



IUL School of Social Sciences
Department of Political Economy

**Dynamic Competition in the Portuguese Banking Sector:
An Analysis of Product Innovation through a New Indicator**

André Filipe Domingues João

A dissertation submitted in partial fulfilment of the requirements for the degree of
Master in Monetary and Financial Economics

Supervisor:
Prof. Dr. Sandro Mendonça, Assistant Professor

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Resumo

Esta dissertação pretende estudar a evolução da banca comercial portuguesa entre 1993 e 2013. Propomo-nos estudar as alterações no setor bancário português da perspetiva da inovação económica. Em particular, usamos as marcas comerciais como novo indicador de inovação de serviços neste setor central do capitalismo financeiro contemporâneo usando o caso nacional como ilustração. Assumimos que será possível, através deste indicador, averiguar a existência de competição dinâmica (no sentido Schumpeteriano) no setor bancário em Portugal, considerando que este indicador poderá ser capaz de mensurar e captar situações de diferenciação vertical (aumento de qualidade), horizontal (diferentes funções) ou ambas (combinação das duas anteriores). A criação de uma base de dados própria com informação de todas as marcas registadas por bancos comerciais (que concedem crédito e recebem depósitos) a atuar em Portugal no período em análise, permitiu-nos encontrar evidências de competição dinâmica no sector e uma preferência pela diferenciação horizontal, bem como, perceber e mapear o fenómeno de internacionalização da banca nacional e entender a resposta do sector tanto a adversidades, de que são exemplo crises financeiras, como a oportunidades, como foi o caso da revolução tecnológica ocorrida em 2000.

Palavras-chave: inovação; serviços financeiros; marcas; competição dinâmica.

Códigos JEL: O30; G20; L80

Abstract

This dissertation aims to study the evolution of Portuguese commercial bank between 1993 and 2013. We study the changes in the banking sector in Portugal from the perspective of innovation economics. In particular, we use trademarks as a new indicator of service innovation in this central industry of the contemporary financial capitalism using Portugal as case study. We assume it will be possible to ascertain if there is dynamic competition (in a Schumpeterian sense) in this sector in Portugal, since the new indicator yields a promise of measuring vertical (higher quality) and horizontal (different functions) differentiation (or a combination of both) in concrete markets in real time. Our database, grouping information about trademarks applied by Portuguese commercial banks (provisioning credit and receiving deposits) from 1993 to 2013, allow us to get evidence of dynamic competition in this sector and a preference by horizontal differentiation in order to achieve larger market share. It was also possible clearly understand and map the level of internationalization of the sector and the strategy practised in this sense as well as the reaction to economic negative events, such as financial crisis, or positive events like technological booms.

Key words: Innovation; financial services; trademarks; dynamic competition.

JEL code: O30; G20; L80

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List of abbreviations and terms

- BCP – Banco Comercial Português
- BERD – Business enterprise expenditure on R&D
- BES – Banco Espírito Santo
- BPI – Banco Português de Investimento
- CTM – Community Trademark
- CGD – Caixa Geral de Depósitos
- GDP – Gross Domestic Product
- GERD – Gross domestic expenditure on R&D
- ICT – Information and communication technology
- INPI – Portuguese Institute of Industrial Property
- IPC – Industrial Portuguese Property Code
- IT – Information Technology
- OECD – Organisation for Economic Co-operation and Development
- OHIM – Organisation for the Harmonization of the Internal Market
- OMFI – Other Monetary Financial Institutions
- R&D – Research and Development
- S&T – Science and Technology
- SME – Small and Medium Enterprises
- TPP – Technological Product and Process
- USPTO – United States Patent and Trademark Office
- WIPO – World Intellectual Property Organization

1. Introduction

Economic globalisation and the Information Revolution propelled innovation to a truly central issue in decisions concerning public policy and business strategy. In the economic literature the concept of innovation appears the first half of the twentieth century, introduced by Schumpeter, and diffuses with his followers of the evolutionary and neo-Schumpeterian schools of thought (Fagerberg, 2004). This dissertation follows this research line.

Innovation studies are, indeed, more than just an academic enterprise. Since the 1960s institutions like Organisation for Economic Co-operation and Development (OECD) have contributed to monitor this key process in developed economies. The work invested into developing quantitative yardsticks of technical change, thus, stretches well in time. All of the proposed indicators have advantages as well limitations. Today these indicators are part of the empirical toolbox of economist and include statistics like Research and Development expenditures (R&D) the patents (Smith, 2004). The addition of trademarks to this portfolio is fairly recent (Schmock, 2003; Mendonça et al., 2004). Trademarks are a form intellectual property that protects the unique commercial identity characteristics of products and firms. Their application reveals entrepreneurial initiative and marketing efforts undertaken by organisations to position themselves before their target-audiences and distinguish themselves from competition. Such decisions concerning products (tangible or intangible products) seek differentiation because of competitive pressure and the need to attract the consumers. The interest in these property rights may be taken as indicating the search for promised benefits, in particular demand inelasticity, customer loyalty and higher profits. Hence, trademarks have been a way of measuring non-technological innovation, showing more advantages than others in the particular field of service innovation (Godinho, 2007). Our agenda is motivated by this methodological potential.

In a global perspective, the number of trademark applications increased significantly after the Second War, with more than three million of applications in 2004 (Millot 2009). A study on this matter (Myers, 2013) shows that in United States of America the number of trademarks applications has been growing over the past 25 years, with the real Gross Domestic Product (GDP) growing 2,8% (average annual growth rate) during this period, while the number of

trademarks applications increasing at an average year rate of 6,5% during the same period. In Europe, in the period from 1996 to 2008, the economy grew 30,5%, while in the same period the number of Community trademarks (CTM) grew 167% (Mendonça and Fontana, 2011). Modern economies are becoming more trademark intensive, a phenomenon that motivates the present research work.

The focus of this dissertation is in the service sector, in particular in the finances services. This is due to the well-known phenomenon of growth of services sector being associated to economic development in modern economies. Services sector nowadays represent around 75% of the value added and employment in advanced economies of OECD (Salter e Tether, 2006). However, the OECD (2007) has highlighted that the importance of innovation in services sector goes well beyond its proportion of GDP. One reason is the fact that this sector presents greatly connects with other sectors of economy (Evangelista, 2000). Another reason is that innovation activities in the services sector may present higher intensity when compared to manufacturing; this is the case, for instance, of Portugal (see the Community Innovation Survey, 2012). Notwithstanding its importance, it remains the case that difficulties in understating and measuring the innovation process in services are difficult since its output is intangible (Gallouj, 2000). This dissertation offers a way to address this research challenge.

The technological and regulatory context shapes the incentive structures of the banking sector (Bos et. al, 2012). On the one hand, information and communication technology (ICT) allows for increased potential in innovation via home-banking or apps for mobile banking. On the other hand, regulation creates pressures for innovation to flow in particular directions. Slumps like the New Economy in the early 2000s or the Subprime crisis in the late 2000s had innovation as a central factor. The interplay between technology and finance was instrumental in the dynamics of this “double bouble” (Pérez, 2009). Understanding the commercial banking sector lived through these turbulent foundational years of the 21st century is a key challenge, both for economic analysis and for sectoral regulation.

There is no established database about trademarks applications for the retail banking sector in Portugal. In our research we make use of official statistics of intellectual property offices to generate a new and original empirical resource for research. The data was compiled from the

Portuguese national institute of industrial property (INPI), the Office for Harmonization of the Internal Market (OHIM), and from the World Intellectual Property Office (WIPO). A new database was built containing 2,493 trademark validated applications for the period between 1993 and 2013. Data collection was limited to the banks that the Bank of Portugal classified as able to receive deposits, i.e. institutions authorised for act in commercial banking. This allows us to study the behaviour and dynamics of financial services sector in Portugal from a unique and fresh perspective.

On the basis of this empirical material we wish to argue that trademarks are a reliable and useful indicator for understanding the structure and the evolution of the competition in financial markets. In particular, we aim at showing that the image that emerges is one of dynamic competition, that is, one in which players jockey for distinct market positionings, struggle to stay ahead of competition, practice a wealth of differentiation strategies, and engage in processes that Joseph Schumpeter termed “creative destruction”.

The dissertation is organized in five chapters. Chapter 2 carves the theoretical framework from the bedrock of innovation studies and evolutionary economics. Chapter 3 describes the methodology deployed in this research, highlighted how the evidence of raised from primary sources and how it may be interpreted. Chapter 4 analysis the trademark data in search of major stylised facts using year of application, products classes, countries of application, and a number of other variables. Finally, Chapter 5 offers some conclusions, stresses the limitations of our study, fleshes out a few policy implications and proposes avenues for future research.

2. Empirical and theoretical perspectives in a Schumpeterian view

2.1. Innovation and dynamic competition in a Schumpeterian perspective

Joseph Alois Schumpeter is well-known for having introduced the concept of innovation in economic theory. He presented “dynamic competition” as a process and the essence of market competition itself. In this historical process, a phenomenon taking place in real-time, innovation is to be understood as the prime strategy that companies employ to attain advantage and remain competitive. Innovation, for Schumpeter (1942, p. 84), “strikes not at the margins of the profits and the outputs of existing firms but at their foundations and very lives”. In the Schumpeterian view, competition mainly occurs through product and quality improvements instead of prices or quantity changes. This process is characterized by the introduction of new products and processes in the market, yielding a temporary monopoly to the innovator which in consequence attracts new costumers. This movement, however, also attracts competitors, which detect the success, choose follow the same path and create a similar business propositions. Advantages achieved by the first-mover are eroded by the swarm of imitators and profits slide down to “normal” levels while the innovation gets diffused widely across a large set of users.

According to Schumpeter, innovation is the basis of economic evolution (Schumpeter, 1942: 81-86; 1947), that is, structural change, while interplay between innovation-diffusion is at the origin of business cycles (see Schumpeter 1912, 1939). Schumpeter defines innovation, not as pure novelty, but as a “new combination” of resources already known. Innovation may be materialized as the introduction of a new or improved good, a new method of production, opening up of a new market not yet explored, a new source of supply of raw materials or the implementation of a new form of organization. In a Schumpeterian light it is important to distinguish the concepts of invention and innovation: invention is the moment in which a new idea arises, but it is only its injection in the market which makes it an all-important economic event (Fagerberg, 2004).

In other words, innovation is about the possible re-writing of the productive system at a variety of levels. When agents are engaged in this activity they are bringing about “creative destruction”, that is, making some practices obsolete while some replacing these with others. Intendedly or

unintendedly, entrepreneurial individuals and organization are transforming the economic system from within and making capitalism a dynamic, evolving process (McGraw 2007, p. 169).

Since the 1950s Schumpeter's concepts have been studied and developed by number of economists. These have focused on their empirical application (Freeman and Soete, 1997; Fagerberg et al., 2004, Hanusch and Pyka, 2007), but also on its more profound theoretical implications (Nelson and Winter, 1982). His constructs have been adopted and revised, adapted and expanded, as well as tested against evidence on stylised facts (Salter and Alexy, 2013).

Currently it is natural to assume, moreover, that the introduction of innovation in a market generates externalities in the economy. Innovation also gives rise to complementary changes of various which coalesce into broad patters and trends. Many authors have contributed to establish the contours of such patterns of innovation according to a systemic perspective in a sectoral (Marleba, 2002), regional (Cooke et al., 1997) and national scales (Nelson, 1993; Lundvall, 2007). Caraça et al. (2009) argue, for instance, that innovation sources and outcomes depend on broad iterative and interactive dynamics in a variety of micro, meso and macro settings. In the same vein, Laranja (2007) states that such evolutionary dynamics is not only mediated and measurable in market terms.

2.2. Types of innovation

Since business environment matters for innovation and competitiveness Schumpeterian insights have, likewise reached the policy sphere. A good example of this is the OECD, which since the 1960s, influenced Science and Technologic (S&T) policy in the developed countries. The OECD's approach was inspired by assumptions on the basis of evolutionary theories (Henriques and Larédo, 2013). In the recent S&T policy perspectives by the OECD the influence of Schumpeter is clear enough.

In the latest edition of the *Oslo Manual*, the OECD distinguishes between key types of innovation. Here the OECD (2005, p. 46) refers to innovation as “*the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations*”. In

other words, product innovation, process innovation, organisational innovation and marketing innovation:

- product innovation refers to the creation of a new good or service as well as to improvements in already existing products, which may be, for example, new components, attributes, etc.;
- process innovation is related with the change of procedures adopted to produce the good or provide service such as new manufacturing methods, new equipment allowing to produce the same output at a lower cost or more for the same cost, etc.;
- organisational innovation implies new ways of managing a company in order to reduce administrative costs or improve employee satisfaction at work;
- marketing innovation is the implementation of new promotion or selling strategies, which can involve improvements at the design or distribution level to better meet consumers' needs.

It may be noted that the four categories of innovation presented above distinguish technological innovation from non-technological innovation. Technological innovation mostly includes product and process innovation (present in earlier works of the OCDE, such as OECD/Eurostat, 1997), but organisational and marketing innovation allows the analysis to extend to virtually all sectors of an economy.

In a different perspective, it is also important distinguish the type of differentiation between products in order to understand sector's dynamic. Chamberlin (1933) considers that product differentiation can be horizontal or vertical. In the first perspective, when a product does not differ in terms of quality but rather in terms of some features not easily ordered in an objective way. The distinction between products in terms of quality is not easily evaluated by costumers, as quality has a mere marginal variation. On the other hand vertical differentiation occurs when in a specific market goods or services can be ordered according their objective quality in a scale and customer choose between two products according its quality preferences.

2.3. The evolution of innovation research in services

The growing importance of services sector in the modern economy, representing about three quarters of employment and value added in advanced countries (Salter and Theter, 2006), have led to an increasing focus on innovation in the services sector. Until 1980 this study area was neglected. Although service innovation has become more popular as a research topic its specificities make it “difficult to investigate and evaluate ... with the traditional analytical tools” (Gallouj 2002, p. 19). Hence, work in this area has been hard and as involved both theoretical and empirical developments.

According to Salter and Theter (2006), up to the 1980s there was a notorious scarcity of studies in this area. In published studies innovation was highly related both to technology as well as equipment. Attention is drawn to the work of Fuchs (1968), Bell (1973) and Pavitt (1984) as examples. Fuchs (1968) warned of the need to redefine the economy as a result of the growing importance of services in the economy where the consumer plays a more important role than previously assumed. In the same way, Bell (1973) talks about a post-industrial society as the result of a fast growth in the service sector and development of ICT. Pavitt (1984) initially makes an important contribution to research on innovation and technical change, presenting a classification for industrial sectors (supplier dominated; science-based; scale intensive; and specialized suppliers) to which added a more intangibles-based/information-intensive category, based on ICT (to which he assigned the banking sector; see Pavitt, 1990).

Then, and still according to Ammon and Theter (2006), came a new phase, from the mid-1980s and to the late-1990s. This period was characterised by the attempt to study innovation in services adapting conceptual tools already used for observation of innovation in manufacturing and by focusing on the impact of technology on services. A highlight is the work of Barras (1986 and 1990), which interpreted the product life-cycle for the service sector. Authors like Miozzo and Soete (2001) adapted the Pavitt taxonomy to the services sector. Evangelista (2000), leaning over the concrete case of Italian economy, also classified companies of the service sector in four major clusters. Also the works of Gallouj (1998, 2002) constituted important contributions to this subject during the referred period.

After the 1990s starts the period Ammon and Theter (1996) dub to be of demarcation and differentiation. The key notion is that the service sector has markedly different characteristics from manufacturing resulting in the need to create different approaches. Examples of this line of work are Gallouj and Weinstein (1997), Sundbo and Gallouj (1998), Sundbo and Gallouj (2000), Coombs and Miles (2000), Drejer (2004), among others. Gallouj and Weinstein (1997) point out that the difficulty of studying innovation in services has been largely due to the fact that the analysis was based on the procedures of technological innovation in manufacturing. Drejer (2004) argued that the concept to innovation goes beyond technological change and should encompass organizational change.

More recently, Gallouj and Savona (2010) argue that increasing synthesis and integration may be rising. However, and as these authors argue, more work is still due in order to restore the balance of research toward a sector that accounts for three-quarters of total employment.

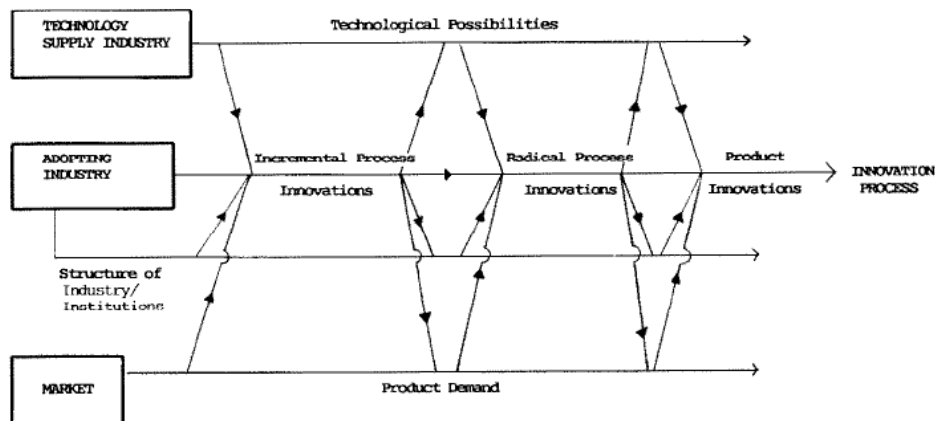
2.3.1. Reverse product cycle

This view, presented by Barras (1986a), portrayed service innovation as a dynamic and evolving process. The process in the service sector starts out as an incremental innovation process in a first phase, evolves to a radical innovation process in a second stage, and ends with product innovation. In other words, the first stage is characterised by an initial investment designed to provide lower costs in mature well-known services by applying already available technology (an incremental innovation), which can directly be connected to a progression along learning curve. Moving forward in this process, on the second phase the application of new technology in radical innovation processes try to improve effectiveness (not an efficiency-driven process anymore) by affecting the quality of services provided. On the last phase of this process, the main concern is centred on the creation of new products, instead of improving the features of the established methodologies, and achieves differentiation in the market where the product is commercialised. By applying this view to services the evolution of innovation along the reverse product cycle moves from a strictly supply-push dynamics to a more market-pull sensitiveness. Firstly, innovation is more dependent of the technological possibilities created by the upstream

equipment manufacturers. Finally, the process becomes much more demand-dependent since service characteristics have to fit costumers needs.

In subsequent work Barras (1990) addressed the topic of innovation in services emphasising more explicitly the supply-demand interplay throughout the reverse product cycle. In this process, new technological possibilities are confronted with market conditions and the institutional context. The cumulative result of this continuous interactive innovation process is at least as sharp as the result of radical product innovation, discontinuous and driven by technology. Moreover, the technological conditions, market and institutional which favour innovation, cannot be considered separately, since these conditions mutually interact. Figure 2.1 illustrates the innovation model interactive services, along the inverted product cycle. Given that technological and market conditions undergo constant change, companies move along possessing imperfect information about these changes. This leads them to take decisions in an unstable and uncertain environment, that is, tentatively judging technological possibilities and evaluating shifting customer needs.

Figure 2.1: Interactive innovation process in services



Source: Barras (1990, p. 19)

Barras’ model also takes into account the coexistence of three types of conditions influencing the process of adoption of new technology. In the first level, the technological possibilities that are created by innovations in the sector responsible for the production of capital goods; secondly, the conditions prevailing demand in the markets served by sector adopter; and finally, the organizational and institutional structure of the adopter sector. In other words, this view is one

that stresses the contingency of firm strategy in the shifting environment where different trends co-evolve.

2.3.2. Specificities of innovation in service sectors

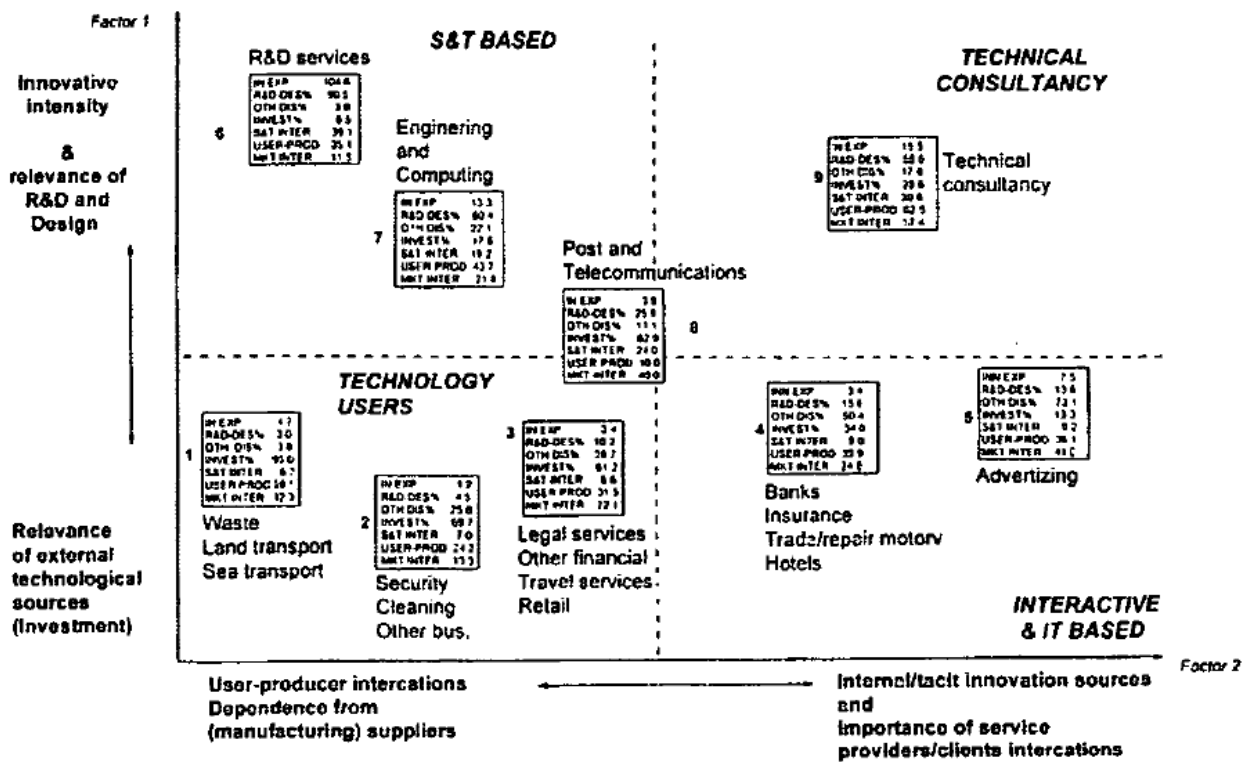
Sundbo and Gallouj (1998) made a contribution in which they set apart specific forms of innovation in services. They stress, for instance, that the discovery of new market niches leads firms to alter its behaviour within the environment in which it operates; and the service environment is different. Given that the customer is an important factor in service business, Gallouj and Weinstein (1997) stress “ad hoc” innovation to be a common stylised fact since customers have idiosyncratic problems many times. In this situation, using the available knowledge and experience accumulated in their activity, firms achieve a solution through an interaction with customer who has highly participatory roles. Such variability, in turn, raises costs and channels incentives in service innovation to be oriented to formalisation and standardisation. In other words, innovation in services pushes and pulls strategies in directions that may lead to tension and contraction.

