional individuals (banks) in each period.

And:

X_{ji} stands for the bank specific explanatory variable "j" for unit "i".

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[153] See annexes XV and XVI (Vol. II) for a detailed computation of each composite index XPROF and XROA, respectively.

X_p represents a proxy for time effects on profitability, that are period individual invariant variables, that is to say general economic and market conditions.

Since this composite index is a weighted variable, the weights assigned to each banking performance determinant are the coefficients estimated in chapter 6. It is therefore assumed that the relative importance of various balance sheet and economic factors remains unchanged.

The number of bank specific explanatory variables is the same as in the unbalanced panel data models developed in chapter 6, that is nine. In contrast, the number of general market and economic conditions is reduced to five (as against seven included in the unbalanced panel data models). In other words, the two missing general market and economic conditions are the two classes of regulation whose effect is captured in the second component part of the right hand side in equation 7.1.

The above composite index is adjusted to each banking profitability measure, profits and R.O.A., with regard to the correspondent statistically significant explanatory variables. With information collected from the unbalanced panel data models estimated in chapter 6, the composite index for profits, XPROF, is detailed next, followed by the examination of the composite index for R.O.A., XROA.

Variables selected to built XPROF are:

X_{1it}– Total Securities/Total Assets (TSTA)
X_{4it}– Total Deposits/Total Assets (TDTA)
X_{8it}– Ownership (OWNER)
X_{9it}– "Endowment Effect" (ENDOW)
X_{1t}– Inflation Rate (INFL)

XROA encompasses the following variables:

X_{1it}– Total Securities/Total Assets (TSTA)
X_{2it}– Government Securities/Total Securities (GSTS)
X_{3it}– Total Loans/Total Assets (TLTA)

X_{8it}– Ownership (OWNER)

X_{9it}– "Endowment Effect" (ENDOW)

X_{5t}– Herfindhal Index of Market Concentration in the Credit Market (HICRE)[154]

After the above explanation of the composite index, it follows the structure of the index number that captures the effect of regulation on risk.

Firstly, the analysis focuses on risk as measured by profits volatility over expected profits. Secondly, the index number relates to regulation when the explanation of risk utilises the profitability measure R.O.A.. In both cases the structure of the index numbers, DPROF and DROA, have their foundations on the coefficients of regulation obtained in the estimated unbalanced panel data models. (2'a table 6.7 for profits and 2'a table 6.8 for R.O.A. in chapter 6)

At this point it is necessary to recall the three categories assigned to regulation as a dummy variable in the above models because these categories are crucial to the construction of the index number.

The three considered levels of regulation are:
-   The less liberalised banking market between 1985 and 1988;
-   The more liberalised banking market between 1989 and 1992;
-   The liberalised banking market between 1993 and 1997.

The first dummy is REG and the second one is REG1. The qualitative variable REG assumes the value 1 if the market is liberalised and zero otherwise, while the binary variable REG1 is 1 if the market is more liberalised and zero otherwise. Hence the category of "less liberalised market" is treated as the base category. In the construction of each index number the assumed value for both profits and R.O.A. in this base category is the correspondent mean obtained from models 2'a table 6.7 and 2'a table 6.8.

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[154] To which it was assigned the subscript seven in the unbalanced panel data models.

The time cut-off explained above is applied not only in the study of the effect of regulation on profitability (chapter 6) but also on the one way analysis of variance where average profitability behaviour in the course of financial regulatory reform is studied (chapter 5).

As mentioned, the index number value in the base category is the mean of profits and the mean of R.O.A. Each index number is built adding to this value the coefficient estimates for REG and REG1 from models 2'a table 6.7 and 2'a table 6.8[155], and their explanation proceeds.

The coefficient estimates for REG1 and REG in mode 2'a table 6.7 is 1119 and 1590, respectively. This means that regulatory changes caused an average growth on profits of 1,119 millions escudos from 1985/1988 to 1989/1992 and of 1,590 millions of escudos from 1985/1988 to 1993/1997. These values are added to the mean of profits for the whole period, 2,185 millions of escudos, and the correspondent index that captures the effect of regulation on risk measured by profits is given in table 7.3 by the name of DPROF.

The same method is utilised to form the index number that allows computing the weight of the influence of regulation on risk when risk is based on R.O.A. behaviour, and may be summarised as follows.

Coefficients estimates for REG1 and REG in model 2'a table 6.8 are 0.305 and 0.445, respectively. For this reason R.O.A., as a result of financial regulatory reform, grew on average 0.305 percentage points from 1985/1988 to 1989/1992 and 0.445 percentage points from 1985/1988 to 1993/1997. Since the index number assigned to the base category is 0.464, that is the mean of R.O.A. for the whole period, the coefficient estimate is added in each subsequent period to obtain the correspondent index number shown in table 7.3 as DROA.

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[155] Chapter 6.

Table 7.3 - Importance of regulation on risk. Regulation as an Index Number.

