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CONCENTRATION AND RESULTS IN BANKING MARKETS:
"an analysis of the relationship between concentration and efficiency in the banking sector EU15"

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Introduction

The relation between the degree of concentration and the level of efficiency of banking institutions have proved somewhat controversial, and remains the subject of study and discussion in academic world. For the understanding of this issue becomes necessary an analysis of the banking sector consolidation in developed countries worldwide, and particularly in Europe.

The banking sector globally has shown a clear trend towards the phenomenon of consolidation, which is far from over (see Walkner and Raes 2005; Berger, 2004), and although there is some integration this was lower in the financial sector than in others business sectors.

It seems to be generally agreed that the deregulation of the banking sector coupled with the increase of technological innovations and the formation of economic and monetary union appear to have been key factors in the bank consolidation phenomenon worldwide and particularly in Europe (see Bikker and Haaf 2002; Stiroh and Poole 2000; Roberto Salgado 2011; among others).

While the European banking industry has been converging towards a further consolidation, particularly after the European monetary system location, there is no consensus as to the importance to be attached will depth of this phenomenon, on the one hand Cabral el al (2002) argue that this integration is a prerequisite for the adoption of the euro and the formation of SME, on the other hand authors like Walker and Raes (2005), Ferreira (2011) and others argue that process is still at the beginning, with slow growth and with some uncertainties in the short/medium term.

In the late nineties, more precisely between the years 1997 and 2000, there has been a significant amount of cross-borders mergers and acquisitions, derived from a deregulation and integration of the financial sector worldwide (Stiroh and Poole, 2000) even though most of the banks in the European Union have shown a tendency to strengthen its position in the domestic market (see Campa and Hernando, 2006; Cabral et al, 2002).

Salgado (2011) classifies the factors that led to the concentration in the banking sector in Europe in two categories; on the one hand, global factors such as the adoption of new technologies, intensifying completion through deregulation of the financial system are evident, on the other hand are referred to specific factors within the European Union, like the adoption of the single currency and the financial system.

The effects of cross-borders consolidation in national banking systems, Claessens et al. (2001) concluded that the entry of new banks could be positive for the consumer, increasing competitiveness in the market, forcing the national banks to become more efficient. However the most important fact is the number of banks entering in the market than its market share.

Subsequently it is examined by Beck et al. (2001) the relationship between the concentration and stability of the financial system and concluded empirically that the most concentrated banking markets are less vulnerable to systemic market risk.

The work on the them of light, Concentration and Banking Markets results within the discipline of "Trabajo Final de Master" in the master of Finance, is based on work carried out by Ferreira (2011; 2012), and Casu Girardone (2006), Guillen and Pinilla (2010) among others who have performed an analysis of the concentration and efficiency in the banking sector, and contributes to the literature by examining Pearson correlations of causality between the concentration and efficiency in the European banking market, highlighting the situation of the fifteen countries that being part of the European Union, EU15 (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and United Kingdom), the relatively long period between 1999 and 2013.

In the first section of the paper I present a brief analysis of the consolidation of the European banking sector. Later, in the second section is exposed a literature review, as well as the theoretical foundation of the topic. In the third section is revealed the methodology, the fourth section presents the results and finally in the fifth section I present the summary and conclusions.

Theoretical background and literature review

As we already said this subject brings some discussion among the experts of this topic, and for that here we will try to show some of that discussion and controversy among them as well as the consolidation of the bank sector.

Quiet life hypothesis

In the analysis of the relation between concentration and efficiency its important reference the work of Hicks (1935) in respect of the Theory of the Monopoly, expose in the Journal of Econometric Society, the principle of the discussion concerning the analysis of the relationship between structure and market performance.

For Hicks, " The normal case that a firm can influence to some extent the prices at which it sells, that it is confronted with a downward sloping demand curve for its products, though this demand curve may have a high elasticity", this leads to the disappearance of the difficulty of increasing returns, causing a detailed examination of the theory of Monopoly. In his work, Hicks, showed that that the tendencies, contrary to what would be normal, more supply leads to a decrease in prices, with only one firm can lead to the opposite, less supply with higher prices, generating a net loss of well-being.

The quite life hypothesis postulates that banks "enjoy" the advantages of market power in terms of foregone revenues or cost savings. I other words, this hypothesis shows that the higher the market power, the lower the effort of managers to maximize efficiency, and with this exists a negative correlation between market power and efficiency. There were many authors empirically testes this hypothesis (Berger and Hannan 1998). This hypothesis is defended by arguing that, if firms can charge prices higher comparatively to competitive levels, the managers do not have incentives to keep costs under control, enjoying a "quiet life". Second, the market power that firms have allows the managers to chase objectives than revenue/ profit maximization. Third, in a non-competitive environment, the managers seek to maintain the market power, which raises the costs and reduces cost efficiency, and no intention to pursue goals other than maximizing firm value.

Non-formal Structural hypotheses

Further studies on the subjected have lead to two different popular types of non-formal structural approaches, in which concentration ratios play a central role. It is important to note that most of the studies leave the conduit banks from outside the analysis, hence the analysis comes down to the structure and performance, S-P (see Bikker & Haaf 2000; among others).

The first approach is the Structure conduct Performance (SCP), developed by the Harvard economist Edward Mason in 1930s, and his student Joseph Bain in 1950, which described it in his book "industrial Organization". The Structure conduct Performance is used as an analytical framework, to make relations among market structure, market conduct and market performance. The SCP paradigm is considered a pillar of industrial organization theory, and it is a starting point when analyzing markets and industries. The paradigm says that the market concentration lowers the cost of collusion between firms resulting in higher than normal profits for all market participants. It assumes that a high level of concentration in the market is harmful in social terms favoring the reduction of competitiveness and consequently the efficiency, while the inverse relationship is not empirically proven.

Another structural approach is the Efficient Sstruture Hypothesis (ESX) proposed by Demsetz in 1973. This assumption lies in the fact within the scope of the Structure Conduct Performance, predicting a reverse causality between competition and cost efficiency. Under the X-efficiency hypothesis, the best-managed firms and/or technologies have the lower costs, with resultant higher profitability, and consequently the larger market shares leading to a higher level of concentration. More X- efficient banks acquire larger market shares, which resultant higher profitability. Here the relationship between concentration and efficiency is reversed in comparison to the Structure Conduct Performance paradigm. Banks with efficient scales can acquire larger market shares, which increases market concentration (see Bikker and Groeneld 1998)

Non-structural hypotheses

The non-structural theory based on the new theory of industrial organization, indicates that other factors other than market concentration and efficiency may affect the competitiveness of the market i.e barriers at the entrance to this non-structural approach have developed models to measure competitiveness the sector without using relevant information as to the market structure. Contributed to this literature, Iwata models (1974), Breshnan (1982; 1989) and still Panzar and Rosse (1987). These models generally use the Lerner index, which measures a firm's level of market power by relating price marginal cost, using price elasticity of demand in order to measure market power. One advantage of non-structural

models is that it is not necessary to specify any geographical area for the measurement of market power as it manifests itself in the behavior of companies.

Further reading

Berger and Hannah (1998) show that a higher local concentration leads to a lower efficiency and a net welfare loss of material due to fixed prices, thereby testing the Quiet life Hypothesis.

Bikker and Haaf (2002) analyze the market structure and competitiveness and their relationship in 27 countries in the 1990-1998 period being analyzed by the competitiveness of the non-structural model of Panzar-Rosse, based on a reduced-form equation relating gross revenue to a vector of input prices and other control variables. They conclude that competitiveness is higher in international markets and larger than in smaller local markets.

There were several academics who tested the hypothesis of SCP in the banking market by checking a negative causal relationship between concentration and efficiency, and although the methodology is not the same in different works, the results are in agreement with the theory of Structure Conduct Performance such as, for example, analysis of Granger causality, a panel of twenty-seven European Countries carried out by Ferreira (2012) or the banking market analysis Venezuelan by Pinilla and Guillen (2010).

Van Rooj and Punt (1999) in a study of eight European countries in the 1992-1997 period found that the X-efficiency is the main factor behind the concentration of the banking sector.

To demonstrate the controversy in the discussion of the relationship between structure and market performance is presented a smillar table to Van Rooij and Punt (1999), which depicts the three theories mentioned above and the results of the papers:

Study	SCP	QLH	ESX
Van Rooij and Punt (99)			+
Ferreira (2012)	+		
Berger e Hannan (98)		+	
Berger (95)			+
Guilen and Pinilla (2010)	+		

Legend: + indicates that the empirical evidence was found to support the hypothesis.

SCP- Structural Conduct Performance Hypothesis

QLH- Quiet Life Hypothesis

ESX- Efficient Structure Hypothesis

Through a detailed analysis of all the literature in this subjected it is possible to see that all theories and hypotheses have been empirically tested al least once, (see Van Rooij & Punt, 1999) hence it is impossible to take only one of them as the dominant explanation to the relationship between structure and the banking sector performance.

