

A Work Project, presented as part of the requirements for the Award of a Masters Degree in Management from the Faculdade de Economia da Universidade Nova de Lisboa.

The impact of banks dimension on profitability, sustainability and efficiency: an analysis for the Iberian financial system

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Abstract

Mergers and acquisitions in the European financial sector peaked in 2007 and then stalled following the liquidity crisis that struck in August of that year. From 2007 to 2009, volumes dropped by almost two-thirds as we saw unprecedented government bailouts and capital injections by governments and sovereign wealth funds.

Inevitably, the crisis has made many investors wary. Concerns about asset quality persist and regulators have been forced to support the industry and prevent widespread fire sales. However, the lack of capital and liquidity that brought buyers to a halt is now triggering a surge in seller activity that can bring new M&A opportunities.

Up to EUR 800 billion of equity is waiting to change hands (equivalent of up to EUR18 trillion of financial assets) from four sources:

1. Forced restructuring of bailed-out banks... Governments intervened to save “too-big-too-fail” banks, injecting almost EUR 200 billion of public capital in 39 institutions analyzed by McKinsey. Now, whether forced by either European or national regulators, many European banking CEOs are having to face restructuring programs. Such restructuring will of course release businesses into the market – in both core and non-core markets, separate banking from insurance, and reduce the asset base (by half in some cases), among other painful measures.

2. Government divestitures... Government bail-outs put around EUR 3 trillion of financial services assets in public hands. Growing public deficits, pressure from public opinion, and the desire to promote competition and realize profits will naturally drive governments to divest their holdings.

3. Need to strengthen capital base... McKinsey estimates that European banks need around EUR 600 billion of equity to reach an 8 percent tier ratio. Despite the efforts to deleverage the balance sheet and improve capital ratios, banks are still hungry for capital. Given its scarcity in the market, players are being forced to divest in order to raise capital or make new calls on investors.

4. Need to exit sub-scale/non-core businesses... Industry returns are expected to be structurally lower, driven largely by the new regulatory frameworks. To reinvigorate these returns, financial institutions need to focus on reaching critical mass in their core businesses and divest sub-scale, non-core, and capital consuming operations. This will lead to a shift towards scale, and lines of business run by their best “natural owner” (the player best positioned to extract a high return from the underlying asset). The result will be that some of the moves in the last wave of M&A will unravel, and there will be a spate of mergers of equals looking for scale in their core business

In such context, this Work Project gains a significant relevance. Determining, whether financial institutions in Iberia really benefited from years of organic and merger growth

to achieve sizeable results in terms of profitability, efficiency and sustainability. The crisis proved that even the larger banks needed rescue. Our project sustains that despite being more profitable, medium sized banks are more sustainable than larger and smaller ones.

Introduction

The primary purpose of this work project is to analyze the relationship between size, financial profitability, technical efficiency and sustainability of the bank companies in Spain and Portugal.

Another interesting implication of the analysis is to find out whether any of the top bank companies in Portugal will fit in the same cluster with the top players in Spain, taking into account the fundamental differences between both financial systems. Portugal has a quite concentrated financial system, in which the major five bank companies have more than 80% of market share in terms of AuM's (assets under management), branch network, customer funds, revenues and FTE's (full time employees). By contrast, the Spanish financial system is much more disperse, although there are four very large bank companies, with massive international presence and coverage of all the national territory, there are lots of smaller, regional players who have an interesting presence in the communities in which they preferably operate. The decision to fit in this work both bank companies and savings banks is due to the fact that both are subject to the same regulatory framework which allows them to perform the same activities and hence to be considered as part of the same competitive environment.

Since most studies on the topic have focused on the post merger period of the 80s and 90s, the purpose of this work project acquires significant importance given the fact that it focuses its analysis in a very difficult and particular period for the banking industry. The global economic downturn that emerged on the U.S in 2007 produced major effects on worldwide financial systems. Particularly, bank companies, and specially those listed in stock exchanges, faced increasing pressure to present "healthier" balance sheets and to be more transparent in order to restore confidence in the market and avoid the plunge in stock prices. Nevertheless, the majority of banks was confronted with huge volumes of nonperforming loan portfolios that produced significant impacts on the earnings and profits. Observe whether large bank institutions, facing an unprecedented crisis, will produce better results in terms of efficiency, sustainability and profitability than smaller banks is another important goal of this work project.

This work project is structured in three distinct parts. In the first, a research review is presented, enunciating the major, and perhaps the most important, previous studies on the impact of bank dimension on their performance as well as the conclusions they

reached and also a thorough macroeconomic and industry specific analysis is carried on to appropriately contextualize the ultimate findings of the study with market conditions that prevailed during the timeframe in question. The second part introduces the methodology and statistical treatments that were conducted in this work project as well as the variables chosen and the size of the sample. Finally, in the third part, results are presented and interpreted with the aid of graphics and tables, all outputs from the statistical software used, SPSS v.17.

1. Research Review

When we attempt to investigate the strategic profile of a bank company and its relation with efficiency, sustainability and profitability, the size or dimension is the variable most commonly used in the existing bibliography (Moya, 1999).

A central issue among bank analysts and economists is whether mergers and consequently larger surviving institutions experience enhanced efficiency and profitability. According to Peristiani, S. (1997) and his investigation of post merger performance in the period of 1980-90, acquirers failed to improve X-efficiency after the mergers despite experiencing some moderate gains on scale efficiency. Moreover, Berger et al (1993) noticed that scale and scope economies explain generally less than 5% of the cost structure, hence there is a tendency to accept that x-efficiency has a greater impact on earnings than in the costs of banking companies.

There are several reasons that support the theory that banking companies of different dimensions behave differently. The same reasons justify choosing the dimension of a company as a strategic independent variable. According to Sánchez and Sastre (1995), larger companies enjoy greater reputation in the marketplace which can be particularly attractive to risk averse clients, that tend to consider safer the placement of their savings in larger bank companies. The dimension of a bank company is closely related with its business volume and consequently with the possibility of better diversifying the risk. Demsetz, R. (1997) concluded that large banking companies are better diversified than smaller ones, however, it does not translate into lower risk since the risk reduction potential is offset by their larger C&I loan portfolios. Moreover, the possible existence of scale economies implies that larger bank companies could produce at lower average costs than smaller dimension companies and hence obtain higher profits. Grosskopf, S. (1995) revealed that most empirical research on scale efficiency in banking that found increasing returns to scale among relatively small banks and decreasing returns to scale among larger banks was biased by problems in statistical techniques used and by the fact that models ignored financial capital, an important input required for the intermediation problem. Once the econometric problems are solved there is strong

evidence of increasing returns to scale for banks up to \$500 million in total assets and approximately constant returns to scale for larger banks. Furthermore, Grosskopf, S., Hayes, K. and Yaisawarng, S. (1993) conducted a study in which output allocation and technical efficiency were calculated for a sample of small banks operating in the U.S in 1982. They concluded, by estimating a Shepard type output distance function as a deterministic frontier, that most banks in the sample were output inefficient.