Period	Time	Index Number	
		DPROF	DROA
June 85	1	2,185	0.464
Dec. 85	2	2,185	0.464
June 86	3	2,185	0.464
Dec 86	4	2,185	0.464
June 87	5	2,185	0.464
Dec 87	6	2,185	0.464
June 88	7	2,185	0.464
Dec 88	8	2,185	0.464
June 89	9	3,304	0.769
Dec. 89	10	3,304	0.769
June 90	11	3,304	0.769
Dec. 90	12	3,304	0.769
June 91	13	3,304	0.769
Dec 91	14	3,304	0.769
June 92	15	3,304	0.769
Dec 92	16	3,304	0.769
June 93	17	3,775	0.909
Dec 93	18	3,775	0.909
June 94	19	3,775	0.909
Dec. 94	20	3,775	0.909
June 95	21	3,775	0.909
Dec 95	22	3,775	0.909
June 96	23	3,775	0.909
Dec.96	24	3,775	0.909
June 97	25	3,775	0.909
Dec.97	26	3,775	0.909

Once both the dependent variables (RISKPROF and RISKROA) and the explanatory variables (XPROF,DPROF and XROA,DROA) have been explained, the study proceeds with the models' estimation along with the correspondent results' analysis.

7.2.2. - ESTIMATION RESULTS

The specification of the first model, the model based on profits, is:

$$RISKPROF_t = \alpha * XPROF_t + (1-\alpha) * DPROF_t + \mu_t \qquad (7.2)$$

With

$$\mu_t \sim N(0, \sigma)$$

$$E(\mu_t \, \mu'_t) = 0$$

While the parametric form of the second model, the model that relates to R.O.A., is:

$$RISKROA_t = \beta * XROA_t + (1-\beta) * DROA_t + \mu_t \qquad (7.3)$$

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With

$\mu_t \sim N(0,\sigma)$

$E(\mu_t \, \mu'_t)=0$

With RISKPROF, XPROF, DPROF, RISKROA, XROS and DROA defined as above.

Estimation of models 7.2 and 7.3 leads to equations 7.4 and 7.5[156] for profits and R.O.A. respectively.

$$\hat{\text{RISKPROF}}_t = \underset{(22.479)}{0.801537} * \text{XPROF}_t + (1 - 0.801537) * \text{DPROF}_t \qquad (7.4)$$

$$\hat{\text{RISKROA}}_t = \underset{(2.826)}{0.688615} * \text{XROA}_t + (1 - 0.688615) * \text{DROA}_t \qquad (7.5)$$

The robustness of these models is based on the fact that both $\hat{\alpha}$ and $\hat{\beta}$ are statistically different from zero at the 1% significance level. Therefore, from equations 7.4 and 7.5 the study concludes that both the composite indexes and regulation are significant in explaining risk in the Portuguese banking system, which is in accordance with findings from the unbalanced panel data models estimated in chapter 6.

Finally, it is important to draw two further conclusions.

On the one hand, in both equations 7.4 and 7.5 bank specific and general market and economic conditions inserted in the composite index are more important than regulation to explain risk in the banking sector.

On the other hand, this study allows the conclusion that the relative impact of the composite index on risk measured by profits behaviour is greater than the same relative impact when risk is evaluated by R.O.A. behaviour. That is to say that the

impact of financial regulatory reform on risk measured by R.O.A. is greater than the impact of financial rules changes on the stability of the system using profits as a measure of risk.

7.3. - CHANGES ON THE EFFECT OF BANKING PERFORMANCE DETERMINANTS ON RISK PROMOTED BY FINANCIAL REGULATORY REFORM

7.3.1. - INTRODUCTION: HYPOTHESIS TO BE TESTED

The hypothesis to be tested is:

"Risk in the banking system has increased in the course of financial regulatory reform"

The analysis developed in this subsection overcomes the difficulty of assigning a time varying structure to the coefficients in the previous model. The use of a multiplicative dummy variable enables the study of the effect of regulation on risk of the banking system. More particularly, with multiplicative dummies, this effect arises from the response of the significant banking determinants to regulatory rules changes. This is an adequate modelling approach when the hypothesis to be tested is that the way banks have accommodated their management strategies to financial regulatory reform has increase risk in the banking system[157]. The accommodative banking strategies have their expression in the significant banking determinants of profits and R.O.A.'s performance. In other words, the model studies the evolution of risk in the Portuguese banking system between 1985 and 1997 resulting from the way banks have reacted to financial regulatory reform. The assumption is that this reaction function is modelled by the composite index behaviour through time, because this index is built with all the significant banking performance determinants obtained from the unbalanced panel data models that are estimated in chapter 6.

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[156] The "t" statistic tests are reported in parentheses under each coefficient estimates.
[157] This assumption is explained in chapter 1.- the research proposition

As in the preceding subsection, the measure of risk remains the ratio between returns volatility and expected returns, and returns are represented both by profits and R.O.A. These are the two measure of profitability used in this chapter.

Next, the diagrammatic approach to the structure of the model is explained, followed by the model specification and hypothesis testing.