Methodology

The question in case, "there is correlation between concentration and efficiency", is a question that comes with discussion among the encomiasts, with some defending that the concentration leads to a bigger efficiency and others the opposite. Numerous empirical studies have been devoted to this topic (*e.g.* Berger *et al.,* 1993; Molyneux *et al.,* 1996). As J.A Bikker and J.M Groeneveld said in their paper in 1998, most studies reach the conclusion that the market conditions prevailing in banking sectors can best characterized as naturally oligopolistic. In this work I will try to analyze this statement due to the fact that since 1998 much thing happened, as was the case of the 2008 crisis that as changed the concentration of the banking sector.

In order to analyze the market structure, the concentration, of each country by it self, and in the whole of the 2 continents It will be used the C4 and the Herfindahl-Hirschamn Index (HHI).

C4

The concentration ratio of C4 is the percentage of market share, owned by the largest m firms in an industry, where m is a specific number of firms, in this work I will use m = 4. The concentration ratio can be expressed as:

$$CRm = S1 + S2 + S3 + \ldots + Sm$$

Where Si is the market share of the i firm.

The C4 is designed to measure industry concentration, and by inference the degree of market control. This concentration range from a low of 0 percentage to a high of 100 percent, analyzing the values we have:

- **Low Concentration:** A concentration ratio of 0 to 50 percent is commonly interpreted as an industry with low concentration. Monopolistic competition falls into the bottom of this, indicating extremely competitive markets, with oligopoly emerging near the upper end.

- **Medium Concentration:** A concentration ratio of 50 to 80 percent is considered an industry with medium concentration. These industries are very much oligopoly.

- **High Concentration:** An industry with a concentration ratio of 80 to 100 percent is viewed as highly concentrated. In that cases government regulators are usually most concerned with industries falling in this category.

While useful, the concentration ratio presents some problems. An incomplete picture of the concentration of firms in an industry by not using the market shares of all the firms in the industry, and does not provide information about the distribution of firm size, for example, when a significant change in the market shares among the firms included in the ratio, the value of the concentration ratio would not change.

HHI

The Herfindahl-Hirschamn Index (HHI), provides a more complete picture of industry concentration than does the concentration ratio. The HHI uses market shares of all the firms in the industry, and these market shares are squared in the calculation to place more weight on the larger firms. The HHI can be expressed as:

$$HHI = S_1{}^2 + S_2{}^2 + S_3{}^2 + … + S_n{}^2$$

Where S_i is the market share of the i firm.

Unlike the Concentration ratio, the HHI will change if there is a shift in market share among the larger firms and is used as a guideline for evaluating mergers.

The HHI is calculated by taking the sum of the squares of the market shares of every firm in the industry, ranging from a low of 0, indicating perfect competition, to a higher of 10,000, indicating compete monopoly. Greater values mean greater concentration, less competition, and more market control held by individual firms, analyzing the values we have:

- **Low Concentration:** A Herfindahl index of 0 to 1,000 is commonly interpreted as an industry with low concentration. Monopolistic competition falls into the bottom of this with oligopoly emerging near the upper end. Generally speaking, industries with concentration ratios between 0 percent and 50 percent have Herfindahl index values between 0 and 1,000.

- **Medium Concentration:** A Herfindahl index of 1,000 to 1,800 percent is considered an industry with medium concentration. These industries are very much oligopoly, representing the concentration ratio of 50 percent to an 80 percent.

- **High Concentration:** A Herfindahl index of 1,800 to a 10,000 percent is viewed as highly concentration, and so as the case of Concentration ratio, government regulators are usually most concerned with industries falling into this category. This level corresponds with concentration ratios between 80 percent and 100 percent.

The HHI, as the Concentration ratios, has its problems. One of the problems is to find meaning in the numbers. In this case is easier to understand the numbers of the Concentration ratios. Another problem of HHI is that it requires a substantial amount of information, more than for concentration ratio, where only needed the market shares of the top four firms in this case. The last problem is regarding to the choice of squaring market shares, no existing

particular reason, theoretical or otherwise, to square the market share, instead of cubed, or raised to the fourth power.

Analyzing the market performance, it will be used the Return on Average Shareholders' Equity (RoE), Profit before tax, Cost to Income ratio, Loan Loss Rate, and Dividend per Share.

Cost-to-income

The cost to income ratio, also known as the efficiency ratio or expense to income ratio, its probably the most important ratio to illustrate the efficiency, is a key financial measure, particularly important in valuing banks. It shows a company's costs in relation to its income. It's calculated by, non-interest costs, excluding bad and doubtful debt expense, divided by the total of net interest income and non-interest income. A reduction in costs, for a fixed level of revenue, should lead to increase profit, and for that will increase other ratios that we are analyzing in this work, such as the return of equity and share price. Changes in this ratio can highlight potential problems: an increase on this ratio from one year to the other, means that costs are rising at a higher rate than income, meaning that company can be trying to attract more business.

For this reasons this ratio will be the first one to be analyze.

ROAE

The Return on Average Shareholders' Equity (RoE), is a financial ratio that measures the return generated on stockholders'/shareholders' equity, the book or accounting value of stockholders'/shareholders' equity which reflects the accumulation over time of amounts received by the company from stock/share issues plus the profits/earnings retained by the company, i.e., not yet distributed in dividends (accounting value of shareholders' equity is also equal to a company's net assets, i.e., assets minus liabilities). One of the formulas can be:

Profit of the year (or net income after taxes)/stockholders' (or shareholders') equity

RoE is often said to be the ultimate ratio or "mother of ratios" that can be obtained from a company's financial statement.

The problems of using only this ratio are the fact that firms can resort to financial strategies to artificially maintain a healthy RoE, and hide deteriorating performance in business fundamentals. Another problem of RoE can be seen in merger transactions, something that we

have to take into account in this work because of the subjected. RoE measures come from the tendency of analysts to focus in performance in single years, years that may be idiosyncratic.

Loan Loss Ratio

The Loan Loss ratio (LLR) is a percentage that reflects accumulated provision expenses and gives an indication of the management's expectation of future loan losses. In other words, is an expense set aside as an allowance for bad loans, such as customer defaults, or terms of a loan have to be renegotiated. It is one of the more challenging ratios to forecast, and can be calculate by:

Write-offs – Value of Loans Recovered/ Average Gross Loan Portfolio

Dividend Per Share

Dividend Per Share (DPS) is the sum of declared dividends for every ordinary share issued. DPS is the total dividends paid out over an entire year divided by the number of outstanding ordinary shares issued; we can see this in the formula:

$$DPS = (D – SD) / S$$

Where **D** represents the sum of dividends over a period; **SD** the special, one-time dividends; and **S** the shares outstanding of the period.

Using DPS, is easy because of its simplicity, but can be a problem due to the fact that it is only applicable to companies that pay dividends, the simplifying assumptions about growth are usually unrealistic, and does not explicitly include risk. However, it will be used in the work to have one more indicator of Market Performance, and to see if DPS declined over the times of crisis.

Correlation

To establish the correlation between the market structure and the market performance it will be used a Person Correlation.

Person correlation, the full name Person Product Moment Correlation (PPMC), is a statistical formula that measures the strength between variables and relationships. In the

field of statistics this formula is often referred to as the Pearson R test. If the relationship between the variables is not linear, then the correlation coefficient does not adequately represent the strength of the relationship between the variables.

The coefficient value can range between -1 and 1. If the coefficient value is in the negative range, that means the relationship between the variables is negatively correlated, in other words, if one value increases, the other decreases. In the case of either values increase or decrease together, the relationship between the variables is positively correlated. Analyzing the values we have:

- **High Correlation:** 0,5 to 1 or -0,5 to -1

- **Medium correlation:** 0,3 to 0,5 or -0,3 to -0,5

- **Low correlation:** 0,1 to 0,3 or -0,1 to -0,3

There are some problems of using this method. The PPMC is not able to tell the differences between dependent and independent variables, and will not give any information about the slope of the line, it only tell whether there is a relationship.

Resuslts

Concentration

      Before starting analyzing the concentration its important to say that in the end of the nineties were seen a relevant mergers and cross-borders acquisitions derived from a deregulation and integration of the financial sector worldwide, and mainly after the crisis of 2007, has shown a clear trend towards the phenomenon of consolidation, which appear to be far from over, banks are growing and increasing its consolidation.

      This may happen because of the deregulation of the banking sector coupled with the increase of the technological innovations as well as the formation of the Economic and Monetary Union in Europe.

      All the analysis of the concentration is done by the total assets of the banks and when I refer the name of the country, I mean the banks of that country.