Rinaldo Evangelista (200) considered the innovation phenomenon in services in recognisably neo-Schumpeterian way, that is, he pointed out that innovation is a quite distributed phenomenon in service sectors but also that it differs across sectors (see Fagerberg, 2004). Evangelista (2000) attempted to sort out service sectors into specific clusters of activity. This analysis was seconded by another study, by Miozzo and Soete (2001). Following Pavitt’s taxonomy (1984), see Figure 2.2, Rinaldo Evangelista identified four groups of innovating service firms:

- i. *technology users*, which resembles the group of supplier-dominated firms by being also considered the least innovative group, especially dependent on upstream industries providing ICT equipment;
- ii. *science and technology-based*, similar to high-tech science-based firms characterised by Pavitt as being strong in innovation activity since they create technological innovations later adopted by other companies;

- iii. *interactive and ICT-based sectors*, characterized by intensive use of electronic and digital means of operation, and which are responsible for innovating interactively with customers and users of its products;
- iv. *technical consultancy*, that is, those supplying knowledge-base and technically-intensive solutions to customer’s highly-specific complex needs.

Figure 2.2: Sectoral patterns of technological change in service sectors



Source: Evangelista (2000, p. 214)

In his survey Evangelista (2000, p. 194) observed that in Banking 61.8% of the firms innovated. This industry came third in his service sector ranking, only after R&D services and insurance. Services, as a whole, were found to rely more on process innovation than manufacturing, which in more balanced between product and service innovation. Notwithstanding, innovating banking firms emerge to have a higher than average intensity in product innovation, when comparing with services in general (Evangelista 2000, p. 196). By far the bulk of innovation spending in banking came in the form of software improvements and in the form of new investment, a trend pushing

banking to the bottom-right quadrant, i.e. a sector display interaction-intensive and ICT-acquiring behaviour.

Table 2.1: Types of innovation introduced in innovating service sectors

| <i>Service sectors</i> | <i>% of firms introducing product innovation</i> | <i>% of firms introducing process innovation</i> | <i>% of firms introducing process and product innovation</i> | <i>% of firms declaring the distinction is not applicable</i> |
|----------------------------|--|--|--|---|
| R&D | 79.4 | 94.1 | 73.5 | 30.8 |
| Insurance | 41.8 | 91.0 | 32.8 | 25.3 |
| Banking | 68.3 | 83.7 | 52.0 | 22.0 |
| Other business services | 34.9 | 76.7 | 11.6 | 20.6 |
| Other financial services | 34.5 | 100.0 | 34.5 | 32.0 |
| Total services | 53.5 | 72.3 | 25.8 | 25.6 |
| Total manufacturing | 80.2 | 83.0 | 63.1 | - |

Source: Evangelista (2000, p. 196, abridged)

2.3.3. The impact of ICT in service innovation

Bilderbeek et al. (1998) presented an additional interpretation of innovation in services considering that most of the innovations in this sector arise from the introduction of ICT. According to these, service innovation is not just about a change in the characteristics of the services themselves offered, but also a wide range of changes such as interactions with customers, distribution processes, among others. For the authors the intangible and interacting components of service innovation were on the rise even before the heyday of the “New Economy”. In particular, client interfaces were becoming important, whereby consumers can produce criticism and make suggestions made possible by the new technologies making possible the rapid interchange of information.

This perspective is consistent with Tufano’s (2003) view that financial innovation exists to correct inefficiencies or imperfections in the market. Other studies defined financial innovation as arising with the aim of minimizing the agency and transaction costs (Ross, 1989; McConnell and Schwartz, 1992; Grinblatt and Longstaff, 2000) and also for minimising the weight of taxation (tax efficiency) and restrictions imposed by regulators (Miller, 1986; Santangelo and Tuffano,

1986). A great many of these gaps and loopholes are informational in nature. It is then not surprising that these and other authors have recognised that the growth of proficiency of the sector in these technologies during the three last decades is recognized by several authors (Miller, 1986 and 1992; Merton, 1992; Nightingale, 2003; Tufano, 2003; Frame and White, 2004 and 2009; Barata, 2011).

Consoli (2007) has recently contributed to show that progress achieved in terms of information processing technologies has performed an important role in innovation in financial services sector, and the increase of variety in knowledge-base results in a greater interaction between the actors, including conducting to new ways of coordination with users. Likewise, Bátiz-Lazo (2009) has also argued that the adoption of real-time computing and online payment media has been a major driving force behind the overhaul of the sector, namely in the retail finance segment.

That new ways of fostering and managing network externalities have mattered has been, indeed, underscored by Oliveira and Hippel (2011), in their first quantitative study about user-innovators in financial services. Users not only are able to access bank records using ATM or electronic banking, they have contributed to shape the service itself. As Oliveira and Hippel (2011) have shown, the proportion of user-led innovation in the finance sector, even in the retail business were costumers tend to be individual consumers has a considerable percentage.

Table 2.2: Sources of ICT-based versions of banking services

| Service types | % User | % Producer | % Joint |
|---|----------|------------|---------|
| Information services and planning solutions | 75% | 25% | 0% |
| Products, transaction services and security | 61% | 8% | 31% |
| Channels to access banking services | 0% | 67% | 33% |
| Corporate services total | 55% (11) | 20% (4) | 25% (5) |

Sources of computerized versions of retail banking services.

| Service types | % User | % Producer | % Joint |
|---|---------|------------|---------|
| Information services and planning solutions | 75% | 25% | 0% |
| Products, transaction services and security | 38% | 62% | 0% |
| Channels to access banking services | 25% | 75% | 0% |
| Corporate services total | 44% (7) | 56% (9) | 0% (0) |

Source: Oliveira e von Hippel (2011, pp. 811-2, abridged)

Hence, it is acknowledge that banks are intensive users of ICT and that financial services are today mostly provided using technological, digital-intensive tools. However, empirical studies based in quantitative elements are limited (Beck et. al., 2012). Frame and White (2004, p. 116)

indeed state: “Everybody talks about financial innovation, but (almost) nobody empirically tests hypotheses about it”.

In the last few years studies in the area of innovation in financial services have emerged. On the one hand, for instance, Lerner e Tufano (2011) have claimed that innovation in financial services is different from other sectors because *i*) financial system is highly interconnected, *ii*) innovation in finance is very dynamic, *iii*) regulation of financial sector is more complex than in the other sectors. On the other, Bos et al. (2012) have found evidence that the relation between competition and innovation in the North-American banking sector could be graphically portrayed as an inverted U-curve where innovation is measured in y-axis and competition in x-axis. Considering that banks are at the left-side of the optimal point (maximum innovation level) authors proved that deregulation has a negative impact in innovation. This is justified by the negative effect of deregulation in competition, which consequently moves banks to the left through the mentioned inverted U-curve, meaning a lower level of innovation in the future. Heffernan et al. (2014), concluded that largest companies from the banking sector are more inclined to innovate, although with lower returns, banks with high quality human resources or higher expenses in R&D are more innovative and that companies protecting their innovations obtain better results.

More to the point, most of this literature seems to be favourable to innovation in finance it is no longer the case that this assumption is unproblematic. The financial crisis which commenced abruptly with the collapse of Lehman Brothers has led to new a debate about the negative aspects of financial innovation (Henderson and Pearson, 2008; Allen, 2011; Beck et. al., 2012). Ben Bernanke, as the head of the FED, noted in his speech dated from 17th April 2009:

“In sum, the challenge faced by regulators is to strike the right balance: to strive for the highest standards of consumer protection without eliminating the beneficial effects of responsible innovation on consumer choice and access to credit. Our goal should be a financial system in which innovation leads to higher levels of economic welfare for people and communities at all income levels”.¹

¹www.federalreserve.gov/newsevents/speech/bernanke20090417a.htm Accessed 18th August 2014

In this sense, sometimes financial innovation creates complex products, barely understood by consumers, which is one of the dark sides of the innovation in this sector. However, as Allen (2011) highlights, in the long term the liberalisation of the sector probably had a worse effect than financial innovation. To take an alternative view we can follow Beck et. al. (2012) who see financial innovation as encouraging banks to assume higher risks, granting more credit and diversifying the risk it is taking, which can be positive since it promotes economic development. It has, however, increased volatility in the banking sector, which can be expressed by significant losses in a financial crisis context.

2.4. Preliminary conclusions

Schumpeter established innovation as the core of process “dynamic competition” and “creative destruction” that characterises modern capitalism. His concepts have been completed, revised and extended over the years by evolutionary and neo-Schumpeterian authors as well as global economic institutions like the OECD. During much of time, nevertheless, studies have neglected the phenomenon of innovation in services sector. Recent years have witnesses many efforts to remedy this situation. A number of views relating to innovation patterns have been suggested, and this work constitutes a yardstick to currently study service innovation.

Research about innovation in financial services increased even before the global financial crisis. Change in the financial business has specific characteristics. It may be more complex than in other sectors. Studies of these issues based in quantitative database are yet limited in number and scope. There is, however, evidence that shows that innovation in finance is frequent but highly specific and increasingly ICT-intensive. Even in market segments that retail banking product innovation is common and the role of costumers in influencing the service. There seems overall to persist a lack of fresh research, and aspects such as the impact of social welfare still not well understood. For the purposes of this Dissertation such problems in the literature may be understood as an opportunity for a new approach.

3. Metodology

3.1. Trademarks: An economic perspective

According to the OECD “a trademark is a sign (a word, a logo, a phrase, etc.) that enables people to distinguish the goods or services of one party from those of another” (Millot 2009, p. 17). Although with less detail, this definition is in line with the one presented by intellectual property offices; for these institutions these entities are first and foremost intangible assets that are warranted protection in the marketplace. For the applied economist, however, these symbols may be taken as evidence of differentiation, innovation and industrial change.

Several authors consider trademarks as one of the most important asset in a company, being an essential factor for the company financial success (e.g. Elliot e Lercy, 2006), since it is through them that consumers identify suppliers and distinguish products from a sea of competing stimulate (Schmalensee, 1978; McClure, 1996; Rao, 2005; Aaker, 2007; Fosfuri et al., 2008; Davis, 2009). A specific trademark allows for higher prices, capitalises on reputation, enables costumers’ loyalty, and consequently yields higher margins (Shaked and Sutton, 1982). In the same line, Keller (2008) affirms that a trademark’s final purpose is the market power that differentiation permits to be achieved. A classic example of this is Coca-Cola and the value of this trademark in the market as well as the clients’ loyalty

Flikkema et al. (2014) identify six different motives that are in the origin of a trademark register: (i) the aim of differentiation and demarcation that inhibit imitation and the drive toward lower prices (Economides, 1998; Ramello, 2006; Ramello and Silva, 2006); (ii) companies’ strategic intent such as the entrance in new markets or business lines (Mendonça et al., 2004; Giarratana and Torrisi, 2010); (iii) industrial protection granted with a trademark registration (Greenhalgh and Rogers, 2010); (iv) customer’s loyalty (Keller and Lehmann, 2006; Krasnikov et al., 2009); (v) competitively advantages via new resources’ combination (Hamel and Prahalad, 1993; Hall, 2006); and (vi) organizational motives (DiMaggio and Powell, 1983; Abrahamson, 1996).

3.2. Trademarks: The legal perspective

A Trademark is an industrial property title. In Portugal the rules to applications, prices, validity, etc., of trademarks are defined in the Decree-Law n. ° 36/2003, 5th March, which transposed an

EU directives². The Portuguese Industrial Property Code (IPC) was last time changed in 2011³. The IPR Code is applied not only to trademarks but also to other forms of industrial property. In Portugal the public agency in charge of this area is the national industrial property office (or INPI).

In the article o 222.º of IPC, trademark is defined as “a signal or signals susceptible graphic representation, namely words, including names, draws, letters, numbers, sounds, products form or package, since they are adequate in order to distinguish the products and services from a company to another”. Trademark can be also an advertising sentence for goods and services, since they have a distinctive character, independently of the protection recognized by copyright protection. In the origin of the application of a trademark, there is no need of creation of a new product (good or service) but only the existence of a new signal able to distinguish it from the others.

A trademark guarantees an industrial property right to its owner, allowing him to use it with exclusivity (article 224.º IPC) in the territory where it is registered (national, community, or a group of countries individually chosen), during a period of 10 years which can be indefinitely renewed for periods with the same duration (art. 255.º IPC). The trademark is identified by the symbol ® or ™ (article 323.º) which conveys a warning or threat of punishment for counterfeiting or imitation. As any other industrial property right, also a trademark register can be denied, based on the causes disclosed in articles 238.º e 239.º of the IPC (for instance the fact of the trademark tentative applied does not constitute any distinctive element or if it may be mistaken with that of other firm).

In what regards territoriality of a trademark, it could correspond to a country or to several countries. A national trademark, registered on INPI, only gives to the owner the exclusive right to use it in Portugal (the same trademark can be used for instance in Spain). However, a trademark can be registered in other countries’ offices individually. In order to facilitate and accelerate the trademark application process in other countries, the denominated CTM⁴ arises (article 248.º IPC), registered in the Office for OHIM, which with a single register gives to a company the

² Directive n.º 98/44/CE, 6th July, on protection of biotechnology inventions and Directive n.º 98/71/CE, 13th October, on legal protection of industrial designs.

³ Law n.º 46/2011, 24th June

⁴ Council Regulation nº 40/94, 20th December 1993

industrial property right in all European Union territory (27 countries). A trademark can also be registered in the WIPO, which allows a company to register a trademark in all countries that assigned the Paris Convention for the Protection of Industrial Property (1883). In all the options mentioned, the application process is easy and quick, once it can be executed directly in the website of each Intellectual Property Office referred⁵.

The classification system adopted by WIPO, in what respects to goods and services, for trademarks register purposes, is the Nice Classification, resulted of Nice Agreement (1957). The Nice Classification of goods and services resulted from the international agreement signed in 15th June, 1957⁶, at Nice Diplomatic Conference and was adopted by the countries that constitute the Paris Union for the Protection of Industrial Property, that use this classification not only in the national register of trademarks but also in community and international trademarks, registered in OHIM and WIPO respectively. This classification aggregates the goods and services in 45 classes: from 1 to 34 the classification regards goods, while classes 35 to 45 respects to services. In the moment of a trademark application, the applicant needs to choose the correspondent Nice Class in which the good or service that will use the trademark must be included.

3.3. Trademark as innovation indicator

Section 2 of this dissertation defined the innovation concept and its evolution in theoretical terms. Another concern of the neo-Schumpeterian school has been the discovery of indicators able to measure the innovation degree in a specific industry. Since 1960s the OECD showed its concern on this matter by establishing indicators to quantify economic change. For example, the Frascati Manual provided the methodology for computing the “Gross domestic expenditure on R&D” (GERD) and the “Business enterprise expenditure on R&D” (BERD). After these early efforts new measurements came by such as scientific production (number of publications) and technological invention (number of patents).

A recent development has been the possibility to use trademarks as innovation indicator. The first criticism to point out to this indicator is the fact that a trademark application, contrary to patents, does not require a product innovation. However, that does not have to be the case but *may* well be

⁵www.marcaspatentes.pt; <https://oami.europa.eu/> ; www.wipo.int/

⁶Later reviewed in Stockholm in 1967 and in Geneva, in 1977,

the case (Velling, 2002). In fact, trademarks often play a crucial role in the commercialization of new products (Trott 2005). For costumers is easier identify product innovation when it happens associated to a new trademark. For this reason, it is becoming apparent that also marketing innovations and strategies go hand in hand with trademarks (Kuratko, 2009).

Trademarks as tool for innovation measurement and mapping displays strong comparative advantages, vis-à-vis other indicators, in the case of the services sector (Schmoch, 2003, 2009). It is difficult to capture innovation in services, since they their immaterial element is not well covered in other innovation indicators (Kleinknecht, 2000). Trademarks applications also present the advantage of allow the capture of innovation in small companies (Mendonça et al. 2004; Mangani, 2006; Fikkema et al., 2007, 2012). Given the easiness and low cost of a trademark registration they are cheaper than patents there is also a higher volume of empirical information. They are, however, a less informative in their details than patents (these contain a precise description of a technological idea, trademarks do not unambiguously point to new business models).

In addition to Schmoch (2003) and Mendonça et al. (2004), considered in the literature as important pioneers of this approach, today exists a lot of new work to support the idea that trademarks are an useful element to join to metrics list that supply relevant information about innovative activity (e.g. Schautschick and Greenhalg, 2013). Several studies have verified by employing different databases of national and international scope the existence of a positive correlation between trademarks register and innovative activities (Milot, 2009), being this correlation particularly significant in the services sector, namely in the industries more intensive knowledge and information (Mendonça, 2012; Mendonça and Fontana, 2013; Flikkema et al., 2014).

3.4. Trademarks in numbers

According to Valentine Milot (2009), the first register of a trademark application goes back to the middle of the 19th Century, with nine offices open for application purposes in 1884 growing to 116 in 2006. In a worldwide perspective, it is interesting note the exponential growing of

trademark applications, increasing significantly after the Second World War, with more than three million applications in 2004 (Milot 2009).

A study on this matter (Myers, 2013) shows that in United States of America the number of trademarks applications is growing robustly. With GDP growing 2,8% annually for the last 25 years the number of trademarks applications increasing at an average yearly rate of 6,5%. In the United States Patent and Trademark Office (USPTO) the number of applications in 2010 nearly reached 300.000. In a European perspective, the economy grew 30,5% between 1996 and 2008 while in the same period the number of community trademarks (CTMs) grew 167%. When comparing the reality of trademarks with patents, is visible that in 2009 there is a general preference for trademarks, with 155.000 (approximately) CTM filings while the number of patents applications did not exceed 61.000 in the same year (Mendonça and Fontana, 2011). Trademark data are also correlated with the business cycle (see Mendonça et al., 2004).

In terms of intrinsic value, it is interesting to analyse the information (collected in November 2013) provided by Forbes⁷ in the article “The World’s Most Valuable Brands” with Apple and Microsoft being the most valuable trademarks in the world (104.3 and 56.7 billion US Dollar respectively), followed by Coca-Cola, IBM and Google in the TOP 5. It is important to note that in the TOP 5, four of the most valuable trademarks in the world belong to technology companies. In this list, the first trademark from a company acting in Financial Services sector is American Express, appearing on the 26th position.

And brands reflect corporate collapses too. From one day to another the value of a trademark can go from a large amount to zero. It happened in 2014 in Portugal with BES, a trademark evaluated in the beginning of this year in 640 Million Euro⁸ reduced to zero due to the recent financial scandal and restructuration .

⁷ <http://www.forbes.com/powerful-brands/list/>

⁸ Article written by João Vieira Pereira: <http://expresso.sapo.pt/fim-da-marca-bes-custa-640-milhoes=f884923> accessed on 15th September, 2014

3.5. The creation of a new database

In order to get evidence about dynamic competition, i.e. non-price and innovation-oriented competition, in the Portuguese banking sector we have create a new database by collecting all trademarks registered in Portugal by Portuguese banks between 1993 and 2013. For purposes of this dissertation, we will only taking into account trademarks registration effectively completed, disregarding trademark applications cancelled or abandoned by applicant or refused by the national industrial property office for not fulfil with all the necessary requirements. We considered this as the most prudent scenario to not bias our analysis with tentative applications not concluded.

Our scope is limited to the banks classified by Bank of Portugal, which are financial institutions able to receive deposits. That is, we used the list of the Portuguese financial regulator as a yardstick to compile the populations of economic agents active in the Portuguese retail banking market. We then obtained information of all trademarks applied using TMView's website⁹, where all the information is compiled (information about the name of trademark, applicant name, Nice Class, type of trademark, country of exclusivity, among other information). This source contains applications and registrations of trademarks for individual but also information of international trademarks (that is, in the EU via OHIM and worldwide through WIPO). In total information was collected from 35 different Offices (listed in Appendix A).¹⁰ Our research was done searching by the applicant name and also by the name of trademark (Annex B displays the list of key words used in our research).

Considering a temporal limitation between 1993 and 2013, 2,864 trademarks registered by Portuguese banks were obtained, divided in the following:

⁹ <https://www.tmdn.org/tmview/welcome.html>

¹⁰ It is important to mention that our territorial scope analysis is larger than countries listed in Annex A, considering that when a trademark is registered in OHIM is considered a CTM offering protection throughout all EU Member States with one single registration. Similarly, a trademark registered in WIPO is considered registered in all the States party of Paris Convention for the Protection of Industrial Property, which includes EU and third countries.

Table 3.1: Trademarks under analysis

| | Number of Trademarks |
|---|----------------------|
| Total trademarks (a) | 2,864 |
| Trademarks out of the temporal scope (b) | 262 |
| Trademarks abandoned, refused and cancelled ¹¹ (c) | 109 |
| Trademarks under analysis (d) = (a) – (b) – (c) | 2.493 |

Source: This thesis

The information collected contain the application number, country of application, application date, type of trademark (Combined/Word), applicant name, address and postal code and Nice Classes registered in each application.

3.6. Preliminary conclusions

In the recent decades, the need emerged of creating quantitative indicators capable to measure innovation in developed economies to all activity sectors, in order to complement the theoretical studies already exists on this matter. However, considering the existence of non-technological changes considered complex and multidimensional, as well as the existence of external strategic and organizational factors, there has being difficult to find a reliable indicator of innovation in services.

Trademarks applications has growing quickly, showing a better performance than some important economies (when comparing growth rates). Trademarks are applied for in both and service areas, and allows the study of competition and innovation in sectors than were understudies before.. Indeed, considering the relevance of the information provided by trademarks (namely the specific product lines they applied for), associated with the availability of data collection, trademarks become an important indicator to study innovation in services sector, including the financial one.

¹¹ Application with the status: application refused, application abandoned, application withdraw, discontinuance of the proceeding, registration cancellation pending, registration cancelled, registration refused, registration revoked/refused, registration surrendered

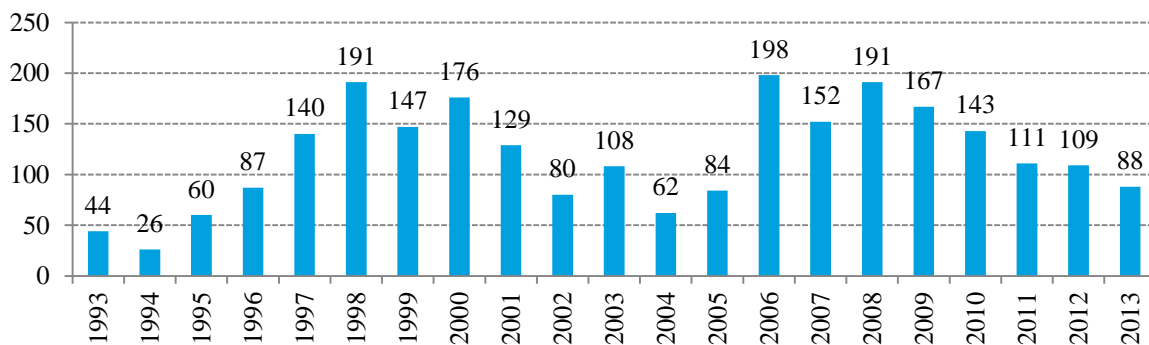
In our dissertation, we wish to exploit the potential of a newly built database to explore the rate and direction of change in the Portuguese retail banking sector, an industry where innovation and hardship have recently taken place.

4. Data and Findings

4.1. Broad patterns in the Portuguese banking sector between 1993 and 2013

After collecting and grouping all the quantitative information obtained, our first analysis is centred on the evolution on trademarks registration and the way it is related with the evolution of the Portuguese banking sector. As the Figure 4.1 makes clear the number of Portuguese banking trademarks per year is not constant, showing fluctuations during the period under analysis. The year registering a lower number of applications was 1994 (24 applications) and the highest number was 2006 (198 applications). Between 1994 and 1998 the number of trademarks shows a strong growth (approximately 635%) followed by a decrease between 1998 and 2004 (-68%). The second cycle identified is characterized by a period of growth on the number of trademarks registered between 2004 and 2006 (219%) and a decrease period between 2008 and 2013 (-54%). That is to say, the two humps seem to denote the “New Economy” hype and the “Sub-prime crises”, although not direct causation is easily ascribable.