An important issue to take into consideration is whether greater dimension of bank companies associated with geographical expansion can increase their efficiency coefficient. It is possible that geographical expansion can increase efficiency by diversifying geographically the services and financial instruments supplied by bank companies (Berger and DeYoung, 2000). Empirical investigations available suggest that geographical expansion has enhanced the risk/profitability relationship. Work conducted by McAllister and McManus (1993), Hughes et al (1996, 1997 and 1999), Demsetz and Strahan (1997), Hughes and Mester (1998) and Cummings and Weiss (1999) all concluded that larger and more geographically diversified bank companies tend, in general, to obtain better risk/profitability rewards. Hughes and Mester (1999) also concluded that the economic benefits of consolidation and geographical expansion are stronger when the expansion diversifies the bank companies' macroeconomic risk.

Nevertheless, there could be efficiency problems with geographical expansion given the inefficiencies of operating at distance, Berger (2000). Berger and DeYoung (2000) concluded that the advantages and inconvenient's of geographical expansion offset each other. However, the results of the investigation are clearly heterogeneous. Berger (2000) also studied the effects that the merger processes have on efficiency and noticed that they can attach efficiency gains. Mergers are dynamic phenomenon's that imply changes in the organizational structure and management behavior which could lead companies closer or farther from the best practices efficiency frontier. M. English (2000) examined the change in relative productivity arising from bank mergers. Using a sample of 2000 banks in each of the years 1984-88 and for a cohort of 160 banks that merged in 1986, he concluded that acquiring banks achieve no gains in efficiency, which is consistent with previous studies that focused on the measurement of merger-induced cost efficiencies, however, the interesting finding is that acquiring banks are consistently more productive than the sample as a whole. By implication, if mergers can be generally characterized as the acquisition of a relatively less productive bank by a relatively more productive one, an empirically valid supposition, then industry performance should improve as a result of these mergers. Avery, R. and Canner, G. (1999) also concluded that horizontal bank mergers during the period of 1981-86 did not yield efficiency gains. Notice that horizontal mergers are likely to result in efficiency gains since firms exhibit considerable deposit overlap and the acquiring firms are on average more efficient than the acquired.

Mendes and Rebelo (1999), in a study on portuguese banking, suggest that efficiency and scale economies seem not to be related with size since the less efficient institutions – with net assests bellow 50 million contos- are the ones facing global but small economies of scale while the largest institutions are more efficient but face diseconomies of scale.

Pinho, P. S. and Lima, F. (2008), also in a study on Portuguese banking, concluded that not including off balance sheet outputs in cost and profit frontiers – common practice in existing literature – leads to an overestimation of banks inefficiency scores. Also, the authors conclude that on and off balance sheet assets and liabilities have differentiated impact on efficiency for profits.

Berger and Humphrey (1997) suggest that the merger and acquisition processes should not be based in the search for greater dimension but in the elimination of x-inefficiencies since they have a greater productive efficiency enhancement potential superior to scale inefficiencies. Both authors noticed that 20% in cost savings and 50% of potential earnings were lost given x-inefficiencies. Altumbas et al (1998), using a wide sample of European banks between 1989-1997, concluded that eliminating scale inefficiencies would translate into a cost reduction of 5 to 10% while eliminating x-inefficiencies the reduction would be of 25%. The same author also concluded that larger banks present higher x-efficiency than smaller ones. Vanders (1996) reached similar conclusion and Pérez (1999) determined that, both for Spanish banks and especially for Spanish savings banks, the higher levels of x-inefficiencies occur at smaller companies'. Nevertheless, the study conducted by Maudos (1996) does not allow inferring any relationship between inefficiency and size in the savings banks although for commercial banks the levels of x-inefficiencies are smaller as the size of the companies increase.

The focus of this work project is the evaluation of the impact of the companies' overall dimension on profitability, efficiency and sustainability. Our work will follow the study conducted by Gómez, S. and Gomez, J. (2008), *Técnica en el sistema bancario español: dimension y rentabilidad*, however we will extend our analysis to examine the impact of dimension in the overall sustainability of bank companies and our sample to Portuguese banks.

Since the analysis of the Work Project is focused on the 2007-2008 period, it is crucial to evaluate the economic conditions and their implications on the performance of the Iberian financial systems for the given timeframe.

1.1 Economic Environment in 2007

The world economy and the financial markets were marked in 2007 by the effects of the subprime mortgage credit crisis in the United States. The adjustment in the housing market and the rising rate of defaulting loans in the US provoked a significant

devaluation of high risk securitized credit. Concerns about the real extension of this type of credit and the losses to be incurred by the financial system led to a strong deterioration in investor confidence levels, spurring a “flight to quality” and a drying of liquidity in the money and credit markets (BES Annual Report 2007). The 3-month Euribor rose from 3,725% to a peak of 4,953% in mid December, later sliding back to 4,684% after the large injections of liquidity in the money market by the European Central Bank. Before these interventions, the spread between the 3-month Euribor and the rate of treasury bills for the same maturity reached a maximum of 115 basis points, which constitutes a widening of 95 points relative to pre-crisis values which reflects a higher uncertainty and diminished liquidity.

1.2 Economic Situation in Portugal

During 2007, the Portuguese economy pursued the trend of gradual recovery observed in previous years, with GDP growth rising from 1, 3% to 1, 9% (Country Report, ViewsWire). Exports growth remained strong at 7.1% although decelerating when compared to 2006. Moreover, there as an evident diversification in the geographic destination of exports, particularly to areas that sustained high growth rates in 2007 such as Africa (Angola in particular), Asia and Latin America. Nevertheless, the acceleration of GDP growth was mainly driven by the increased contribution of domestic demand and by gross fixed capital formation. This performance was directly linked to the recovery in corporate investment in line with the improvement of business confidence indices along the year (BES Annual Report 2007). Private consumption also expanded in 2007, despite the weakening tendency throughout the year, consistent with the deterioration of household confidence indices that was most noticeable in the second semester. In a context of high household indebtedness (nearly 130% of disposable income) and rising interest rates, families became more cautious in their consumption expenditures. Also, the rise of the unemployment rate (rose from 7.7% to 8% in average annual terms) contributed to the tightening of household expenditures. Household sentiment was also penalized by rising fuel and food prices which contributed to an average annual inflation rate of 2.5%.

A restrictive fiscal policy was adopted during 2007, allowing the government deficit to fall from 3.9% to 2.5% of GDP which complied with the Stability and Growth Programme’s target of a deficit below 3% of GDP (BES Annual Report 2007). Simultaneously the strong growth in exports allied with a steady deceleration of imports contributed to the diminishing of the combined current and capital account deficit from 8.6% to 8.2%. Both the acceleration of the GDP growth and the reduction of the “twin deficits” occurred against a difficult external environment marked by the subprime mortgage credit crisis. Despite the fact that the Portuguese banking sector did not suffer from direct exposure to this type of high risk credit, the weakening confidence in the international financial markets and the squeeze in on liquidity created harder funding conditions for financial and non financial institutions. The greater restrictiveness in

lending criteria did not actually harm the annual growth of loans to the non financial sector, which accelerated from 8.7% to 9.5%.