C4

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Austria	72,58	59,85	63,55	62,97	56,32	51,02	44,72	41,36	42,51
Belgium	74,08	74,01	78,73	74,11	75,50	89,17	69,56	69,07	69,36
Denmark	74,89	71,76	79,40	79,94	76,16	76,41	69,59	64,34	64,73
Finland	95,18	95,24	99,98	100	99,74	96,39	83,80	79,95	72,27
France	43,97	32,70	38,50	52,24	48,29	56,20	38,95	39,61	40,31
Germany	30,48	34,95	37,57	32,16	31,05	29,23	27,18	29,54	33,02
Greece	95,06	98,02	99,82	99,01	98,54	64,10	64,33	63,92	62,05
Ireland	51,04	49,14	53,66	39,67	47,92	66,39	56,76	47,69	46,61
Italy	52,95	58,26	55,18	75,99	82,07	83,19	44,17	40,26	44,90
Luxembourg	27,74	30,37	37,17	36,77	37,62	37,06	39,22	37,23	29,95
Netherlands	52,52	44,33	52,27	55,38	59,82	76,36	74,46	79,16	71,16
Portugal	72,73	82,88	94,91	98,56	98,19	87,37	57,37	55,66	56,39
Spain	85,99	87,97	86,92	90,00	93,63	65,81	53,89	49,71	49,71
Sweden	75,80	77,34	74,22	76,35	77,37	62,70	78,67	72,95	74,19
U. Kingdom	43,91	48,97	48,25	50,08	53,88	41,71	33,87	31,46	37,76

	2008	2009	2010	2011	2012	2013
Austria	41,75	40,82	39,46	40,07	41,53	43,85
Belgium	66,50	63,24	61,19	57,72	54,81	54,61
Denmark	62,41	60,29	60,15	59,79	59,46	60,68
Finland	73,27	72,08	78,07	81,47	82,77	83,80
France	37,40	42,35	41,13	39,22	38,40	38,97
Germany	33,52	38,17	39,48	39,97	39,68	43,22
Greece	63,24	64,08	68,05	80,62	79,91	82,13
Ireland	56,03	53,82	54,51	59,65	64,18	68,55
Italy	44,47	41,21	44,45	45,88	46,34	48,93
Luxembourg	32,87	35,73	38,96	40,08	63,23	68,63
Netherlands	68,22	61,24	63,89	64,16	64,28	67,31
Portugal	59,27	59,25	61,56	62,49	63,75	63,14
Spain	47,55	47,11	42,92	46,40	50,82	51,45
Sweden	73,81	76,63	71,51	72,43	70,29	69,29
U. Kingdom	39,87	33,91	33,21	33,06	32,65	31,74

Looking to the concentration C4 we can see some tendency among the countries. All the 15 countries, apart from France, Ireland, Germany, Luxembourg, Netherlands and more or less Sweden, reach their maximum concentration between 1990 and 2006, to have their minimum level of concentration after their maximum of concentration. The other 6 countries, France, Ireland, Germany, Luxembourg, Netherlands and Sweden, reach their maximum in the end of the reporting period. Analyzing country by country we can see this.

Austria reach is maximum of concentration in 1999 with the value of 72,58% starting declining is concentration until 2010 with a value of 39,46% to start increasing to small amounts of 43,85 in 2013.

Belgium between 1999 and 2003 are stable in 74% to 78% to reach in 2004 a value of concentration of 89,17% to start decreasing this value along the years progressively to is minimum in 2013 with a value of concentration of 54,61%.

Denmark is similar to Belgium, reaching is maximum value of concentration in 2002 with 79,94% to decrease progressively to a value of 59,46% as is minimum of concentration in 2012.

Finland (as others countries as Portugal, Spain and Greece) has his concentration a little different from the other countries. This countries because of the few banks analyzed in the end of the nineties had concentration levels very high in the first years of the study. Finland reach is maximum of concentration in 2002 with a value of 100%, when the previous three years was close to 100% as well, to starting decline this huge concentration level to is minimum in 2009 to 72,08%. After 2009 Finland started increasing is concentration again to the value of 83,80 in 2013.

France is one of the countries that have its concentration cycle different from the other countries. Its minimum comes before is maximum with a value of 32,70% in 2000 as is minimum, and 56,20% in 2004 as its maximum. In the rest of the period in analysis France stable is values approximately in 40%.

Germany, as well as France, have the same cycle with is minimum in 2005, 27,18%, but different to France with a progressive increasing along the years reaching is maximum in 2013 with a value of 43,22% in concentration.

Greece, from 1999 to 2003, had its values close to 100% with its maximum in 2001 with a value of 99,82% in concentration level. After 2003 Greece felt a huge fall in concentration level to values close to 64% reaching is minimum in 2007 with a value of 62,05% maintain close values to the year of 2010. In the years of 2011, 2012 and 2013 Greece increased its concentration level to the value of 82,13% in 2013.

Ireland, is one of the countries that reached is minimum first than is maximum. Its minimum value is observed in 2002 with a value of 39,67%, increasing the rest of the years study, with some ups and downs, reaching is maximum in the end of the studying period with a value of 68,55%.

Italy between 1999 and 2004 was always increasing its concentration level reaching is maximum in 2004 with a value of 83,19%, to had a huge drop in concentration level two years later in 2006 to a value of 40,26% being is minimum level of the all period. The rest of the years were stable between 41% and 48%.

Luxembourg can be seen as the opposite of countries as Finland, Portugal, Spain and Greece. Its minimum value is observed in 1999, 27,74% in concentration level, to start increased its concentration level progressively during the period in analysis, to reach is maximum in 2013 to value of 68,55%, more than double the concentration level during the period.

Netherlands, being one of the six, had is minimum in 2000 with a value of 44,33% beginning to increase its values reaching 79,16% in 2006 to start decreasing its values again but stabilizing approximately between 64% and 67%.

Portugal between 1999 and 2004 had its values from 72,73% and 98,56% in 2002, being the maximum level of concentration. After this period, Portugal had its values between 55,66%, as its minimum level of concentration, and 63,75% in 2012.

Spain similar to Portugal, had its values between 1999 and 2003, has the highest ones, being is maximum in 2003 with a value of 93,63%, having a huge drop in concentration levels, to the value of 42,92% in 2010. Spain in the rest of the years maintains a stable concentration level of approximately 50% in 2012 and 2013.

 Sweden is the last country that has the opposite concentration levels, having is minimum level of concentration in 2004 with a value of 62,70%, but reaching is maximum in 2005 with a value of 78,67%. Sweden is different from the other six countries because in this

case the concentration level during the period it is almost always the same, approximately 70%.

The Unit Kingdom in the first years was increasing is concentration level reaching is maximum in 2003 with a value of 53,88%. After that period Unit Kingdom had decreasing is concentration to values a little higher than 30% with is minimum of 31,46% in 2006 ending the period in analysis with a 31,74% of concentration level.

HHI

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Austria	1945,8	1391,3	1387,1	1300,8	1030,9	801,7	697,4	613,7	619,1
Belgium	3193,4	3238,3	4208,2	3462,6	3402,7	2689,2	1462,3	1447,7	1464,5
Denmark	1574,7	1493,4	2307,4	2236,8	1795,1	2235,6	1761,7	1575,0	1696
Finland	3316,6	2986	3542,7	5063,3	4934,7	2662,2	2545,4	2241,5	2039,0
France	643,4	432,7	564,9	867,6	887	1025,5	536,9	529,2	543,5
Germany	312,1	399,5	438,1	327,4	319,4	288,5	269,6	383,4	422,3
Greece	5387,2	7162,2	7874,3	7716,5	7744,5	1305,8	1286,1	1297,5	1236,6
Ireland	963,2	937,6	1223,5	802,9	1185,86	1426,1	955,4	738,7	691,9
Italy	932,7	1264,8	1321,3	2666,7	4851,7	2837,5	695	585,4	768,3
Luxembourg	355,4	394,5	550,7	567,6	580,6	560,5	556,8	513,1	381,6
Netherlands	1004,9	778,9	897,7	976,6	1281,5	2035,9	1553,3	1710,1	1420
Portugal	1487,6	2292,7	3121,7	3767,4	3837,4	3464,9	1112,5	1034	1059,3
Spain	3325,7	5955,76	5408,7	5625,3	6623,4	1655,6	1158,5	976,6	932,8
Sweden	2049,3	2185,4	2045,2	2127,3	2169,4	1189,1	1813,2	1536,9	1621,4
U. Kingdom	708,2	790,7	705,6	774,5	880,75	668,9	466,4	423,4	546,3

	2008	2009	2010	2011	2012	2013
Austria	571,7	539,5	554,0	571,8	600,3	646,4
Belgium	1370,0	1252,9	1196.0	1086,5	1009,2	987,7
Denmark	1598,6	1367,8	1387,3	1422,1	1440,4	1423,3
Finland	2315,5	2168,8	2820,1	3036,2	2776,1	3074,8
France	522,2	621,6	585,9	554,9	533,6	541
Germany	449,9	520,8	536,2	541	539,7	606,2
Greece	1244,2	1252,7	1404,3	2006,1	1965,3	1962,3
Ireland	1069,9	952,1	1034,8	1321,7	1411,3	1528
Italy	742,1	616,5	689,1	675,4	666,4	720,5
Luxembourg	423	467,5	511,7	529,2	2000,2	2301,2
Netherlands	1417,4	1205,3	1281,8	1257,5	1252,9	1353,8
Portugal	1142,5	1132,3	1144,1	1156,6	1196,6	1191,1
Spain	832	827,5	755,5	853,9	934,8	989,1
Sweden	1719	1664,1	1667,2	1783,9	1614,4	1551,6
U.Kingdom	583,7	491,2	480,9	475,6	467,1	459,2