7.3.2. - MODEL SPECIFICATION AND HYPOTHESIS TESTING

Three yardstick periods have already been identified in the process of financial regulatory reform in the Portuguese Banking System. These periods are 1985/1988, 1989/1992 and 1992/1997, the same time split being applied in the unbalanced Panel Data Models developed in chapter 6, as well as in the one way analysis of variance model estimated in chapter 5. These periods can be labelled as a less liberalised market (1985/1988), a more liberalised market (1989/1992) and a liberalised market (1993/1997). The aim of the model presented in this subchapter is to analyse changes in the influence of the significant banking performance determinants on risk in the course of financial regulatory reform. Regulation is presented as a multiplicative dummy variable. In other words, the objective is to test whether risk has increased from the first period to the second period and from the second period to the third period, which means comparing the first period with the second period and the third period with the second period. Hence, the base category of the dummy variable is the second period. The adequate codification of this problem's nature is presented in table 7.4.

Table 7.4 - Codification of regulation as a dummy variable

	DUM1	DUM3
1st period – June85/December88	1	0
2nd period – June89/December92	0	0
3rd period – June93/December97	0	1

Adopting a diagrammatic approach, the structure of the model has the following presentation:

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Figure 7.1- Structure of the model with multiplicative dummies

	1st period	2nd period	3rd period
Coefficient	c_1+c_2	c_1	c_1+c_3
Dummy variable	DUM1	Base	DUM3
Explanatory variable	Composite Index	Composite Index	Composite Index

As it is explained later in this subsection[158], if c_2 is not statistically different from zero the conclusion is that the impact of the composite index on risk is unchangeable with changes in financial rules from period one to period two. In the same way, if c_3 is not statistically different from zero then risk has not altered with the accommodation of banking performance determinants to changes in financial rules from period two to period three.

The general parametric form of the model is:

$$Y_t = c_1 * X_t + c_2 * (X * DUM1)_t + c_3 * (X * DUM3)_t + \mu_t \quad (7.6)$$

With

$\mu_t \sim N(0,\sigma)$

$E(\mu_t \mu'_t)=0$

Where:

Y_t is the measure of risk defined in subsection 7.2.1, and

X_t is the composite index built with the significant banking performance determinants obtained in chapter 6, and earlier explained in this chapter.

Table 7.4 together with figure 7.1 and equation 7.6. allows the following conclusions:

a) For the 1st period , the value of estimated Y_t in this category is given by:

$$\hat{Y}_t(DUM1 = 1, DUM3 = 0) = \left(\hat{c}_1 + \hat{c}_2\right) * X_t$$

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[158] p. 195.

b) For the second period, the value of estimated Y_t in this category is given by:

$$\hat{Y}_t(\text{DUM1}=0,\text{DUM3}=0)=\hat{c}_1 * X_t$$

c) For the third period, the value of estimated Y_t in this category is given by:

$$\hat{Y}_t(\text{DUM1}=0,\text{DUM3}=1)=\left(\hat{c}_1+\hat{c}_3\right)* X_t$$

Since following economic intuition alone, it is impossible to anticipate the sign of each coefficient (X is a composite index), the hypotheses tests are two two-tailed tests to the significance of the coefficients, their statistics being the "t statistics".

The first null hypothesis, that c_2 equals zero, is tested against the hypothesis that c_2 is statistically different from zero. If the null hypothesis is rejected, then the influence of X on risk changes with regulatory reform from 1985/1988 to 1989/1992.

The second hypothesis test refers to the significance of c_3. If the null hypothesis is rejected, c_3 is statistically different from zero, which means that risk has changed with X because of financial regulatory reform, that is between 1989/1992 and 1993/1997.

To conclude, this model enables the testing of the direct influence of X on risk, followed by the discussion whether this influence of X on risk varies in the course of financial regulatory reform, and if so, the direction of this variation.

Next follows the application of the model discussed above, first on risk measured from profits standpoint and afterwards on risk measured from R.O.A. standpoint.

7.3.2.1.- REGULATION AND RISK WHEN BANKING PERFORMANCE IS MEASURED BY PROFITS

The theoretical structure of the model depicted in equation 7.6. changes to equation 7.7. when the measure of banking performance is profits.

$$RISKPROF = \alpha_1 * XPROF + \alpha_2 * (XPROF*DUM1)_t + \alpha_3 (XPROF*DUM3)_t + \varepsilon_t$$

(7.7)

Where:

$$RISKPROF = \frac{PROFITS\ VOLATILITY}{EXPECTED\ PROFITS}$$

This is the measure of risk arising from uncertainty theory.

"XPROF" is the composite index built with all the banking performance determinants that are significant in the explanation of profits behaviour[159].

Regulation is the dummy variable (DUM1 and DUM3) whose values are presented in table 7.4.

In addition, combining this model with information from table 7.4, the changes on the effect of XPROF on risk promoted by financial regulatory reform are:

a) For the first period 1985/1988,

$$\hat{RISKPROF}_t (DUM1 = 1, DUM3 = 0) = \left(\hat{\alpha_1} + \hat{\alpha_2} \right) * XPROF_t$$

b) For the second period 1989/1992,

$$\hat{RISKPROF}_t (DUM0 = 1, DUM3 = 0) = \hat{\alpha_1} * XPROF_t$$

c) For the third period 1993/1997,

$$\hat{RISKPROF}_t (DUM1 = 0, DUM3 = 1) = \left(\hat{\alpha_1} + \hat{\alpha_3} \right) * XPROF_t$$

7.3.2.2.- REGULATION AND RISK WHEN BANKING PERFORMANCE IS MEASURED BY R.O.A.