Figure 4.1: Number of trademarks registered 1993-2013 (analysis per year)



Source: This thesis, from now on all the figures and tables are original material

To put this data into perspective it is important to analyse the dynamics of the banking sector in Portugal during the same period. Firstly, it is important to mention the privatization of the Portuguese banking sector that occurred in 1989, followed, in the beginning of 1990's, by this deregulation associated with the liberalisation of the international financial markets area (Blommestein, 1995). The increase in the number of banks and the larger operational freedom led to higher competition.

By the mid-1990s banks were vying for stronger market position and at eliminating new competitors, promoting a strong tendency towards concentration in the sector (Serra, 2012). At the end of the decade we observed a technological *boom*, especially with regards to the use of computing and the internet as working tools able to streamline processes and increase efficiency levels (Musara and Fatoki, 2010). This was also a sub-period characterized by the growth of credit to non-financial corporations and private individuals (Lagoa et al, 2004). Also the Portuguese integration in the Economic and Monetary Union and the consequent adoption of the EURO as the single currency, allowed the integration of financial markets. At this time, we observed a sharp growth of credit, a common phenomenon throughout the euro area. The currency risk disappeared; liquidity increased and banks started issuing very low spreads. Housing loans also grew strongly, due to, among other factors, the increasing competition between banks as a result of liberalization (Serra, 2012). These factors combined may account for the increasing number of trademarks between 1994 and 2000.

Although the concentration process has started in the mid-90's, the effects of such operations on the levels of concentration are more evident from 2000 onwards, a period marked by a consolidation of banking groups, with the restructuration of groups by merging the different trademarks within a group in a single trademark. The analysis of the evolution of concentration in the Portuguese banking system suggests an increased concentration of all variables, indicating the dominance of the banking groups (Carvalho, 2010). This is likely to have impacted upon the number of trademarks, since the level of competition decreases and the effort of the banks to achieve market share is consequently lower.

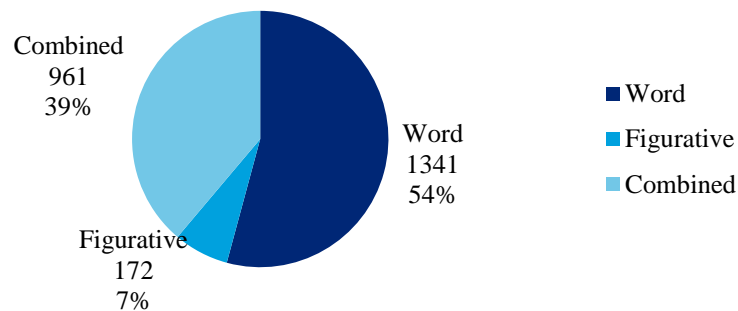
Recently, the fall of Lehman Brothers (in September 2008) led to a financial crisis that morphed into a sovereign debt crisis in the peripheral countries in 2011. This cluster of events had a strong impact on the banking sector. Before 2008 the greatest weakness of the Portuguese banking system was the dependence on external financing. The crisis was mostly absorbed by Portuguese banks in two ways: (i) the emergency liquidity concessions of the ECB and the intervention of the “Troika”, and (ii) a shift towards savings capture (Serra, 2012).

4.1.1. Type of trademark registered

The analysis comprised in this sub-section pretends to give us information regarding the type of trademarks predominantly registered by the sector, i.e., do the registered trademarks contain only text, image(s) or a combination of both?

It is noticed in the chart disclosed below that 54% of the registered trademarks by sector are text only, being given importance to the message that is passed, e.g. "Conta rendimento CR 3,25%" ("Account CR 3.25%"), which has the main objective to provide the most important and attractive information to the client. Moreover, 7% of the trademarks that are images are mostly logos registered by the banks. See Figure 4.2.

Figure 4.2: Type of Trademark registered (1993-2013)



4.2 Trademark creation and destruction

Another perspective is the decomposition of the data presented in Figure 4.1 regarding active and expired trademarks. Based on our database, we considered as expired trademarks all applications indicating the information "Expired", "Registration Expired" and "registration Lapsed" and the remaining as active trademarks. The expectation is to map the level of "creative destruction" within banking sector. According to the legislation in force regarding industrial property matters¹², trademarks are active during 10 years, counted from the date of grant and can be renewed indefinitely for identical periods. After this period, the applicant must analyse and

¹² Directive 2008/95/CE, transposed to Portuguese legislation in the Decree-Law n.º 143/2008.

decide whether the trademark registered in the past is still important in its present activity or if it has no more utility within the current context.

Considering the already mentioned 10 years' term, this analysis must be limited, as a trademark registered, for instance, in 2006 will expire in 2016. As such, it is reasonable that the focus of our analysis comprises the period ranging between 1993 and 2003. The percentage of expired trademarks is not constant. In fact, it is possible to identify that, in 1994, 1997, 1998 and 1999, the number of trademarks expired was greater than the number of trademarks active (Figure 4.4). This may point to product substitution: 10 years after the initial register, Portuguese banks opted for non-renewing these trademarks and to create new ones, meaning that these trademarks are no longer deemed as appropriate on its expiration term. On the other hand, it is also important to highlight the evolution of strategy shown in Figure 4.3, as from 1997 to 2003, the percentage of expired trademarks registered in a year, decreased from 69% to 7%. The early 2000s seem to start a new wave of trademarks.

Notwithstanding, it is important to notice that a large percentage of this destruction is not a radical process but rather an incremental one, meaning that it is evident a phenomenon of horizontal differentiation in place of vertical differentiation. Some of trademarks applications are related with deposits and credits. Focusing for example in deposit trademarks, BES applied a trademark named "Conta rendimento 3,25%" which expired. After that, in 2009, a new trademark was applied with the name "De tudo o que se diz sobre mim, apenas 4,25% é garantido". Looking to both trademarks, we know that it was not a new product created but a change in one of the conditions (interest rate).

Figure 4.3: Active and expired Trademarks (1993-2003)

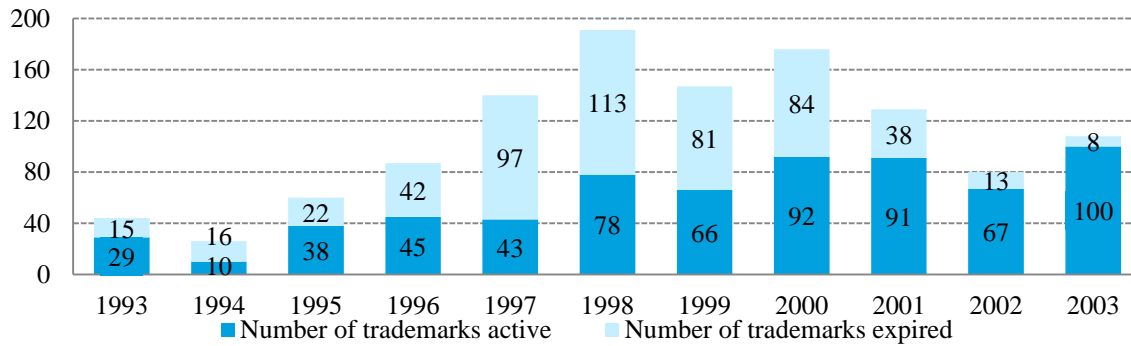
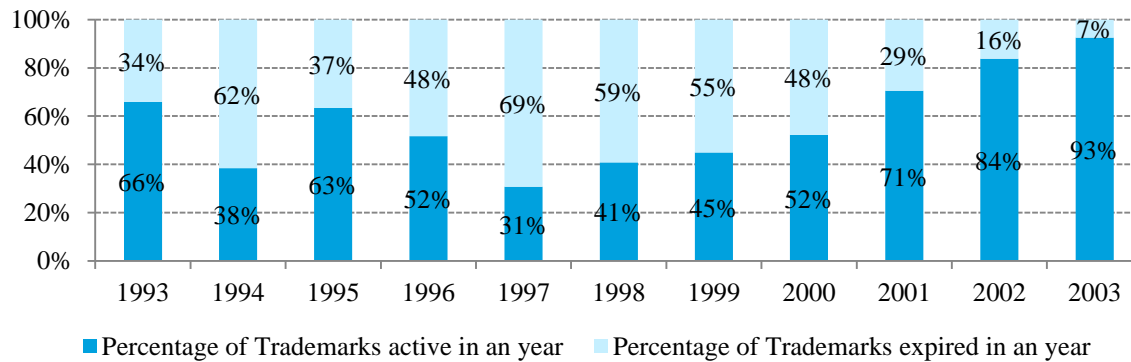


Figure 4.4: Proportion of active and expired Trademarks 1993-2003



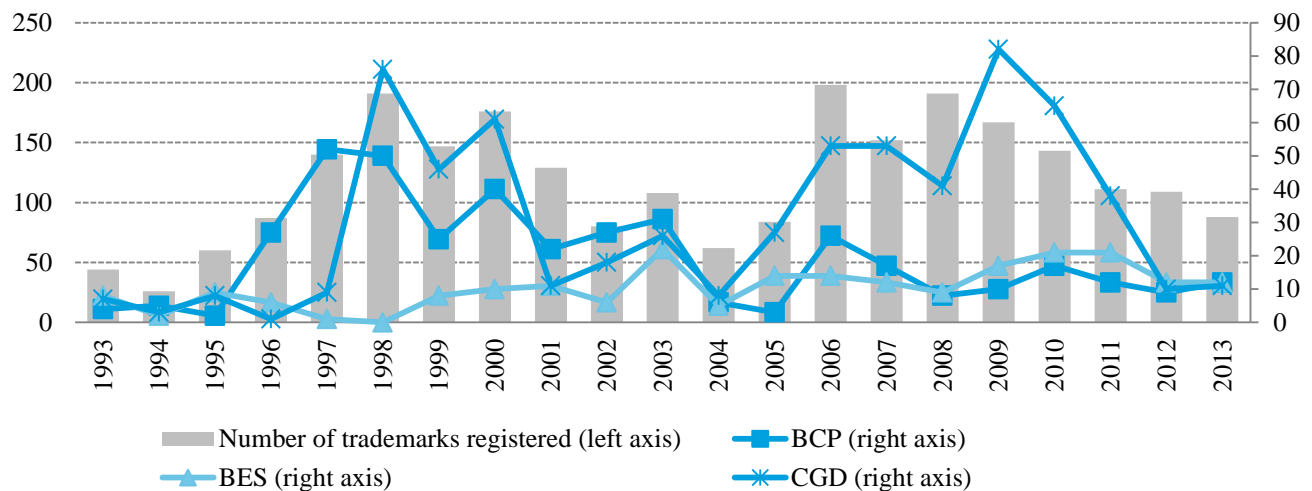
4.3 Focus on the three banks with more Trademarks registered

The analysis performed on the previous section can be seen with more detail in each bank. In order not to be too exhaustive, we will not detail the evolution of trademarks registered in every banking institution considered in this dissertation. In this sense, we have calculated the concentration level of trademarks registered in the banking sector, named C_k , with the necessary adaptations (not considering for this purpose the total turnover of the sector and the turnover of each bank), obtained through the following formula:

$$C_k = \sum_{i=1}^k s_i, C_k \in \left[\frac{k}{n}, 1 \right] \quad s_i = \frac{x_i}{x} \quad (1)$$

For this purpose, we considered “ x_i ” as the number of trademarks registered by bank I, and “ x ” the total number of trademarks registered by the sector. The results obtained are explained in Appendix C. Nonetheless, it is important to note that Caixa Geral de Depósitos (“CGD”), Banco Comercial Português (“BCP”) and BES are the three banks with more trademarks registered (C_3) representing 51.3% of the total of trademarks registered between 1993 and 2013.

Figure 4.5: Three banks with more Trademarks registered (1993-2013)



As it can be seen by the comparison of trademarks registered by the banking sector and by CGD, BCP and BES (Figure 4.5), it is visible that the two first banks referred, present a similar evolution in the period under analysis, while BES presents a more discreet evolution but still in line with the other two banks.

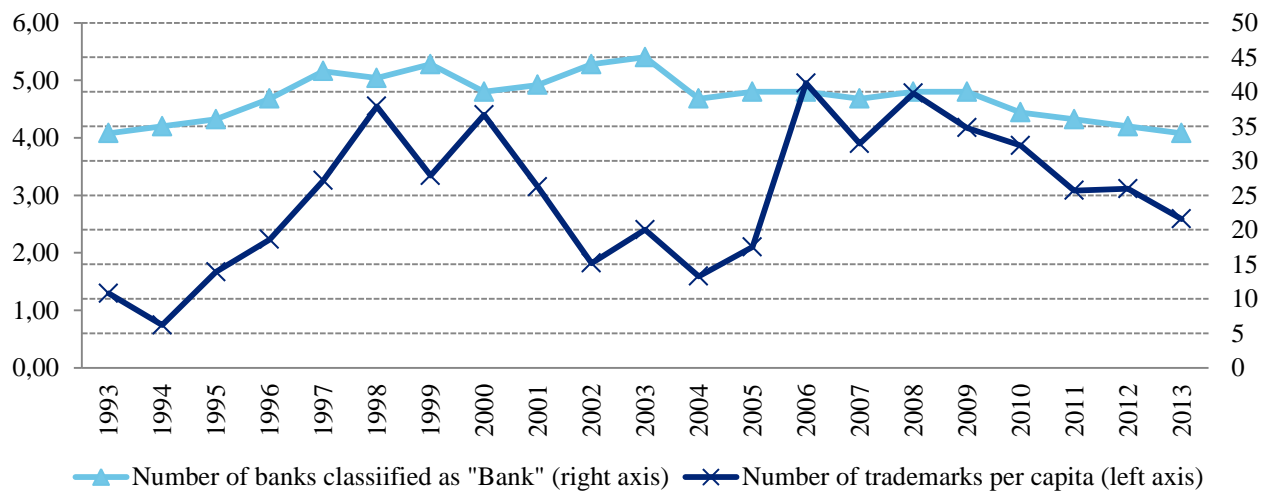
On the other hand, on a yearly analysis, it is clear that the increasing level of registrations between 1997 and 1998 (51) is justified by the raise of trademarks registered by CGD (67), compensating the decrease in another banks. Additionally, between 2007 and 2008, the increase of trademarks registered (from 152 to 191 per year) occurs when the number of trademarks registered by the three banks focused on this section decreased, meaning that this movement is justified by the activity of the remaining banks, which are outside the scope of this specific analysis.

4.4 Trademarks per Bank

To further the considerations above, we will also analyse the evolution of trademarks per bank in order to clarify if flows and trends captured Figure 4.1 are mainly due to fluctuations in the number of banks considered in each year of our analysis. For this purpose, we listed the number of banks classified by the Bank of Portugal as commercial banks in 31 December of each year (Appendix D), on the period ranging between 1993 and 2013, and divided the number of trademarks registered (total number, including active as well expired) in a year, divided by the number of banks that are operation. During our time scope, number of banks acting in Portugal and considered by us do not suffer considerable changes. The maximum number of banks in the sector was registered in 2003 (45 banks) while the lowest was in 1993 and 2013 (34 banks), representing a variation interval relatively low.

Based on our results presented in Figure 4.6, the first important observation is that in some periods, the number of trademarks per capita increased, while the number of banks remained stable or even decreased (2004-2006). The opposite also occurs, when the number of trademarks per capita decreased and the number of banks in the sector rose (2000-2002). It can also be stated that between 1994 to 2000 and 2004 to 2008 we observe a rise in trademarks per bank, with the rise of banks acting in the banking sector only within the first period. On the other hand, between 2000 to 2004 and 2008 to 2013 the number of trademarks per capita substantially declined, a trend accompanied by a decreasing number of banks within the second period.

Figure 4.6: Trademarks per capita (1993-2013)



According to the above interpretation, we do not find evidence that the number of trademarks is strongly dependent of the number of banks present in the sector. Instead we do not have a large number of observations (21 observations for each time series), we made a regression considering the number of trademarks registered per year as dependent variable and the number of banks in each year as independent variable. To complete our study and accurate our results we considered both variables in absolute values and in logarithms, performing 2 regressions (Annex E and F). For both estimations, R-square is clearly low, about 20%, denoting that the number of trademarks registered only depends on the number of banks in the banking sector by 20%. Regarding statistical significance of the independent variable, we can affirm that in both estimations the number of banks is statistically significant at a 5% level.

4.5 Banking trademarking and economic indicators

Since our database is centred on trademarks registered by retail banks, we consider it crucial to proceed with a comparison between the data collected and some indicators which strongly affect the activity of banking sector, in order to help us on the evaluation process of the sector performance: deposit level, credit level and GDP.

In order to obtain reliable data in the econometric analysis, it is appropriate to obtain the maximum amount of information possible. In this sense, we chose to work with quarterly data for the same time period (Q1 1993 to Q4 2013). This procedure, unusual in innovation studies using trademarks, effectively quadrupled the size of the time series. We use the variables in logarithms, a technique generally used in the analysis of financial and monetary variables.

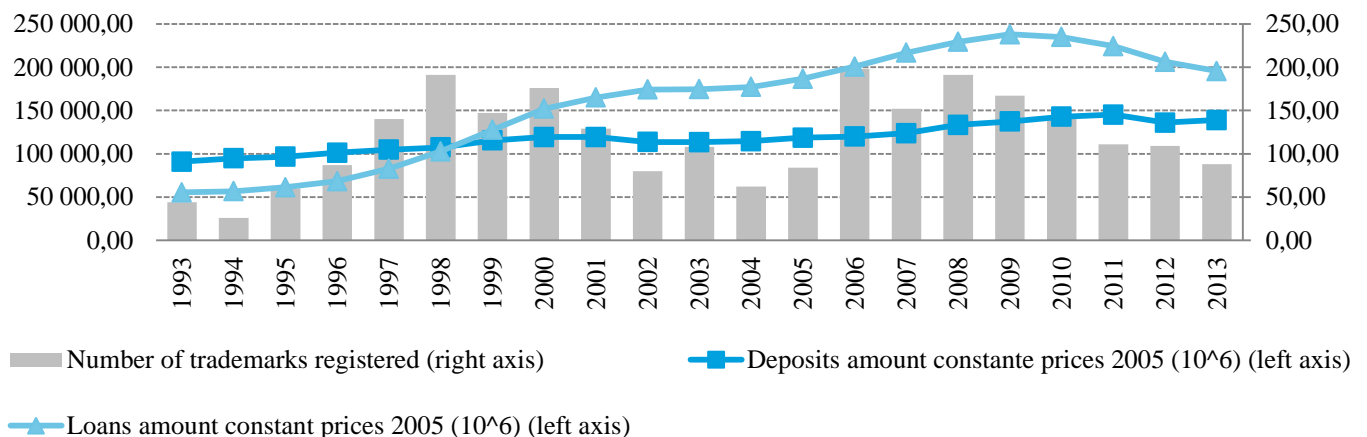
4.5.1. Deposit and Credit level

The analysis performed in the present section used data regarding trademarks registered in the banking sector, collected by us, and information about deposit and credit level of the sector, obtained in the Bank of Portugal's databases (both variables at constant prices, so we can achieve results due to economic movements, instead of fluctuations associated to the value of the money). The variable "Deposits amount constant prices 2005 (10^6)" was obtained by summing the total of deposits from private individuals and non-financial corporations in Other Monetary Financial Institutions ("OMFI"). The information of this variable can be read on the left axis of the Figure

presented in Figure 4.7 and it is visible that, during the period under analysis, its evolution has been smooth, moving from 90.848,47 million Euro in 1993 to 138.935,05 million Euro in 2013 (53% in 20 years).

On the other hand, the variable “Credit amount constant price 2005 (10^6)” is the sum of the total amount of credit from OMFI to private individuals and non-financial corporations. Contrarily to the previous variable, the evolution of this one was not so smooth, with the amount of credit in 1993 amounting to 55.445,40 million Euro and in 2013 to 195.415,22 million Euro, representing an increase rate of 252% in 20 years. It is interesting to note the movement of reduction of credit amount from 2008 onwards, as a consequence of the fall of Lehman Brothers and the sovereign debt crisis in peripheral countries.

Figure 4.7: Trademarks registered, Deposits and Credit level at constant prices (1993-2013)



Source: This thesis and Bank of Portugal databases

It appears that the registration of trademarks reacts a little to the variation in the volume of deposits received, while in some periods the number of registered trademarks and the volume of credit evolved in parallel: 1994-2000 and 2005-2008 in terms of growth, as well as between 2008 and 2013 in terms of decrease. This reading is consistent with the business model of the banking business, since the profit of the sector became linked to the volume of credit granted, which is why there is a justifiable evolution between trademarks and credit amount on the same direction.

In econometric terms, after transforming the variables in logarithms, we tested the ordinary least squares considering two linear regressions: one considering the volume of credit and another

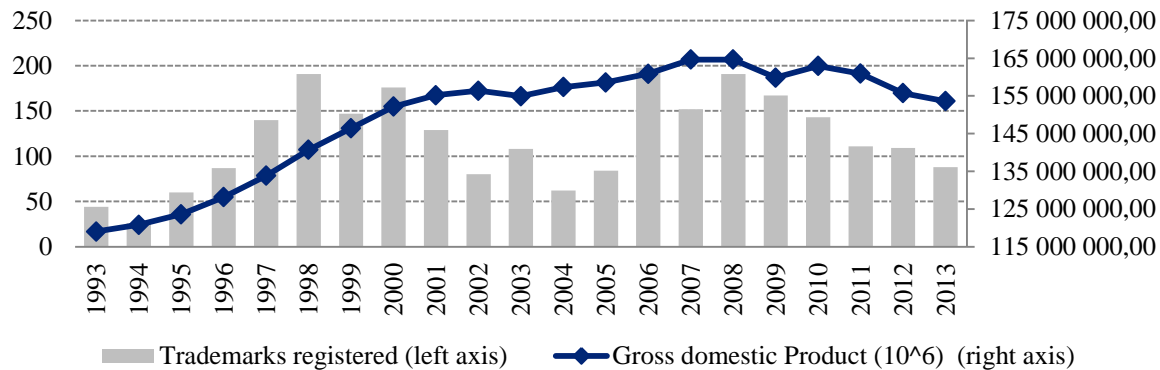
considering the volume of deposits as the dependent variable, being the number of registered trademarks considered as the independent variable (Appendixes G and H).

Since we are only considering one variable depending on another, the conclusions are limited but may constitute an important indicator to our study. It is important to analyse the adjusted R² obtained, slightly higher in the estimated volume of credit than in deposits amount (20% vs. 18%). On the other hand, when the number of trademarks registered increases 1%, the amount of credit increases 0.30%, whereas the amount of deposits received increased 0.08% for the same variation of the independent variable, with the independent variable in both regressions being statistically significant at 1%. Another test is the study of the Granger causality, which allows us to study if a variable X causes other variable Z in a Granger sense if an observation of the variable X in the past or in the present helps to predict future values of Z for a defined period (the number of lags to which one variable causes other) (Granger 1969). In this sense, we considered various lags up to a maximum of 5 (taken by the AIC test as the optimal number of lags) and concluded that the number of trademarks registered does not Granger cause the volume of deposits not even the volume of deposits Granger cause the number of registered trademarks (Appendix I). On the other hand, in relation to credit and the number of trademarks, for a maximum of 2 lags (we cannot conclude the same with a maximum with 3 lags) it can be stated that the number of registered trademarks Granger cause the volume of credit, while the volume of credit does not Granger cause the number of trademarks (Appendix J).

