

# The fall of Spanish *cajas*: Lessons of ownership and governance for banks<sup>1</sup>

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## Abstract

How ownership and governance of banks, in general, and institutional diversity, in particular, matter for financial stability, is a subject of concern for public and regulatory policies. This paper examines how different ownership and governance of banks mattered in both the risk-taking decisions that preceded the financial crisis and in the capability to respond when the shock materialized. The empirical evidence is drawn from Spanish banks, a case of high institutional diversity, composed of not-for profit *cajas* and commercial banks. We examine the links between the massive migration of Spanish banks to market-debt dependent business models in the pre-crisis period to finance high growth in loans to real estate, with the severity of the damage caused by the crisis. We also examine whether the migration and the resulting consequences were similar or not in *cajas* and banks. We find that the severity of damages increases with the migration to more market-debt dependent business models, and that *cajas* were more severely damaged than banks, even though the two ownership forms of banks made similar business model choices. The paper highlights that bank ownership differences do not necessarily translate into differences in behavior in normal times, but what matter most is the resilience of ownership forms in bad times.

*JEL classification:* G21.

*Keywords:* Ownership of banks, governance, banking crisis, Spain, *cajas*, business models.

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## 1. Introduction

The ownership and governance of banks have been claimed to have high responsibility in the causes and consequences of the financial crisis (Kirkpatrick, 2009, Mulbert, 2010, Berger et al, 2012, Hopt, 2013). However, the reforms proposed to improve corporate governance do not converge towards some common grounds on what good governance of banks actually means. In this respect, the Walker Report (2009) for the UK adopts the shareholders' perspective on good governance and recommends that banks should be managed under the single goal of profit maximization. The Basel Committee (2010) and the European Commission (2010) adopt a different view of good governance and recommend banks' boards and senior managers to perform their duties taking into account the interests of shareholders, depositors and other relevant stakeholders (stakeholder-orientation of bank management). Finally, the Liikanen (2012) report to the European Commission praises institutional diversity as the best organizational structure for the banking industry. The diversity of views around what good governance means for banks reflects the lack of robust evidence about the superiority of one form of bank ownership (state, private owned banks, mutual, saving banks, cooperatives, stock corporations, listed or unlisted banks...) over the others (for reviews see Berger et al., 2005; Butzbach and Mettenheim, 2014). In this paper we extend the analysis of the relevance of ownership and governance of banks for financial stability. To do so, we compare the performance of different ownership forms in economic expansion and in crisis periods, using data from Spanish banks.

The Spanish banking industry has been traditionally seen as an example of institutional diversity as corporate banks (i.e. for-profit, shareholder-controlled banks), and the so-called *cajas* (i.e. not-for-profit, stakeholders-controlled, mission-oriented banks) split evenly practically all the Spanish retail banking market<sup>3</sup>. For many years, *cajas* profitably gained market share at the expense of banks and they were often cited as an example of the superior performance of stakeholders' banks over shareholders' banks (Butzbach and Mettenheim, 2013). However, in the recent financial crisis, the ex-post damages (quantified by government aids to compensate losses in the value of banks'

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<sup>3</sup>Corporate banks and *cajas* together concentrate more than 90% of the total bank assets; the rest of the banks' assets belong to credit cooperatives, subsidiaries and branches of foreign banks.

assets) have been much higher for *cajas* than for corporate banks: 85% of banks' total assets seriously damaged by the crisis belong to *cajas* and only 15% to corporate banks. The high damages together with some notorious cases of banking malpractices, have turned out into a loss of social confidence in the *cajas*. Today, politically driven regulatory reforms have determined the transfer of all the banking activities of the old *cajas* to a shareholders corporation and the Spanish banking industry has lost its historical institutional diversity. Those that praise diversity as positive for financial stability will regret the extinction of Spanish *cajas*, while those that praise the superiority of shareholders' profit maximizing firms will welcome their extinction. Since the debate on what means good governance of banks is not yet settled, a thorough study of why Spanish *cajas* failed with the crisis will contribute to a better understanding of how and when ownership of banks matter the most for financial stability.