The Herfindahl-Hirschamn index the other concentration ratio, is similar to the C4 but with some differences in respect of the years of maximum and minimum. Regarding to the "groups" of countries in the cycles, HHI as the same, with a little difference, as C4. All the countries has is maximum levels first than the minimum levels of concentration, apart from Germany, Ireland, Luxembourg and Netherlands, in this case France and Sweden do not enter in the this group having the "normal" cycle of concentration. The other countries with huge concentration, like Finland, Portugal and Spain here with the HHI register the same pattern as in C4. In a close look we have:

Austria, as in C4 as is maximum in 1999 with a value of 1954,8 having is minimum in 2009 with a value of 539,5. Austria, like some of the other countries, as some values different from the C4. For example in C4 the concentration level is bigger in 2000 with a value of 59,85% than in 2002 with the value of 62,97%, but in HHI the concentration in 2000 is 1391,3 and in 2002 is 1300,8, the opposite. This can happen due to the fact that the C4 concentration in 2002 was disperse by the 4 biggest companies but in the total sum was bigger than in 2000, where probably the whole concentration was in only one bank giving a bigger HHI concentration because of the squares.

Belgium during the first six years of the period, it is considered with a high concentration level reaching is maximum in 2001 with a value of 4208,2. After this year the concentration of Belgium start-declining reaching is minimum in 2013 with a value of 987,7, passing from high concentration to a low concentration in 2013.

Denmark had some years of high concentration and others of medium concentration, never reaching the low concentration. Its maximum is observed in 2001 with a value of 2307,4 (high concentration), and is minimum in 2009 with the value of 1367,8 (medium concentration).

Finland, as said and seen before have concentration level different from the other countries regarding to high values. Finland never leaves the high level of concentration during the full period, having is maximum in 2002 with 5063,3 and is minimum in 2007 with the value of 2039,0, ending the period under review with 3074,8.

France during the full period under analysis was always in low concentration except in one year, 2004, with 1025,5 being is maximum, and in 2008 with 522,2 being is minimum.

Germany, as in C4, have is cycle different from the other countries. Its minimum level was recorded in 1999 with a value of 312,1, having is maximum level in the last year, 2013, with a value of 606,2. Germany, as France, was always in the low concentration level during the period.

Greece is the country with the highest concentration level, with the value of 7874,3 in 2001. During the first five years of the period Greece record values of High concentration, starting after 2003 record values of medium concentration reaching is minimum level in 2007 with a value of 1236,6 ending the period under analysis with values of high concentration. If we compare Greece to Finland, we can see the same exact thing that happened to Austria. The

maximum level of C4 for Finland was 100% in 2002 and for Greece was 99,82% in 2001, but looking to the concentration levels in HHI we have 7874,3 to Greece in 2001 and 5063,3 in 2002 for Finland. This happened because of the value of the individual concentration in banks, being in Greece less scattered than in Finland among the "top" 4 banks.

Ireland, it as its minimum first of its maximum, with a value of 691,9 in 2007 and its maximum in the end of the period with a value of 1528. Ireland had is values in the first years in the low concentration level until its reach is minimum, to enter in the medium concentration level to the rest of the period.

Italy, during the 5 first years, recorded an progressive increase passing from the low concentration level to the high concentration level in 2 consecutive years, 2002 and 2003, reaching is maximum value of 4851,7 in 2003. After this period Italy start decreasing a lot is concentration levels reaching is minimum in 2009 with a value of 616,5, ending the period in analysis with levels of low concentration.

Luxembourg, don't differ much from the C4, having is minimum in 1999 with a value of 355,4. The following years was recorded as an increase, with some downs but ending the period with a value of 2301,2 in 2013. This maximum value is considered a high concentration level, passing from 529,2 in 2011 to 2031,2 in 2013.

Netherlands, as Luxembourg, and the others, as its cycle in reverse, having is minimum level of concentration in 2000 with a value of 778,9, passing to is maximum 4 years later with a value of 2035,9, being considered highly concentrated. After is maximum value Netherlands start decreasing is values of concentration but never reaching the low concentration level again, maintaining its levels as medium concentrated.

Portugal, apart from 1999 the first six years where recorded has highly concentrated levels with its maximum in 2004 with a value of 2035,9. After 2004 Portugal start declining is levels of concentration recorded its minimum in 2006 with a value of 1034. During the rest of the period Portugal maintain levels of medium concentration ending the period with 1191,1.

Spain, recorded values of concentration in the first five years has highly concentrated levels, highest than Portugal, with its maximum level of 6623,4 in 2003. In 2004 Spain pass from high concentration to middle concentration, but with a huge drop, having the next years values of low concentration levels reaching is minimum in 2010 with the value of 755,5.

Sweden, against of what happened in C4, has a "normal" cycle in HHI. Having high concentration levels in the first 5 years reaching is maximum in 2000 with a value of 2185,4. Its minimum level was registered in 2004 with a value of 1189,1, passing to medium concentration. This medium concentration continued in the rest of the years apart from 2005 with a value of high concentration level.

United Kingdom, is characterized by having all the years of the period in the low concentration levels, registered is maximum level in 2003 with a value of 880,75, passing to its minimum level 3 years later with a value of 423,4 in 2006, maintain approximately this value in the end of the period analyze.

Ratios

Before we analyze the ratios is important to know that I chose 25 of the biggest banks in each country and with that the values shown below are the average of each ratio, with the possibility of don't have the values of every 25 banks and for that I only used some of the total 25 banks. All the values in the tables are in absolute years.

Cost to income ratio

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Austria	58,75	59,09	61,83	63,08	61,75	60,65	59,38	56,46	60,32
Belgium	46,91	46,61	136,18	63,52	59,43	52	56,54	56,29	57,42
Denmark	47,33	44,53	29,24	32,61	21,93	43,32	43,40	43,52	42,55
Finland	61,90	49,73	90,17	56,41	58,81	66,56	55,62	77.03	52,60
France	64,98	42,75	74,95	69,26	63,78	71,24	64,06	60,76	72,89
Germany	62,38	62,65	61,45	65,05	79,04	70,77	57,67	55,11	61,30
Greece	36,02	87,03	157,8	104,74	102,87	71,19	59	58,94	60,75
Ireland	18,58	11,58	19,40	12,26	72,51	42,47	35,51	39,07	31,60
Italy	61,63	62,66	61,29	n.a	156,36	89,55	54,96	51,27	52,48
Luxembourg	51,82	53,92	55,05	44,23	50,02	54,42	54,87	49,46	50,15
Netherlands	22,24	9,77	37,28	93,90	30,85	49,60	49,52	45,98	58,15
Portugal	72,92	79,77	78,78	60,65	60,37	67,03	63,13	60,87	59,49
Spain	36,64	6,81	10,80	24,60	47,40	52,16	46,77	44,98	46,83
Sweden	45,34	37,17	36,51	52,26	45,83	49,25	40,09	43,42	49,34
U. Kingdom	73,18	81,61	109,00	96,08	35,56	66,11	63,40	61,88	56,15

	2008	2009	2010	2011	2012	2013
Austria	75,23	57,71	53,49	75,55	59,16	70,12
Belgium	68,91	59,68	60,56	64,43	68,91	58,52
Denmark	51,36	43,97	46,44	51,39	42,90	45,18
Finland	57,49	55,24	48,68	60,47	60,59	55,93
France	101,46	69,14	73,61	66,80	64,10	65,18
Germany	97,57	63,36	78,30	67,23	64,31	61,12
Greece	72,84	67,70	118,33	86,29	103,24	88,40
Ireland	37,82	34,77	60,71	53,18	113,31	65,65
Italy	54,79	52,08	53,68	62,37	52,80	67,23
Luxembourg	51,25	49,70	55,17	50,04	59,94	54,53
Netherlands	55,61	67,11	52,70	57,84	54,22	69,39
Portugal	94,19	73,95	74,91	78,40	76,86	79,11
Spain	45,70	45,11	52,78	63,24	81,11	58,05
Sweden	67,29	54,62	48,85	44,60	51,70	44,97
U.Kingdom	69,11	68,01	68,12	86,02	83,74	81,47

The lower the value of the cost-to-income the better, because with for example a Ratio equals to 50% that means that it costs to the Banks X 0,5€ to generate 1€. A group of six countries among them, Belgium, France, Greece, Ireland, Italy, and Unit Kingdom, have shown a cost-to-income ratio bigger than 100%. Saying this the analysis of each individual country is shown below.

Austria, as is values between 50% and approximately 75% showing a good level of the ratio, with the smallest value being 53,49% in 2010 and the biggest one in 2011 with the value of 75,55%. The tendency of Austria was to increase is ratio to values of 70%.