4.5.2. Gross Domestic Product

A crucial indicator of the economic performance of a country in an internal or external perspective, is the behaviour of the GDP, defined by the OECD as “an aggregate measure of production equal to the sum of the gross values added of all resident institutional units engaged in production (plus any taxes, and minus any subsidies, on products not included in the value of their outputs)”¹³. In this sense, considering that one of the sectors that influence the total amount of GDP is the banking sector, we consider interesting the comparison of the number of trademarks registered and the fluctuation of GDP in Portugal, taking into account the period ranging between 1993 and 2013.

¹³ Definition consulted on <http://stats.oecd.org/glossary/detail.asp?ID=1163> on 15th September, 2014

Figure 4.8: Trademarks registered and GDP (1993-2013)

Source: This thesis and AMECO's database

Figure 4.8 discloses in the left axis the number of trademarks registered and in the right axis the value of GDP (in Million Euro) in 31 December of each year and at constant prices (2005). We opted not to carry out econometric tests (as it was demonstrated on the preceding section), as we consider that the number of trademarks registered by the banking sector and GDP are two distinct realities and, therefore, the presented conclusions should not constitute conclusive empirical evidence. For this purpose, not many studies have attempted to connect GDP to aggregate trademarking (one such studies, using a panel data approach, found a positive relation; see Mendonça, 2011).

On visual inspection it appears that the GDP has a similar evolution to credit, which makes sense in economic terms, as the credit is responsible for financing investment and consumption which in turn has a direct impact on GDP. In this sense, a similar trend is visible between the number of registered trademarks and the level of GDP, with the first variable tracking the growth of the second in almost all periods: growth between 1993 and 2000 and decrease between 2008 and 2013.

4.6 Trademarks per Nice class

The Nice classification indicates goods or services for which trademarks are applied for. This allows for checking the thematic distribution of trademarking behaviour. Nice classes are divided into goods and services, respectively corresponding to each classification classes 1-34 and 35-45.

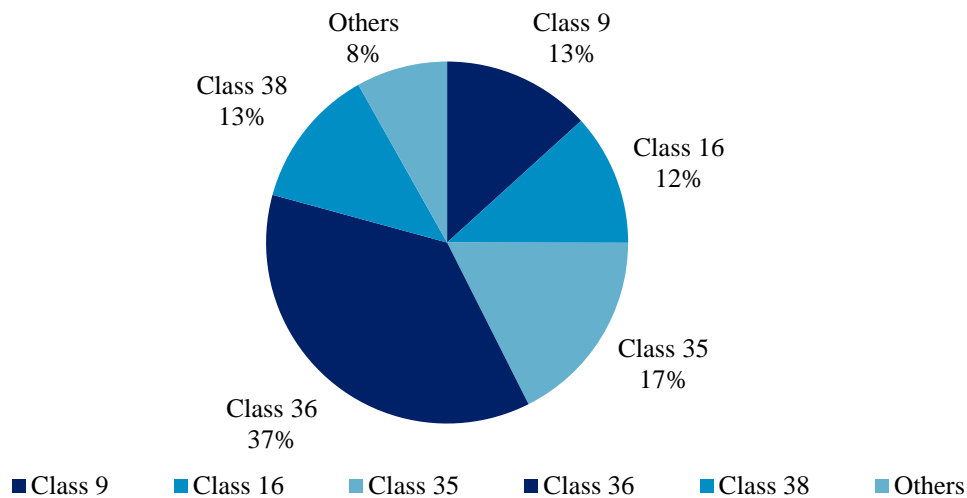
4.6.1. The structure of banking trademarks

An interesting finding is that, as Figure 4.9 shows, 25% of trademarks registered between 1993 and 2013 in Nice Classes corresponding to goods (Class 9 with 13% and Class 16 with 12%), when it would be expected that the banking sector had almost exclusively trademarks in classes of services. It is also visible that 92% of total trademarks were registered in classes 36, 35, 38, 9 and 16 (from largest to smallest), getting evidence from the concentration level of sector on these 5 classes.

In order to better understand this issue, it is necessary to analyse the type of goods of services registered in each class (mere examples and not an exhaustive list):

- Class 9: magnetic credit cards, magnetic cards for banking operations, magnetic data storage, debit cards;
- Class 16: paper, cardboard and goods made of these materials not included in other classes, printed for use in banking transactions, periodicals, print advertising, calendars, books, magazines, newspapers, brochures, leaflets;
- Class 35: advertising services, slogans, dissemination of advertising material, market research, assistance in directing the establishment of advisory services for business management services;
- Class 36: financial services, management and services of management savings; and
- Class 38: telecommunications in financial business, messaging and online data and internet, data and messaging for financial affairs, providing access to the database, email.

Hence, it is worth pointing that banking trademarking is a remarkably distributed affair. A full 63% of all trademarks are outside the financial services product.

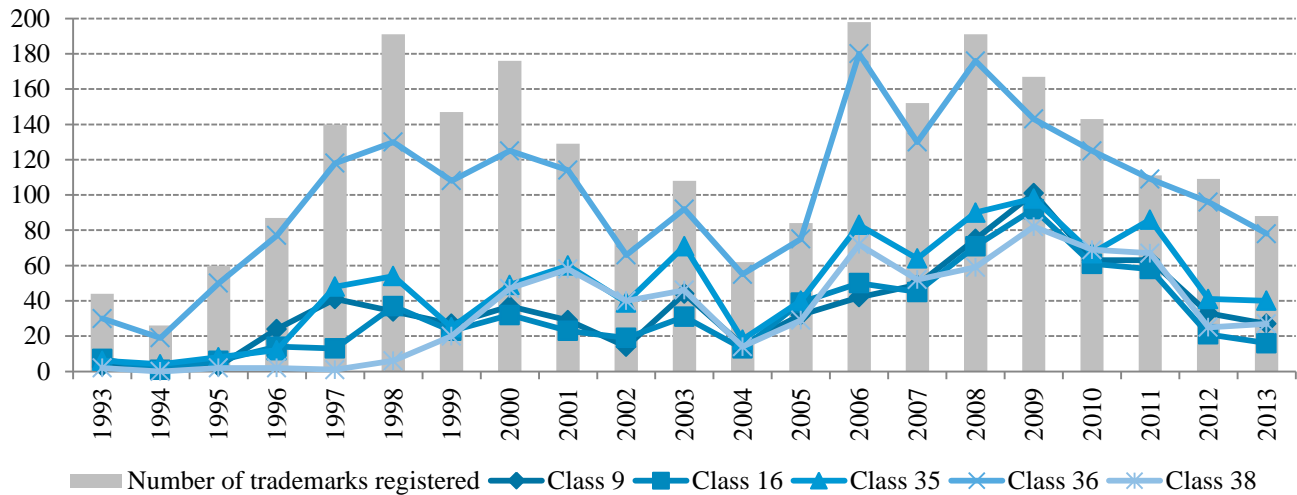
Figure 4.9: Structure trademarks by Nice classes for the whole period

4.6.2. The dynamics of banking Nice classes

Based on information disclosed in Figure 4.10, we see that the Nice class 36 follows exactly the same trend that the number of trademarks registered in the sector, which would be expected since, as we have seen, this class is responsible for the registration of 37% of the marks. This would be expected as financial products comprise the “core business” of the retail banking sector. The remaining classes (9, 16, 35 and 38) also follow a trend very similar to the evolution of the volume of trademarks registered by the banking sector.

The following features should be noted: (i) until 1995, the four classes have practically no results; (ii) Class 38 has a later onset, gaining relevance in 1999, which is explained by the internet and telecommunications revolution (it assumed increasing importance since 1998, growing to 1999, even when the number of trademarks of the sector decreased, in line with Evangelista’s (2000) classification that bank sector is classified as interactive and ICT-based sector; (iii) between 2000 and 2001 the number of registered trademarks dropped by 27% but trademarks in Classes 35 and 38 continued increasing; (iv) the number of trademarks registered in Class 35 increased from 2010 to 2011, while the number of trademarks registered by sector decreased; (v) by the end of the period Class 16, an “old economy” class, is the least trademarked product class.

Figure 4.10: Evolution of Trademarks by Nice Class (1993-2013)



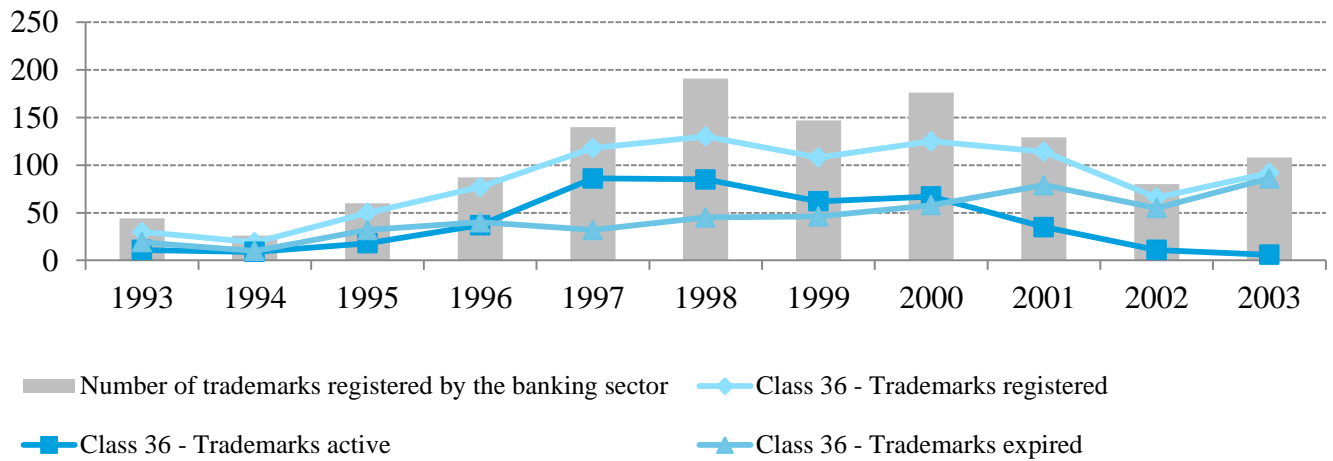
4.6.3. Active and expired in Nice classes

It seems equally important to analyse the division between active and expired trademarks registered in each Nice Class, in order to understand whether there were changes on the sector’s strategy. The procedure adopted was the same already explained in section 4.2 but considering not only the division between active and expired but also considering a division by Nice class. As already mentioned, the analysis of the distribution of trademarks between active and expired only makes sense until 2003, considering the duration of the 10 years’ term of each trademark registration. Thus, on the table above it is notorious that more than half of the registered trademarks in Class 36 (54%) have expired. On the opposite side, Class 38 shows a greater percentage of active trademarks, while Classes 9, 16 and 35 present a percentage of active trademarks varying from 58% to 66%.

It seems clear that the banking industry believes that a good strategy to the sector requires going through ICT, as Class 38 is the one with the highest percentage of active trademarks, meaning that the respective applicants renewed these trademarks when they expired.

It seems useful to analyse in more detail Nice class 36, considering the large percentage of expired trademarks:

Figure 4.11: Analysis of Nice Class 36 (1993-2003)

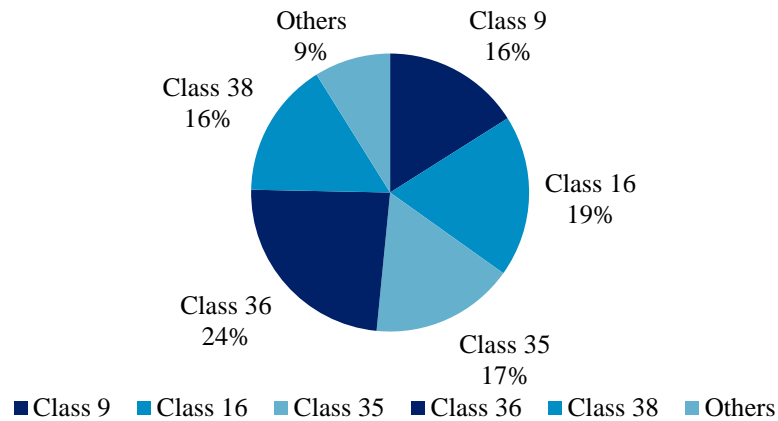


Focusing on Figure 4.11, it is visible that from the biennium 1999/2000 banking industry faced a period with lower activity in terms of trademarks registration and a change is also visible in terms of the decomposition of active and expired trademarks, with the number of trademarks expired in those years (2001, 2002 and 2003) clearly surpassing the number of active trademarks.

4.6.4. Focus on CGD

Considering that CGD is the Portuguese bank with the largest number of trademarks registered during the period under analysis, we believe that it is useful to study the behaviour of this bank during the relevant period, in terms of the Nice classification system.

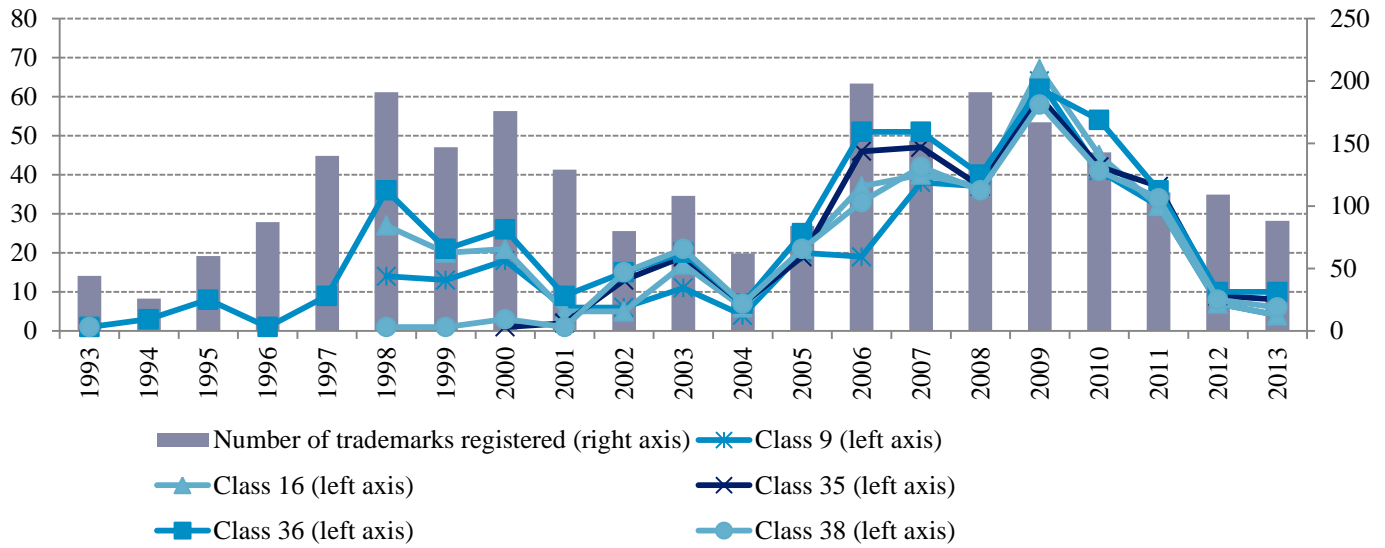
As can be gleaned from Figure 4.12 CGD’s situation is similar to the remaining sector (which was expected, since this is the bank with more applications in the period), with 91% of the trademarks registered under Classes 36, 16, 35, 38 and 9 (in order, from the largest to the smallest percentage), and with 56% of the trademarks registered in Classes relating to services and 35% of the trademarks registered in Classes related with goods (the remaining 9% are residual). We may say that the strategy of CGD and the remaining sector are very similar, making a special remark for the highest percentage of trademarks registered under goods’ Classes.

Figure 4.12: CGD - Trademarks by Nice Class (1993-2013)

Only from 1998 onwards CGD has an interesting number of trademarks registered, which is a relevant factor so that we can proceed with our analysis to Figure 4.13. As such, the five classes under analysis (9, 16, 35, 36 and 38) present behaviour similar to the remaining banking sector, exception made for the period comprised between 2011 and 2012, with the number of trademarks registered in all the classes decreasing in a percentage higher than the decrease occurred in the total number of trademarks registered.

We also highlight the fact that Class 9 (predominantly for applications for credit /debit cards) and 16 only present results from 1998 onwards, meaning that before this date that was not an area of focus to this group and only from such year on, CGD started registering trademarks related to goods. On the other hand, Classes 35 and 38 only present relevance as of 2002, year in which they start being a concern of CGD (which accompanies the evolution of the bank).

Figure 4.13: CGD - Nice Classes 9, 16, 35, 36 and 38 (1993-2013)



4.8 Competitive advantages analysis

It is also possible to show that trademark analysis contributes to improve the understanding about firm specialisation and competitive differentiation within the sector. For making particular comparisons in terms of business strategy we used the Nice classes for computing the Revealed Marketing Advantage (RMA), and following Mendonça (2011), we used the following formula:

$$RMA_t = \left[\frac{tm_{it}}{\sum_i tm_{it}} \right] / \left[\frac{tm_{it}}{\sum_{it} tm_{it}} \right] \quad (2)$$

where i is the class considered, t is the period under analysis and tm is the number of trademarks applications. For purposes of illustration we have considered two different periods in our analysis (1999-2003 and 2009-2013) with the aim of understanding differences in the sector across the years. In the first period, we computed RMA to four banks and five Nice classes with more applications, meaning CGD, BCP, BES and ActivoBank for Nice Classes 9, 16, 35, 36 and 38. On the other hand, in the period 2009-2013, our analysis focused in CGD, BCP, BES and Montepio and in the same Nice classes. The analysis is displayed in Tables 4.1 and 4.2.

Table 4.1: RMA 1999-2003

| Classes | MRA_CGD | MRA_BCP | MRA_BES | MRA_ActivoBank |
|-----------|---------|---------|---------|----------------|
| 9 | 1,24 | 0,94 | 1,07 | 0,28 |
| 16 | 1,84 | 0,74 | 0,00 | 0,55 |
| 35 | 0,62 | 1,21 | 1,41 | 0,72 |
| 36 | 0,93 | 0,88 | 1,35 | 1,50 |
| 38 | 0,76 | 1,78 | 0,20 | 0,32 |

Table 4.2: RMA 2009-2013

| Classes | RMA_CGD | RMA_BCP | RMA_BES | RMA_Montepio |
|-----------|---------|---------|---------|--------------|
| 9 | 1,05 | 0,87 | 1,30 | 0,52 |
| 16 | 1,22 | 1,05 | 0,25 | 0,48 |
| 35 | 0,98 | 1,08 | 1,24 | 0,76 |
| 36 | 0,83 | 0,91 | 1,58 | 2,24 |
| 38 | 1,03 | 1,35 | 0,61 | 0,77 |

During 1999-2003, in Nice Class 9 CGD and BES presented a competitive advantage, in line with the result in the period 2009-2013. In Class 16, in the first period CGD sported a comparative advantage, shared with BCP only in the second period (BES has no applications in this class for the period 1999-2003). Regarding Class 35 it is visible the comparative advantage achieved by BCP and BES in both periods. On the other hand, in Class 36 the banks with a competitive advantage in 1999-2003 are BES and ActivoBank, while in 2009-2013 are BES and Montepio. Finally, Class 38 points to a competitive advantage for BCP in the first period and for BCP and CGD in the second one.

Focusing on each bank individually and analyzing changes occurred in terms of competitive advantages between two different temporal periods, we can see that CGD shows a competitive advantage in Nice Classes 9 and 16 in the period 1999-2003 and in Classes 9, 16 and 38 in the period 2009-2013. BCP presents competitive advantages in Nice Classes 35 and 38 in the first period and in Classes 16, 35 and 38 in the second one. Regarding, is visible that also this bank

does not present always the same competitive advantages, with Nice Classes 9 and 35 in the period 1999-2003 and in Class 9, 35 and 36 in period 2009-2013.

Facing both analyses, we get evidence that agents in the market do not present similar behaviours and are heterogeneous, showing different strengths and weaknesses.

4.9. Creative destruction

Also using Nice classes, we also get evidence of “creative destruction” phenomena. Looking with more detail to Nice Classes 9, 16, 35, 36 and 38 (Classes with more trademarks applications) and the percentage of each Nice Class in the total number of applications of these five Classes we obtain Table 4.3.

The table suggests some interesting aspects:

- The global rise in the utilization of credit cards also had repercussions in Portugal. As we can see, from 1996 onwards the percentage of trademark application in Class 9 raised in the range of the five Nice Classes under the scope of this particular analysis. This increase of applications in Class 9 was compensated by the decrease in Class 36. This opposite behaviour is also showed by the correlation coefficient between these two classes, amounting to -0,56, meaning a strong and negative correlation.
- Similarly to the previous point, Nice Class 38 suffered a clear increase in trademark applications from 1999 onwards. This evolution is in line with the technological evolution. If we consider the “dot com” revolution (about 2000), was expected that this Class registered a large increase, in consequence of the change in business paradigm and the creation of new products. Correlation calculus reveal that from 2000 onwards only Class 35 shows a positive correlation (0,42), while the correlation between Class 38 and the remaining are negative, meaning opposite behaviours.
- Nice classes 16 and 35 do not have a pronounced pattern of evolution.

Further to the above, we can affirm that banks are transforming the economic system from within and making capitalism a dynamic (creative destruction) and it is possible being studied in financial services sector using information collected about trademark applications.

Table 4.3: Analysis of trademarks applications in Nice Classes 9, 16, 35, 36 and 38 per year (1993-2013)

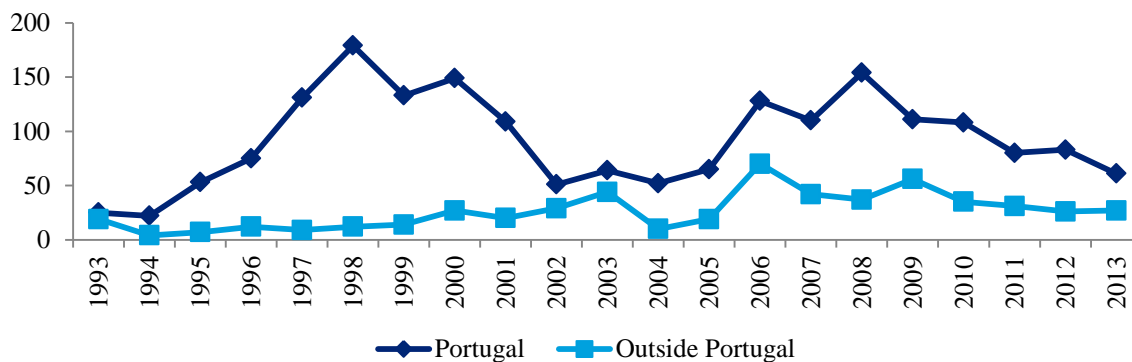
| Year | Class 9 | Class 16 | Class 35 | Class 36 | Class 38 |
|-------------|----------------|-----------------|-----------------|-----------------|-----------------|
| 1993 | 6,25% | 14,58% | 12,50% | 62,50% | 4,17% |
| 1994 | 7,69% | 3,85% | 15,38% | 73,08% | 0,00% |
| 1995 | 4,35% | 8,70% | 11,59% | 72,46% | 2,90% |
| 1996 | 18,60% | 10,85% | 9,30% | 59,69% | 1,55% |
| 1997 | 18,55% | 5,88% | 21,72% | 53,39% | 0,45% |
| 1998 | 13,03% | 14,18% | 20,69% | 49,81% | 2,30% |
| 1999 | 13,30% | 11,33% | 12,32% | 53,20% | 9,85% |
| 2000 | 12,76% | 11,03% | 16,90% | 43,10% | 16,21% |
| 2001 | 10,21% | 8,10% | 21,13% | 40,14% | 20,42% |
| 2002 | 7,87% | 10,67% | 21,91% | 37,08% | 22,47% |
| 2003 | 15,49% | 10,92% | 25,00% | 32,39% | 16,20% |
| 2004 | 13,04% | 11,30% | 15,65% | 47,83% | 12,17% |
| 2005 | 14,88% | 18,14% | 18,60% | 34,88% | 13,49% |
| 2006 | 9,84% | 11,71% | 19,44% | 42,15% | 16,86% |
| 2007 | 14,41% | 13,24% | 18,82% | 38,24% | 15,29% |
| 2008 | 15,92% | 15,07% | 19,11% | 37,37% | 12,53% |
| 2009 | 19,57% | 17,83% | 18,99% | 27,71% | 15,89% |
| 2010 | 16,36% | 15,84% | 17,40% | 32,47% | 17,92% |
| 2011 | 16,45% | 15,14% | 22,45% | 28,46% | 17,49% |
| 2012 | 15,28% | 9,72% | 18,98% | 44,44% | 11,57% |
| 2013 | 14,36% | 8,51% | 21,28% | 41,49% | 14,36% |

4.10. The process of internationalization

As result of the increasing level of globalization in the services sector, it is crucial to analyse the trend of internationalisation that the banking sector has experienced. For this purpose, the analysis was made exclusively to marks registered in Portugal and trademarks with an international dimension, directly registered in the Office of Industrial Property of European or third countries, as well (e.g. Spain, France, etc.) in the OHIM and the WIPO.