This paper formulates two main hypotheses on why the *cajas* did not survive to the external shock of the financial crisis. One hypothesis states that the uniqueness of *cajas*' ownership and governance led them to make business decisions in the years before the crisis different from those of banks and, thus, the higher damages of *cajas* can be attributed to different ex-ante critical business decisions. The other hypothesis is that business decisions previous to the crisis were similar in *cajas* and banks, but *cajas* adjusted less effectively to the external shocks of the crisis. The lower capability of *cajas* to adjust and respond to external shocks was a consequence of their unique ownership and governance features (multiple goals, heterogeneous interests of stakeholders groups, impossibility of issuing new shares). The empirical evidence provided in this paper rejects the hypothesis that the *cajas* behaved differently from banks in the pre-crisis period. Moreover, it shows the likelihood of experiencing a severe damage with the crisis is positively associated with being a *caja*, controlling for risk variables in the pre-crisis period. We then conclude that the unique ownership and governance of *cajas* had more to do in the limitations to adjust and respond to the crisis than in inducing differences in behavior and risk exposure with respect to corporate banks during the pre-crisis period.

The pre-crisis behavior of Spanish banks is modeled in the paper following the business model approach. A business model consists in a pattern of assets and liabilities

composition of the balance sheets adopted by a group of banks that differs from the pattern adopted by other banks, with different risk and return combinations (Ayadi et al, 2012, 2013; Llewellyn, 2013; Ayadi and de Groen, 2014; Roengpitya et al. 2014). The methodology followed to address our research questions consists on grouping banks in business models and then comparing the performance across models. This strategy lays on the fact that firms, in general, and banks, in particular, make strategic decisions that involve a set of variables at the same time, rather than deciding on one by one (Buch et al., 2013, Blundell-Wignall et al., 2014). In this respect, the paper differs from those that examine the effects of business models on performance (risk and return) considering only variables of the composition of banks assets (Shleifer and Vishny, 2010, Diamond and Rajan, 2011) or of the composition of banks' liabilities<sup>4</sup>. All these papers analyze whether it is appropriate to set different regulations across business models, but they do not combine ownership form of banks and business models choices under a unified framework, as we do in this paper.

The Spanish banking industry, with the presence of both banks and *cajas*, offers a good natural experiment to examine how the choice of business model made by banks of different ownership and governance forms, affected both the collective (i.e. financial stability) and the individual (growth, risk, profitability) performance. Spain becoming a member of the Euro facilitated the access to international financial markets and loosened the financial constraints for both *cajas* and banks. The observation of how banks of each ownership type behaved when they were freed from constraints will provide valuable knowledge on how ownership may affect behavior in the new unconstrained situation.

Until the Euro, deposits were the main financing source of the banking sector. After Spain joined the Euro, the proportion of activity financed by wholesale markets increased exponentially, especially via securitization (Martín-Oliver et al. 2015). The Spanish banking sector expanded their balance sheets from 1.1 billions of Euros in 1999 up to 3.1 billions in 2007 (cumulative annual growth rate of 14%, compared with

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<sup>4</sup>Brunnermeier (2009), Diamond and Rajan, (2009), Gorton (2009), Beltrati and Stulz (2012) analyze the effect of liability composition on performance before the crisis. Dermiguç-Kunt and Huinga (2010), Ivashina and Scharfstein (2010), Altubans et al. (2011), Allen et al.(2014) analyze the effect after the crisis

compounded growth of nominal GDP of 7.4%) and the domestic credits and loans grew from 0.5 billions in 1999 up to 1.6 billion in 2007 (16% annual growth rate). This growth occurred at the same time that the Spanish institutions migrated massively from traditional business models with deposits financing the bank loans, to business models where loans (especially real-estate loans) were financed by increasing volumes of market debt. This paper documents the time path of this migration and the differences in the speed of migration among banks, as well as the growth, risk and return performance in each business model. This framework allows us to explore how migration affects the vulnerability of the banking system considering differences both within and across business models.

The results show that *cajas* followed corporate banks and also migrated from more traditional banking models towards models based on market-debt finance. The convergence in banking practices among *cajas* and banks is a phenomenon observed all along the period of study 1992-2007. What is different in the euro period is that both *cajas* and banks spread their assets more evenly among different business models, from less vulnerable (low leverage with balanced ratio of loans and deposits) to more vulnerable (higher leverage with higher dependence on market debt finance). Another evidence is that, although all *cajas* followed banks in the direction of changing their business model, not all *cajas* did it at the same pace neither all *cajas* experienced the same damages ex-post. Another question addressed in this paper is then what determines the different behavior and performance among *cajas*.