Belgium, start the period in study with low values of almost 50% with the lower value of 46,61% in 2000, reaching is biggest value in 2001 with 136,18%, being part of the group of countries with values bigger than 100%. After this huge value Belgium stabilized between 60% and 70%.

Denmark, is one of the countries that maintain almost the same values along the period in study, with values below 50% in the first years, reaching is smallest value in 2003 with 21,93%, to stabilized its values between 40% and 50% being the biggest value in 2011 with 51,39%.

Finland, despite having a big value in 2001 with 90,17%, and the smallest value 42,75% in 2000, had all the values between 50% and 60%, with some ups in some years.

France, is one of the countries that had a value bigger than 100%, being that value the biggest value of the period, 101,46% in 1999. For the rest of the period, France was stable between 60% and 70%, reaching the smallest value in 2000 42,75%, the only year in the period that wasn't in the range, apart from the biggest value.

Germany, as France, it had values close to each other. Is minimum value comes in 2006 with 55,11% and the biggest one in 2008 with 97,57%. In the rest of the period Germany had values between 60% and 70%.

Greece was completely different from the other countries due to the fact that is values don't have a "tendency". Greece is the country that had more values bigger than 100%, five values, but having the smallest value in 1999 with 36,02%. In the rest of the years Greece had values between 50% and almost 90%.

Ireland, had one year with a value bigger than 100% in 2012 with 103,24%, but this value does not track the past values. In the first years of the period in study the values were very low, reaching is minimum in 2000 with the value of 11,58% but after 2002 the values were floating between 30% and 70%.

Italy, in 2002 don't have data, and in the rest of the period had 2 high values, in 2003 with 156,36%, the highest value of all countries, and in 2004 with 89,55%. Without this values, Italy maintain is values very close to each other, between 50% and 60%, registered the smallest value in 2009, 52,08%.

Luxembourg is probably the country that maintains the closest values along the period in study. The smallest value is registered in 2002 with a value of 44,23%, and the biggest value in 2012 with 59,94%.

Netherlands, we can say that had the values close to each other if we look first for the 5 first years, and after for the rest of the years, 10 years. In the first 5 years Netherlands had is minimum value in 2000 with the value of 9,77%, but at the same time had is biggest value in 2002 with a value of 93,90%. Apart from the year of 2002 Netherlands had values between 10% and 30%. In the rest of the years, Netherlands, had values between 45% and 70% swaying a bit from year to year.

Portugal, apart from the other countries wasn't the country with the smallest ratio, but it wasn't the country with the biggest one as well, however is one of the countries with the highest values during the period. The smallest value for Portugal was 60,37% in 2003 and the biggest one in 2008 with 94,14%. In the rest of the years Portugal registered values between 60% and 80%.

Spain, had is values almost the same during the period in study, with the exception of having the lowest value of all countries, 6,81% in 2000. Spain biggest value comes in 2012 with a value of 81,11%. During the period Spain registered some low values in the first 4 years, to after that years increased its values to stabilized between 40% and 60%.

Sweden had some consistency in its values, despite the gap between them. The Smallest value of Sweden was in 2000 with the value of 37,17% and the biggest one in 2008 with the value of 67,29%, the rest of the values were between this two values.

Unit Kingdom was a bit scattered in their values. The biggest value was bigger than 100% in 2001 with the value of 109,00%, and the smallest one in 2003 with the value of 35,56%. The rest of the period Unit Kingdom had values between 50% and 90%, but with the extremes of this range only occur once.

In a quick look we can see that in this ratio the minimum levels in each countries come first and the maximum values coming after, the exact opposite happening in the concentration, but when we analyze the correlation between them we will see if there is correlation or not.

Loan loss

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Austria	3,26	3,20	3,45	3,54	3,53	3,05	2,67	2,59	2,46
Belgium	n.a	0,23	0,23	0,23	0,73	0,8	1,14	0,84	0,76
Denmark	1,28	1,27	1,59	2,32	4,68	2,72	1,71	1.05	0,68
Finland	0,22	0,39	n.a	n.a	n.a	0,1	0,25	0,89	0,93
France	0,19	0,62	0,36	0,42	0,75	3,38	2,25	2,0	1,78
Germany	2,02	2,08	2,42	3,13	2,65	2,12	1,73	1,40	1,73
Greece	6,68	8,09	7,20	6,29	1,60	4,38	3,74	3,76	3,03
Ireland	n.a	n.a	n.a	n.a	n.a	0,72	0,35	0,37	0,36
Italy	3,17	3,55	n.a	n.a	n.a	n.a	4,58	3,33	2,76
Luxembourg	1,82	1,07	n.a	n.a	n.a	2,28	2,04	1,20	0,75
Netherlands	n.a	n.a	n.a	n.a	n.a	0,62	0,59	0,42	0,48
Portugal	3,15	1,99	1,85	2,39	2,45	2,59	1,96	2,08	1,74
Spain	1,43	n.a	n.a	n.a	n.a	2,01	1,98	1,84	1,84
Sweden	0,25	0,23	0,21	0,16	0,21	0,26	0,38	0,22	0,20
U. Kingdom	n.a	n.a	n.a	n.a	n.a	1,26	0,97	0,95	1,03

	2008	2009	2010	2011	2012	2013
Austria	2,56	4,01	4,47	4,60	5,25	5,66
Belgium	0,95	1,38	1,57	1,88	1,79	1,97
Denmark	1,18	2,89	2,43	3,05	3,47	3,85
Finland	1,11	1,66	1,51	1,09	1,00	1,17
France	2,06	2,79	2,83	2,93	2,87	3,00
Germany	1,71	2,10	1,96	1,86	1,72	1,68
Greece	2,96	4,25	6,39	11,12	14,76	14,53
Ireland	1,11	2,92	5,93	7,01	6,15	7,96
Italy	2,61	3,15	3,42	4,04	4,99	6,07
Luxembourg	1,15	1,58	1,52	1,74	1,39	1,51
Netherlands	1,17	1,62	1,68	1,60	1,87	2,11
Portugal	3,53	4,18	3,15	4,05	5,15	6,25
Spain	2,42	2,87	3,42	4,13	6,10	7,16
Sweden	0,18	0,40	0,36	0,28	1,26	1,19
U.Kingdom	1,62	2,55	3,03	3,16	2,95	2,99

This ratio is part of Asset Quality ratios of the banks and determines the quality of loans of a bank, the higher the ratio, the more problematic the loans are and vice versa, and is expressed in %. It was the ratio that was more complicated to get data and some of the years in some countries doesn't have any data. The biggest value observed in the table was 14,76 but we will use the 8% as our "top", so we will use this value as the maximum value possible for we could compare the different countries. With this we can analyzed the countries in our period of study.

Austria, take into account the maximum value of all the countries, is a country that had is values between the middle reaching is minimum level in 2008 with 2,56% and the maximum

in 2013 with a value of 5,66% more than the double comparing the minimum value and the maximum.

Belgium was one of the countries with the smallest values in this ratio, having no value in 1999 and reaching is minimum level in 2000 and 2001 with the value of 0,23%. Belgium had is maximum level of loan loss in 2011 with a value of 1,88%.

Denmark, apart from 2003 when registered is maximum level of the ratio with a value of 4,68%, the first 10 years had normal values with a minimum value of 0,68% in 2004. The rest of the years are characterized by an increased in the values stabilized between 3% and almost 4%.

Finland in the first 9 years, 1999 to 2007, registered one of the lowest values on loan loss rate, with 3 of the years without data to be analyzed, 2001 to 2003. The rest of the years 2008 to 2013 were characterized with bigger values, but still with lower values, reaching is maximum value in 2009 with the value of 1,66%.

France had is first 5 years bellow one percent, having is minimum value in 1999, 0,19%. In 2004 France reach is maximum level of 3,38% to decline a little in the next 3 years to start increasing the values again between 2% and 3 % in 2013.

Germany is one of the countries that had is cycle different from the other countries, having moderate values when compared to other countries, but big values when compared by itself, reaching is maximum value in 2002, 3,13%. In 2003 the values start declining progressively to reach is minimum level in 2013 with the value of 1,61%.

Greece is the country with the highest values in this ratio during the period. Apart from the minimum level recorded in 2003, 1,6%, the values were really high in the rest of the years. Middle values of 3% were the lowest values in Greece ending the period in study with 3 values higher than 10% with a maximum value of 14,76% almost 15% in 2012. As Greece was the only country reaching such a huge value we didn't considered this value as the maximum value for we could compare better the other countries.

Ireland for the first 5 years doesn't have any data to be analyzed. After the first fie years, Ireland had some low levels of loan loss in the next 5 years, 2004 to 2008, having is minimum in 2005 with a value of 0,35%. After 2008 Ireland started to increase is values reaching is maximum value in the end of the period in study with a value of 7,96%, the maximum value when compared with the other countries.

Italy with a gap of data between 2001 and 2004 is characterized by having middle values from 2,61% being the minimum value recorded in 2008 and 2012 with the value of almost 5%. The year of 2013 was characterized by the maximum value of this ratio with a value of 6,07%, a high value when having 8% as the highest value.