4.10.1. Patterns and internationalization

Figure 4.14: Trademarks registered in Portugal and outside Portugal (1993-2013)



By interpreting the Figure 4.14, it appears that until 1999, the concern of the industry to internationalise and explore other markets was minimal, something that is justifiable as those were times of domestic growth of the banking business in Portugal. Then small peaks of trademarks registered outside Portugal (by Portuguese banks) are visible in 2003, 2006 and 2009. Overall, 22% of the trademarks were registered outside of Portugal (550 marks), while the remaining 68% were registered in Portugal (1943). The years beyond 2000 are much more expressive in this trend (Figure 4.15).

Figure 4.15: Division of trademarks registered in an year per territory

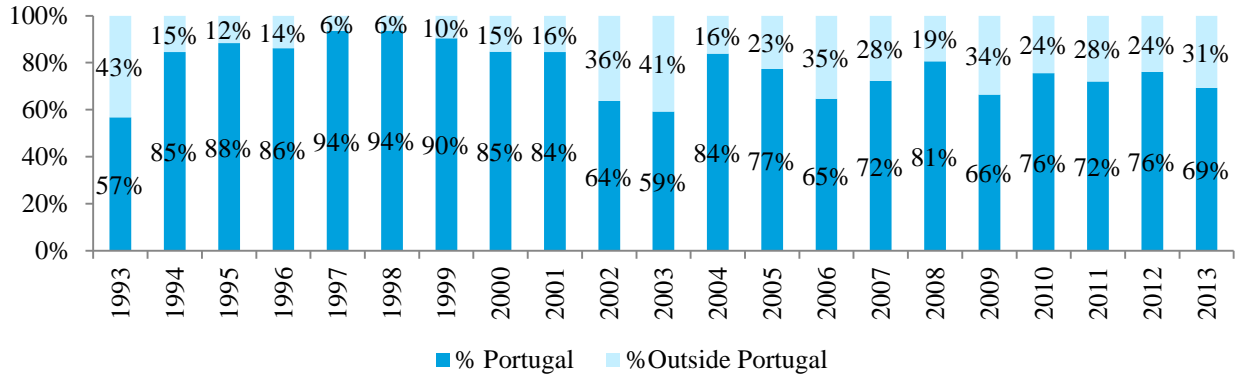


Figure 4.16: Trademarks registered in OHIM and WIPO (1993-2013)

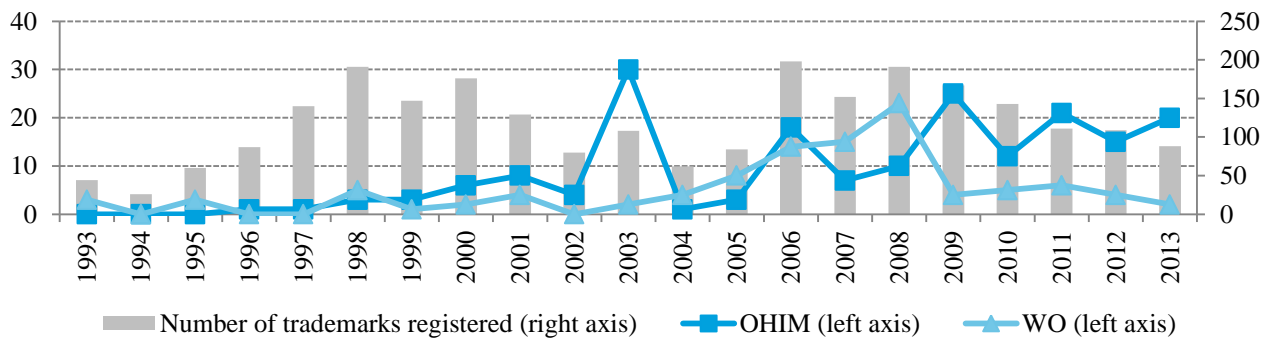
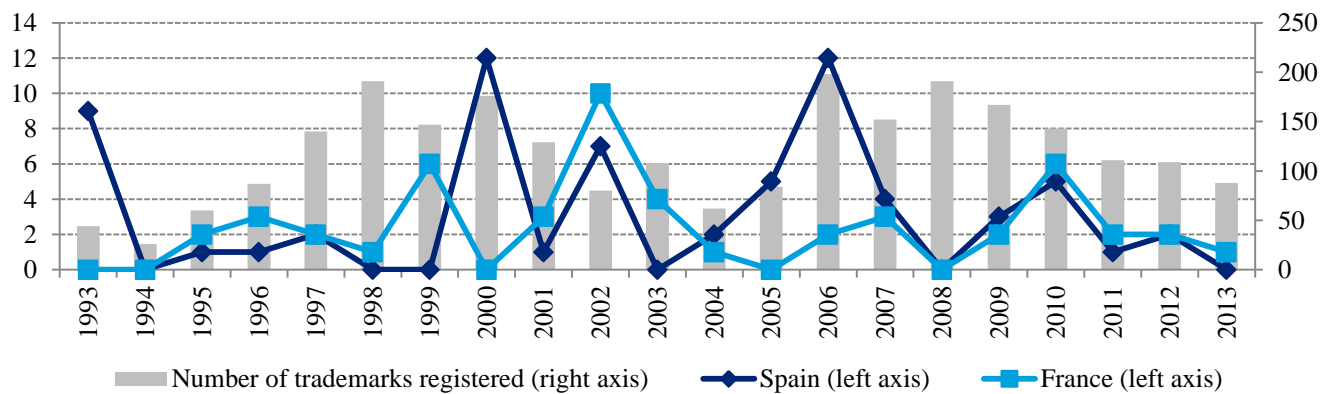


Figure 4.17: Trademarks registered in France and Spain



The fact that the Portuguese emigrant community always had a strong presence in France, makes this country attractive to the Portuguese banking sector, in an attempt to capture savings and raise funds to boost their profit activity (credit), making this country the second with more trademarks registered. Looking to Figure 4.17, the peak in 1999 is exclusively due to BES' activity, in 2002

almost exclusively due to CGD, while in 2010 the trademarks are registered equally by CGD and BCP (in total: 52% CGD, 20% BES, 20% BCP, 4% BPI and the remaining divided by Bank Best and Bank Popular). This Figure is also an evidence of the European expansion of Portuguese Banking sector.

Regarding Figure 4.16, showing the number of applications in the OIHM (named Community trademarks) and in the WIPO, the evolution of both over time is not similar: OIHM's registered peaks of applications in 2003, 2006, 2009 and 2011 and BES, CGD and BCP are responsible for 76% of all applications, while the WIPO's peak occurred in 2008 mostly due to CGD's activity on this year.

It is important to note that these are not the only territories with applications from Portuguese banks. In Appendix K it is possible to find all the details regarding this topic, but we would like to highlight the following considerations:

- The focus of several national banks in Greece (the majority by BCP, followed by CGD) led to serious liquidity difficulties with an impact in Portugal, due to the sovereign debt crisis in that country;
- Applications in Malta: 6 trademark applications by BPI and 4 by Banif in the context of Banif Bank (Malta) plc since 2008;
- 6% of the international applications took place in Mexico (Banif, BES and CGD);
- Focus of BCP in Poland, Turkey and the United States of America;

Another interesting conclusion is the existence of a high concentration level with regards to international trademarks applications, with only four banks (CGD, BES, BCP and Banif) being responsible for approximately 80% of the trademarks registered on a third territory, in a range of 31 banks applying in third countries (Appendix K).

We sustain our reading analysing, for instance, by focusing on the business strategy of Millennium BCP. On their website¹⁴ it is possible to read that the major concern of this bank in the international expansion strategy is to establish new branches in external markets with a historical link with Portugal (Portuguese communities) or with markets characterized for a strong commercial rationality to financial operations. In this sense, they have created the Bank Millennium in Poland (441 branches), Banca Millennium in Romania (65 branches), a technological platform of private banking in Switzerland, the Millennium Bim in Mozambique (152 branches), Banco Millennium Angola (with 78 branches in this country) and a branch in Macau. This tendency of internationalization is an old strategy of this bank. In 2001, in *Jornal de Noticias*¹⁵, reference is made to the investment of 2.9 Billion Euro on this regard, by buying company participations in banks and security companies in Spain, Poland, Italy and Greece, leading the international activity to represent, on the first semester of 2001, 18% of the total revenue of this group.

On CGD's website¹⁶, it is also possible to read that the group intends to be present in countries with historical links to Portugal, countries which are commercially stronger than Portugal and with high potential of economic growth and also countries characterized to be large international financial centres. In this sense, the group holds shares in Germany, Belgium, Spain, France, the Netherlands, Luxembourg, Monaco, United Kingdom, Switzerland, Austria, South Africa, Cape Verde, Mozambique, São Tomé and Príncipe, Brazil, United States of America, Caiman Islands, Mexico, Venezuela, China, India and Timor-Leste. The objective of international expansion was also affirmed by Rodolfo Lavrador (CGD's administrator responsible for the international markets) as we can read in an article published in *Jornal Expresso*¹⁷, in which he affirms, back in 2007, that the group had the objective of achieving 15% of its profitability from external markets.

¹⁴ Consulted on 15th September, 2014 <http://ind.millenniumbcp.pt/pt/Institucional/quemsomos/Pages/internacionalizacao.aspx>

¹⁵ Article written by Bárbara Leite on 24th July, 2001, consulted on 15th September, 2014 http://www.jornaldenegocios.pt/empresas/detalhe/bcp_investiu_29_mil_milhoes_de_euros_na_internacionalizacao_afecta_550_milhoes_para_expansao.html

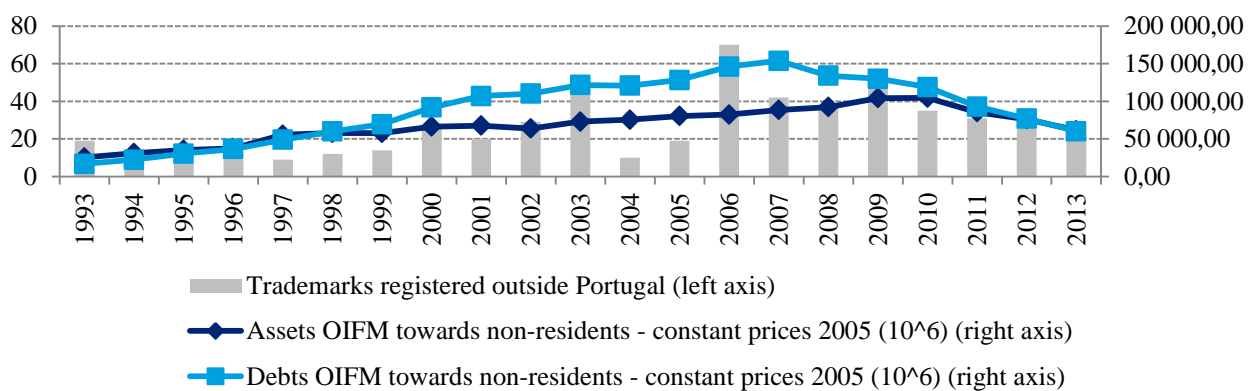
¹⁶ Consulted on 15th September, 2014, <https://www.cgd.pt/Institucional/Patrimonio-Historico/Historia/Pages/Historia-CGD.aspx>

¹⁷ Consulted on 15th <http://expresso.sapo.pt/banca-cgd-quer-15-do-lucro-a-vir-do-exterior-e-fixa-como-prioridade-expansao-internacional=f300430>

In the same direction, BES¹⁸ promoted an international expansion of the group for the same reasons than the previous two banks. In this sense, reference is made to the groups' activity in Spain (with 22 branches), United Kingdom, United States of America, France, Brazil, China, Venezuela¹⁹ and a couple of countries in Africa.

4.10.2. Trademarks and Assets and Debts towards non-residents

Figure 4.18: Trademarks registered outside Portugal, OIFM's Assets and Debts towards non-residents (1993-2013)



Source: This thesis and Bank of Portugal databases

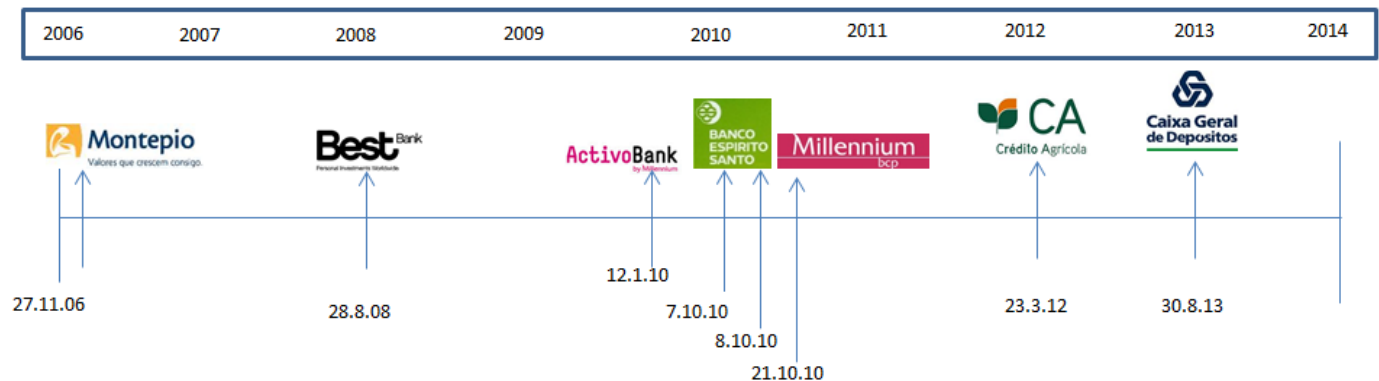
It is visible in figure 4.18 that trademarks in foreign territories react more to changes in liabilities to non-residents (in the broad sense of deposits received), and less to changes in the assets to non-residents (in the broad sense of credit). This strategy will be in line with the theory of some authors, who argue that banks seek to internationalize in order to obtain cheaper funds to finance their activities in countries that can borrow money at higher interest rates, thereby achieving a gain in terms of spread (Gray, 1981).

¹⁸ Consulted on 15th September, 2014
http://bes-sec.bes.pt/site/014_NewsletterValorBES_BES/newsletter24/13.html

¹⁹ Consulted on 15th September, 2014
<http://visao.sapo.pt/banca-bes-reforca-aposta-na-expansao-internacional-para-mercados-emergentes=f534752>

4.11. Dynamic Competition in close inspection

In order to prove one of the central subjects of this thesis, i.e., that the registration of marks is a good indicator of dynamic competition within the banking sector, below we present a chronology, regarding the registration of trademarks with reference to mobile applications, designed to facilitate the user's access to Internet banking.



As it is visible from the presented chronology, Montepio was the first bank to register trademarks on this regard, by registering three trademarks on November 27th, 2006, namely "Netmóvel 24 Empresas", "Netmóvel 24" and "Phone 24". Moving forward in the chronology, the Best Bank responded in 2008 with the creation of "BTP Mobile". The year of 2010 was a more active year on this matter, with three banks proving a growing interest on registering trademarks of this type of mobile applications: ActivoBank registered "SmartBanking", BES registered three trademarks named "BESmobile" (one trademark in Portugal and two other with the same name within European territory) and BCP registered "M Mobile" and "Mobile Millennium". Furthermore, only in 2012 and 2013 additional trademarks were registered within this business area, with Crédito Agrícola registering "CA Mobile" and CGD registering the trademark "CGD Mobile".

After analyzing the characteristics of each product associated to each trademark, it is visible that products do not differ in terms of quality in any of the essential aspects but the most recent products are always trying to get differences in terms of the functionalities offered. This type of product differentiation is named Horizontal Differentiation (Chamberlin, 1933). On this type of differentiation the distinction between products in terms of quality is not easily evaluated by

customers, as quality has a mere marginal variation. Consequently banks create aggressive marketing campaigns, so they can highlight their products (even when they are quite similar) in an offering range raising the number of customers (marketing innovation)

Banks need to create similar products to those offered by their competitors within the same sector, in order not to lose customers due to the fact that they are not offering the same variety/range of products.

Therefore, we can affirm that this data allows us to observe that the registration of trademarks captures evidence of the dynamic competition between banks and the innovation happening in the financial sector through new technologies applications and marketing strategies. Even though some banks take longer to react, in the long-term they feel the pressure to create the same products (by imitation), by moving forward in the same direction.

Notwithstanding, banks also have a concern to create new products (product innovation) in order to achieve some advantage in the market to obtain larger market shares (even if for a short period), once they know that their competitors will also create a similar product. This process, and the corresponding need of constantly creating new products, is what lead sectors to constantly innovate. Competition occurs not only through price reductions but also through the introduction of new products or even changes in the existing ones, which is line with Schumpeter's concept of dynamic competition (Duygun et Al., 2013).

These findings are also in line with Barras' (1986 and 1990) models of innovation in services sector, stating that new technological possibilities are confronted with market conditions and institutional context. When a product is created it need to be tested in the real context of the market and many times, some adjustments are needed to guarantee that it is designed in accordance to customer's objectives. According to Oliveira and Hippel (2011), a large percentage of innovation in services provided by banks is user-led innovation, completing Barras' theory that this process is dynamic and interactive.

4.12. Preliminary conclusions

This chapter was dedicated to the quantitative analysis of the database created according to the methodology defined on the previous chapter, in order to get evidence of stylized facts captured with this new indicator.

In a first analysis it was possible to study the evolution of trademark applications, during the period comprised between 1993 and 2013, and interpret the signals of innovation captured through the analysis of active and expired trademarks.

Our analysis per capita shows that these applications are not strictly dependent of the number of banks acting in the sector (due to the concentration level of the market in few companies) and that banks are more motivated to apply trademarks in order to increase credit amount granted to the clients (the profitable activity) instead the capitation of funds in deposits.

In another sense, an analysis to the Nice Class tendencies denote the particularity of the application of about 25% of the trademarks in the sector in goods' Classes, which was not expected, considered that banks are inserted in the services sector. Moreover, the comparison between expired and active trademarks indicates that Nice Class 38, associated to technologies, is the one with a larger percentage of active trademarks, proofing the tendency of the sector on get focused on this angle.

Regarding internationalization, it is visible that the majority of the applications is linked to countries with strong historical links to Portugal, to the considerable percentage of Portuguese emigrants, as well as to countries in economic expansion (OHIM, WIPO, Spain and France).

With regards to dynamic competition, the attempt of innovation within the sector (mobile applications) is evident, with the imitation of products already existent in the market and with the attempt to increase the quality of some particular aspects of the original products, even if marginally (horizontal differentiation).

In the next chapter, final conclusions will be presented, in order to summarize this dissertation's main contributions to the research on this field. We will also approach the limitations of this study, as well as suggestions for further research on this topic.

5. Conclusions

The present dissertation studies the presence of dynamic competition and innovation in financial services using trademarks and is divided in 3 chapters (excluding introduction and conclusion): a theoretical approach of the thematic under analysis, focusing on the concept of dynamic competition and innovation in services (and particularly in financial services), an explanation about the adopted methodology and, lastly, our motivation in considering that trademarks may be a good indicator for our purposes, the process of construction of a new database and the conclusions achieved with its analysis.

As previously mentioned, our methodology led us to the creation of a new database, using TMView's website to collect all the trademarks (registered on the National Offices for Intellectual Property, the OHIM and the WIPO) belonging to the financial services sector in Portugal, on the period comprised between 1993-2013, which led us to gather information of 2.493 trademarks inside of our scope (the information collected covered 2.864 trademarks).

The volume of trademark applications in Portugal does not present a constant behaviour between 1993 and 2003, as the number of application increased between 1994 and 1998 (26 to 191 applications) and between 2004 to 2006 (62 to 198 applications). On the other hand, the number of applications decreased between 1998 and 2004 and from 2008 to 2013 (191 to 62 and 198 to 88 respectively).

The number of expired trademarks represents the innovation level and in an indicator of destruction in the sector, as a trademark is not renewed and is substituted by a new application, which means that a new product was created and another trademark was registered. On this regard, it is visible that between 1993 to 2003, the division between active and expired trademarks shows some fluctuation and, in 1994 and between 1996 to 2000 the number of trademarks expired was higher (always between 48% and 69%), which indicates that 10 years after the application applicants considered that those trademarks no longer make sense. Focusing in type of differentiation, it is visible that trademarks expired are many times replaced by new

ones with similar characteristics showing some evidence of horizontal differentiation instead vertical.

In a per capita analysis, it was proved that the number of trademark applications is not so dependent of the number of banks as could be expected before our tests. This result is coherent with our previous conclusions, considering that the sector has a high level of concentration, considering that only 3 banks get 51.3% of the market share (CGD, BCP and BES)

When comparing applications from the sector with performance indicators, it is visible that there is evidence of a parallel movement between our central indicator and the credit volume, but we do not achieve the same conclusions when comparing our indicator with the deposits amount. This was also proved by econometrics, with the evidence that trademarks Granger cause the credit amount for a maximum of 2 lags.

Regarding Nice Classes, we assist to a level of 37% of the total applications in Class 36, 17% in Class 35, 13% in Class 38 and 9 and 12% in Class 19 (the remaining 8% are divided for every Class). It is interesting to note that the financial sector, which is part of the services sector, registers a total of 25% of its applications in classes created for goods. Applications in Class 36 present the same evolution than financial sector, while Classes 9, 16, 35 and 38 had practically no results until 1995 and therefore registered an evolution similar to the sector. Comparing active and expired applications, Class 36 is the one presenting a larger percentage of expired trademarks (54%) and Class 38 presents the lower percentage (29%), constituting evidence from the objective of the sector in keep their trademarks related with technology. Focusing on CGD, it is visible that this bank has the same structure than the sector in terms of Nice Classes applications and in terms of evolution through the period under analysis.

Moving forward to a RMA analysis, comparing two different periods (1999-2003 and 2009-2013), we were able to get evidence that agents in this sector in Portugal do not present similar behaviours and are heterogeneous, showing different strengths and weaknesses, being in line with Schumpeter findings about this thematic.

Yet according to Schumpeter, innovation process is seen as a process of “creative destruction” where new products in the market replace older ones considered obsolesces. Based on our database, and in Nice Class evolution through all the period, we get evidence that banks are transforming the sector in a dynamic way. Nice Class 9, where trademarks related to credit or debit cards are registered, suffered an increment from 1996 onwards, compensate by the decrease of application in Nice Class 36 (negative and high correlation). In the same way, Nice Class 38 (ICT Class) suffered a clear increase in trademark applications from 1999 onwards due to technological revolution, compensated by the opposite movement in Nice classes 16 and 36.