Following previous research, the paper first focuses on differences among *cajas* in political influences (Illueca et al., 2013; Fernández-Villaverde et al., 2013), and in human capital of the chairman of the board (García-Marco and Robles Fernandez, 2008, Cuñat and Garicano, 2010, García-Meca and Sánchez-Ballesta, 2012, García-Cestona and Sagarra, 2014), as a possible explanation of differences in behavior. But, as it has been the case in most of previous work, we do not find conclusive evidence supporting that these variables explain differences neither in the choice of the business model made by *cajas* nor in the ex-post damages among *cajas*<sup>5</sup>. What is new in this paper is the

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<sup>5</sup> *Cajas* have been sometimes viewed as state owned banks (Illueca et al., 2013) so one possible conceptual framework to study the behavior and performance of *cajas* is that developed for state owned banks (La Porta et al, 2002, Dinç, 2005). However, from a legal point of view *cajas* are private entities

evidence that cajas that migrated to business models more dependent on market debt paid higher compensation to the management team. Moreover, higher compensation of the management team is also positively associated with higher ex-post damage for the cajas with the crisis. Chang et al (2010) provide evidence that institutional investors pushed banks managers towards riskier decisions, rewarding for such behavior. It could be that the cajas that issued larger volumes of market debt to finance credit growth and taking higher risks were also induced to do so by a compensation system that rewarded growth and profits, while ignoring the excessive risk taking in the process.

The rest of the exposition is organized as follows. In Section 2 we present the results of the cluster analysis used to identify the business models of Spanish banks, examine the time stability of the clusters, and compare the behavior and performance of banks in different clusters. Section 3 examines why Spanish banks migrated from balanced loans-deposits business models to market debt dependent business models during the pre-crisis years. Section 4 explores the ex-post damages experienced by banks in each business model in the 2008 financial crisis. Section 5 examines the relationship between pre-crisis behavior and post-crisis damages for each ownership form of banks. Section 6 enters deeply into the determinants of observed differences in pre-crisis behavior and post-crisis damages within the group of cajas. Finally, the Section 7 summarizes the main results of the paper.

## **2. Business models in banking: Application to the Spanish banking industry**

In this section we use the statistical method of cluster analysis (Everitt et al 2001) to identify the business models operating in the Spanish banking industry. The methodology is similar to that followed by Ayadi et al. (2011, 2012)<sup>6</sup>. We split the data sample for the period 1992-2007 into shorter sub-periods and do a cluster analysis in

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and the observed differences in performance and behavior among them, as well as their profitable growth during many years do not match well with what could be expected from state owned banks.

<sup>6</sup>Retail banks are characterized by serving customers with traditional products such as deposits, saving and loans, and payment services, using a dense network of relatively small branches extended through local, regional, national and, in some cases, international geographic markets. Investment-oriented banks focus on trading activities and rely on different sources of funding, specially issuing debt. Finally, wholesale banks concentrate their activities in market segments of institutional clients, such as governments, corporations or other financial institutions. They get funds from the debt and the wholesale markets. Some banks specialize in one business model and others do business with all of them, universal banks.

each of them: Pre Euro periods of 1992-1994 (recession), 1995-1998 (recovery); post-Euro periods of 1999-2002 (moderate growth) and 2003-2007 (exponential growth). The data sources are the income statements, balance sheets, complementary information remitted by the individual banks to the Banco de España, and the Spanish Credit Register. The accounting statements and other complementary data refer to individual non-consolidated banks (except data on regulatory capital) and is limited to the banking activity performed in Spain. Banks in the sample include corporate banks, cajas, and subsidiaries of foreign banks.