Luxembourg during the all period in study didn't change much having is minimum value in 2007, 0,75%, and is maximum value in 2004, 2,28%. This value of 2,28% didn't corresponded to the other values that were close to 1,5%. The years of 2001 to 2003 don't have any data to be analyzed.

Netherlands the first 5 years don't have any data to be analyzed. After that Netherlands was characterized by having very low values in the rest of the years, with special attention from 2004 to 2007 with values bellow 1% being is minimum value in 2006 with 0,42%. In the other years Netherlands start increasing is values reaching is maximum value in 2013 with 2,11%, even with this value less than the middle value comparing with the other countries.

Portugal had one of the biggest minimum levels recorded, with a value of 1,74% in 2007, and a maximum value of 6,25% in 2013. In the rest of the years Portugal recorded middle values apart from 2010 when the value of the ratio start increasing to the maximum value in 2013.

Spain had is minimum value in 1999 with a value of 1,43%. The next four years Spain didn't have any data to be analyzed. Between 2004 and 2009 Spain had values bellow 3%, to start increasing the values in 2010 reaching the maximum value in 2013 with 7,16%, almost the maximum value possible to reach.

Sweden is the country with the smallest values in all the period in study, having values bellow 1% until 2012, with a minimum value of 0,16% in 2002. In 2012 Sweden reach is maximum value with 1,26% declining a little in 2013 to the value of 1,19%.

United Kingdom didn't have any data in the first 5 years, having is values from 2004 to 2007 close to 1% reaching is minimum value in 2006 with 0,95%. In 2008 the values of loan loss started to increase from 1,62% to values close to 3% having the maximum value of 3,16% in 2011.

Analyzing the values, we can conclude that the higher values of each country appear normally between 2009 and 2013, the end of the period study, with more than the half of the countries having there maximum values in the last year of the period in study.

ROAE

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Austria	3,11	13,19	11,93	10,50	8,99	11,30	12,57	25,76	9,64
Belgium	17,07	8,5	-10,71	-1,95	10,81	12,68	14,31	15,46	12,54
Denmark	6,76	8,46	6,94	8,08	7,40	10,45	13.02	12,81	11,10
Finland	7,10	17,41	10,29	12,42	11,93	15,33	11,14	10,06	14,89
France	23,46	24,85	15,04	8,12	7,82	10,10	13,15	18,37	11,72
Germany	9,26	17,07	14,96	3,79	-8,96	3,05	12,56	14,27	8,32
Greece	33,11	13,27	-2,23	-0,08	1,76	2,75	12,39	9,06	12,66
Ireland	14,78	17,31	14,25	33,71	8,80	12,31	14,22	13,58	13,54
Italy	6,40	6,18	2,79	0,35	0,30	0,15	12,90	11,98	9,28
Luxembourg	13,79	15,79	12,47	18,86	12,59	12,24	14,72	23,06	16,64
Netherlands	1,26	1,77	1,27	0,12	0,29	0.53	0,62	0,60	0,94
Portugal	7,59	7,74	7,80	12,07	14,01	12,35	13,37	15,78	14,51
Spain	45,79	117,15	90,78	62,77	93,79	14,34	23,89	21,16	17,99
Sweden	12,12	16,14	22,69	14,60	18,96	14,65	15,15	12,30	5,21
U. Kingdom	9,12	19,09	-4,08	2,17	3,09	12,15	13,33	14,05	9,56

	2008	2009	2010	2011	2012	2013
Austria	1,81	-2,3	6,92	-2,49	10,78	-0,76
Belgium	-8,80	7,46	8,12	-8,24	-3,48	5,17
Denmark	1,43	-1,60	4,3	2,96	4,88	4,45
Finland	4,99	9,25	9,04	6,70	7,76	8,20
France	-9,14	-2,89	2,04	-19,31	-4,10	2,74
Germany	-17,90	-6,17	0,84	0,31	13,55	14,35
Greece	-0,01	-6,61	-23,26	-187,1	-27,85	16,15
Ireland	3,4	-28,13	-73,91	-11,69	-12,23	-12,58
Italy	6,84	6,10	10,12	-1,65	6,17	-0,64
Luxembourg	12,48	12,98	3,29	-12,00	6,43	4,50
Netherlands	1,31	0,65	0,75	0,67	0,45	0,10
Portugal	14,41	8,41	6,56	-2,20	-4,47	-9,89
Spain	13,91	11,05	8,18	-16,43	-140,8	10,67
Sweden	5,05	6,01	6,82	13,06	17,69	28,25
U.Kingdom	-7,67	1,29	1,96	-0,74	0,43	0,00

ROAE refers to the performance of the banks over a financial year. This ratio measures the profitability of a company in relation to the average shareholders' equity. In this ratio we can have negative values when the banks have negative profitability generated a negative equity value to the shareholders' and are expressed in percentage. Analyzing the countries we subdivided the period in study in two period, the first one being the first 9 years, and the second period the rest of the years.

Austria during the first 9 years of the period in study had good values of the ratio, having a small 3,11% in 1999 but in the rest of the years having values higher than 10%, or almost 10% in case of 2003 and 2007, reaching is maximum value in 2006 with 25,76%. In the end of 2008 Austria had decreases a lot in the value of this ratio to the value of 1,81%. The next years were characterized by negative values, apart from 2006 with a high value of 6,92%

and 2012 with 10,78%. The minimum value was between these two years with the value of -2,49%.

Belgium was one of the 4 countries that had negative values in the first 9 years, having in 2001 the lower value of -10,71%, in 2002 had a negative value but only of -1,95%. The rest of the first 9 years were characterized by positive values and high values having is maximum in 1999 with 17,07%. From 2008 to 2013 Belgium had 3 negative years and 3 positive years, almost compensated each other with the results.

Denmark in the first 9 years had good results overcoming the 10% in the 2004, 2005 2006 and 2007, reaching is maximum value in 2005 with 13,02%. After 2007 Denmark decreased a lot the results of this ratio, passing to almost 1,5% in 2008 reaching is minimum value in 2009 whit a negative value of -1,6%. In 2010 Denmark started to increase to higher values but never reached the same values as before, with a 4,45% in 2013.

Finland is one of the 3 countries that didn't have any negative value during the period in study. The first 9 years were characterized by high values on ROAE having is maximum value in 2000 with 17,41% but never had less than 10% apart from 1999 with 7,10%. The last 6 years of the period were characterized by a decrease in the values but still with good values higher than 5% apart from 2008 recorded the lowest value with 4,99%.

France in the first 9 years had high values having 2 years higher than 20% reaching is maximum in 2000 with 24,85%. The second part of the period in study, from 2008 to 2013 was characterized by 4 negative values and the other 2 years approximately 2%. In the negative values France reach the value of -19,31% in 2011 a high value compared to the other years of France.

Germany is one of the 4 countries that had a negative value in the first 9 years, with a value of -8,96% in 2003 not being the minimum value during the period. The rest of the 9 years were characterized by 4 years higher than 10% with the maximum value of the period in 2000 with 17,07%. The second part of the period, from 2008 to 2013 Germany recorded 2 more negative years having is minimum value in 2008 with -17,90%, but a good recover in the last 2 years of the period recorded values higher than 10%.

Greece is one of the 4 countries that had negative values in the first 9 years, in this case 2 negative years in 2001 with -2,23% and 2002 with -0.08%. The rest of the period was characterized by one very good value in 1999 being the maximum of the period with 33,11% and other lower years comparing to the other countries. The second period, from 2008 to 2013, Greece recorded 5 negative years being the highest one the value of -27,85% in 2012. In 2013 Greece recorded a high value of 16,15%.

Ireland in the first 9 years had high values on ROAE always higher than 10%, apart from 2003 with 8,80%, and having is maximum value in 2002 with 33,71%. In the second period the values drop to 3,4% in 2008 to start being negative for the rest of the period reaching the minimum value in 2010 with -73,91%.

Italy was the country with a different cycle in the values. The first period, the first 9 years were characterized by values lower than 10% having almost 0% from 2002 to 2004, to

reach is maximum value in 2005 with 12,90%. The second period Italy had 2 negative years with is minimum value of -1,65% having in the rest of the years the same values as the other period a little higher than 5%.

Luxembourg is one of the countries with the highest values, having in the first 9 years values higher than 10% reaching is maximum level in 2006 with 23,06%. In the second period Luxembourg had a high negative value of -12% in 2011 but having in the sum of the years the higher value comparing to the other countries.

Netherlands is one of the 3 countries that didn't have a negative value during the period in study. The values in both periods were very low being the maximum value 1,77% in 2000 and the minimum value in 2013 with 0,10%. The rest of the values are between these two extremes.

Portugal, apart from the 3 first years of the period in study, which had value lower than 10%, had values higher than 10% from 2002 to 2008 reaching is maximum value in 2007 with 14,51%. After 2008 Portugal had 2 more positive years, but with values less than 10%, ending the second period, from 2011 to 2013, with negative values with a minimum value of -9,89% in 2013.