In what concerns the international expansion of the sector, until 1998 the number of trademark applications outside Portugal does not present any considerable fluctuation, which has changed after this year, with small peaks in 2003, 2006 and 2009. In terms of percentage, 1993, 2002, 2003, 2006 and 2009 are the years where the percentage of trademarks application outside Portugal is larger (varying between 31% and 43% on these years), and such applications predominantly applied in OHIM, WIPO, France and Spain. Portuguese banks have particular interest in opening banks and registering trademarks in countries with historical links with Portugal and has a considerable focus on the percentage of Portuguese emigrant population and on countries with expected economic growth. Another interesting evidence achieved with this indicator is the variance of trademarks applications more similar with OIFM’s non-resident debts instead of non-residents assets, in accordance with the theory that banks pretend to collect funds in some economies at a cheaper price and make loans in countries with a higher interest rate.

With the case study performed to trademarks related to banks’ online access mobile versions to financial services, it is possible to get evidence of dynamic competition within the sector. It is visible that products do not differ in quality in any of the essential aspects but the most recent products are always trying to get little differences in terms of the functionalities offered (for instance a novel function, a quick app, most security, the specialization in the business area), which can be classified as Horizontal Differentiation. As such, the distinction between products is made in terms of quality, not easily evaluated by costumers as product quality varies marginally. This “imitation” is necessary to face the aggressive competition of the market. It is visible that banks must innovate in order to keep or increase their customer base, which is made

not only via prices but also by the introduction of new and original products or by the creation of new varieties of products already used by customers.

On this last topic, we also achieve evidence of Barras' (1986 and 1990) service innovation models once these mobile versions needed to be tested in the real context of the market and suffered some adjustments and improvements in order to guarantee that were designed in accordance to customer's objectives. This is also in line with Oliveira and Hippel (2011) theory of user-led innovation, completing Barras' theory that this process is dynamic and interactive.

It is important to refer that our analysis was limited to the segment of retail (or commercial) banking inside the financial services sector and our focus is limited to Portuguese banks or foreign banks with a subsidiary in Portugal (like Santander or BBVA), excluding branches, investment banking and all the remaining institutions composing financial services sector. In this sense, it may be interesting to proceed with the studies on this area, with positive results already proved, to other segments in financial services. We also suggest that our methodology should be adopted to study the concentration level of the sector and the effects of the regulation in innovation process in future research.

As final remark we would like to make a little parenthesis about innovation and regulation. According to some authors (mentioned on literature review) financial innovation can be pointed as one of the causes to the recent financial innovation. Banks innovate on products commercialized and some of them are too much complex to allow clients to clearly understand why they really are buying and transform regulatory role a complex and difficult process. In this sense, a study of sector's financial innovation level could be a precious tool to guarantee an accurate supervision and trademarks can be a good way to accomplish with this objective.

6. References

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Legislation

Directive n.º 2008/95/CE, 22nd October, Harmonization of trade mark law in the European Union

Decree-Law n.º 143/2008, 25th July, and Law n.º 46/2011, 24th June, Portuguese Industrial Property Code

Directive n.º 98/44/CE, 6th July, legal protection of biotechnological inventions

Directive n.º 98/71/CE, 13th October, legal protection of industrial designs

7. Appendices

Annex A

| Trade mark offices considered in TMView's-website | |
|---|---|
| Austria (OPA - 181394) | Morocco (OMPIC - 162695) |
| Benelux (BOIP - 373557) | Norway (NIPO - 239816) |
| Bulgaria (BPO - 125816) | OHIM (OHIM - 1132744) |
| Croatia (DZIV - 43176) | Poland (PPO - 358924) |
| Cyprus (DRCOR - 81313) | Portugal (INPI PT - 352867) |
| Czech Republic (IPOCZ - 223721) | Republic of Korea (KIPO - 2771920) |
| Denmark (DKPTO - 276664) | Romania (OSIM - 176329) |
| Estonia (EPA - 53684) | Russian Federation (ROSPATENT - 439095) |
| Finland (PRH - 169311) | Slovakia (SKIPO - 106005) |
| France (INPI - 1182099) | Slovenia (SIPO - 43312) |
| Germany (DPMA - 1725685) | Spain (OEPM - 894441) |
| Greece (GCE - 233063) | Sweden (PRV - 422798) |
| Hungary (HIPO - 125143) | Turkey (TPI - 1101368) |
| Ireland (IEIPO - 157807) | United Kingdom (UKIPO - 922626) |
| Italy (UIBM - 1072802) | United States (USPTO - 7148168) |
| Latvia (LRPV - 55460) | WIPO (WIPO - 459825) |
| Lithuania (VPB - 69985) | Mexico (IMPI - 991643) |
| Malta (CD-IPRD - 51695) | |

Annex B

General Key words used:

Banco, Investimento

| Bank | Key words udes in the research |
|--|--|
| BANCO ACTIOBANK, SA | BANCO ACTIOBANK |
| | mello |
| | banco mello investimento |
| | Activobank |
| BANCO BAI EUROPA, SA | BAI |
| | BAI Europa |
| | Banco Africano Investimento |
| | BANCO BAI EUROPA |
| BANCO BANIF MAIS, SA | BANCO BANIF MAIS |
| | Banif Mais |
| | Mais |
| BANCO BIC PORTUGUÊS, SA | BANCO BIC PORTUGUÊS |
| | BIC |
| | BPN |
| | Negócios |
| BANCO BILBAO VIZCAYA ARGENTARIA (PORTUGAL), SA | BANCO PORTUGUÊS DE NEGÓCIOS |
| | bilbao |
| | vizcaya |
| | argentaria |
| | BBVA |
| | CRÉDIT LYONNAIS PORTUGAL, SA |
| | LYONNAIS PORTUGAL |
| BANCO BILBAO VIZCAYA ARGENTARIA | |
| BANCO BNP PARIBAS PERSONAL FINANCE, SA | BNP PARIBAS PERSONAL FINANCE |
| | BNP PARIBAS |
| | credifin |
| | CREDIFIN - BANCO DE CRÉDITO AO CONSUMO |
| | Banco Cetelem |
| | cetelem |
| | Paribas |
| | BNP |
| BANCO BPI, SA | BPI |
| | <i>Banco de Fomento e Exterior</i> |
| | fomento |
| | <i>Banco Borges & Irmão</i> |
| | Borges |

| | |
|--|--|
| | Irmão |
| BANCO COMERCIAL PORTUGUÊS, SA | banco expresso do atlantico |
| | expresso |
| | atlântico |
| | sotto |
| | mayor |
| | pinto |
| | Banco mello |
| | mello |
| | credibanco |
| | União dos bancos portugueses |
| | União bancos |
| | cisf |
| | burnay |
| | fonsecas |
| | BANCO COMERCIAL PORTUGUÊS |
| | millenium |
| BCP | |
| BANCO CREDIBOM, SA | Credibom |
| BANCO DE INVESTIMENTO GLOBAL, SA | BANCO DE INVESTIMENTO GLOBAL |
| | BIG |
| | Banco BIG |
| | B.I.G. |
| BANCO DE INVESTIMENTO IMOBILIÁRIO, SA | BANCO DE INVESTIMENTO IMOBILIÁRIO |
| | BANCO IMOBILIÁRIO |
| | Imobiliário |
| BANCO EFISA, SA | Efisa |
| | Banco Efisa |
| BANCO ESPÍRITO SANTO DE INVESTIMENTO, SA | BANCO ESPÍRITO SANTO DE INVESTIMENTO |
| | BESI |
| | ESPÍRITO SANTO |
| BANCO ESPÍRITO SANTO DOS AÇORES, SA | BANCO ESPÍRITO SANTO DE INVESTIMENTO |
| | ESPÍRITO SANTO |
| | Açores |
| BANCO ESPÍRITO SANTO, SA | espírito |
| | santo |
| | BES |
| | banco internacional de crédito |
| | internacional de crédito |
| | BIC |
| | BANCO ESPIRITO SANTO E COMERCIAL DE LISBOA |
| BANCO FINANTIA, SA | finantia |
| | banco finantia |

| | |
|---|---------------------------------------|
| BANCO INVEST, SA | Banco Invest |
| | invest |
| | Banco Alves ribeiro |
| BANCO L.J. CARREGOSA, SA | Alves ribeiro |
| | Banco Carregosa |
| BANCO MADESANT - SOCIEDADE UNIPessoAL, SA | Carregosa |
| | BANCO MADESANT - SOCIEDADE UNIPessoAL |
| | Madesant |
| BANCO POPULAR PORTUGAL, SA | BANCO MADESANT |
| | popular |
| | banco popular |
| | popular portugal |
| | banco nacional de crédito imobiliário |
| | nacional crédito |
| | B.N.C. |
| BNC | |
| BANCO PORTUGUÊS DE GESTÃO, SA | banco português de gestão |
| | português de gestão |
| | gestão |
| BANCO PRIMUS, SA | primus |
| | banco primus |
| BANCO PRIVADO ATLÂNTICO - EUROPA, SA | Banco Privado Atlântico |
| | privado |
| | atlântico |
| BANCO RURAL EUROPA, SA | banco rural europa |
| | rural |
| BANCO SANTANDER CONSUMER PORTUGAL, SA | Santander |
| | Consumer |
| | Santander Consumer |
| BANCO SANTANDER TOTTA, SA | santander |
| | totta |
| | bsn |
| | Banco Santander de Negócios Portugal |
| | Negócios Portugal |
| | Banco de Comercio e Indústria |
| | bci |
| | Banco Totta e Açores |
| | Crédito Predial Português |
| | predial portugues |
| | CPP |
| central hispano | |
| BANIF - BANCO DE INVESTIMENTO, SA | BANIF |
| | Funchal |

| | |
|--|-----------------------------------|
| | Banif Investimento |
| BANIF - BANCO INTERNACIONAL DO FUNCHAL, SA | BANCO COMERCIAL DOS AÇORES, SA. |
| | BANIF |
| | Funchal |
| | BANCO INTERNACIONAL DO FUNCHAL |
| BEST - BANCO ELECTRÓNICO DE SERVIÇO TOTAL, SA | Banco Best |
| | BEST |
| BNI - BANCO DE NEGÓCIOS INTERNACIONAL (EUROPA), SA | BNI |
| | negócios internacional |
| | negócios |
| CAIXA - BANCO DE INVESTIMENTO, SA | Caixa |
| | Caixa BI |
| | Banco Investimento |
| | investimento |
| | investimento grupo |
| | caixa banco investimento |
| CAIXA GERAL DE DEPÓSITOS, SA | CGD |
| | Caixa Geral de Depósitos |
| | Caixa |
| MONTEPIO INVESTIMENTO, SA | montepio investimento |
| | montepio |
| | finibanco |
| CAIXA CENTRAL - CAIXA CENTRAL DE CRÉDITO AGRÍCOLA MÚTUO, CRL | CCAM |
| | Caixa |
| | Crédito |
| | Agrícola |
| | CA |
| CAIXA ECONÓMICA DA MISERICÓRDIA DE ANGRA DO HEROÍSMO | Caixa Económica |
| | Económica |
| | Misericórdia |
| | MISERICÓRDIA DE ANGRA DO HEROÍSMO |
| CAIXA ECONÓMICA DO PORTO | Caixa Económica |
| | Económica |
| | Económica Porto |
| CAIXA ECONÓMICA MONTEPIO GERAL | Montepio Geral |
| | Chave 24 |
| | Montepio |
| | MG |
| CAIXA ECONÓMICA SOCIAL | Caixa Económica Social |
| | Económica |

Annex C

| Concentration Level | Percentage | Concentration Level | Percentage |
|---------------------|------------|---------------------|------------|
| C1 | 26,23% | C35 | 96,11% |
| C2 | 42,48% | C36 | 96,47% |
| C3 | 51,30% | C37 | 96,75% |
| C4 | 55,56% | C38 | 97,03% |
| C5 | 59,69% | C39 | 97,31% |
| C6 | 64,54% | C40 | 97,55% |
| C7 | 68,27% | C41 | 97,79% |
| C8 | 71,60% | C42 | 97,99% |
| C9 | 74,13% | C43 | 98,19% |
| C10 | 76,53% | C44 | 98,36% |
| C11 | 78,86% | C45 | 98,52% |
| C12 | 80,67% | C46 | 98,68% |
| C13 | 82,43% | C47 | 98,80% |
| C14 | 83,96% | C48 | 98,92% |
| C15 | 85,12% | C49 | 99,00% |
| C16 | 86,08% | C50 | 99,08% |
| C17 | 87,00% | C51 | 99,16% |
| C18 | 87,00% | C52 | 99,24% |
| C19 | 87,81% | C53 | 99,32% |
| C20 | 88,57% | C54 | 99,40% |
| C21 | 89,33% | C55 | 99,48% |
| C22 | 89,93% | C56 | 99,52% |
| C23 | 90,53% | C57 | 99,56% |
| C24 | 91,05% | C58 | 99,60% |
| C25 | 91,74% | C59 | 99,64% |
| C26 | 92,26% | C60 | 99,68% |
| C27 | 92,78% | C61 | 99,72% |
| C28 | 93,26% | C62 | 99,76% |
| C29 | 93,70% | C63 | 99,80% |
| C30 | 94,14% | C64 | 99,84% |
| C31 | 94,54% | C65 | 99,88% |
| C32 | 94,95% | C66 | 99,92% |
| C33 | 95,35% | C67 | 99,96% |
| C34 | 95,75% | C68 | 100,00% |

Annex D

| Year | Number of banks classified as "Bank" |
|------|---|
| 1993 | 34 |
| 1994 | 35 |
| 1995 | 36 |
| 1996 | 39 |
| 1997 | 43 |
| 1998 | 42 |
| 1999 | 44 |
| 2000 | 40 |
| 2001 | 41 |
| 2002 | 44 |
| 2003 | 45 |
| 2004 | 39 |
| 2005 | 40 |
| 2006 | 40 |
| 2007 | 39 |
| 2008 | 40 |
| 2009 | 40 |
| 2010 | 37 |
| 2011 | 36 |
| 2012 | 35 |
| 2013 | 34 |

Annex E

Modelo 3: Mínimos Quadrados (OLS), usando as observações 1993-2013 (T = 21)
Variável dependente: Trademarks_registered

| | <i>Coefficiente</i> | <i>Erro Padrão</i> | <i>rácio-t</i> | <i>valor p</i> | |
|------------------------------------|---------------------|-----------------------|----------------|----------------|----|
| const | -147,452 | 122,078 | -1,2078 | 0,24193 | |
| Number_of_banks _classified_as_ | 6,7916 | 3,10426 | 2,1878 | 0,04138 | ** |
| Média var. dependente | 118,7143 | D.P. var. dependente | | 50,58176 | |
| Soma resid. quadrados | 40873,26 | E.P. da regressão | | 46,38129 | |
| R-quadrado | 0,201231 | R-quadrado ajustado | | 0,159190 | |
| F(1, 19) | 4,786591 | valor P(F) | | 0,041383 | |
| Log. da verosimilhança | -109,3217 | Critério de Akaike | | 222,6433 | |
| Critério de Schwarz | 224,7323 | Critério Hannan-Quinn | | 223,0967 | |
| rho | 0,524530 | Durbin-Watson | | 0,912864 | |

Annex F

Modelo 4: Mínimos Quadrados (OLS), usando as observações 1993-2013 (T = 21)
Variável dependente: l_Trademarks_registered

| | <i>Coefficiente</i> | <i>Erro Padrão</i> | <i>rácio-t</i> | <i>valor p</i> | |
|-------------------------------------|---------------------|-----------------------|----------------|----------------|----|
| const | -6,79111 | 4,4558 | -1,5241 | 0,14395 | |
| l_Number_of_ban ks_classiified_a | 3,12583 | 1,21547 | 2,5717 | 0,01868 | ** |
| Média var. dependente | 4,664894 | D.P. var. dependente | | 0,527245 | |
| Soma resid. quadrados | 4,124178 | E.P. da regressão | | 0,465899 | |
| R-quadrado | 0,258208 | R-quadrado ajustado | | 0,219166 | |
| F(1, 19) | 6,613641 | valor P(F) | | 0,018678 | |
| Log. da verosimilhança | -12,70732 | Critério de Akaike | | 29,41465 | |
| Critério de Schwarz | 31,50369 | Critério Hannan-Quinn | | 29,86802 | |
| rho | 0,595840 | Durbin-Watson | | 0,762568 | |

Annex G

Modelo 2: Mínimos Quadrados (OLS), usando as observações 1993:1-2013:4 (T = 84)
Variável dependente: l_Deposits_amount_constante_p

| | <i>Coefficiente</i> | <i>Erro Padrão</i> | <i>rácio-t</i> | <i>valor p</i> | |
|------------------------|---------------------|-----------------------|----------------|----------------|-----|
| const | 11,3868 | 0,0582053 | 195,6317 | <0,00001 | *** |
| l_Trademarks_regi | 0,0791183 | 0,0178359 | 4,4359 | 0,00003 | *** |
| stereid | | | | | |
| Média var. dependente | 11,63707 | D.P. var. dependente | | 0,145116 | |
| Soma resíd. quadrados | 1,409618 | E.P. da regressão | | 0,131112 | |
| R-quadrado | 0,193526 | R-quadrado ajustado | | 0,183691 | |
| F(1, 82) | 19,67720 | valor P(F) | | 0,000028 | |
| Log. da verosimilhança | 52,48409 | Critério de Akaike | | -100,9682 | |
| Critério de Schwarz | -96,10655 | Critério Hannan-Quinn | | -99,01385 | |
| rho | 0,846939 | Durbin-Watson | | 0,329264 | |

Annex H

Modelo 1: Mínimos Quadrados (OLS), usando as observações 1993:1-2013:4 (T = 84)
Variável dependente: l_Loans_amount_constant_price

| | <i>Coefficiente</i> | <i>Erro Padrão</i> | <i>rácio-t</i> | <i>valor p</i> | |
|------------------------|---------------------|-----------------------|----------------|----------------|-----|
| const | 10,8959 | 0,204887 | 53,1801 | <0,00001 | *** |
| l_Trademarks_regi | 0,297665 | 0,0627836 | 4,7411 | <0,00001 | *** |
| stereid | | | | | |
| Média var. dependente | 11,83749 | D.P. var. dependente | | 0,517808 | |
| Soma resíd. quadrados | 17,46640 | E.P. da regressão | | 0,461525 | |
| R-quadrado | 0,215148 | R-quadrado ajustado | | 0,205577 | |
| F(1, 82) | 22,47829 | valor P(F) | | 8,84e-06 | |
| Log. da verosimilhança | -53,22825 | Critério de Akaike | | 110,4565 | |
| Critério de Schwarz | 115,3181 | Critério Hannan-Quinn | | 112,4108 | |
| rho | 0,852798 | Durbin-Watson | | 0,301575 | |

Annex I

Sistema VAR, grau de desfasamento 1
 Estimativas Mínimos Quadrados (OLS), observações 1993:2-2013:4 (T = 83)
 Log. da verosimilhança = 89,974619
 Determinante da matriz de covariâncias = 0,00039216918
 AIC = -2,0235
 BIC = -1,8486
 HQC = -1,9532
 Teste de Portmanteau: LB(20) = 364,433, gl = 76 [0,0000]

Equação 1: 1_Trademarks_registered

| | <i>Coefficiente</i> | <i>Erro Padrão</i> | <i>rácio-t</i> | <i>valor p</i> | |
|-------------------------------------|---------------------|----------------------|----------------|----------------|----|
| const | -13,055 | 6,44781 | -2,0247 | 0,04623 | ** |
| 1_Trademarks_regi stered_1 | 0,245927 | 0,100619 | 2,4441 | 0,01672 | ** |
| 1_Deposits_amount _constante_p_1 | 1,33031 | 0,565985 | 2,3504 | 0,02122 | ** |
| Média var. dependente | 3,201390 | D.P. var. dependente | | 0,731778 | |
| Soma resíd. quadrados | 34,79457 | E.P. da regressão | | 0,659494 | |
| R-quadrado | 0,207609 | R-quadrado ajustado | | 0,187799 | |
| F(2, 80) | 10,48014 | valor P(F) | | 0,000091 | |
| rho | 0,050647 | Durbin-Watson | | 1,852823 | |

Testes-F com zero restrições:

Todos os desfasamentos de 1_Trademarks_registered F(1, 80) = 5,9738 [0,0167]
 Todos os desfasamentos de 1_Deposits_amount_constante_p F(1, 80) = 5,5245 [0,0212]

Equação 2: 1_Deposits_amount_constante_p

| | <i>Coefficiente</i> | <i>Erro Padrão</i> | <i>rácio-t</i> | <i>valor p</i> | |
|-------------------------------------|---------------------|----------------------|----------------|----------------|-----|
| const | 0,570726 | 0,304739 | 1,8728 | 0,06474 | * |
| 1_Trademarks_regi stered_1 | 0,00429198 | 0,00475552 | 0,9025 | 0,36949 | |
| 1_Deposits_amount _constante_p_1 | 0,950305 | 0,0267498 | 35,5257 | <0,00001 | *** |
| Média var. dependente | 11,64074 | D.P. var. dependente | | 0,142034 | |
| Soma resíd. quadrados | 0,077722 | E.P. da regressão | | 0,031169 | |
| R-quadrado | 0,953016 | R-quadrado ajustado | | 0,951842 | |
| F(2, 80) | 811,3606 | valor P(F) | | 7,55e-54 | |
| rho | -0,315023 | Durbin-Watson | | 2,620190 | |

Testes-F com zero restrições:

Todos os desfasamentos de 1_Trademarks_registered F(1, 80) = 0,81455 [0,3695]
 Todos os desfasamentos de 1_Deposits_amount_constante_p F(1, 80) = 1262,1 [0,0000]

Sistema VAR, grau de desfasamento 2
 Estimativas Mínimos Quadrados (OLS), observações 1993:3-2013:4 (T = 82)
 Log. da verosimilhança = 95,696121
 Determinante da matriz de covariâncias = 0,00033218921
 AIC = -2,0901
 BIC = -1,7966
 HQC = -1,9723
 Teste de Portmanteau: LB(20) = 288,606, gl = 72 [0,0000]

Equação 1: 1_Trademarks_registered

| | <i>Coefficiente</i> | <i>Erro Padrão</i> | <i>rácio-t</i> | <i>valor p</i> | |
|-------------------------------------|---------------------|----------------------|----------------|----------------|-----|
| const | -11,1238 | 6,82863 | -1,6290 | 0,10740 | |
| 1_Trademarks_regi stered_1 | 0,298487 | 0,110427 | 2,7030 | 0,00845 | *** |
| 1_Trademarks_regi stered_2 | 0,119698 | 0,10429 | 1,1477 | 0,25463 | |
| 1_Deposits_amount _constante_p_1 | 1,07887 | 2,33442 | 0,4622 | 0,64527 | |
| 1_Deposits_amount _constante_p_2 | 0,0371597 | 2,28315 | 0,0163 | 0,98706 | |
| Média var. dependente | 3,201177 | D.P. var. dependente | | 0,736278 | |
| Soma resid. quadrados | 32,44751 | E.P. da regressão | | 0,649150 | |
| R-quadrado | 0,261055 | R-quadrado ajustado | | 0,222668 | |
| F(4, 77) | 6,800637 | valor P(F) | | 0,000097 | |
| rho | -0,044103 | Durbin-Watson | | 2,084530 | |

Testes-F com zero restrições:

Todos os desfasamentos de 1_Trademarks_registered $F(2, 77) = 5,3913 [0,0064]$
 Todos os desfasamentos de 1_Deposits_amount_constante_p $F(2, 77) = 1,7041 [0,1887]$
 Todas as variáveis, desfasamento 2 $F(2, 77) = 0,65884 [0,5203]$