We consider that the decisions that shape the banks' business model are decisions on the *sources* and the *uses* of the funds, which are reflected in the composition of the assets and liabilities of their respective balance sheets. The actual variables used in the cluster analysis are similar to those used in previous work on business models of banks (Ayadi et al., 2011, 2012), adapted to the characteristics of Spanish banks, particularly their main orientation towards retail banking. The final list of variables is the following:

1. *Equity as percentage of total assets.* Common equity, i.e. capital and reserves from retained earnings. It is the component of the bank regulatory capital with high loss-absorbing capacity. The ratio of equity over total assets of the bank is the complementary to the accounting leverage ratio. Banks with higher risk exposure and banks with higher risk aversion for a given level of risk exposure are expected to choose a higher equity ratio (i.e. lower leverage ratio), while complying with the regulatory capital requirements.
2. *Loans as percentage of total assets.* Banks grant loans and invest in securities. Banks in the retail banking business will have a higher proportion of bank loans in the total assets, while investment banks will have a higher proportion of their assets in trading securities.
3. *Loans over deposits ratio.* Collecting deposits and using the collected funds to grant loans to business and families characterize retail banking. A value lower than one for this variable indicates that the amount of deposits collected by the bank exceeds the amount of granted loans. So, the excess of funds will be used to trading activities or to lend to other banks. On the contrary, a value of this ratio higher than one means that the bank is granting more loans than the collected deposits and, consequently, relying on market debt to finance the gap.

#### 4. *Bank loans minus bank liabilities as a percentage of total assets (Net interbank).*

The numerator of this ratio accounts for the net position of the bank in the interbank market. A positive (negative) value indicates that the bank is a net lender (borrower) in the interbank market. Information of this variable is complemented with information on bank loans and bank liabilities separately. All together will indicate the activity of the bank in the wholesale market.

Figure 1 shows the assets-weighted mean values of these variables for every year for the three ownership forms of banks in the database. The figure documents a decreasing time trend in the equity-to-total assets ratio; an increasing time trend in the proportion of loans in the assets of banks, as well as in the ratio of loans to deposits (especially after year 2000), and a decreasing trend in the net interbank position. The *cajas* present some unique features compared with banks. First, the equity ratio of *cajas* first increases until year 2000 and then it decreases until 2007. Second, the *cajas* had a larger balance of deposits compared to loans until the mid nineties. Since then, loans have increased more than deposits and by 2007 the ratio of loans to deposits was close to that of corporate banks.

### 2.1. Business models from cluster analysis

Taking into consideration the maximum value of the Calinski-Harabsz pseudo F-statistics and the economic meaning of the results, banks are grouped into four business models, the same in the four sub-periods of time. Table 1 shows, for each cluster, the average value of selected variables including: those used in the identification of the cluster; the proportion of loans to other banks; and the proportion of securitized assets (ABS and MBS). The number of crosses (+) indicates the number of clusters whose mean value is statistically different ( $p < 10\%$ ) to the one where the “+” is placed. For instance, the average of Loans/Assets in Cluster 1, period 1992-1994, displays three (+), meaning that the value of 0.299 is statistically different from the average value of the variable in the other three clusters. By the same token, the average value of the variable in Cluster 2 displays two (+), meaning that 0.493 is statistically different from two other clusters (Cluster 1 and 4) and non-different from the value of one cluster (Cluster 3). Figure 2 offers a visual representation of the profiles of the four clusters, reporting the mean values of the variables by clusters, for the period 2003-2007.



Cluster 1 includes banks with relatively low volume of loans in total assets, which also present a ratio of loans to deposits clearly lower than one. Banks in this cluster lend the excess of liquidity to other banks, so the net position in the interbank market is positive. Additionally banks in this cluster lend high amounts in the interbank market and do not securitize loans. The equity ratio is in line with the ratio for the rest of groups, with some exceptions in the final period. We call this business model *Retail-deposits* model.

Cluster 2 includes banks with relatively high volume of loans and also a relatively high volume of deposits (ratio of loans to deposits close to one). Banks have similar volume of borrowing and lending in the interbank market, i.e. the net interbank position is close to zero. Banks in the cluster follow the bank practice of originate-to-hold, and their securitization activity is almost nonexistent. The equity ratio does not differ substantially from the ratio of the rest of groups. We call the business model of these banks *Retail-balanced* model.