1.3 Economic Situation in Spain

During 2007 the Spanish economy grew by 3.8%, however, the pace of growth was not even throughout the year since there was a visible deceleration in the second semester in line with the deterioration in the main confidence indices (Country Report, ViewsWire). Private consumption rose in full by 3.4% while the gross fixed capital formation dropped from 6.8% to 6% which reflected a slower growth in the construction sector (4.2% versus 6% in 2006) (Santander Annual Report 2007). The slowdown of residential investment and private consumption is linked to the rise of real interest rates, not only through the lifting of ECB's reference rates but also through the turbulence in the money and credit markets observed in the second half of the year, which created a restrictive climate in terms of liquidity. Household indebtedness reached 127% of disposable income while house prices growth maintained a downward trend, falling year-on-year from 9% to 5% increasing perception among economic agents that the expansionary cycles of residential investment and private consumption were reaching an end. Household spending nevertheless continued to be supported by favorable progress in the labor market. In such scenario, credit to private sector, although still growing strongly, showed a clear deceleration trend throughout the year. In year-on-year terms, the growth of loans to non financial corporation's declined from 27% to 18 % while the growth in residential mortgage lending and consumer lending decline from 20% to 15% and from 18% to 12% respectively.

1.4 Economic environment in 2008

The year of 2008 was marked by the unfolding of the subprime mortgage credit crisis in the US and its gradual transformation into a widespread confidence crisis, with reflex on the financial system and on economic activity at global level. The increased perception of liquidity and solvency risks precipitated the bankruptcy or loss of independence of several financial institutions in US and Europe which led banks to avoid exposing themselves to money and credit markets (BES Annual Report 2008). As a result, the private sector unavailability to provide liquidity culminated with aggressive interventions by authorities aimed at ensuring the regular functioning of the markets. In the Euro-Area, the 3-month Euribor reached a maximum high of 5.393% in October, closing the year at 2.892% after the ECB had progressively cut interest rates and made strong liquidity injections into the money market (Bloomberg). The uncertainty in the financial sector allied with the expectations of global economic slowdown strongly penalized the main stock indices: in the US, the Dow Jones, Nasdaq and S&P500 fell respectively by 33.8%, 40.5% and 38.5% while in Europe the DAX, CAC40, IBEX and PSI-20 retreated by 40.4%, 42.7% and 51.3% (Bloomberg). High volatility also plagued commodities markets. In the first half of the year oil prices showed a steep upward

trend, reaching close to US 150/barrel in July. Such rise was mainly driven by a strong demand from the emerging markets, difficulties in expanding global supply and in particular by a rise and increase in demand of speculative nature. Later in 2008, expectations of a demand downturn and the growing likelihood of a global recession scenario led to a sharp downward correction in the oil prices, which closed the year slightly above USD 40.

2008 was also marked by more restrictive monetary and financial environment and by a drying up of liquidity in capital markets. The significant deterioration of the confidence indices fueled a deceleration and even contraction of activity in the main developed economies. Although maintaining better growth prospects than Europe and US, emerging markets were also hit by the global deterioration of confidence levels affecting not only their economic activity but also their financial markets. In Brazil the Bovespa index fell by 41.2% while in China the Shanghai Composite index plunged by 65.4%.

1.5 The impact of market conditions on bank companies performance

Portuguese economy was more resilient during crisis, however the pace of recovery is expected to be slower than EU average. Moreover, unemployment levels, despite reaching historical highs, remained well below EU average and also government deficit is expected to slow down in compliance with EU requirements.

Nevertheless, markets are concerned with the high levels of public debt. These concerns are reflected on analysts' opinions on Portuguese economy. Rating agencies consider that Portugal is facing a "slow dead" given the increase in the spreads on sovereign debt and the consequent increase in the interest burden. Furthermore, despite the efforts of the Portuguese government to contain public deficit, rating agencies demand for bolder goals and initiatives. Fitch attributed AA rating to the Portuguese republic but shifted the outlook from stable to negative while Moody's attributed an Aa2 rating and maintained a negative outlook. These concerns quickly reflected on the markets leading CDS spread on 5 year government bonds to reach a maximum high of 242 basis points.

Portugal's debt levels have grown strongly since the 90s, with growth in banking lending concentrating mostly in residential mortgages which ultimately led to an increase in family indebtedness levels.

The banking industry is tackling the crisis, however there are still some danger signs. A significant slowdown in volumes of loans specially, corporate loans practically stagnant driven by economic downturn and a more conservative commercial approach. Also deposit volumes registered a significant slowdown, especially in individual deposits reflecting generalized concerns on the stability of the financial system. Competition over customer funds is leading banks to adopt aggressive pricing strategies on deposits given the higher financing costs in the wholesale market. Also, stricter policies on credit

concession driving loan margins upwards Finally, after a continuous and significant increase since 2007, nonperforming loan (ratio) is showing the first signs of recovery following major write off operations by bank companies.

A player level analysis reveals that for Portuguese top players, profitability levels are being undermined by high risk costs. Profit results are mixed, and apart for Totta, profitability is low. Despite positive results on revenues, most banks are decreasing their net interest margin although cost base remained stable. Some banks were able to compensate the loss in deposit margin with steep increases in credit spreads compensating the higher cost of risk which ultimately reflected on a sharp increase in loan impairments given the higher delinquency levels.

1.6 Present and Future trends for the banking industry

The crisis in Greece underscores the importance of credible fiscal consolidation programmes for maintaining investor confidence and market access. Small so-called “peripheral” economies of the eurozone — notably Portugal and Ireland (both downgraded to ‘AA–’ over the last six months, though the Outlook on Portugal remains Negative) — and to a lesser extent Spain (‘AAA’/Stable), are suffering contagion from the worsening Greek financial crisis. While all face significant economic and fiscal challenges, their underlying sovereign credit fundamentals are much stronger than Greece. Nonetheless, there is need for a strengthening of fiscal consolidation programmes, and the substantial additional measures recently announced by the Portuguese and Spanish governments to reduce their budget deficits are expected to smooth market concerns.

In Spain, a major risk to the economy and public finances is the pending restructuring of the savings banks sector. Unlike in other countries, in which governments had to devote sizeable resources to recapitalise struggling financial institutions, in Spain there has not been any material intervention to date mostly due to the role of the Bank of Spain and its strict regulation in terms of solvency and provisions, which insured that Spanish institutions were better prepared to deal with the crisis than many of their European counterparts.