Equação 2: 1_Deposits_amount_constante_p

| | <i>Coefficiente</i> | <i>Erro Padrão</i> | <i>rácio-t</i> | <i>valor p</i> | |
|-------------------------------------|---------------------|----------------------|----------------|----------------|-----|
| const | 0,619541 | 0,314528 | 1,9697 | 0,05246 | * |
| 1_Trademarks_regi stered_1 | 0,00390344 | 0,00508632 | 0,7674 | 0,44517 | |
| 1_Trademarks_regi stered_2 | 0,00433036 | 0,00480362 | 0,9015 | 0,37015 | |
| 1_Deposits_amount _constante_p_1 | 0,635565 | 0,107524 | 5,9109 | <0,00001 | *** |
| 1_Deposits_amount _constante_p_2 | 0,309614 | 0,105163 | 2,9441 | 0,00428 | *** |
| Média var. dependente | 11,64418 | D.P. var. dependente | | 0,139374 | |
| Soma resid. quadrados | 0,068839 | E.P. da regressão | | 0,029900 | |

| | | | |
|------------|-----------|---------------------|----------|
| R-quadrado | 0,956249 | R-quadrado ajustado | 0,953976 |
| F(4, 77) | 420,7418 | valor P(F) | 1,80e-51 |
| rho | -0,060053 | Durbin-Watson | 2,112041 |

Testes-F com zero restrições:

| | |
|---|-----------------------------|
| Todos os desfasamentos de 1_Trademarks_registered | F(2, 77) = 0,92499 [0,4009] |
| Todos os desfasamentos de 1_Deposits_amount_constante_p | F(2, 77) = 576,23 [0,0000] |
| Todas as variáveis, desfasamento 2 | F(2, 77) = 4,7469 [0,0114] |

Para o sistema como um todo

Hipótese nula: o maior desfasamento é 1

Hipótese alternativa: o maior desfasamento é 2

Teste de razões de verosimilhanças: Qui-quadrado(4) = 10,906 [0,0276]

Sistema VAR, grau de desfasamento 3

Estimativas Mínimos Quadrados (OLS), observações 1993:4-2013:4 (T = 81)

Log. da verosimilhança = 99,316773

Determinante da matriz de covariâncias = 0,00029515199

AIC = -2,1066

BIC = -1,6927

HQC = -1,9405

Teste de Portmanteau: LB(20) = 244,515, gl = 68 [0,0000]

Equação 1: 1_Trademarks_registered

| | <i>Coefficiente</i> | <i>Erro Padrão</i> | <i>rácio-t</i> | <i>valor p</i> | |
|-------------------------------------|---------------------|----------------------|----------------|----------------|-----|
| const | -4,70348 | 7,10833 | -0,6617 | 0,51023 | |
| 1_Trademarks_regi stered_1 | 0,255954 | 0,110841 | 2,3092 | 0,02373 | ** |
| 1_Trademarks_regi stered_2 | 0,0789245 | 0,113628 | 0,6946 | 0,48949 | |
| 1_Trademarks_regi stered_3 | 0,275713 | 0,103002 | 2,6768 | 0,00915 | *** |
| 1_Deposits_amount _constante_p_1 | 0,859037 | 2,40849 | 0,3567 | 0,72235 | |
| 1_Deposits_amount _constante_p_2 | 1,00985 | 2,73573 | 0,3691 | 0,71308 | |
| 1_Deposits_amount _constante_p_3 | -1,35767 | 2,33858 | -0,5806 | 0,56330 | |
| Média var. dependente | 3,208117 | D.P. var. dependente | 0,738162 | | |
| Soma resid. quadrados | 29,40536 | E.P. da regressão | 0,630373 | | |
| R-quadrado | 0,325421 | R-quadrado ajustado | 0,270725 | | |
| F(6, 74) | 5,949675 | valor P(F) | 0,000041 | | |

rho -0,007181 Durbin-Watson 1,993380

Testes-F com zero restrições:

Todos os desfasamentos de 1_Trademarks_registered $F(3, 74) = 6,2116 [0,0008]$
 Todos os desfasamentos de 1_Deposits_amount_constante_p $F(3, 74) = 0,32196 [0,8095]$
 Todas as variáveis, desfasamento 3 $F(2, 74) = 3,801 [0,0268]$

Equação 2: 1_Deposits_amount_constante_p

| | <i>Coefficiente</i> | <i>Erro Padrão</i> | <i>rácio-t</i> | <i>valor p</i> | |
|-------------------------------------|---------------------|--------------------|----------------|----------------|-----|
| const | 0,567223 | 0,336545 | 1,6854 | 0,09612 | * |
| 1_Trademarks_regi stered_1 | 0,00353375 | 0,00524777 | 0,6734 | 0,50280 | |
| 1_Trademarks_regi stered_2 | 0,00595593 | 0,00537975 | 1,1071 | 0,27184 | |
| 1_Trademarks_regi stered_3 | -0,00188527 | 0,00487664 | -0,3866 | 0,70017 | |
| 1_Deposits_amount _constante_p_1 | 0,575946 | 0,11403 | 5,0508 | <0,00001 | *** |
| 1_Deposits_amount _constante_p_2 | 0,189256 | 0,129523 | 1,4612 | 0,14820 | |
| 1_Deposits_amount _constante_p_3 | 0,184753 | 0,11072 | 1,6686 | 0,09941 | * |

| | | | |
|-----------------------|-----------|----------------------|----------|
| Média var. dependente | 11,64752 | D.P. var. dependente | 0,136915 |
| Soma resid. quadrados | 0,065914 | E.P. da regressão | 0,029845 |
| R-quadrado | 0,956047 | R-quadrado ajustado | 0,952484 |
| F(6, 74) | 268,2714 | valor P(F) | 4,19e-48 |
| rho | -0,105531 | Durbin-Watson | 2,193476 |

Testes-F com zero restrições:

Todos os desfasamentos de 1_Trademarks_registered $F(3, 74) = 0,76083 [0,5196]$
 Todos os desfasamentos de 1_Deposits_amount_constante_p $F(3, 74) = 337,15 [0,0000]$
 Todas as variáveis, desfasamento 3 $F(2, 74) = 1,4876 [0,2326]$

Para o sistema como um todo

Hipótese nula: o maior desfasamento é 2

Hipótese alternativa: o maior desfasamento é 3

Teste de razões de verosimilhanças: Qui-quadrado(4) = 11,1858 [0,0246]

Sistema VAR, grau de desfasamento 4

Estimativas Mínimos Quadrados (OLS), observações 1994:1-2013:4 (T = 80)

Log. da verosimilhança = 112,88325

Determinante da matriz de covariâncias = 0,00020390929

AIC = -2,3721

BIC = -1,8361

HQC = -2,1572
 Teste de Portmanteau: LB(20) = 117,426, gl = 64 [0,0001]

Equação 1: 1_Trademarks_registered

| | <i>Coefficiente</i> | <i>Erro Padrão</i> | <i>rácio-t</i> | <i>valor p</i> | |
|-------------------------------------|---------------------|----------------------|----------------|----------------|----|
| const | -4,14487 | 7,4784 | -0,5542 | 0,58115 | |
| 1_Trademarks_regi stered_1 | 0,247683 | 0,117196 | 2,1134 | 0,03808 | ** |
| 1_Trademarks_regi stered_2 | 0,107543 | 0,116686 | 0,9216 | 0,35984 | |
| 1_Trademarks_regi stered_3 | 0,209566 | 0,115837 | 1,8092 | 0,07466 | * |
| 1_Trademarks_regi stered_4 | 0,0155452 | 0,108711 | 0,1430 | 0,88670 | |
| 1_Deposits_amount _constante_p_1 | 1,45495 | 2,47662 | 0,5875 | 0,55875 | |
| 1_Deposits_amount _constante_p_2 | 1,42686 | 2,80773 | 0,5082 | 0,61290 | |
| 1_Deposits_amount _constante_p_3 | -0,492576 | 2,79168 | -0,1764 | 0,86045 | |
| 1_Deposits_amount _constante_p_4 | -1,91866 | 2,40268 | -0,7985 | 0,42722 | |
| Média var. dependente | 3,230889 | D.P. var. dependente | | 0,713612 | |
| Soma resid. quadrados | 28,49995 | E.P. da regressão | | 0,633567 | |
| R-quadrado | 0,291577 | R-quadrado ajustado | | 0,211755 | |
| F(8, 71) | 3,652833 | valor P(F) | | 0,001295 | |
| rho | -0,039743 | Durbin-Watson | | 2,048892 | |

Testes-F com zero restrições:

Todos os desfasamentos de 1_Trademarks_registered $F(4, 71) = 3,7445 [0,0080]$
 Todos os desfasamentos de 1_Deposits_amount_constante_p $F(4, 71) = 0,38971 [0,8153]$
 Todas as variáveis, desfasamento 4 $F(2, 71) = 0,32863 [0,7210]$

Equação 2: 1_Deposits_amount_constante_p

| | <i>Coefficiente</i> | <i>Erro Padrão</i> | <i>rácio-t</i> | <i>valor p</i> | |
|-------------------------------------|---------------------|--------------------|----------------|----------------|-----|
| const | 0,711345 | 0,301798 | 2,3570 | 0,02118 | ** |
| 1_Trademarks_regi stered_1 | 0,00438536 | 0,00472956 | 0,9272 | 0,35695 | |
| 1_Trademarks_regi stered_2 | 0,00470013 | 0,00470898 | 0,9981 | 0,32161 | |
| 1_Trademarks_regi stered_3 | 0,000558814 | 0,0046747 | 0,1195 | 0,90518 | |
| 1_Trademarks_regi stered_4 | 0,00261247 | 0,00438714 | 0,5955 | 0,55341 | |
| 1_Deposits_amount _constante_p_1 | 0,468997 | 0,0999463 | 4,6925 | 0,00001 | *** |

| | | | | | |
|-------------------------------------|-----------|-----------|---------|----------|-----|
| 1_Deposits_amount _constante_p_2 | 0,0757281 | 0,113309 | 0,6683 | 0,50609 | |
| 1_Deposits_amount _constante_p_3 | -0,120883 | 0,112661 | -1,0730 | 0,28691 | |
| 1_Deposits_amount _constante_p_4 | 0,512849 | 0,0969622 | 5,2892 | <0,00001 | *** |

| | | | |
|-----------------------|----------|----------------------|----------|
| Média var. dependente | 11,65040 | D.P. var. dependente | 0,135284 |
| Soma resid. quadrados | 0,046415 | E.P. da regressão | 0,025568 |
| R-quadrado | 0,967897 | R-quadrado ajustado | 0,964280 |
| F(8, 71) | 267,5815 | valor P(F) | 7,67e-50 |
| rho | 0,379697 | Durbin-Watson | 1,207743 |

Testes-F com zero restrições:

| | | |
|---|------------|-----------------|
| Todos os desfasamentos de 1_Trade marks_registered | F(4, 71) = | 1,0604 [0,3826] |
| Todos os desfasamentos de 1_Deposits _amount_constante_p | F(4, 71) = | 319,22 [0,0000] |
| Todas as variáveis, desfasamento 4 | F(2, 71) = | 14,177 [0,0000] |

Para o sistema como um todo

Hipótese nula: o maior desfasamento é 3

Hipótese alternativa: o maior desfasamento é 4

Teste de razões de verosimilhanças: Qui-quadrado(4) = 28,5133 [0,0000]

Sistema VAR, grau de desfasamento 5

Estimativas Mínimos Quadrados (OLS), observações 1994:2-2013:4 (T = 79)

Log. da verosimilhança = 143,40249

Determinante da matriz de covariâncias = 9,0859446e-005

AIC = -3,0735

BIC = -2,4136

HQC = -2,8091

Teste de Portmanteau: LB(19) = 53,5806, gl = 56 [0,5670]

Equação 1: 1_Trade
marks_registered

| | Coefficiente | Erro Padrão | rácio-t | valor p | |
|-------------------------------------|--------------|-------------|---------|---------|----|
| const | -1,43971 | 7,70496 | -0,1869 | 0,85233 | |
| 1_Trade marks_regi stered_1 | 0,198563 | 0,116279 | 1,7076 | 0,09226 | * |
| 1_Trade marks_regi stered_2 | 0,0406185 | 0,119218 | 0,3407 | 0,73437 | |
| 1_Trade marks_regi stered_3 | 0,231268 | 0,115002 | 2,0110 | 0,04829 | ** |
| 1_Trade marks_regi stered_4 | -0,0852687 | 0,115095 | -0,7409 | 0,46133 | |
| 1_Trade marks_regi stered_5 | 0,202674 | 0,106303 | 1,9066 | 0,06080 | * |
| 1_Deposits_amount _constante_p_1 | 3,1795 | 2,88292 | 1,1029 | 0,27397 | |

| | | | | |
|-------------------|-----------|---------|---------|---------|
| 1_Deposits_amount | 1,53622 | 2,75104 | 0,5584 | 0,57839 |
| _constante_p_2 | | | | |
| 1_Deposits_amount | -0,664283 | 2,73739 | -0,2427 | 0,80899 |
| _constante_p_3 | | | | |
| 1_Deposits_amount | -1,17886 | 2,73132 | -0,4316 | 0,66739 |
| _constante_p_4 | | | | |
| 1_Deposits_amount | -2,63861 | 2,78361 | -0,9479 | 0,34653 |
| _constante_p_5 | | | | |

| | | | |
|-----------------------|-----------|----------------------|----------|
| Média var. dependente | 3,249106 | D.P. var. dependente | 0,699201 |
| Soma resid. quadrados | 25,70658 | E.P. da regressão | 0,614848 |
| R-quadrado | 0,325868 | R-quadrado ajustado | 0,226731 |
| F(10, 68) | 3,287040 | valor P(F) | 0,001605 |
| rho | -0,032733 | Durbin-Watson | 2,055697 |

Testes-F com zero restrições:

Todos os desfasamentos de 1_Trademarks_registered F(5, 68) = 3,2461 [0,0109]
 Todos os desfasamentos de 1_Deposits_amount_constante_p F(5, 68) = 0,63557 [0,6733]
 Todas as variáveis, desfasamento 5 F(2, 68) = 2,3194 [0,1061]

Equação 2: 1_Deposits_amount_constante_p

| | <i>Coefficiente</i> | <i>Erro Padrão</i> | <i>rácio-t</i> | <i>valor p</i> | |
|-------------------|---------------------|--------------------|----------------|----------------|-----|
| const | 0,374282 | 0,225759 | 1,6579 | 0,10195 | |
| 1_Trademarks_regi | -0,000992583 | 0,00340702 | -0,2913 | 0,77168 | |
| stered_1 | | | | | |
| 1_Trademarks_regi | 0,00176504 | 0,00349314 | 0,5053 | 0,61499 | |
| stered_2 | | | | | |
| 1_Trademarks_regi | 0,000646458 | 0,00336962 | 0,1918 | 0,84843 | |
| stered_3 | | | | | |
| 1_Trademarks_regi | -0,000686857 | 0,00337233 | -0,2037 | 0,83922 | |
| stered_4 | | | | | |
| 1_Trademarks_regi | 0,00182464 | 0,00311472 | 0,5858 | 0,55994 | |
| stered_5 | | | | | |
| 1_Deposits_amount | 0,864595 | 0,0844708 | 10,2354 | <0,00001 | *** |
| _constante_p_1 | | | | | |
| 1_Deposits_amount | 0,00515781 | 0,0806067 | 0,0640 | 0,94917 | |
| _constante_p_2 | | | | | |
| 1_Deposits_amount | -0,0526644 | 0,0802067 | -0,6566 | 0,51365 | |
| _constante_p_3 | | | | | |
| 1_Deposits_amount | 0,823374 | 0,0800289 | 10,2885 | <0,00001 | *** |
| _constante_p_4 | | | | | |
| 1_Deposits_amount | -0,672942 | 0,0815609 | -8,2508 | <0,00001 | *** |
| _constante_p_5 | | | | | |

| | | | |
|-----------------------|----------|----------------------|----------|
| Média var. dependente | 11,65422 | D.P. var. dependente | 0,131722 |
| Soma resid. quadrados | 0,022070 | E.P. da regressão | 0,018015 |
| R-quadrado | 0,983693 | R-quadrado ajustado | 0,981294 |
| F(10, 68) | 410,1881 | valor P(F) | 1,15e-56 |

rho 0,119800 Durbin-Watson 1,732785

Testes-F com zero restrições:

Todos os desfasamentos de 1_Trademarks_registered $F(5, 68) = 0,19699 [0,9626]$
Todos os desfasamentos de 1_Deposits_amount_constante_p $F(5, 68) = 481,15 [0,0000]$
Todas as variáveis, desfasamento 5 $F(2, 68) = 34,372 [0,0000]$

Para o sistema como um todo

Hipótese nula: o maior desfasamento é 4

Hipótese alternativa: o maior desfasamento é 5

Teste de razões de verosimilhanças: Qui-quadrado(4) = 59,9447 [0,0000]

Annex J

Sistema VAR, grau de defasamento 1
 Estimativas Mínimos Quadrados (OLS), observações 1993:2-2013:4 (T = 83)
 Log. da verosimilhança = 124,52163
 Determinante da matriz de covariâncias = 0,00017058524
 AIC = -2,8559
 BIC = -2,6811
 HQC = -2,7857
 Teste de Portmanteau: LB(20) = 215,73, gl = 76 [0,0000]

Equação 1: 1_Trademarks_registered

| | <i>Coefficiente</i> | <i>Erro Padrão</i> | <i>rácio-t</i> | <i>valor p</i> | |
|---------------------------------|---------------------|----------------------|----------------|----------------|----|
| const | -2,2252 | 1,74362 | -1,2762 | 0,20558 | |
| 1_Trademarks_registered_1 | 0,233988 | 0,101151 | 2,3132 | 0,02328 | ** |
| 1_Loans_amount_constant_price_1 | 0,395971 | 0,157939 | 2,5071 | 0,01420 | ** |
| Média var. dependente | 3,201390 | D.P. var. dependente | | 0,731778 | |
| Soma resid. quadrados | 34,48767 | E.P. da regressão | | 0,656579 | |
| R-quadrado | 0,214598 | R-quadrado ajustado | | 0,194963 | |
| F(2, 80) | 10,92935 | valor P(F) | | 0,000064 | |
| rho | 0,056638 | Durbin-Watson | | 1,845726 | |

Testes-F com zero restrições:

Todos os defasamentos de 1_Trademarks_registered F(1, 80) = 5,3511 [0,0233]
 Todos os defasamentos de 1_Loans_amount_constant_price F(1, 80) = 6,2856 [0,0142]

Equação 2: 1_Loans_amount_constant_price

| | <i>Coefficiente</i> | <i>Erro Padrão</i> | <i>rácio-t</i> | <i>valor p</i> | |
|---------------------------------|---------------------|----------------------|----------------|----------------|-----|
| const | 0,337789 | 0,0600188 | 5,6281 | <0,00001 | *** |
| 1_Trademarks_registered_1 | 0,0125987 | 0,00348182 | 3,6184 | 0,00052 | *** |
| 1_Loans_amount_constant_price_1 | 0,969451 | 0,00543658 | 178,3200 | <0,00001 | *** |
| Média var. dependente | 11,84951 | D.P. var. dependente | | 0,509024 | |
| Soma resid. quadrados | 0,040863 | E.P. da regressão | | 0,022601 | |
| R-quadrado | 0,998077 | R-quadrado ajustado | | 0,998029 | |
| F(2, 80) | 20757,76 | valor P(F) | | 2,3e-109 | |
| rho | 0,035316 | Durbin-Watson | | 1,896290 | |

Testes-F com zero restrições:

Todos os desfasamentos de 1_Trademarks_registered $F(1, 80) = 13,093$ [0,0005]
 Todos os desfasamentos de 1_Loans_amount_constant_price $F(1, 80) = 31798$ [0,0000]

Sistema VAR, grau de desfasamento 2
 Estimativas Mínimos Quadrados (OLS), observações 1993:3-2013:4 (T = 82)
 Log. da verosimilhança = 132,39304
 Determinante da matriz de covariâncias = 0,00013572869
 AIC = -2,9852
 BIC = -2,6917
 HQC = -2,8674
 Teste de Portmanteau: LB(20) = 186,295, gl = 72 [0,0000]

Equação 1: 1_Trademarks_registered

| | <i>Coefficiente</i> | <i>Erro Padrão</i> | <i>rácio-t</i> | <i>valor p</i> | |
|---------------------------------|---------------------|----------------------|----------------|----------------|----|
| const | -4,67478 | 2,10166 | -2,2243 | 0,02906 | ** |
| 1_Trademarks_registered_1 | 0,182251 | 0,116862 | 1,5595 | 0,12297 | |
| 1_Trademarks_registered_2 | 0,0464784 | 0,10511 | 0,4422 | 0,65959 | |
| 1_Loans_amount_constant_price_1 | 8,22216 | 3,39364 | 2,4228 | 0,01775 | ** |
| 1_Loans_amount_constant_price_2 | -7,62968 | 3,27552 | -2,3293 | 0,02247 | ** |
| Média var. dependente | 3,201177 | D.P. var. dependente | 0,736278 | | |
| Soma resid. quadrados | 30,19596 | E.P. da regressão | 0,626223 | | |
| R-quadrado | 0,312330 | R-quadrado ajustado | 0,276607 | | |
| F(4, 77) | 8,743089 | valor P(F) | 7,14e-06 | | |
| rho | -0,070254 | Durbin-Watson | 2,140102 | | |

Testes-F com zero restrições:

Todos os desfasamentos de 1_Trademarks_registered $F(2, 77) = 1,3872$ [0,2559]
 Todos os desfasamentos de 1_Loans_amount_constant_price $F(2, 77) = 4,7019$ [0,0118]
 Todas as variáveis, desfasamento 2 $F(2, 77) = 3,3626$ [0,0398]

Equação 2: 1_Loans_amount_constant_price

| | <i>Coefficiente</i> | <i>Erro Padrão</i> | <i>rácio-t</i> | <i>valor p</i> | |
|---------------------------------|---------------------|--------------------|----------------|----------------|-----|
| const | 0,364453 | 0,0713319 | 5,1093 | <0,00001 | *** |
| 1_Trademarks_registered_1 | 0,0118797 | 0,0039664 | 2,9951 | 0,00369 | *** |
| 1_Trademarks_registered_2 | 0,0102284 | 0,00356751 | 2,8671 | 0,00534 | *** |
| 1_Loans_amount_constant_price_1 | 1,01535 | 0,115183 | 8,8152 | <0,00001 | *** |

1_Loans_amount_c -0,0508088 0,111174 -0,4570 0,64894
 onstant_price_2

| | | | |
|-----------------------|-----------|----------------------|----------|
| Média var. dependente | 11,86131 | D.P. var. dependente | 0,500605 |
| Soma resid. quadrados | 0,034785 | E.P. da regressão | 0,021254 |
| R-quadrado | 0,998286 | R-quadrado ajustado | 0,998197 |
| F(4, 77) | 11214,24 | valor P(F) | 1,3e-105 |
| rho | -0,055790 | Durbin-Watson | 2,105128 |

Testes-F com zero restrições:

Todos os desfasamentos de 1_Trademarks_registered F(2, 77) = 9,4459 [0,0002]
 Todos os desfasamentos de 1_Loans_amount_ constant_price F(2, 77) = 15009 [0,0000]
 Todas as variáveis, desfasamento 2 F(2, 77) = 4,9711 [0,0093]

Para o sistema como um todo

Hipótese nula: o maior desfasamento é 1

Hipótese alternativa: o maior desfasamento é 2

Teste de razões de verosimilhanças: Qui-quadrado(4) = 15,491 [0,0038]