Spain in the sum of all the years is the county with the highest value in the ratio, having the maximum value recorded in 2000 with 117,15 and the lowest value recorded in 2012 with -140,8%. This two values comparing to the other countries are highest ones. Apart from these two values, Spain had in the first period very high values and in the second period values as high as the other countries in the first period.

Sweden is the last country that didn't have any negative value during the period in study, having values higher than 10% from 1999 to 2006, having a small decrease from 2007 to 2010 with values lower than 10%. After these years Sweden back to the first values higher than 10% reaching is maximum in 2013 with 28,25.

United kingdom recorded the maximum value in 2000 with 19,09% having the following year a negative value of -4,08%. The rest of the first period was characterized with 3 more strong years, 2004, 2005 and 2006 with values higher than 10%. In the second period United Kingdom had 2 negative values, with is minimum value in 2008 with -7,67%. The rest of the second period was characterized by low values, less than 2% having in 2013 the value of 0%.

Dividend

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Austria	46,67	35,24	37,17	34,23	33,04	32,14	33,13	31,77	30,19
Belgium	53	31	68,88	60,11	55,05	43,23	43,96	54,55	30,18
Denmark	66,59	10,72	34,09	54,50	85,93	61,33	42,85	50,39	40,11
Finland	46,21	56,37	38,98	50,00	50,00	31,67	43,97	96,36	36,08
France	25,99	99,30	83,75	n.a	n.a	32,63	31,13	45,16	52,96
Germany	46,44	25,48	136	12,66	28,02	15,70	33,35	30,23	23,90
Greece	100	99,82	100	92,07	100	58,99	40,36	34,23	50,30
Ireland	86,05	86,71	94,25	99,41	466,23	97,59	43,39	57,57	77,53
Italy	n.a	n.a	n.a	n.a	n.a	n.a	53,16	49,76	40,79
Luxembourg	104,90	99,25	80,81	81,43	111,30	107,95	60,24	84,48	90,70
Netherlands	60,29	71,71	80,82	58,41	n.a	49,72	82,51	54,07	36,71
Portugal	21,56	25,00	25,00	51,05	51,07	46,76	36,45	36,54	41,92
Spain	46,45	n.a	n.a	n.a	n.a	32,25	33,03	27,53	30,60
Sweden	58,98	69,86	59,49	n.a	n.a	n.a	36,84	-115,1	43,35
U. Kingdom	50,53	36,95	52,46	39,99	43,04	55,39	54,07	46,09	47,96

	2008	2009	2010	2011	2012	2013
Austria	42	34,69	13,9	36,55	52,09	44,67
Belgium	10,51	15,80	37,92	49,96	55,88	51,77
Denmark	139,65	26,44	37,09	29,04	44,41	40,67
Finland	142,16	4,76	-11,96	47,57	51,16	65,96
France	39,46	-3,54	33,50	121,25	3,38	18,65
Germany	72,83	22,63	18,53	27,00	75,57	52,09
Greece	11,36	4,51	81,26	-0,60	0,65	0,17
Ireland	98,93	5,14	24,54	32,84	67,05	73,20
Italy	37,14	31,35	26,76	8,03	1,82	76,69
Luxembourg	70,25	122,35	97,42	41,29	41,90	37,71
Netherlands	76,17	19,68	45,43	17,32	32,62	36,34
Portugal	46,79	31,19	31,29	179,99	0,00	0,00
Spain	43,49	41,58	39,93	28,33	25,75	15,65
Sweden	36,44	85,78	57,23	41,09	73,26	58,37
U.Kingdom	65,26	47,44	32,37	32,37	24,40	56,82

As explained above on the methodology, in the Dividend Pay-Out banks pay dividends from their earnings or profits as a percentage. This ratio can me negative due to the fact that banks generates negative earnings, or a net loss, and still pays a dividend, it has a negative payout ratio. It means the bank had to use existing cash or raise additional money to pay the dividend. When it is said that "half payout" mean it is paid less than 50%. Looking to each country individually see some different things.

Austria during the period in study paid a percentage of the profits less than 50%, around 30% and less than 50%, expect in 2012 paying 52,09% being the maximum value paid by Austria. In 2010 Austria paid a very low percentage of the profits with a value of 13,9%.

Belgium along the period in study had some years paying more than half of profits reaching in 2001 the value of 68,88% the maximum value in the period in study. As its minimum value Belgium had two years paying, comparing to the other years, a low payout with the minimum value of 10,51% in 2008.

Denmark is one of the few countries that had is minimum value of payout during the 9 first years, having a payout of 10,72% in 2000. The rest of the years in that period of time had good payout having values higher than the half. The maximum value paid by Denmark comes in 2008 with the value of 142,16% meaning that apart from the profits of the year paid more, in that case 42,16%, using existing cash.

Finland, it is one of the four countries that had a negative value. During the first 9 years Finland had a normal payout plan except in 2006 when paid 96,36%. The last 6 years where characterized by having the maximum and the minimum value. In both cases they had to use existing cash or raise additional money to pay the dividend, with a maximum value of 142,16% in 2008 and a minimum value in 2010 with -11,96%.

France had two years without data, the years of 2002 and 2003, and like Finland, France belong to one of the four countries that had a negative value during the period. The first nine years had normal payouts except in 2000 with a high value of 99,30%. During the last 6 years of the period in study, France had to use existing cash or raise additional money to pay the dividend, in its maximum and minimum value. The minimum value was in 2009 with -3,54%, and the maximum value was in 2011 with 121,25%.

Germany is one of the countries that had is minimum value during the first 9 years, having 12,66% has minimum value in 2002. Its maximum value is also in the first nine years with a value of 136% in 2001, meaning that they had to use existing cash or raise additional money to pay the dividend. The last 6 years of the period were characterized by being either well bellow or well above of the half payout.

Greece is one of the 4 countries that had a negative value during the period. In the first 9 years Greece was one of the countries who payout more reaching its maximum value 3 times in this period, 100%, in the years of 1999, 2001 and 2003. The last 6 years of the period in study Greece had a negative value of -0,60% in 2011, and despite the low values during this period, Greece had a value of 81,26% in 2010.

Ireland was by far the country with the higher payout ratio during the period in study. During the first 9 years Ireland had values much more higher than the half reaching the maximum value in 2003, whit an absurd value of 466,23%, using a high level of existing cash or raise additional money to pay the dividend. The minimum value was very low comparing to the other years of Ireland with a value of 5,14% in 2009.

Italy from 1999 to 2004 didn't have any data to be analyzed and for that I only start my analysis from the year of 2005. The first 6 years, from 2005 to 2010, Italy had a normal payout, to drop to values of less than 10% in 2011 and 2012, having is minimum value in 2012 with 1,82%. In 2013 Italy had its maximum value of 76,69%.

Luxembourg is the country who had the highest payout during the entire period in study. In the first 9 years Luxembourg paid always more than the half having 3 years with values higher than the 100%, meaning that had to use existing cash or raise additional money to pay the dividend. In the last 6 years Luxembourg had its maximum value in 2009 with 122,35% and its minimum value in 2013 with 37,71%, a high value for a minimum value.

Netherlands didn't have one year of data, 2003, but along the period in study had very different values. Netherlands such had high values, with maximum value of 80,82% in 2001, as low values with a minimum value of 17,32% in 2011.

Portugal is one of the countries that had a lower payment throughout the period compared with other countries. In the first 9 years, only had surpassed "the half" one year with the value of 51,07%, almost the half, having in the rest of the years, values between 20% and 40%. In the last 6 years of the period in study Portugal reached its maximum and minimum values in 2011 with 179,99% and 0% in 2012 and 2013.

Spain didn't have data from 2000 and 2003, but had its maximum value in 1999 with 46,45%. In the rest of the first 9 years, Spain had low payouts. In the last 6 years of the period in study, Spain was always bellow the half, reaching its minimum value in 2013 with 15,65%.

Sweden is the last country that had a negative value during the period in study, and didn't have data from 2002 to 2004. Sweden had a negative value of -115,1% in 2006 meaning that they had to use existing cash or raise additional money to pay the dividend. In the rest of the years Sweden had normal values, reaching high values in some years with a maximum value of 85,78% in 2009.

Unit Kingdom is characterized by having middle values, always between 30% and the 60% during the all period in study, except in 2012 with the minimum value of 24,4%. The maximum value was reached in 2008 with the value of 65,26%.

Correlation

Before I start analyzing the correlation I will group the different country values into high, medium and low correlation.