Over the longer term, the expected restructuring of the savings banks is likely to provide market share opportunities and potentially a less competitive environment for private banks. However, it is still early to be bullish, given the current sector challenges: 1. asset quality risks from the economic situation and from the exposure to real estate; 2. funding constraints, given a large commercial gap and dependence on wholesale financing; and 3. pressure on margins – given the above – which will likely be aggravated by the current ‘deposit war’.

A main issue for the savings banks has been its aggressive expansion process over the last few years. By rapidly opening branches, savings banks were able to grow loans

faster than private banks, thus gaining market share over time. This has left savings banks with: 1. a larger exposure to the real estate sector (and hence larger asset quality risks); and 2. more overcapacity in terms of branches than private banks. Those challenges, coupled with their lower market visibility as not for-profit institutions, translate into deeper funding constraints. Most of their recent debt issuance has carried government guarantees, which constitutes – given the sector financing gap – another risk to the government involvement with the sector.

In a global perspective, the crisis forced regulator to take action. The expected new regulatory framework will drastically change banking economics, challenge business models, and reconfigure the industry landscape. Regulatory proposals follow a common agenda – objectives are broadly agreed, but details can still be influenced. Objectives are clear and broadly agreed namely: raise overall capital level and quality in the banking system; reduce interconnectedness of financial institutions to reduce systemic risk; penalize trading business and complex products; set stricter liquidity/funding standards; mitigate procyclicality; intensify supervision and increase transparency; correct weaknesses of current legislation. However, proposals are likely to be reviewed and softened to some degree, including grandfathering periods to ease transition and ensure that banks do not have to tap capital markets and/or reduce lending significantly. This "regulatory storm" is likely to substantially shift the pecking order of banks over the next few years as it will test the quality and skills of individual organizations and affect players and market segments very differently

1.7 Goals, Hypothesis and Design of the work project

As mentioned earlier, the goals of this work project are, first determining whether size of bank companies impacts on their overall profitability, sustainability and efficiency and second, to determine if any Portuguese player will fit in the cluster with the largest Spanish banks. Hence, we can summarize our hypothesis into:

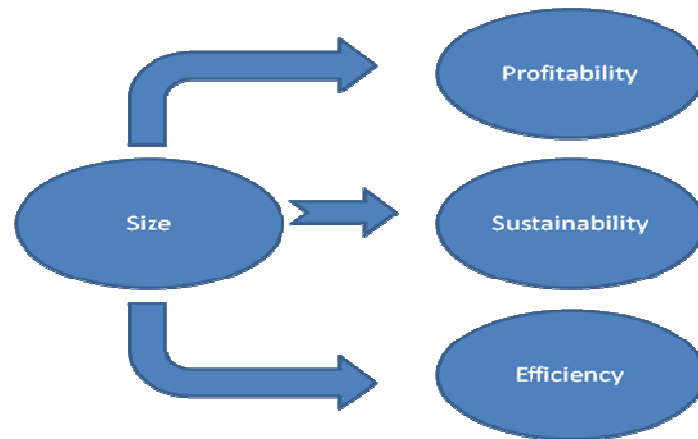
H1: Size impacts positively in banks profitability

H2: Size impacts positively in banks sustainability

H3: Size impacts positively in banks efficiency

H4: According to results of the cluster analysis, Portuguese banks will fit in the 2nd cluster, that is, with the medium sized banks

Finally we can summarize our first goal and the three first hypothesis of the work project in the following design:



2. Methodology

2.1 Banks Sample and Data Sources

All data used throughout this Work Project was retrieved from the companies' annual reports and also from the databases of Bank of Portugal, Bank of Spain, Asociación Española de Banca (AEB) and Confederación Española de Cajas de Ahorros (CECA). The sample includes all the savings banks operating in the Spanish financial system as well as the majority of the bank companies in Iberia that fit in the retail banking segment in a total of 73 entities. Most foreign subsidiaries operating in Portugal were not included given the fact that their results are not significant, since the top 10 players comprise around 90% of the market. For Spain, credit unions were not included in the sample because the data availability is scarce and in the overall their impact is not relevant.

2.2 Variables

Since the ultimate purpose of this work project is to evaluate the impact of bank companies' size on their overall profitability, sustainability and efficiency, the variables chosen were those that better describe banks in terms of the four dimensions mentioned above.

To evaluate banks **size** the variables chosen were: total assets (TA), the sum of current and long-term assets owned by bank companies; customer deposits (DC), which are classified as a current liability on the balance sheet; customer loans (LC); number of branches (BR) and number of employees (EMP).

To evaluate banks **profitability** two variables were chosen: Return on Equity (ROE) defined as the earnings before taxes over banks shareholders equity and Net Income or net profit for the period (NI), defined as the banks total revenues minus its operating expenses (staff, administrative and depreciation expenses), its risk costs (impairments) and other expenses (minority interests, taxes and other).

To evaluate **efficiency** the variables chosen were: Cost to Income Ratio (CTI) defined as operating expenses (staff costs, administrative expenses and depreciation) over gross income; the Core Transformation Ratio (C/D) defined as the volume of customer loans over the volume of customer deposits and also a Productivity Ratio (C/EMP) defined as the volume of customer loans over the number of employees. Notice that the core transformation ratio (C/D) is a liquidity measure, yet we will use it to evaluate efficiency with the rationale being that since higher the ratio, the lower the entity's liquidity and consequently the its inefficient capture of customer resources (high level assumption).

Finally, to evaluate banks **sustainability** two variables were selected: the Non Performing Loans Ratio (NPL) defined as the volume of delinquent customer loans over the overall balance sheet customer loans portfolio and the Coverage Ratio (COV) defined as the on balance sheet credit provisions over total volume of overdue loans.

2.3 Vulnerabilities of the variables

It is important to acknowledge that since most of the data used in this Work Project was retrieved from companies' annual reports, they may not reflect their true financial situation and soundness. Often companies recur to financial engineering to stretch and even hide the truth in order to search for faster revenue growth, higher stock prices and more attractive balance sheets. The most vulnerable variables in our analysis are the profitability variables: net income and ROE. ROE measures a company's profitability by revealing how much profit it is generating with shareholders investment and it is usually defined as the company's net income for the fiscal year over shareholders equity excluding preferred shares. Net income is calculated by taking revenues and adjusting for depreciation, interest, taxes and other expenses. In this Work Project, and since we extend our analysis for the Portuguese and Spanish financial system we will use pre-tax ROE to exclude the effects of different tax burdens specific to each country. The implication is that for the calculus of the ROE we will use Net Income before taxes, commonly referred to as EBT (Earnings before Taxes).

The most common financial shenanigan is related to revenue recognition specifically, recording revenues too early, either before the earnings process has been completed or before and unconditional exchange has occurred. Another common financial shenanigan is recording bogus revenue. Often companies record bogus revenue by conducting a scheme in which the company sells a product or a service to customers, yet the later has no obligation of keeping it or paying for it hence the transaction has no economic

substance. Another common scheme is to inflate revenue right after the closing of an acquisition by instructing the target company to hold back revenue until after the merger closes so that revenue reported by the new merged company improperly includes revenue earned by the target before the merger

Another financial shenanigan that is common in the financial sector is boosting income with one-time gains. Company's often increase their income by selling assets that have appreciated above their book value, which in turn is unrealistically low resulting in a substantial gain from the sale. Moreover, companies also use one-time gains or other nonoperating sources of income and hide them as reduction in Opex (operating expenses).