The study of risk on the R.O.A standpoint is carried out by equation 7.8. that results from equation 7.6.

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[159] This composite index is explained in detail in this chapter, page 186.

$$RISKROA_t = \beta_1 * XROA_t + \beta_2 *(XROA*DUM1)_t + \beta_3(XROA*DUM3)_t + \varepsilon_t$$
(7.8)

Where:

$$RISKROA = \frac{ROA\ VOLATILITY}{EXPECTED\ ROA}$$

Which, as in the precedent model, is a measure of risk arising from uncertainty theory.

"XROA" is the composite index built with all the banking performance determinants that are significant in the explanation of R.O.A. behaviour[160].

Regulation is defined as above.

Using the codification of regulation as a dummy variable (table 7.4), this model means that:

a) For the first period 1985/1988,

$$\stackrel{\wedge}{RISKROA_t}(DUM1=1, DUM3=0) = \left(\stackrel{\wedge}{\beta_1} + \stackrel{\wedge}{\beta_2}\right) * XROA_t$$

b) For the second period 1989/1992,

$$\stackrel{\wedge}{RISKROA_t}(DUM0=1, DUM3=0) = \stackrel{\wedge}{\beta_1} * XROA_t$$

c) For the third period 1993/1997,

$$\stackrel{\wedge}{RISKROA_t}(DUM1=0, DUM3=1) = \left(\stackrel{\wedge}{\beta_1} + \stackrel{\wedge}{\beta_3}\right) * XROA_t$$

Data for the above models are presented in table 7.5.

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[160] This composite index is also explained in detail in this chapter, page 186.

Table 7.5- Data for the Model that explains the effect of regulation on risk in the course of financial regulatory reform

Period	Profits		R.O.A.	
	Dependent Variable	Explanatory Variable	Dependent Variable	Explanatory Variable
	RISKPROF	XPROF	RISKROA	XROA
June 85	2.964734	-2974.414	1.554933	1.761180
Dec 85	1.914772	-2593.231	1.517316	1.690934
June 86	3.229609	-1877.667	1.347774	1.702608
Dec 86	4.116963	-1127.145	1.729481	1.840863
June 87	2.834150	-1014.364	1.081112	1.836327
Dec 87	1.810701	-767.3427	0.955126	1.954304
June 88	2.003789	-763.3561	0.908316	1.940229
Dec 88	2.466033	-858.5806	3.004976	1.758394
June 89	2.205727	-1054.012	1.026907	1.852045
Dec 89	0.934524	-1092.256	1.035072	1.875767
June 90	1.717593	-993.2757	0.932729	1.711078
Dec 90	1.302731	-919.0107	0.948118	1.653028
June 91	1.746238	-406.5086	0.938487	1.666218
Dec 91	1.364969	-248.1782	0.856723	1.627238
June 92	1.831480	-149.5560	1.143981	1.609655
Dec 92	2.752197	-169.0646	1.744205	1.443616
June 93	1.944763	-273.7471	0.968384	1.298065
Dec 93	1.616748	-301.2101	1.595028	1.213687
June 94	2.139778	-100.0255	1.049316	1.242383
Dec 94	2.499336	-169.6808	6.194474	1.164847
June 95	1.983943	-143.6914	1.305405	1.169788
Dec 95	1.991582	-198.0837	1.032183	1.144658
June 96	1.666897	-286.6822	1.154005	1.091294
Dec 96	1.953676	-228.1007	1.978003	1.067221
June 97	1.380262	-138.5407	0.876966	1.087369
Dec 97	2.803286	-179.2549	1.069654	1.089175

Source: Models 2'a table 6.7 and 2'a table 6.8 estimated in chapter 6

7.3.3. - THE RESULTS

7.3.3.1.- INTRODUCTION

Estimation results from equations 7.7. and 7.8. are presented in equations 7.9. and 7.10. respectively. These estimated models study risk evolution in the banking system when profitability is measured by profits behaviour (equation 7.9) and when the measure of banking profitability behaviour is R.O.A.(equation 7.10.)[161]

$$\hat{RISKPROF_t} = \underset{(-3.122)}{-0.001821} * XPROF_t + \underset{(0.677)}{0.000431} * (XPROF * DUM1), \underset{(-3.634)}{-0.006968} * (XPROF * DUM3),$$

(7.9)

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[161] The "t"-statistic tests are reported in parentheses under each coefficient estimates.

$$\overset{\wedge}{RISKROA}_t = \underset{(2.734)}{0.630783} * XROA_t + \underset{(0.615)}{0.193692} * (XROA * DUM1)_t + \underset{(2.249)}{0.851075} * (XROA * DUM3)_t$$

(7.10)

The diagrammatic illustration of above models follows.

Figure 7.2 - Changes on the effect of the composite index on risk promoted by financial regulatory reform (the case of profits)

	1st period	2nd period	3rd period
Coefficient estimates	- 0.001821+0.0004321	- 0.001821	(-0.001821)+(-0.006968)
Dummy variable	DUM1	base	DUM3
Explanatory variable	Composite Index	Composite Index	Composite Index

Figure 7.3 - Changes on the effect of the composite index on risk promoted by financial regulatory reform (the case of R.O.A.)