Banks in Cluster 3 differ from banks in Cluster 2 in that the volume of deposits is lower than the volume of loans and part of the deficit is covered with funds obtained in the interbank markets. These banks lend in the interbank market similar relative amounts than those in Cluster 2, but they borrow larger amounts. Since 1999, banks obtain part of their funds issuing market debt and securitization. We call this business model *Retail diversified*, since banks finance their assets with funds from multiple sources.

Finally, banks in Cluster 4 have a similar lending activity relative to total assets compared to Cluster 3, but their volume of deposits relative to loans is lower. For this reason, banks have a more negative position in the interbank market and, on average, have to issue relatively more market debt than those in Cluster 3. The amount of issued securities is relatively small before the period 2003. After this year banks in Cluster 4 have the lowest equity ratio and the highest leverage. We call the business model of banks in Cluster 4 *Retail-market* model.

From the information at the bottom of each sub-period displayed in Table 1, in the years 1992-2002, at least 90% of the assets of the banks in the sample are concentrated in Clusters 1 and 2 (retail-deposits and retail-balanced models). In period 2003-2007, the industry experienced important changes. The number and characteristics of business

models did not change (averages values of variables in each cluster do not change too much), but many banks changed their business model migrating from Cluster 1 and 2 to Cluster 3 and 4. On average, for the five-year period 2003-2007, Cluster 1 concentrates only 5% of the total assets while the remaining 95% of the assets are distributed almost evenly among the other three business models: in the period 2003-2007, 72% of the assets of Spanish banks were operating under Cluster 3 and 4 (business models of either balanced or market-based finance). Five years earlier these two business models concentrated only 4% of the total industry assets.

Table 2 and Figure 3 show a transition matrix across clusters from period 1999-2002 to period 2003-2007. The table confirms that persistency is very low, except for banks in Cluster 4. The migration over time from Clusters 1 and 2 to Clusters 3 and 4 is evident from the data. In 2007 the assets of banks are mostly distributed between the business model of market debt (around 60% of assets) and that of diversified finance (around 30%). The remaining 10% split equally between the models of deposits and balanced.

## 2.2. Structural characteristics, behavior and performance across business models

The variables used in the cluster analysis only capture part of the heterogeneity observed among banks in the sample data. The composition of assets and liabilities that defines each business model will likely induce other business decisions by banks and may imply differences in performance across clusters. In this section we compare the business models along other dimensions than those in Table 1, in particular: i) size and growth; ii) product and market scope; and iii) performance. The information is limited to the most recent period of 2003-2007, just before the crisis. A more detailed definition of the variables used in this analysis together with descriptive statistics for the whole sample period, are presented in the Appendix A1 and A2, respectively.

### Size and growth

Table 3 shows the averages of size (average assets of all bank-years observation in a given cluster) and growth (average annual growth rate in assets, loans and number of branches) of banks across clusters. The values of the size and growth variables are a reflection of the high balance sheet expansion experienced by Spanish banks in the

period 2003-2007, coinciding with the credit boom (concentrated mainly in loans to construction and real-estate businesses, as we will see later). Differences in average sizes across business models, increasing from Cluster 1 to Cluster 4, result in part from the higher growth rates of banks in Clusters 3 and 4: An average cumulative annual growth rate of 20.9% (11%) of banks in Cluster 4 (Cluster 1) implies that, after 5 years, the initial size of the bank is multiplied by a factor of 2.5 (1.6). The average annual growth rate of loans around 20% is similar across business models, except for Cluster 1 that is statistically lower (15.6%). The average annual growth of the number of branches is between 3% and 4% in all business models except in Cluster 1, for which the growth rate is close zero. The high expansion of the banks assets in the period 2003-2007 was possible because banks borrowed funds from market sources, so the pattern of growth rates and sizes in Table 3 are the counterpart of migrations from Clusters 1 and 2 to Clusters 3 and 4.

#### Markets and product specialization

We now focus on variables that capture the specialization decisions of banks (Table 4). The first block of variables refers to the composition of the portfolio of loans; the second block refers to the customer base; and the third one to the specialization in terms of sources of revenues and in pricing behavior.