Companies also frequently shift current expenses to a later or earlier period, by capitalizing normal operating costs by improperly recording them as an asset and amortizing it over future periods. Another common technique is to artificially inflate earnings by not allocating sufficient costs to the appropriate period by depreciating fixed assets too slowly. Furthermore, companies must adjust certain assets to reflect customer defaults, inventory obsolescence and other decreases in value and by doing so they establish a variety of reserves (contra accounts) that also need to be adjusted every period. Failing to add sufficient amount to these reserves or reducing them inappropriately creates artificial profits.

There are several financial shenanigans used by companies nowadays. To our analysis is also important to refer the failure to record expenditures and related liabilities when future obligations remain or recording revenue when cash is received when future obligations remain.

Companies often shift current revenue to a later period by creating reserves and releasing them into income in a later period or simply holding back revenue to a period when financial strength is more needed.

Another common shenanigan is valuing on balance sheet items by their book value rather than by market value (when $BV > MV$), avoiding the respective impairments, which would impact negatively on results. Also, some on and off balance sheet items such pension funds contributions, impact directly on equity and don't go through the P&L and hence do not translate into results.

Bank companies also use financial schemes to manipulate their ratio of nonperforming loans or delinquency by writing down or writing off impaired assets. In fact one of the most difficult and subjective decisions for management is to decide when an asset is permanently impaired. An asset is overvalued when its book value exceeds the amount that is expected to be realized through its use or sale. The amount of the overvaluation is a loss not yet recognized. A failure to establish sufficient reserves or improperly releasing those reserves would understate expenses and inflate profits. Usually at the

end of each fiscal year, bank companies write off pools of delinquent loans and consequently reduce the values of their assets but eliminate the credit impairment related to them. If the pool was fully provisioned, the result is null, since the decrease in assets in balance sheet is compensated by a decrease in the impairments account in the P&L. However, if the loans were not fully provisioned the company incurs in a gain that consists on the difference between the value of the assets and the amount of their provision. Nowadays, bank companies also manipulate their credit quality ratios by selling pools of delinquent loans to servicing companies for 10% to 15% of the overall value. The bank companies get rid of the risk of default but incur in a loss. This procedure is extremely important in a tumultuous time when investors pay increased attention to the soundness of banks' balance sheets.

2.4 Variables Description

For all the selected variables, graph below provides the main descriptive statistics:

1. Descriptive Statistics

	Label	Unit	Mean	Std. Deviation	Analysis N
Total Assets	TA	Million Euros	46041,57	123765,908	73
Deposits to clients	DC	Million Euros	31603,84	96905,083	73
Loans to clients	LC	Million Euros	30960,43	75665,383	73
Employees	EMP	Unit	4213,70	7424,228	73
Branches	BR	Unit	621,53	1033,146	73
ROE	ROE	Percentage	,12022	,070414	73
NPL	NPL	Percentage	,0099	,00735	73
Coverage Ratio	COV	Percentage	2,34160	4,582942	73
Cost to Income	CTI	Percentage	,51829	,197867	73
Net Income	NI	Million Euros	424,160	1279,5845	73
Credit/Deposits	C/D	Percentage	1,24625827	,6750147	73
Credit/Employees	C/EMP	Million Euros	7,45015218	12,8031133	73

2.5 Testing the analytical model

The first step in this Work Project was to conduct a Factor Analysis to check if our theoretical dimensions are really independent and the variables considered belong to the theoretical dimensions in reality. We used the principal component analysis and a Varimax rotation to extract the relevant factors. The common factors retained were those who presented an eigenvalue superior to 1 – Kaiser criteria- in accordance with the results presented by the scree plot and the percentage of variance explained. To evaluate the validity of the factor analysis we used the KMO criteria. In general, our theoretical model for analysis was confirmed, dimensions: size, efficiency, profitability and sustainability. However, profitability is not independent of banks' size. Size and

profitability variables belong to the same factor. Both dimensions belong to the same factor because there is a strong covariance between them, nevertheless the profitability variables (ROE and NI) are conceptually totally different from the size variables (TA, DC, LC, BR, EMP).

Given the significant correlation among the variables, which was consonant to the KMO value obtained, 0,751 (which is considered to be medium), and the result of the Bartlett's sphericity test which was an observed χ^2 of 1324,092 with 66 degrees of freedom associated with a p-value of 0,000, we were able to conduct a factor analysis.

2. Correlation Matrix

		TA	DC	LC	EMP	BR	ROE	NPL	COV	CTI	NI	C/D	C/EMP
Correlation	TA	1,000											
	DC	,960	1,000										
	LC	,997	,966	1,000									
	EMP	,958	,902	,964	1,000								
	BR	,884	,855	,897	,958	1,000							
	ROE	,440	,349	,455	,565	,529	1,000						
	NPL	,038	,036	,044	,074	,058	,187	1,000					
	COV	-,046	-,038	-,050	-,063	-,062	-,061	-,248	1,000				
	CTI	-,102	-,098	-,115	-,119	-,141	-,110	-,166	,064	1,000			
	NI	,990	,943	,985	,951	,880	,490	,082	-,044	-,121	1,000		
	C/D	-,070	-,131	-,067	-,062	-,099	-,069	-,175	-,172	-,238	-,070	1,000	
	C/EMP	,028	,030	,028	-,005	-,012	-,178	-,136	,006	-,359	,031	,371	1,000

3. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,751
Bartlett's Test of Sphericity	Approx. Chi-Square	1324,092
	Df	66
	Sig.	,000

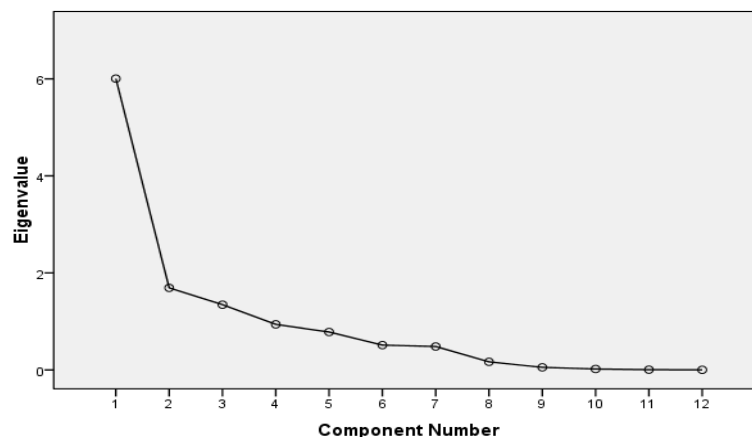
The correlation matrix revealed some interesting relationships between variables. First, it is important to point out the significant correlation between all the dimension variables. This is consonant with the findings by Sánchez and Sastre (1995) that banks size is closely related to its business volume.