	1st period	2nd period	3rd period
Coefficient estimates	0.630783+0.193692	0.630783	0.630783+0.851075
Dummy variable	DUM1	Base	DUM3
Explanatory variable	Composite Index	Composite Index	Composite Index

The analysis of this study's results is conducted with two guidelines as orientation. One guideline is the variation on the effect of the composite index on risk resulting from financial regulatory reform. This analysis makes it possible to draw some conclusions about how risk has evolved from 1985 to 1997 as a result from the way banks have accommodate their strategies to changes in regulatory rules. The other guideline is the analysis of the estimated coefficients' sign, which reveals the orientation of the effect on risk promoted by variations on the composite index because of financial regulatory reform.

Above approaches are followed firstly on the measure of risk arising from uncertainty theory when the profitability measure is profits (that is profits volatility over expected profits), and afterwards on the same risk measure but based on R.O.A. behaviour.

7.3.3.2.- RESULTS FROM THE STUDY OF THE EFFECT OF REGULATORY CHANGES ON RISK (THE CASE OF PROFITS)

From both equations 7.7. and 7.9., combined with information from figure 7.2, the conclusion is that the effect of XPROF on risk is not significantly different when comparing the period of a less liberalised market (that is, the first period 1985/1988) with the period of a more liberalised market (that is, the second period 1989/1992). Clearly, looking at the statistical significance of the coefficients' estimates, with a probability value of 0.5048 the null hypothesis of $\alpha2$ equal to zero is not rejected and with a probability value of 0.0048 the null hypothesis that $\alpha1$ equals zero is rejected. Therefore, the conclusion is that there is no difference between the second and the first period in what concerns the influence of XPROF on risk. In addition $\alpha3$ is statistically different from zero at the significance level of 1%. This statistical evidence means that there is a statistically significant difference between the second and the third period referring to the influence of XPROF on risk. Being these influences on risk promoted by regulatory reform.

To conclude the study as to whether risk has increased or not in the course of financial regulatory reform it is sufficient to look at the sign of α^3. In this case the sign is negative. Because the composite index for profits (XPROF) has an upward trend from 1989 onwards (as shown in table 7.5), under this circumstance risk has decreased with the complete liberalisation of the market. Based upon this model the hypothesis that risk has increased in the course of financial regulatory reform does not hold good.

7.3.3.3.- RESULTS FROM THE STUDY OF THE EFFECT OF REGULATORY CHANGES ON RISK (THE CASE OF R.O.A.)

Results from the analysis of risk evolution based on the effect of the composite index (XROA) on R.O.A. behaviour are very similar to the preceding conclusions. These

results can be analysed using both equations 7.8. and 7.10.. Having also as reference figure 7.3, the study concludes that the effect of the significant banking performance determinants on risk has not changed due to the transition from a less liberalised market (1985/1988) to a more liberalised market (1989/1992). Again, risk in the banking system has statistically changed with the fully liberalisation of the banking market (that is, transition from the period 1989/1992 to the period 1993/1997).

In reality, looking at the hypothesis tests, $\beta 2$ with a probability value of 0.5445 is not statistically different from zero. While the null hypothesis concerning $\beta 2$ is not rejected, the null hypothesis that $\beta 3$ equals zero is rejected at the 1% level of significance.

Next follows the study whether risk has increased or decreased with the complete financial liberalisation of the market.

Because β^3 is greater than zero, the composite index and risk vary in the same direction. As it is shown in table 7.5, the tendency of XROA is to decrease between 1989 and 1997, which means that risk in the banking system has decreased in the course of the last steps of financial regulatory reform. This is the same conclusion as in the study of risk based on profits behaviour. It follows that the hypothesis tested by these models that risk in the banking system has increase with financial regulatory reform is false.

To conclude, the idea that financial liberalisation, as well as the new rules that followed, may have induced banks to act in their business dealings against the stability of the system does not hold good when the approach is stability from the profitability standpoint[162].

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[162] Another possible study of banking stability is the incidence of banks failure approach.

CHAPTER 8.- CONCLUSION

This research investigates how the Portuguese banking system has reacted to changes in its regulatory framework. The lifespan of the empirical study begins in 1986 (the year of EEC adherence), when very timid changes are implemented, and ends in 1997, when the system was fully in line with E.U. financial rules.

The methodology encompasses models that study average profitability behaviour, the *importance of banking performance determinants* to explain the behaviour of profitability and, finally, the evolution of risk from the profitability standpoint. These models may be useful to monitor the evolution in the banking performance of those countries that have applied for E.U. membership, such as the Czech Republic, Hungary, Slovenia, Poland, Turkey and Slovakia.

The abolition of macroeconomic, allocative and structural controls and the adoption of prudential, organisational and protective controls are viewed as a process of financial regulatory reform. Based on the abovementioned methodology the research finds that the adoption of new financial rules in Portugal has contributed to strengthen its banking system. These results refute the general idea that financial systems became unstable after liberalisation.