We observe that banks in Clusters 2 and 3 tend to follow a similar specialization strategy in markets and products, while banks in Clusters 1 and 4 follow a more differentiated one. While banks in Clusters 1 and 4 specialize more in consumer loans and less in government and mortgage loans, those in Clusters 2 and 3 serve a large base of consumers in urban and rural areas, and earn a relatively high intermediation margins (difference interest rates of loans and deposits). They sell traditional bank products, including mortgages, and have a substantial presence in the market of construction and real estate and in lending to government. Banks in Cluster 1 specialize in consumer credit (i.e., riskier and, thus, charge high interest rates on their loans), operate mainly in urban areas with a small network of large branches, and the collected fees from services represent an important source of revenues<sup>7</sup>. Finally, banks in Cluster 4 earn higher

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<sup>7</sup> Banks in Cluster 1 in the period 2003-2007 are not representative of the Banks in this cluster along the whole period of time. The cajas in Cluster 1 (that traditionally collected more deposits than the loans they

fraction of revenues in the form of service fees and follow an aggressive pricing policy, probably to sustain their high grow rates and because their customers are more sophisticated buyers (firms, high-volume accounts and urban residents).

### Performance

We now focus, Table 5, on the variables that capture the performance of banks, i.e. solvency, liquidity, operating efficiency, profitability and risk. This table provides evidence that the level and quality of the regulatory capital, as well as liquidity ratios worsen as we move towards clusters more dependent on wholesale financing. Banks with high market debt finance show relative high efficiency and profitability ratios and mixed results in terms of risk than banks in other clusters.

The solvency ratio (ratio of regulatory capital over risk weighted assets, RWA) and the proportion of equity in the total regulatory capital (indicator of the quality of the solvency ratio) present higher average values in Clusters 1 and 2 and lower in Cluster 4 (consistent with lower equity ratio in Cluster 4, see Table 1). Overall, banks in Clusters 3 and 4 show higher leverage and lower regulatory solvency ratios and also hold lower liquid assets than banks in Clusters 1 and 2. These results are in line with the findings in Table 1, where we observed a higher loans-to-deposits ratio and higher dependence on market debt for banks in Clusters 3 and 4.

There are practically no statistical differences in TFP across clusters (only between Cluster 2 and 4). But the ratio of operating costs to operating margins indicates that the operating efficiency increases from Cluster 1 to Cluster 4. For banks in Clusters 1 and 2, the lower operating efficiency may respond to their smaller size (Cluster 1) and their specialization in low-volume customers and their larger network of smaller branches (Cluster 2). On the other hand, the higher operating efficiency of banks in Cluster 4 may respond to the issuance of more market debt to finance their assets investment. The reason is that getting the debt from the market requires much less resources than collecting deposits through branches.

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granted) migrate to other business models after 2003. Thus, the banks that continue in Cluster 1 after this year are a miscellaneous of banks, including e-banking banks..

The averages of accounting ROA are not statistically different across business models. However, the ROE increases from Cluster 2 to Cluster 4 and there are statistical differences across clusters. Similar averages in ROA and higher averages in ROE are explained by the fact that the average leverage increases from Cluster 2 to Cluster 4. As well as the accounting ROA (net profits over total assets), Table 5 also shows what we call *ROA before*, equal to the profit before provisions and depreciations divided by the total assets, i.e. *operating cash flows* over total assets. The average *ROA before* increases from Cluster 2 to Cluster 4 and the differences are statistically significant. The comparison of this result with that of equal average accounting ROA indicates that loan loss provisions and depreciation over total assets also increase moving from Cluster 2 to Cluster 4, consistent with the pattern of differences in growth rates (for example, high credit growth increases the statistic provision of banks).

The Z-score is an inverse measure of the insolvency risk of banks. Banks in Clusters 2 and 3 show similar average Z-scores for the two measures of ROA (accounting *ROA* and *ROA before*). We observe that banks in Cluster 1 present higher insolvency risk than banks in Clusters 2 and 3. Banks in Cluster 4 have lower average z-score than banks in other clusters, when the score is calculated with the operating cash flow, Z-score of *ROA before*. Therefore, in terms of relative volatility of operating cash flows banks in Cluster 4 are riskier than banks in Clusters 2 and 3.

As for the other two measures of risk, banks in Clusters 2 and 3 show similar ratio of RWA over book value assets. This ratio is particularly low for banks in Cluster 1 (see note 7). The lowest ratio of non-performing loans is for banks in Cluster 4, what can be explained by their higher assets growth rates. Banks in Cluster 2 score relatively high in non-performing loans, although not too different from banks in Cluster 3. This is consistent with the previous evidence on the similar specialization in products and markets of Clusters 2 and 3.