After applying a factor analysis to all variables, three principal components were obtained that explain 75,342% of the total variance. Once again the scree plot corroborates the retention of the three components.

4. Total Variance Explained

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	6,005	50,038	50,038
2	1,692	14,098	64,136
3	1,345	11,206	75,342
4	,939	7,824	83,166
5	,781	6,511	89,677
6	,511	4,260	93,937
7	,483	4,024	97,960
8	,167	1,391	99,351
9	,053	,439	99,790
10	,019	,156	99,946
11	,005	,043	99,989
12	,001	,011	100,000

5 Scree Plot



After conducting the Varimax rotation we observed that the variables (and respective loadings) TA (0,985), DC (0,953), LC (0,99), EMP (0,982), BR (0,937), ROE (0,529) and NI(0,981) were associated to component 1, CTI(-0,64), C/D (0,744) and C/EMP (0,803) were associate with component 2 and finally NPL (0,817) and COV (-0,657) were associated with component three.

6. Rotated Component Matrix^a

	Component		
	1	2	3
Total Assets	,985	,025	-,006
Deposits to clients	,953	,003	-,031
Loans to clients	,990	,029	,007

Employees	,982	,004	,071
Branches	,937	-,006	,071
ROE	,529	-,157	,354
NPL	,027	-,161	,817
Coverage Ratio	-,012	-,176	-,657
Cost to Income	-,117	-,640	-,336
Net Income	,981	,025	,038
Credit/Deposits	-,098	,744	-,015
Credit/FTE	,014	,803	-,173

Following the factor analysis, a cluster analysis was conducted in order to obtain groups of bank companies with high levels of resemblance, considering for that purpose, only the dimension variables previously chosen. The aggregation method selected was the Ward method with Euclidean Distance – sensitive to the measure of the variables. Using a hierarchical method has two very important advantages: first it allows fixing a priori the number of clusters to be formed, second it aggregates every cluster until a single one is originated which enables the observation of the stages in which the aggregations occurred. Once the variables do not have similar measures, and all should contribute equally to the solution they were standardized.

Furthermore, we divided all bank companies in three groups according to their nationality and nature. The objective was to compare the means of one of the factors for each of the three groups. The analysis is valid if the factor considered is normally distributed and the variances are homogenous across the three groups.

Finally, two linear regression analyses were carried out in order to explain the possible linear relationship between two retained factors and the previously chosen dimension and profitability variables.

2.6 Results

Following the results of the factor analysis we conducted our cluster analysis taking into account not only the original dimension variables but also the two profitability variables –ROE and NI- given the fact that they all belong to the same component.

This result validates the first hypothesis (H1) of this work project, that size is positively related with profitability

7. Cluster Membership

Case	3 Clusters
1:BES	1
2:BPI	1
3:Santander Totta	1
4:Millennium BCP	1
8:CGD	1
19:Bankinter	1
21:Sabadell	1
27:Banco Popular	1
52:Caixa Catalunya	1
56:Caja Mediterráneo	1
58:Caja Galicia	1
5:Banco Finantia	2
6:Banco Popular Portugal	2
7:Banif	2
9:Banco Gallego	2
10:Banco Guipuzcoano	2
11:Banco Pastor	2
12:Banco de Valencia	2
13:Banca March	2
14:Banco Pueyo	2
15:Bancofar	2
16:Banco Fibanc	2
17:Bankoa	2
18:Banco Cooperativo Español	2
20:Barclays Bank	2
23:Banco de Andalucía	2
24:Popular Hipotecario	2
25:Popular-e	2
26:Popular Banca Privada	2
29:Banco Halifax	2
30:Banco Caixa Geral	2
31:Banco Urquijo	2
32:Deutsche Bank	2
33:C.A. Rioja	2
34:Caixa Tarragona	2
35:Caixa Manresa	2
36:Caixa Laietana	2
37:Caixa Terrasa	2
38:Caja de Badajoz	2
39:Caja de Jaén	2
40:Caixa Ontinyent	2
41:Caja de Guadalajara	2
42:Caixa Colonya	2
43:Caixa Manlleu	2
44:Caja Segovia	2
45:Caja de Ávila	2
46:Caja Circulo Católico de Burgos	2
47:Caja Cantabria	2
48:Caja de Extremadura	2
49:Caja de Canarias	2
53:Bancaja	2

54:Ibercaja	2
55:CajaMurcia	2
57:Unicaja	2
59:Kutxa	2
60:Caja España	2
61:Caja Duero	2
62:Caixanova	2
63:CajaSur	2
64:Caixa Penedes	2
65:Caja Castilla La Mancha	2
66:Caja Sol	2
67:Caja Granada	2
68:Caja Navarra	2
69:CajAstur	2
70:Caja Inmaculada	2
71:Sa Nostra	2
72:Caixa Sabadell	2
73:Caja de Burgos	2
22:Santander	3
28:BBVA	3
50:La Caixa	3
51:Caja Madrid	3

The cluster analysis revealed that the larger bank companies, **BBVA, Santander and the two major savings banks, La Caixa and Caja Madrid** belong to cluster 3. This result is not surprising since there is a significant difference in terms of the dimension of the cluster three members comparing to all the other bank companies in the sample. In the intermediate cluster 1 belong a mix of the top Portuguese banks and midsized Spanish banks and savings banks. Finally, on cluster 2 we have the small sized Iberian bank companies with the majority of the Spanish savings banks that are mostly regional operators.

The purpose of and ANOVA analysis is to compare means for more than two independent groups. To ensure the validity of the test, it is assumed that data is normally distributed and that variances between groups are homogenous. We will use our ANOVA analysis to check whether factor 2 and factor 3 vary across the three clusters. Recall that factor 2 is composed of the variables CTI, C/D and C/EMP, hence from now onwards it shall be labeled the **efficiency** factor while factor 3 is composed by the NPL and COV so it will be labeled by **sustainability** factor. Hence, the purpose of the ANOVA analysis is to determine whether the two dimensions – efficiency and sustainability – vary across clusters.

8. Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
REGR factor score 2 for analysis 1	,387	2	70	,680
REGR factor score 3 for analysis 1	3,050	2	70	,054

9. ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
REGR factor score 2 for analysis 1	Between Groups	,213	2	,106	,104	,902
	Within Groups	71,787	70	1,026		
	Total	72,000	72			
REGR factor score 3 for analysis 1	Between Groups	3,170	2	1,585	1,612	,207
	Within Groups	68,830	70	,983		
	Total	72,000	72			

For the endogenous variables, Factor 2 and Factor 3, none of the 3 groups considered – the three clusters- present different means (p value of 0,902 and 0,207 respectively) and the assumption of homogeneity of variances is verified (p value of 0,680 and 0,054 respectively)

Following our ANOVA one-way analysis, a multiple comparisons analysis was carried which yielded different results:

10. Multiple Comparisons

Tukey HSD

Dependent Variable	(I) Ward Method	(J) Ward Method	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
REGR factor score 2 for analysis 1	1	2	,14647190	,33303382	,899	-,6509980	,9439418
		3	,18514948	,59128031	,947	-1,2307075	1,6010065
	2	1	-,14647190	,33303382	,899	-,9439418	,6509980
		3	,03867757	,52351120	,997	-1,2149021	1,2922573
	3	1	-,18514948	,59128031	,947	-1,6010065	1,2307075
		2	-,03867757	,52351120	,997	-1,2922573	1,2149021

REGR factor score 3 for analysis 1	1	2	,46505406	,32610251	,333	-,3158184	1,2459265
		3	-,16542428	,57897422	,956	-1,5518136	1,2209650
	2	1	-,46505406	,32610251	,333	-1,2459265	,3158184
		3	-,63047834	,51261556	,440	-1,8579678	,5970111
	3	1	,16542428	,57897422	,956	-1,2209650	1,5518136
		2	,63047834	,51261556	,440	-,5970111	1,8579678

The Tuckey H.S.D test reveals the differences between the average values of factor 2 and factor 3 for each pair of clusters. The positive differences reveal superior means for cluster i while negative differences reveal superior mean for cluster j. Hence, factor 2 or efficiency is higher on average on cluster 1 than in the other two. This means that the medium sized banks are the more efficient, since we grouped the clusters according to factor 1, which is composed by the size and profitability variables. Also the cluster 2, which is composed by all the smaller banks is on average more efficient than cluster 3 which comprises the top 4 banks in the Iberian banking system. In respect to factor 3 there is an interesting finding; cluster 1 has higher sustainability on average than cluster 2 and 3. That is, medium sized banks are on average more sustainable than large and small size banks. However, despite being qualitatively relevant, the results of this multiple means comparison analysis are statically insignificant for a level of significance of 5% (p-values>0,05).

In the first linear multiple regression, we wanted to observe whether there was any linear relationship between factor 2, efficiency, and the profitability and size variables that compose factor 1. The following statistics reveal that for a 5% significance level the model is not valid, hence it does not pass the global significance test (p-value of 0.244 and R^2 of 0,126).

10. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,356 ^a	,126	,032	,98367058

11. ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9,105	7	1,301	1,344	,244 ^a
	Residual	62,895	65	,968		
	Total	72,000	72			

Despite the invalidly of the model, we decided to conduct individual significance tests which yielded some relevant results. Again, for a level of significance of 5%, the

variables Deposits to clients, Loans to clients and ROE are relevant to explain factor 2 – efficiency. The standardized coefficients reveal the existence of a negative linear relationship between ROE and Deposits to clients with efficiency while Loans to clients has a positive linear relationship

12. Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	,562	,284		1,979	,052
	Total Assets	,000	,000	-4,279	-1,927	,058
	Deposits to clients	,000	,000	-1,197	-2,003	,049
	Loans to clients	,000	,000	4,772	2,169	,034
	Employees	,000	,000	-,229	-,227	,821
	Branches	,000	,000	-,048	-,093	,926
	ROE	-6,320	2,711	-,445	-2,331	,023
	Net Income	,001	,001	1,164	1,221	,226

The second linear regression determined whether there is a linear relationship between factor 3 –sustainability- and the variables that compose factor 1. Statistics bellow reveal that the model is altogether valid, p-valid equal to 0,034, but its quality is weak given the low R^2 .

13. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,449 ^a	,201	,115	,94064165

14. ANOVA^b

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	14,488	7	2,070	2,339	,034 ^a
	Residual	57,512	65	,885		
	Total	72,000	72			

Globally the dimensions of the factor size/profitability explain 20% of the variance of sustainability (p-value < 0,05). However, none of the dimensions by itself is able to influence sustainability.

15. Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	-,417	,272		-1,533	,130
Total Assets	,000	,000	-,3578	-1,685	,097
Deposits to clients	,000	,000	,029	,050	,960
Loans to clients	,000	,000	1,446	,687	,494
Employees	,000	,000	,749	,776	,440
Branches	,000	,000	-,317	-,645	,521
ROE	3,226	2,592	,227	1,244	,218
Net Income	,001	,001	1,582	1,736	,087

3. Conclusions

Recall that one of the purposes of this work project was to determine whether there was a relationship between banks size and their profitability, efficiency and sustainability. The factor analysis revealed that there is a strong positive correlation between size and profitability dimensions. Hence we can conclude that larger banks tend to be more profitable than others. This finding itself should not be binding. This conclusion is valid when we analyze banks with the same operating profile, that is, banks that perform similar activities and whose differentiating factor is size. A bank with a mature branch network and a consolidated management team can extract higher revenues for a given fixed cost while a smaller bank might need to increase its costs to capture all potential.

Also, our multiple linear regression analysis revealed that medium sized banks are on average more sustainable than both large and small bank companies and that there is no statistically significant relationship between the dimension and profitability variables and the banks efficiency. These results contradict the findings of Grosskopf. S. (1995) that sustained increasing returns to scale on efficiency for larger banks. Also Altumbas et al (1998) reached contradictory finding. According to this author, larger banks have higher levels o x-efficiency than smaller ones. Comparing bank companies in terms of efficiency is always tricky. Efficiency depends not only on the composition of revenues

(focus on retail, wholesale, type of loans prevalent, the existence of complementary activities such as insurance and so on) but also on the granularity of the retail network. Finally the life cycle of the institution is also very important. A given bank company might experience a short term deterioration of efficiency as a result of an expansion strategy for example (technological improvement, post merger integration processes, branch maturity...) that in the long run can translate into efficiency gains and in a competitive advantage against competitors. Efficiency is an indicator that must always be analyzed together with other elements to reach an adequate conclusion about the performance and mostly, about the perspectives of a given bank company.

Once again, and although our work project sustains that medium sized banks are more sustainable on average than smaller and larger banks, this finding is neither always valid nor should bind future analysis and conclusions. In a liquidity crunch smaller and medium sized banks suffer more than larger ones because depositors tend to opt for the security of larger and stronger institutions and because funding availability in the wholesale market tend to decrease also.

The cluster analysis proved that none of the major top banks operating in Portugal fit in the same cluster of the larger Spanish banks. This result is consonant with the differences in values observed in the dimension variables between them.

Once again it is important to mention that the Spanish companies, including banks, have fiscal benefits on acquisition processes which allow them to be more aggressive in their geographical expansion strategies.

Bibliography

Annual Report of the Spanish Banking System (2007 and 2008), Asociación Española de Banca.

Annual Report of the Portuguese Financial System (2007 and 2008), Bank of Portugal.

Annual Report of the Spanish Savings Banks (2007 and 2008), Confederación Española de Cajas de Ahorro.