Sistema VAR, grau de desfasamento 3

Estimativas Mínimos Quadrados (OLS), observações 1993:4-2013:4 (T = 81)

Log. da verosimilhança = 139,70262

Determinante da matriz de covariâncias = 0,00010888681

AIC = -3,1038

BIC = -2,6899

HQC = -2,9377

Teste de Portmanteau: LB(20) = 201,219, gl = 68 [0,0000]

Equação 1: 1_Trademarks_registered

| | <i>Coefficiente</i> | <i>Erro Padrão</i> | <i>rácio-t</i> | <i>valor p</i> | |
|-------------------------------------|---------------------|--------------------|----------------|----------------|---|
| const | -4,73988 | 2,58313 | -1,8349 | 0,07053 | * |
| 1_Trademarks_regi stered_1 | 0,137734 | 0,119198 | 1,1555 | 0,25160 | |
| 1_Trademarks_regi stered_2 | -0,0356375 | 0,120923 | -0,2947 | 0,76904 | |
| 1_Trademarks_regi stered_3 | 0,180582 | 0,108079 | 1,6708 | 0,09898 | * |
| 1_Loans_amount_c onstant_price_1 | 6,16153 | 3,51194 | 1,7544 | 0,08349 | * |
| 1_Loans_amount_c onstant_price_2 | -0,418761 | 4,704 | -0,0890 | 0,92930 | |
| 1_Loans_amount_c onstant_price_3 | -5,16345 | 3,31683 | -1,5567 | 0,12380 | |

| | | | |
|-----------------------|-----------|----------------------|----------|
| Média var. dependente | 3,208117 | D.P. var. dependente | 0,738162 |
| Soma resíd. quadrados | 27,58125 | E.P. da regressão | 0,610508 |
| R-quadrado | 0,367267 | R-quadrado ajustado | 0,315965 |
| F(6, 74) | 7,158835 | valor P(F) | 4,83e-06 |
| rho | -0,014115 | Durbin-Watson | 2,010830 |

Testes-F com zero restrições:

Todos os desfasamentos de 1_Trademarks_registered F(3, 74) = 1,3162 [0,2756]
 Todos os desfasamentos de 1_Loans_amount_constant_price F(3, 74) = 1,9746 [0,1251]
 Todas as variáveis, desfasamento 3 F(2, 74) = 3,5043 [0,0351]

Equação 2: 1_Loans_amount_constant_price

| | <i>Coefficiente</i> | <i>Erro Padrão</i> | <i>rácio-t</i> | <i>valor p</i> | |
|---------------------------------|---------------------|--------------------|----------------|----------------|-----|
| const | 0,25716 | 0,082907 | 3,1018 | 0,00272 | *** |
| 1_Trademarks_registered_1 | 0,00881221 | 0,00382574 | 2,3034 | 0,02407 | ** |
| 1_Trademarks_registered_2 | 0,00384468 | 0,00388108 | 0,9906 | 0,32510 | |
| 1_Trademarks_registered_3 | 0,00175401 | 0,00346887 | 0,5056 | 0,61461 | |
| 1_Loans_amount_constant_price_1 | 0,992871 | 0,112718 | 8,8085 | <0,00001 | *** |
| 1_Loans_amount_constant_price_2 | 0,37499 | 0,150978 | 2,4837 | 0,01526 | ** |
| 1_Loans_amount_constant_price_3 | -0,39268 | 0,106456 | -3,6887 | 0,00043 | *** |

| | | | |
|-----------------------|----------|----------------------|----------|
| Média var. dependente | 11,87335 | D.P. var. dependente | 0,491641 |
| Soma resíd. quadrados | 0,028412 | E.P. da regressão | 0,019595 |
| R-quadrado | 0,998531 | R-quadrado ajustado | 0,998412 |
| F(6, 74) | 8381,501 | valor P(F) | 1,1e-102 |
| rho | 0,000172 | Durbin-Watson | 1,999278 |

Testes-F com zero restrições:

Todos os desfasamentos de 1_Trademarks_registered F(3, 74) = 2,2188 [0,0930]
 Todos os desfasamentos de 1_Loans_amount_constant_price F(3, 74) = 10067 [0,0000]
 Todas as variáveis, desfasamento 3 F(2, 74) = 7,9298 [0,0008]

Para o sistema como um todo

Hipótese nula: o maior desfasamento é 2

Hipótese alternativa: o maior desfasamento é 3

Teste de razões de verosimilhanças: Qui-quadrado(4) = 19,1207 [0,0007]

Sistema VAR, grau de defasamento 4
 Estimativas Mínimos Quadrados (OLS), observações 1994:1-2013:4 (T = 80)
 Log. da verosimilhança = 141,14967
 Determinante da matriz de covariâncias = 0,00010058616
 AIC = -3,0787
 BIC = -2,5428
 HQC = -2,8639
 Teste de Portmanteau: LB(20) = 158,99, gl = 64 [0,0000]

Equação 1: 1_Trademarks_registered

| | <i>Coefficiente</i> | <i>Erro Padrão</i> | <i>rácio-t</i> | <i>valor p</i> | |
|-----------------------|---------------------|----------------------|----------------|----------------|----|
| const | -6,03913 | 2,86787 | -2,1058 | 0,03876 | ** |
| 1_Trademarks_regi | 0,144113 | 0,121304 | 1,1880 | 0,23878 | |
| stered_1 | | | | | |
| 1_Trademarks_regi | -0,0311097 | 0,12334 | -0,2522 | 0,80159 | |
| stered_2 | | | | | |
| 1_Trademarks_regi | 0,0817626 | 0,121533 | 0,6728 | 0,50328 | |
| stered_3 | | | | | |
| 1_Trademarks_regi | -0,0772673 | 0,11026 | -0,7008 | 0,48574 | |
| stered_4 | | | | | |
| 1_Loans_amount_c | 4,05645 | 3,77783 | 1,0738 | 0,28657 | |
| onstant_price_1 | | | | | |
| 1_Loans_amount_c | 2,85084 | 5,03006 | 0,5668 | 0,57266 | |
| onstant_price_2 | | | | | |
| 1_Loans_amount_c | -1,38265 | 4,90264 | -0,2820 | 0,77875 | |
| onstant_price_3 | | | | | |
| 1_Loans_amount_c | -4,79602 | 3,60184 | -1,3315 | 0,18727 | |
| onstant_price_4 | | | | | |
| Média var. dependente | 3,230889 | D.P. var. dependente | | 0,713612 | |
| Soma resíd. quadrados | 26,24637 | E.P. da regressão | | 0,608003 | |
| R-quadrado | 0,347595 | R-quadrado ajustado | | 0,274084 | |
| F(8, 71) | 4,728507 | valor P(F) | | 0,000112 | |
| rho | -0,051845 | Durbin-Watson | | 2,075321 | |

Testes-F com zero restrições:

Todos os defasamentos de 1_Trademarks_registered $F(4, 71) = 0,50818 [0,7299]$
 Todos os defasamentos de 1_Loans_amount_constant_price $F(4, 71) = 1,9472 [0,1120]$
 Todas as variáveis, defasamento 4 $F(2, 71) = 0,98377 [0,3789]$

Equação 2: 1_Loans_amount_constant_price

| | <i>Coefficiente</i> | <i>Erro Padrão</i> | <i>rácio-t</i> | <i>valor p</i> | |
|-------------------|---------------------|--------------------|----------------|----------------|-----|
| const | 0,316696 | 0,0927607 | 3,4141 | 0,00106 | *** |
| 1_Trademarks_regi | 0,00780071 | 0,00392357 | 1,9882 | 0,05065 | * |

| | | | | | |
|-------------------|------------|------------|---------|----------|-----|
| stered_1 | | | | | |
| 1_Trademarks_regi | 0,00455918 | 0,00398943 | 1,1428 | 0,25695 | |
| stered_2 | | | | | |
| 1_Trademarks_regi | 0,00182835 | 0,00393095 | 0,4651 | 0,64327 | |
| stered_3 | | | | | |
| 1_Trademarks_regi | 0,00550425 | 0,00356635 | 1,5434 | 0,12718 | |
| stered_4 | | | | | |
| 1_Loans_amount_c | 1,00216 | 0,122193 | 8,2015 | <0,00001 | *** |
| onstant_price_1 | | | | | |
| 1_Loans_amount_c | 0,31909 | 0,162696 | 1,9613 | 0,05377 | * |
| onstant_price_2 | | | | | |
| 1_Loans_amount_c | -0,416944 | 0,158575 | -2,6293 | 0,01048 | ** |
| onstant_price_3 | | | | | |
| 1_Loans_amount_c | 0,0645769 | 0,116501 | 0,5543 | 0,58111 | |
| onstant_price_4 | | | | | |

| | | | |
|-----------------------|----------|----------------------|----------|
| Média var. dependente | 11,88522 | D.P. var. dependente | 0,482906 |
| Soma resid. quadrados | 0,027459 | E.P. da regressão | 0,019666 |
| R-quadrado | 0,998510 | R-quadrado ajustado | 0,998342 |
| F(8, 71) | 5945,586 | valor P(F) | 3,93e-97 |
| rho | 0,004583 | Durbin-Watson | 1,904850 |

Testes-F com zero restrições:

Todos os desfasamentos de 1_Trademarks_registered $F(4, 71) = 2,2616 [0,0710]$
 Todos os desfasamentos de 1_Loans_amount_constant_price $F(4, 71) = 6676,8 [0,0000]$
 Todas as variáveis, desfasamento 4 $F(2, 71) = 1,2217 [0,3008]$

Para o sistema como um todo

Hipótese nula: o maior desfasamento é 3

Hipótese alternativa: o maior desfasamento é 4

Teste de razões de verosimilhanças: Qui-quadrado(4) = 6,48527 [0,1657]

Sistema VAR, grau de desfasamento 5

Estimativas Mínimos Quadrados (OLS), observações 1994:2-2013:4 (T = 79)

Log. da verosimilhança = 175,78269

Determinante da matriz de covariâncias = 4,0027298e-005

AIC = -3,8932

BIC = -3,2334

HQC = -3,6289

Teste de Portmanteau: LB(19) = 86,111, gl = 56 [0,0060]

Equação 1: 1_Trademarks_registered

| | <i>Coefficiente</i> | <i>Erro Padrão</i> | <i>rácio-t</i> | <i>valor p</i> | |
|-------------------------------------|---------------------|--------------------|----------------|----------------|---|
| const | -6,44095 | 3,23549 | -1,9907 | 0,05053 | * |
| 1_Trademarks_regi stered_1 | 0,090853 | 0,122464 | 0,7419 | 0,46072 | |
| 1_Trademarks_regi stered_2 | -0,0539788 | 0,12229 | -0,4414 | 0,66032 | |
| 1_Trademarks_regi stered_3 | 0,0998939 | 0,121763 | 0,8204 | 0,41486 | |
| 1_Trademarks_regi stered_4 | -0,202617 | 0,11978 | -1,6916 | 0,09530 | * |
| 1_Trademarks_regi stered_5 | 0,0741761 | 0,112145 | 0,6614 | 0,51057 | |
| 1_Loans_amount_c onstant_price_1 | 4,19027 | 3,78974 | 1,1057 | 0,27276 | |
| 1_Loans_amount_c onstant_price_2 | 0,0138428 | 5,19675 | 0,0027 | 0,99788 | |
| 1_Loans_amount_c onstant_price_3 | 1,56757 | 5,03692 | 0,3112 | 0,75659 | |
| 1_Loans_amount_c onstant_price_4 | 0,789207 | 5,0207 | 0,1572 | 0,87556 | |
| 1_Loans_amount_c onstant_price_5 | -5,77263 | 3,59132 | -1,6074 | 0,11260 | |

| | | | |
|-----------------------|----------|----------------------|----------|
| Média var. dependente | 3,249106 | D.P. var. dependente | 0,699201 |
| Soma resid. quadrados | 23,90852 | E.P. da regressão | 0,592955 |
| R-quadrado | 0,373020 | R-quadrado ajustado | 0,280817 |
| F(10, 68) | 4,045645 | valor P(F) | 0,000223 |
| rho | 0,003498 | Durbin-Watson | 1,983014 |

Testes-F com zero restrições:

Todos os desfasamentos de 1_Trademarks_registered $F(5, 68) = 0,82863 [0,5338]$
 Todos os desfasamentos de 1_Loans_amount_constant_price $F(5, 68) = 1,7062 [0,1450]$
 Todas as variáveis, desfasamento 5 $F(2, 68) = 1,8719 [0,1617]$

Equação 2: 1_Loans_amount_constant_price

| | <i>Coefficiente</i> | <i>Erro Padrão</i> | <i>rácio-t</i> | <i>valor p</i> | |
|-------------------------------|---------------------|--------------------|----------------|----------------|----|
| const | 0,175083 | 0,0688221 | 2,5440 | 0,01324 | ** |
| 1_Trademarks_regi stered_1 | 0,0024829 | 0,00260494 | 0,9532 | 0,34389 | |
| 1_Trademarks_regi stered_2 | 0,00290582 | 0,00260122 | 1,1171 | 0,26788 | |
| 1_Trademarks_regi stered_3 | 0,00111767 | 0,00259002 | 0,4315 | 0,66745 | |
| 1_Trademarks_regi stered_4 | -0,0043228 | 0,00254783 | -1,6967 | 0,09433 | * |
| 1_Trademarks_regi | 0,000686887 | 0,00238543 | 0,2880 | 0,77426 | |

| | | | | | |
|------------------|-------------|-----------|---------|----------|-----|
| stered_5 | | | | | |
| 1_Loans_amount_c | 1,06167 | 0,0806115 | 13,1702 | <0,00001 | *** |
| constant_price_1 | | | | | |
| 1_Loans_amount_c | -0,00516013 | 0,11054 | -0,0467 | 0,96290 | |
| constant_price_2 | | | | | |
| 1_Loans_amount_c | -0,111606 | 0,10714 | -1,0417 | 0,30125 | |
| constant_price_3 | | | | | |
| 1_Loans_amount_c | 0,716486 | 0,106795 | 6,7090 | <0,00001 | *** |
| constant_price_4 | | | | | |
| 1_Loans_amount_c | -0,676674 | 0,0763909 | -8,8580 | <0,00001 | *** |
| constant_price_5 | | | | | |

| | | | |
|-----------------------|----------|----------------------|----------|
| Média var. dependente | 11,89794 | D.P. var. dependente | 0,472322 |
| Soma resíd. quadrados | 0,010818 | E.P. da regressão | 0,012613 |
| R-quadrado | 0,999378 | R-quadrado ajustado | 0,999287 |
| F(10, 68) | 10931,55 | valor P(F) | 7,0e-105 |
| rho | 0,183137 | Durbin-Watson | 1,599444 |

Testes-F com zero restrições:

Todos os desfasamentos de 1_Trademarks_registered F(5, 68) = 1,1121 [0,3622]
 Todos os desfasamentos de 1_Loans_amount_constant_price F(5, 68) = 11610 [0,0000]
 Todas as variáveis, desfasamento 5 F(2, 68) = 42,303 [0,0000]

Para o sistema como um todo

Hipótese nula: o maior desfasamento é 4

Hipótese alternativa: o maior desfasamento é 5

Teste de razões de verosimilhanças: Qui-quadrado(4) = 64,3078 [0,0000]

Annex K

| Country Office | Applicant Name | Number of trademarks registered |
|----------------|---|---------------------------------|
| AD | BANIF - SGPS, S.A. | 2 |
| | Subtotal | 2 |
| AT | BANCO ESPIRITO SANTO, S.A. | 1 |
| | Subtotal | 1 |
| BX | CAIXA GERAL DE DEPOSITOS SA | 3 |
| | Subtotal | 3 |
| DE | Caixa Geral de Depositos, S.A. | 2 |
| | Subtotal | 2 |
| DK | BANCO ESPIRITO SANTO, S.A. | 2 |
| | Banco Santander De Negocios, S.A. | 1 |
| | Subtotal | 3 |
| EM | Banco ActivoBank (Portugal) S.A. | 1 |
| | BANCO BIC PORTUGUÊS, S.A. | 4 |
| | BANCO CAIXA GERAL, S.A. | 1 |
| | Banco Cif | 1 |
| | BANCO COMERCIAL PORTUGUES, SA | 26 |
| | BANCO DE INVESTIMENTO GLOBAL S.A. (BIG) | 2 |
| | BANCO ESPIRITO SANTO, S.A. | 2 |
| | BANCO FINANTIA, S.A. | 1 |
| | Banco Primus, S.A. | 1 |
| | BANIF Banco Internacional do Funchal S.A. | 1 |
| | BANIF-SGPS, S.A. | 1 |
| | BES | 43 |
| | BEST - BANCO ELECTRÓNICO DE SERVIÇO TOTAL, S.A. | 11 |
| | BEST-BANCO ELECTRÓNICO DE SERVIÇO TOTAL, S.A. | 3 |
| | BNI - Banco de Negócios Internacional (Europa), S.A. | 6 |
| | BPN-BANCO PORTUGUÊS DE NEGÓCIOS, S.A. | 1 |
| | CAIXA GERAL DE DEPOSITOS, S.A. | 71 |
| | FINIBANCO, SA | 2 |
| | Banco Efisa | 1 |
| | BANCO PRIVADO ATLÂNTICO | 4 |
| | Banco Popular | 1 |
| | LJ Carregosa - Sociedade Financeira de Corretagem, SA | 2 |
| | MARCAS GRUPO SANTANDER | 2 |
| | Subtotal | 188 |
| ES | Ángeles Moreno | 1 |
| | Antonio Botella | 12 |
| | BANCO BANIF, S.A. | 5 |
| | BANCO CAIXA GERAL, S.A. | 17 |
| | BANCO COMERCIAL PORTUGUES, S.A. | 1 |
| | BANCO ESPIRITO SANTO Investimento, S.A. | 3 |
| | BANCO ESPIRITO SANTO, S.A. | 3 |
| | BANCO FINANTIA SOFINLOC, S.A. | 1 |
| | BES | 4 |
| | BEST - BANCO ELECTRONICO DE SERVIÇO TOTAL, S.A. | 1 |
| | CAIXA GERAL DE DEPOSITOS, S.A. | 19 |
| | Subtotal | 67 |
| FR | BANCO COMERCIAL PORTUGUÊS, S.A. | 3 |
| | BANCO ESPIRITO SANTO, SA Société Anonyme | 1 |
| | BANCO NACIONAL DE CREDITO, S. A. | 1 |
| | Banco Português de Investimento, S.A., Société de droit portugais | 1 |
| | BANQUE BCP - S.A. Simplifiée à Directoire et Conseil de Surveillance, | 7 |
| | BANQUE ESPIRITO SANTO ET DE LA VENETIE SOCIETE ANONYME | 9 |
| | BEST-BANCO ELECTRONICO DE SERVICIO TOTAL, S.A., Société constituée selon les lois portugaises | 1 |
| | BPI, Société anonyme | 1 |
| | CAIXA GERAL DE DEPOSITOS - SUCCURSALE DE PARIS (siège) | 13 |

| | | |
|----|--|----|
| | Caixa Geral de Depositos, SA | 13 |
| | Subtotal | 50 |
| GB | BANCO COMERCIAL PORTUGUES, S.A. | 2 |
| | BANCO ESPIRITO SANTO, S.A. | 2 |
| | Banco Nacional Ultramarino, S.A. | 2 |
| | Banco Santander de Negocios S.A. | 1 |
| | Caixa Geral de Depositos, S.A. | 2 |
| | Subtotal | 9 |
| GR | BANCO COMERCIAL PORTUGUES, S.A. | 4 |
| | BANCO ESPIRITO SANTO E COMERCIAL DE LISBOA, S.A. | 2 |
| | BANCO NACIONAL ULTRAMARINO, SA. | 1 |
| | BANCO SANTANDER DE NEGOCIOS, S.A. | 1 |
| | CAIXA GERAL DE DEPOSITOS S.A. | 2 |
| | Subtotal | 10 |
| HR | BANCO COMERCIAL PORTUGUES S.A. | 1 |
| | Subtotal | 1 |
| HU | BANCO COMERCIAL PORTUGUES, S.A. | 2 |
| | Subtotal | 2 |
| IE | BANCO ESPIRITO SANTO DE INVESTIMENTO, S.A. A limited liability company organised and existing under the laws of Portugal | 2 |
| | BANCO ESPIRITO SANTO E COMERCIAL DE LISBOA, S.A. a body corporate organised and existing under the laws of Portugal | 1 |
| | BANCO ESPIRITO SANTO, S.A. a body corporate organised and existing under the laws of Portugal | 1 |
| | BANCO SANTANDER DE NEGOCIOS, S.A. a Sociedad Anonima organised and existing under the laws of Spain | 1 |
| | Subtotal | 5 |
| IT | BANCO COMERCIAL PORTUGUES, S.A. | 3 |
| | BANK ESPIRITO SANTO INTERNATIONAL L IMITED | 2 |
| | CAIXA GERAL DE DEPOSITOS S.A. | 2 |
| | Subtotal | 7 |
| MA | BANCO ESPIRITO SANTO, S.A. | 1 |
| | Subtotal | 1 |
| MT | BANCO BPI, S.A. | 6 |
| | BANIF - SGPS, S.A. | 4 |
| | Subtotal | 10 |
| MX | BANCO ESPIRITO SANTO DE INVESTIMENTO, S.A. | 3 |
| | BANCO ESPIRITO SANTO, S.A. | 10 |
| | Banif SGPS | 4 |
| | BANIF INVESTIMENTO MEXICO, S.A. DE C.V. | 1 |
| | Caixa Geral de Depositos, S.A. | 16 |
| | Subtotal | 34 |
| PL | BANK MILLENNIUM Spółka Akcyjna | 11 |
| | Caixa Geral de Depositos, S.A. | 1 |
| | Subtotal | 12 |
| RO | BANCO COMERCIAL PORTUGUES, S.A. | 5 |
| | Subtotal | 5 |
| TR | BANCO COMERCIAL PORTUGUES, S.A. | 16 |
| | BANQUE PRIVEE ESPIRITO SANTO SA | 1 |
| | Subtotal | 17 |
| US | BANCO COMERCIAL PORTUGUES, S.A. | 7 |
| | Banco Espirito Santo De Investimento, S.A. | 1 |
| | Banco Privado Atlântico, S.A. | 2 |
| | Banco Totta & Acores, S.A. | 1 |
| | CAIXA CENTRAL - CAIXA CENTRAL DE CRÉDITO AGRICOLA MÚTUO, CRL | 2 |
| | Caixa Geral de Depositos, S.A. | 2 |
| | FINIBANCO, S.A. | 1 |
| | Subtotal | 16 |
| WO | BANCO BIC PORTUGUÁS, S.A. | 1 |
| | BANCO BPI, S.A. | 4 |
| | BANCO BSN BANIF, S.A. | 2 |
| | BANCO COMERCIAL PORTUGUÁS, S.A. | 6 |
| | BANCO ESPIRITO SANTO DE INVESTIMENTO, S.A. | 3 |

| | |
|--|------------|
| BANCO ESPIRITO SANTO, S.A. | 8 |
| BANCO FINANTIA, S.A. | 1 |
| BANCO L. J. CARREGOSA, S.A. | 1 |
| BANIF - BANCO INTERNACIONAL | 1 |
| BANIF-SGPS, S.A. | 4 |
| Banque Privé Espírito Santo S.A. | 8 |
| BNP PARIBAS PERSONAL FINANCE | 7 |
| BPN - BANCO PORTUGUÊS DE NEGÂCIOS, S.A. | 3 |
| CAIXA GERAL DE DEPÓSITOS, S.A. | 54 |
| CREDIFIN - BANCO DE CRÉDITO AO CONSUMO, S.A. | 2 |
| Subtotal | 105 |