### **3. Why did Spanish banks migrate to market-debt business models?**

Spain became a founding member of the Euro zone in 1999. Since then, Spanish banks benefited from a reduction in the risk premium brought by the new currency and from

the relaxation of the monetary policy of the major Central Banks in the world that aimed at mitigating the effects of the dotcom crisis. In the period 2003-2006 took place the bulk of the migration of Spanish banks to more market debt dependable business models, a period when official interest rates continued at their low values and securitization of loans become a common practice in financial markets around the world (CDS, ABS,...). In this context of abundant liquidity in international financial markets, Spanish banks borrowed at low costs comparable to those of banks anywhere in the Euro zone and, as a result, banks' balance sheets increased at higher rates than deposits. Spanish banks used the market-supplied debt to finance loans to construction and real estate activities, which resulted in a real estate bubble<sup>8</sup>.

The response of banks to the lax monetary conditions was probably individually rational, but it is not clear whether that the performance was superior in the new market equilibrium than in the equilibrium before the migrations took place. In this section we provide some evidence that should tell us if migration to the market debt dependable business model improved or not the performance of Spanish banks.

Table 6 compares the average values of selected variables in business models of Clusters 1 and 2 during 1999-2002 (in this period practically all activity was concentrated in these two clusters), with those of Clusters 2, 3 and 4 during 2003-2007 (Cluster 1 is residual in this period and is ignored in the analysis). The questions posed are: Did banks that migrate to Clusters 3 and 4 improve their performance compared to that of banks that continued in the Balanced-business model of Cluster 2? Did banks improve their performance in the more lax monetary conditions of 2003-2007 compared with the performance in the years before?

As expected given the lower cost of market debt funds, banks in Cluster 2 grew at higher rates during the years 2003-2007 than in the previous period (15% and 11% of annual growth rate in total assets, respectively). Most of this growth was in loans to construction and real estate activities and, thus, banks in Cluster 2 increased

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<sup>8</sup>Existing real estate assets in Spain experienced a substantial price increase with the Euro since long living assets are those benefiting relatively more from the drop in the discount factor resulting from the lower risk premium brought by the transition from the Peseta to the Euro and by the negative real interest rate of the Spanish economy in the year of lax monetary policy.

substantially the concentration of loans in these activities. The rates of return, both *ROA accounting* and *ROA before* (accounting profits and operating cash flows over total assets, respectively) decreased on average from 0.93% and 1.48% in 1999-2002 to 0.62% and 1.28% in 2003-2007, respectively, whereas the ratio of equity over total assets slightly decreased from 6.12% to 5.97%. However the z-scores slightly increased in the period 2003-2007, what implies more stable rates of return in 2003-2007 than in 1999-2002 (lower standard deviation of rates of return). Overall, the evidence from Table 6 indicates that banks in Cluster 2, banks with a Balanced business model, grew faster in the period of lax monetary conditions, but they did so maintained practically unchanged the trade-off between risk and return.

We now turn into the comparison between banks that migrated to business models of Cluster 3 and 4 and banks that did not migrate. Banks in Clusters 3 and 4 grew at higher rates than banks in Cluster 2 (20% compared with 15% in 2003-2007), mostly again with loans to construction and real estate that reached concentration levels of 50%. The averages of *ROA accounting*, *ROA before* and of the *z-score accounting* of banks in Cluster 3 and 4 in 2003-2007 are practically the same to those of banks in Cluster 2 in the same period. However, the average value of the *z-score before* decreased and average leverage ratio (inverse of Equity/Assets) increased in 2003-2007 compared with the previous period, which implies higher insolvency risk and higher financial risk, respectively.

From the values shown in Table 6 the response to the questions raised at the beginning of this section must be that the lax monetary conditions of 2003-2007 induced high growth behavior among Spanish banks lending to construction and real estate activities at much higher growth rates than in the years before. However, this growth did not turn into higher profitability, neither among banks that continued in the Balanced-business model (Cluster 2) nor among banks that migrated to the faster-growing, market-debt business models (Clusters 3 and Cluster 4). Migrating banks lowered their equity capital ratios, increased their leverage, and (especially for those that migrated to Cluster 4) increased their default risk (lower z-score computed with operating cash flows). Overall, we conclude that, even though banks probably behaved in an individual rational way, increasing the lending activity while migrating to market-debt business models did not reward them with a more favorable risk-return combination.