8.1. - ECONOMIC BACKGROUND

Economic growth and fluctuations in Portugal were characterised by four distinct periods as outlined in table 8.1, while figures 8.1, 8.2 and 8.3 show the behaviour of output, the inflation rate and the Balance of Payments' deficits as a percentage of G.D.P..

Table 8.1- Portuguese Business Cycles

expansion	years	recession	years
1975-1976	1	1976-1978	2
1978-1979	1	1979-1984	5
1984-1987	3	1987-1993	6
1993-...	-		

**Figure 8.1 – G.D.P. Behaviour**
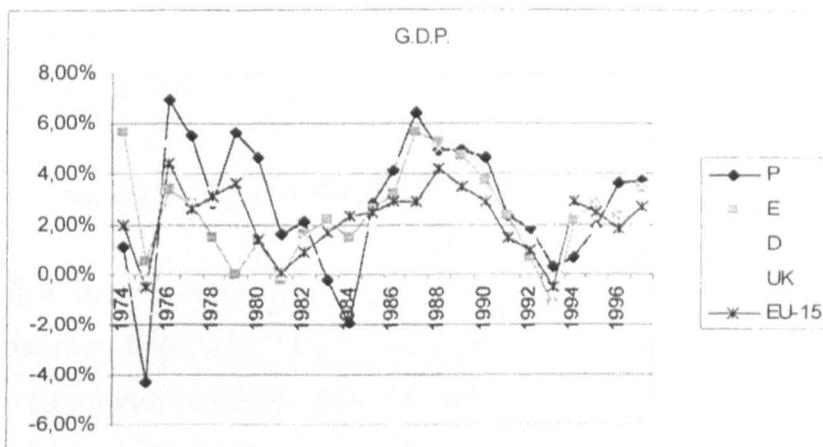
Source: The author's research: Annex XVII (Vol. II)

Figure 8.2 – Inflation Behaviour
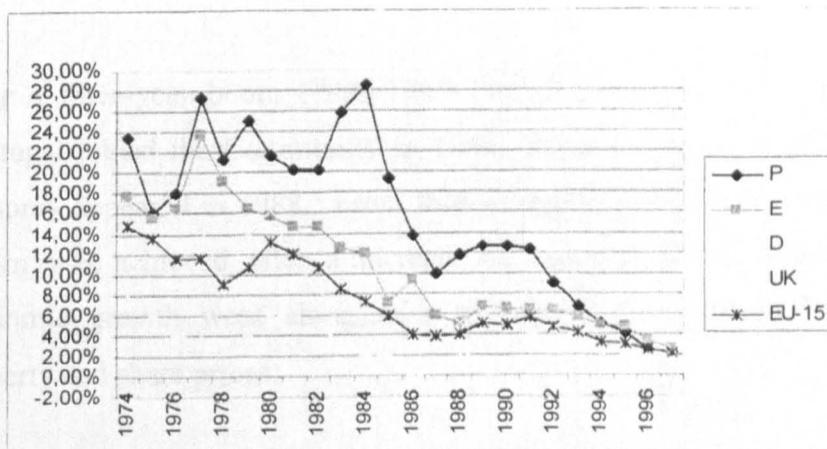
Source: The author's research: Annex XVIII (Vol. II)

Figure 8.3 – Balance of Payments Behaviour
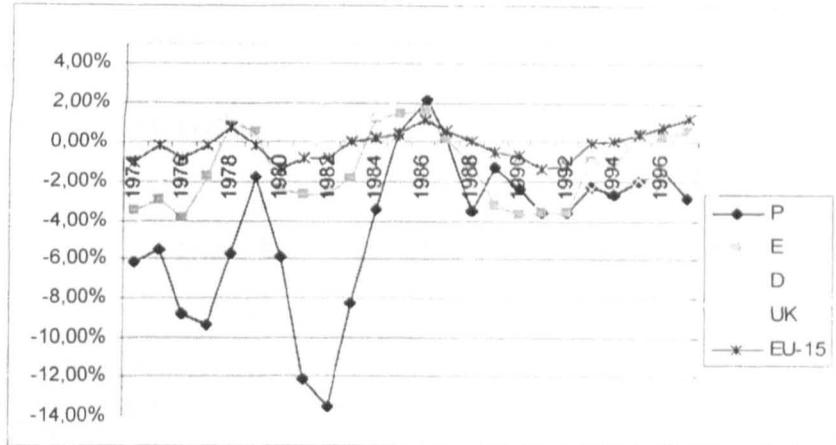
Source: The author's research: Annex XIX (Vol. II)

Despite slight economic recoveries in 1975 and 1978, Portugal went through a recession between 1974 and 1984 as a consequence of both the oil shock and the "Carnation Revolution" (dated April 1974). Economic weaknesses during this period were high levels of inflation, attaining peaks in 1977 and 1984 of 27.30% and 28.50% respectively, and huge deficits in the Balance of Payments, for example 9.40% of G.D.P. in 1977 and 13.50% in 1982. These internal and external economic imbalances forced Portugal to submit two Letters of Intention to the International Monetary Fund. The first agreement with the International Monetary Fund was signed on May 1978 and the second agreement was dated July 1983.