Correlation C4- ratios

	Cost to income	Loan Loss	ROAE	Dividend
Austria	-0,16215	-0,22751	0,123974	0,226734
Belgium	0,103595	-0,81435	0,28383	0,139903
Denmark	-0,66295	-0,15424	0,491473	0,095803
Finland	0,467546	-0,80275	0,38718	-0,09163
France	0,124085	0,005174	0,04418	-0,33528
Germany	0,037662	-0,11907	0,049889	0,288657
Greece	0,464357	0,283847	0,022486	0,60948
Ireland	0,561967	0,55472	-0,37116	-0,24885
Italy	0,841799	0,13955	-0,61229	0,067841
Luxembourg	0,499032	0,095186	-0,3925	-0,69336
Netherlands	0,360632	-0,84758	-0,4384	-0,19079
Portugal	-0,19448	-0,34487	0,174192	-0,02917
Spain	-0,68215	-0,35032	0,692164	0,320698
Sweden	-0,16874	-0,35943	-0,15914	0,095906
U. Kingdom	0,050059	-0,47613	0,055889	0,079028

C4-Cost-to-income

The correlation between C4 and the ratio Cost-to-income, are well disperse by the different countries predominating a positive correlation with 9 countries having positive values against 5 having negative correlation.

With a positive correlation we have Belgium, Finland, France, Greece, Ireland, Italy, Luxembourg, Netherlands and Unite kingdom. Between them we have Italy and Ireland having high correlation; Finland, Greece, Luxembourg and Netherlands with medium correlation; and Belgium, France and United Kingdom with low correlation.

With a negative correlation we have; Denmark, Spain having high correlated, and Austria, and Sweden with low correlation between the C4 and Cost-to-income. Don't exist medium negative correlation between C4 and cost-to-income.

The value of correlation of Germany is not being analyzed because it is very close to 0, so it is considered not to exist correlation.

C4-Loan Loss

The correlation between C4 and Loan loss, are well disperse by the different countries, but here predominate a negative correlation with 10 countries having negative correlation against 4 having positive correlation.

With a positive correlation we only have Ireland having high correlation; Italy and Luxembourg with low correlation between the C4 and Loan Loss. Don't exist medium positive correlation between the C4 and Loan Loss.

With a negative correlation we have Belgium, Finland and Netherlands having high values of correlation; Portugal, Spain, Sweden and United Kingdom with medium correlation; Austria and Germany being low correlated.

Also here, the value of correlation of France is not being analyzed because it's very close to 0, so it is considered not to exist correlation.

C4-ROAE

The correlation between C4 and ROAE it isn't so well distributed by the different countries, predominating a positive correlation with 7 countries having positive correlation against 5 having negative correlation.

With a positive correlation we have, only Spain with high correlation; Denmark and Finland with medium correlation; and Austria, Belgium, Germany, Portugal and United Kingdom with low correlation.

With negative correlation we have, only Italy having values of high correlation; Ireland Luxembourg and Netherlands with medium correlation; and only Sweden with values of low correlation.

France and Greece for having values close to 0 are considered countries without correlation.

C4- Dividend payout

The correlations between C4 and Dividend aren't well distributed by the different countries, predominating a negative correlation with 9 countries having positive correlation against 5 having negative correlation.

With Positive correlation we have, only Greece with a high correlation; only Spain with a medium correlation; and Austria Belgium, Denmark, Italy, Sweden and United Kingdom with low correlations.

With negative correlation we have, only Luxembourg with high correlation: only France with medium correlation:Finland and Ireland with low correlations.

Portugal because of the value close to 0 is considered a country without correlation.

In the end we can conclude that correlation between C4 and the ratios can't say much about the question if there is correlation between Concentration and efficiency, because of the disparity of the values. Only Belgium, Greece, Italy, Sweden and Unite Kingdom have shown, within the 4 ratios analyzed, 3 values converging into the same direction.

Correlation HHI-ratios

	Cost to income	Loan Loss	ROAE	Dividend
Austria	-0,18683	-0,21064	0,104844	0,247867
Belgium	0,354567	-0,83431	-0,00311	0,424022
Denmark	-0,6037	-0,14323	0,462548	0,149494
Finland	0,18871	-0,3076	0,114538	-0,07497
France	0,091441	-0,03828	0,042717	-0,2543
Germany	0,077686	-0,35682	-0,02187	0,230191
Greece	0,467304	-0,0392	0,181955	0,772184
Ireland	0,600007	0,66415	-0,25247	0,123328
Italy	0,971743	-0,14638	-0,51896	0,178823
Luxembourg	0,50636	0,010836	-0,30136	-0,65249
Netherlands	0,207731	-0,71753	-0,41542	-0,14816
Portugal	-0,30951	-0,39398	0,290966	0,002267
Spain	-0,71014	-0,37055	0,732556	0,401524
Sweden	-0,3169	-0,33615	0,17986	0,353271
U. Kingdom	-0,01036	-0,33807	0,107522	0,052536

In this correlation the values of positive and negative comparing to the concentration C4 are practically the same, with a little difference between the intensity of the correlation, high medium or low.

HHI- Cost-to-income

The correlations between HHI and the cost-to-income are well disperse by the different countries, predominating a positive correlation with 9 countries having positive values and 5 having negative values.

With positive correlation we have Ireland, Italy and Luxembourg with high correlation; Belgium and Greece with medium correlation; and Finland, France, Germany and Netherlands with low correlation.

With negative correlation we have Denmark and Spain with high correlation; Portugal and Sweden with medium correlation; only Austria with low correlation.

United Kingdom because of the value close to 0 is considered a country without correlation.

HHI- Loan Loss

The correlation between HHI and Loan Loss regarding to the levels of correlation isn't well disperse, with a predomination of a negative correlation with 10 countries having negative values against 2 having positive values.

With positive values we only have Ireland and Netherlands having high levels of correlation.

With negative values we have only Belgium with high correlation; Finland, Germany, Portugal, Spain, Sweden and United Kingdom with medium correlation; Austria and Italy with low correlation.

France, Greece, and Luxembourg because of the values close to 0 are considered countries without correlation.

HHI-ROAE

The correlation between HHI and ROAE regarding to the levels of correlation isn't well disperse, with a predomination of positive correlation with 8 countries having positive values against 4 having negative values.

With positive values we have only Spain with high correlation; only Denmark with medium correlation; Austria, Finland, Greece, Portugal, Sweden and Unit kingdom with low correlation.

With negative values we have only Italy having high correlation; only Netherlands with medium correlation; Ireland and Luxembourg with low correlation.

Belgium, France and Germany because of the values close to 0 are considered countries without correlation.

The correlation between HHI and the dividend payout regarding to levels of correlation isn't well disperse, with a predomination of positive correlation with 10 countries having positive values against 4 having negative values.

With positive values we have only Greece having high correlation; Belgium, Spain, Sweden with medium correlation; Austria, Denmark, Germany, Ireland, Italy and United Kingdom with low correlations.

With negative values we have only Luxembourg having high correlation; no countries having medium correlation; Finland, France and Netherlands with low correlation.

Portugal because of the value close to 0 is considered a country without correlation.

We can conclude, as before in the C4 that correlation between HHI and the ratios can't say much about the question "if there is correlation between concentration and efficiency, because of the disparity of the values. In this case only Greece and Ireland have shown, within the 4 ratios analyzed, 3 values converging into the same direction.

Conclusion

The topic we covered is the center of much debate in academic world, from the theory of monopoly Hicks (1935), it was already come a long way in the analysis of the structure performance of the banking sector, with the emergence of multiple hypothesis based on theory Industrial Organization and as we have seen, all have been tested and proven empirically at least once (see Van Rooij & Punt 1999), hence it is impossible to define one as the main theory that allows explain the relationship between structure-performance of the banking sector.

The objective of this study is to test empirically the relationship between structure and market performance, for such we relied on the analysis of Ferreira (2012; 2011) about the relationship between concentration and efficiency in the banking sector in 27 European countries through a causality analysis Granger.

To analyze the market structure we used the most common indicators of concentration: the C4 indicating the cumulative percentage of the assets of the three largest domestic banks; and the Helfindhal-Hirschman index that measures the concentration by adding the squares of the market shares of domestic banks. Data taken from Bankscope database revealed a general trend for bank consolidation in the analyzed period, even though the level of bank concentration in the main EU countries remains relatively low (France, Italy , Spain, Germany, United Kingdom).

As for market performance, I used the Cost-to-income ratio, Loan Loss ratio, ROAE ratio and Dividend payout ratio, to analyze the efficiency in the banking sector. The cost-to-income ratio represents the percentage of operating income that is absorbed by operating costs therefore a smaller ratio implies greater efficiency. The Loan Loss determines the quality of Loans of a bank, the higher the ratio the more problemtic the loans are and vice versa. ROAE refers to a company's performance over a fiscal year. Dividend payout ratio discloses what portion of the current earning the company is paying to its stockholders.

Through the analysis of the correlations I didn't found strong enough results, not even a general trend that allows me to say that there is a relationship between concentration and efficiency in the banking sector of the treated sample. An explanation can be found in the fact that the banks are not restricted to any specific type of activity which can dissolve the results. When looked at the results of the correlations individually for each country, the results become more significant although the absence of a general tendency is maintained, this may be explained by the specificities of each banking and in that the integration of the sector European banking is still a process at the beginning and with some uncertainties in the short / medium term (see Walkner & Raes, 2005; Ferreira, 2011).

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