Altumbas, Y, E. P. M. Gardener, P. Molineux and Moore (1998), "Efficiency in European Banking", Research Paper in Banking and Finance, RP 98/2, Institut of European Finance.

Avery, R. and Canner, G. (1999), "Consolidation and Depositor Services", Journal of Banking and Finance, nº 23.

Berger, A. N. (2000) "The Integration of the Financial Services industry: Where are the efficiencies", Finance and Economics Discussion Series 2000-36, Board of Governors of the Federal Reserve System (U.S.).

Berger, A.N., D. Hancock, and D.B. Humphrey (1993), "Bank Efficiency Derived from the Profit Function," Journal of Banking and Finance, n° 17, pages 317-47.

Berger, A.N., and D.B. Humphrey (1991), "The Dominance of Inefficiencies over Scale and Product Mix Economies in Banking," Journal of Monetary Economics, n° 28, pages 117-48.

Berger, A.N., and D.B. Humphrey (1992), "Megamergers in Banking and the Use of Cost Efficiency as an Antitrust Defense," Antitrust Bulletin, n° 37, pages 541-600.

Berger, A.N. and DeYoung, Robert (2000), "Globalization of Financial Institutions: Evidence from Cross-Border Banking Performance", Wharton Papers on Financial Services.

Bessis, Joel (2002), "Risk Management in Banking", 2nd Edition, Wiley & Sons.

Densetz, R. S. and Strahan, P. E. (1997), "Diversification, Size, and Risk at Bank Holding Companies", Journal of Money Credit and Banking, n° 29, pages 300-313.

Dietsch, M. and Lozano-Vivas, A. (2000), "How the Environment Determines the Efficiency of Banks: A Comparison Between French and Spanish Banking Industry", Journal of Banking and Finance, n° 24, pages 985-1004.

Dietsch, M. and Weill, L. (2000), "The Evolution of Cost and Profit Efficiency in the European Banking Industry", Research in Banking and Finance, n° 1, pages 199-218.

Efron, B. (1979), "Bootstarp Methods: Another Look at the Jackknife. Ann. Stat", n° 7, pages 1-26.

Efron, B. and Tibshirani, R. (1993), An introduction to the Bootstrap, New York, Chapman and Hall.

Elyasiani, E. and Mehdiian, S. (1990), "Efficiency in the Commercial Banking Industry, A Production Frontier Approach", Applied Economics, n° 22, pages 539-551.

Elyasiani, E. and Mehdiian, S. (1992), "Productive Efficiency Performance of Minority and Nonminority Owned Banks. A Nonparametric Approach", Journal of Banking and Finance, n° 16, pages 933-948.

English, M., Grosskopf, S., Hayes, K. and Yaisawarng, S. (1993), "Output Allocative and Technical Efficiency of Banks", Journal of Banking and Finance, n° 17, pages 349-366.

Ferrier, G. and Lovell, C. A. K. (1990), "Measuring Cost Efficiency in Banking: Econometric and Linear Programming Evidence", Journal of Econometrics, n° 46, pages 229-245.

Fixler, D. J. and Zieschang, K. (1993), "An Index Number Approach to Measuring Bank Efficiency: An application to Mergers", *Journal of Banking and Finance*, nº 17, pages 437-450.

Griffell, E. and Novell, C. A. K. (1996), "Profits and Productivity: A Theoretical Analysis and an Empirical Application to Spanish Banking", Working Paper, University of Barcelona.

Gómez, Salvador and Gómez, Juan (2008), "Técnica en el Sistema Bancário Español: Dimensión y Rentabilidad, *El Trimestre Económico*, nº 300, pages 1017-1040.

Grosskopf, Shawna (1995), "A Nonparametric Cost Approach to Scale Efficiency", *Scandinavian Journal of Economics*, nº 87, pages 594-604.

Grosskopf, S., Hayes, K. and Yaisawarng, S. (1992) "Measuring Economies of Diversification: A Frontier Approach," *Journal of Business and Economic Statistics*, nº 10(4), pages 453-459.

Hughes, J. P., Lang, W., Mester, L. G. and Moon, C. G. (1996), "Efficient Banking under Interstate Branching", *Journal of Money, Credit and Banking*, nº 28, pages 1043-1071.

Hughes, J. P., W. Lang, Mester, L. J. and Moon, C. G. (1997), "Recovering Risky Technologies Using the Almost Ideal Demand System: An Application to U.S Banking", Federal Reserve Bank of Philadelphia Research Working Paper, nº 97-98.

Hughes, J. P., Lang, W., Mester, L. J. and Moon C. G. (1999), "The Dollars and Sense of Bank Consolidation", *Journal of Banking and Finance*, nº 23, pages 291-324.

Hughes, J. P. and Mester, L. J. (1998), "Bank Capitalization and Cost: Evidence of Scale Economies in Risk Management and Signaling", *Review of Economics and Statistics*, nº 80, pages 314-325.

Maudos, J. (1996), "Cost And Profit Efficiency In European Banks", *Journal of International Financial Markets, Institutions and Money*, nº 12, pages 33-58

McAllister, P.H., and McManus, D. (1993), "Resolving the scale efficiency puzzle in banking", *Journal of Banking and Finance*, nº 17, pages 389-405.

Mckinsey&Company, (2010), "An Overflow of Assets", European Banking M&A Report

Mendes, V. and Rebelo, J. (1999), "Productive Efficiency, Technological Change and Productivity in Portuguese Banking", *Applied Financial Economics*, Vol. 9, pages 513-521.

Moya, C. and Gual, M. (1999), "Inefficiency of the Spanish Cooperative Banking Sector", *Annals of Public and Cooperative Economics*, nº 70 (4), pages 621-637.

Resti, Andrea and Sironi, Andrea (2007), “Risk Management and Shareholders’ Value in Banking: From Risk Measurement Models to Capital Allocation Policies”, Wiley & Sons.

Sánchez, J.M. and Sastre, M.T. (1995) “Es el tamaño un factor explicativo de las diferencias entre entidades bancarias?”, Bank of Spain Working Paper, nº 9512.

Saunders, Anthony and Cornett, Marcia (2008), “Financial Institutions Management: A Risk Management Approach”, 6th Edition, McGraw-Hill Irwin.

Schilit, Howard (2002), “Financial Shenanigans: How to Detect Accounting Gimmicks and Fraud in Financial Reports”, 2nd Edition, McGraw-Hill.

Peristiani, Stavros (1997), “Do Mergers improve the X-Efficiency and Scale Efficiency of U.S Banks? Evidence from the 1980s”, Federal Reserve Bank of New York research Paper nº 9623.

Pinho, P. S. and Lima, F. (2008) “Financial Desintermediation and the measurement of efficiency in banking: the case of Portuguese banks”, Int. Journal of Banking, Accounting and Finance, Vol. 1, Nº 2.

Vander, R. (1996), “Efficiency Effects of Bank Mergers and Acquisitions”, Tinbergen Institute Discussion Papers, number 01-088/3.