After a three-year boom (1984/1987) driven in part by EEC inflows of capital (Portugal joined the Community in 1986), signs of a slowdown in the Portuguese economy appeared in 1988. From then recession hit Portugal until 1993, when the upturn was achieved after a increase of only 0.30% of G.D.P. This slump in economic growth went along with an international environment of decreasing property and share prices.

After the 1993 trough, Portuguese output recovered and it expanded until 1997, supported mainly by E.U. cohesion funds, by the liberalisation of credit to consumption and by the excellent international momentum. It goes without saying

that led by a strict nominal convergence discipline[163] the inflation rate was already contained in 1997 at the level of 2.10%.

Finally, it is worthwhile mentioning the exchange rate regimes the Escudo was submitted to. The behaviour of the escudo exchange rate is summarised in figure 8.4[164].

Figure 8.4 – Exchange Rates Behaviour
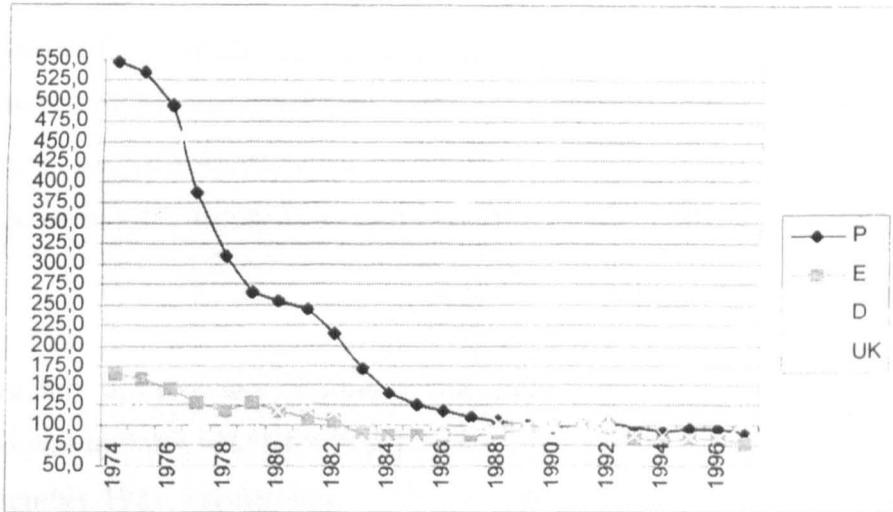
Source: The author's research: Annex XX (Vol. II)

Portuguese exchange rate regimes between 1974 and 1997 were characterised by several patterns.

During 1974 and 1975, in the aftermath of the Carnation Revolution, the Portuguese economic authorities resisted the devaluation of the Escudo, anchored in the long held principle of the Estado Novo's policy of a stable currency. Nevertheless, rallying inflation rates (much higher than European average levels) and accelerating labour costs increased the unsustainability of such a exchange rate policy. Therefore the floatation of the Escudo was decided in 1976 and its depreciation attained 7% during this year which was clearly insufficient prevent the loss of competitiveness of the Portuguese Economy in external markets. As a consequence two discrete depreciation were decided, the first in the magnitude of 15% in February 1977 and the second in August 1977 when the Escudo lost 4% of its value. The latter was

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[163] The Portuguese Escudo joined the Euro on January 1999.

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accompanied by a radical transformation in the exchange rate policy. Flexible exchange rates were definitively abandoned in 1977 and replaced by a crawling peg at a monthly pre-determined devaluation. Hence, between 1977 and 1989, the Escudo was pegged to a basket of 13 currencies[165] and the rhythm of its devaluation was established in accordance with the differentials between Portuguese and European average inflation rates.

The crawling peg was not enough to halt macroeconomic imbalances and discrete devaluations followed the continuous deterioration in both the terms of exchange and the Balance of Payments deficits. These discrete devaluations attained 6% in May 1978 (after the IMF Agreement), 9.4% in June 1982, 2% in March 1983 and another devaluation of 12% in July 1983 as a consequence of the Second Agreement with the IMF.

Besides this discretionary exchange rate policy, the monthly devaluation of the Escudo was initially 1% and was reduced to 0.5% in 1980[166] and increased to 0.75% in December 1981, accelerating to 1% per month in June 1983. Between 1987 and 1989 (the final phase of the crawling peg regime), and due to improvements in the Balance of Payments and in the domestic inflation behaviour, the monthly depreciation of the Escudo slowed to 0.5% in 1987 and 0.4% in 1988.

The year 1990 was a time of switching monetary and exchange rates policies with regard to the future adherence of the Escudo to the Exchange Rate Mechanism of the European Monetary System, which occurred on April 1992. Step by step, the required mechanisms of indirect control of monetary aggregates were put in place. First a shadow mechanism was established between 1990 and 1992, aiming at testing the adjustment reaction of the Portuguese economy. Then, from 1992 onwards the Portuguese Escudo joined the large band (6%) of the ERM, band that was widened to 15% in August 1993. Meanwhile several adjustments have occurred motivated by exchange markets turmoil during the 90s. Since Spain became the most important

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[164] Nominal effective exchange rates. Performance relative to 21 industrial countries: double export weights.
[165] USD, JPY, ESP, GBP, DEM, ITL, FRF, BEF, NLG, DKK, NKK, SKK, CHF.
[166] The Minister of Finance Cavaco Silva, arguing that previious devaluations went too far, also decided a 6% ad-hoc appreciation of the Escudo in 1980.

commercial partner of Portugal, the adjustment of the Escudo central exchange rate was fuelled by the devaluation of the Peseta.

Finally, and due to strict macroeconomic policies enforced by the discipline of the nominal convergence criteria[167], short term interest rates dropped from 17.8% in 1991[168] to 5.1% in 1997[169], long term interest rates[170] from 9.0% in 1993 to 5.7% in 1997, and the general Government overall balance, as a percentage of GDP, from – 6.4 in 1991 to –2.5 in 1997.

8.2. - DEREGULATION OR FINANCIAL REGULATORY REFORM?

The process that has gone on in financial markets in western economies people described it as deregulation but, for the following reasons, the expression regulatory reform is more appropriate.

a) Definitions of regulation, for instance the Webster Dictionary and Llewellyn:

Webster's dictionary defines regulation as "the act of reducing to order, of disposing in accordance with rule or established custom". Llewellyn (1986) defines regulation as "a body of specific rules or agreed behaviour, either imposed by some government or other external agency or self imposed by explicit or implicit agreement within the industry, that limits the activities and business operations of financial institutions".

b) Because of the rationales for regulation (asymmetric information, externalities and market power) banking systems are at present much more regulated then they were before the 1980s.

c) The term "deregulation" suggests the dismantling or at least diminution of rules in the financial system, but what followed cannot be characterised as a laissez-faire financial market.

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[167] Portugal was entitled to join the single currency by 1999.
[168] Treasury Bills, 91 days (primary market).
[169] LISBOR-3 months interest rate.
[170] Treasury Bond 10 year fixed rate yield

These are the reasons why the expression "financial regulatory reform" is consistently employed throughout this thesis, rather than the more widely used term, "financial deregulation".

In Portugal the most important new financial rules were implemented, gradually, from 1985 to 1993, when the full liberalisation of the market was enforced. Since then, the Portuguese Financial System has been fully in line with European standard financial requirements.

8.3. – THE BEHAVIOUR OF BANKING PROFITABILITY IN THE COURSE OF FINANCIAL REGULATORY REFORM

The analysis of variance developed in chapter five doesn't allow any conclusions about the effect of regulation on banking profitability. Instead, it allows us to draw some conclusions about the behaviour of average profitability through time. The time that is considered is the time during which financial regulatory reform occurred in Portugal. This analysis is complemented and enriched by empirical tests based on unbalanced panel data models carried out in chapter six. These models allow us to distinguish the effect of regulation on banking profitability as well as the effects of the other banking profitability determinants. The responses of profitability measures to changes in regulatory rules are different.

The different behaviour of profits, R.O.A. and R.O.E. during the period of the study, when the main changes in the regulatory rules took place, are summarised as follows:

The effect of time is very clear on profits, and the analysis of variance shows that liberalisation in the Portuguese Banking System was followed not only by higher average profits, in absolute terms, but also by greater volatility. Average profitability measured by R.O.A. and R.O.E. is statistically significantly different at the end of the process of liberalisation when compared with what it was at the beginning. Average profitability measured by R.O.A. and R.O.E. fell during this period.

The unbalanced panel data models tested demonstrate the statistical significance of regulation on profits and on R.O.A., these results indicating that average profitability (measured by profits in escudos terms) has increased in the course of financial regulatory reform in Portugal. In the analysis of variance models average R.O.A. has decreased in the course of financial regulatory reform. Changes in regulation may however not have been responsible for this behaviour. For in fact regulation is statistically significant to explain R.O.A. behaviour but the coefficient estimates have a positive sign. This fact means that, given the codification assigned to regulation as a binary variable, regulation appears to have produced an increase in average R.O.A. These results suggest that other banking performance determinants, such as the ratio total deposits to total assets and increasing competition on the credit market, have outweighed this effect.

R.O.E displayed peculiar behaviour during regulatory changes. Average R.O.E. fell while also becoming more stable. These moves were in the opposite direction to those of profits as measured in escudos and of R.O.A.. Tests carried out in chapter six show that regulation is not statistically significant in explaining the behaviour of R.O.E..

The difficulty in explaining R.O.E. behaviour using the method adopted in the study suggests the importance of capital markets and market prices data instead of accounting data in studying R.O.E. behaviour. This suggestion is reinforced by the fact that shareholders are concerned with this measure of profitability. Nevertheless, as this thesis is about banking stability and soundness, the data are examined so as to illuminate these issues rather than some which may concern bank shareholders.

8.4. – THE EVOLUTION OF RISK IN THE COURSE OF FINANCIAL REGULATORY REFORM

This thesis has considered whether financial regulatory reform in Portugal contributed to reducing risk and increasing stability of credit institutions.

The conclusion was that changes in financial regulation did have that effect. Empirical work showed that: risk remained statistically unchanged between the first period of liberalisation (1985-1988) and the second one (1989-1992), and risk decreased with the full liberalisation of the banking industry, that is during 1993-1997.

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