#### **4. The materialization of risk**

As the crisis evolved and turned more systemic in most parts of the developed world, it became evident the high vulnerability of the Spanish banking industry as the result of the funding and lending practices just described. Although in 2007 Spanish banks were moderating the rate of growth in loans in response in part to the tightening of the monetary policy by the ECB since 2006, the sudden stop of construction and real estate activities that employed almost 20% of the private labor force of the Spanish economy in 2007, accelerated the economic recession brought in part by the international financial crisis. The severity of the shock for the highly vulnerable banking sector is clear if one takes into account that unemployment rose above 25 and prices of real estate and other long term assets went down by almost 60% in real terms since 2007 and on. We now present some evidence on the damages experienced by Spanish banks and analyze whether the size of the damages were proportional to the vulnerability of the business model chosen by the bank in the pre-crisis period.

One important element of this analysis is choosing the variable with which we measure the severity of the damage experienced by each bank. For the purpose of our analysis, we rank banks in terms of the size of the experienced damages taking into account: i) the results from the stress test by Oliver Wyman in year 2012, attending to the resulting capital requirements; and ii) whether the banks survive after the industry restructuring or not. Banks (only parent banks, subsidiaries are excluded) in each business model are then classified, depending on the severity of their situation after the crisis, in one of the following levels of damage: A) banks acquired or absorbed; B) banks with high capital requirements after the stress test, including nationalized ones; C) banks with minor capital requirements, partial public support and restructuring; and D) banks with no additional capital needs.

The results of the cross-tabulation of the banks' business model in 2007 and the categories of degree of damage after the crisis appear in Table 7. Half of the banks are classified as banks with severe damage (A and B). More than 70% of the banks either disappeared because they had been merged or acquired by others, or were diagnosed needing an amount of additional capital. The highest proportion of more severely damaged banks within a particular business model occurs in Cluster 4 and the lower in



Clusters 1 and 2. For banks in Cluster 3 the likelihood of being severely damaged by the crisis was 56%, i.e. in this business model the probability of suffering a serious damage is almost equal to the probability of not needing extra capital. A Pearson correlation test rejects the null hypothesis of independence between belonging to a business model and the severity of damages in the crisis (p-value= 1.6%).

The conclusion from Table 7 is that the-ex-ante high vulnerability of Cluster 4 (i.e. relatively high dependence on market debt and high leverage) is correlated with the ex-post degree of difficulties faced by the bank. In terms of systemic damage, we recall that in 2007, 60% of the total assets of Spanish banks were managed under business model of market debt. Therefore, in the years previous to the crisis the expected proportion of total assets exposed to severe damage was 40% ( $60\% \cdot 0.67$ ). If we take together the exposure to damage of banks in Clusters 3 and 4, then the expected damage increases up to 54% (probability of damage increases up to 60% and 90% of the total assets are damaged)

Although belonging to Cluster 4 implied a higher likelihood of severe damage in the crisis, there are five banks in this business model that passed the stress test without additional capital requirements. Similarly, the ex-post likelihood of severe damage is around 50% in Cluster 3, even though banks in this cluster could be considered to be medium-high vulnerable to the crisis. These results suggest that, although differences in the business model of the bank imply different ex-ante vulnerability to severe external shocks, there may be additional factors affecting such vulnerability too. One of these factors could be the ownership form of banks taken into account that half of the Spanish banks are *cajas*, with an ownership and governance system different from that of corporate banks. In the next section we examine in detail and compare ex-post damage and ex-ante performance of *Cajas* and of corporate banks.

## **5. Separate analysis for corporate banks and *cajas***

The Spanish banking industry was split between corporate banks and *cajas*, with residual presence of credit cooperatives and subsidiaries and branches of foreign banks (less than 10% of the assets all together). The corporate banks are shareholder-controlled, for-profit banks with governance systems in line with those of other

corporate banks around the world. The *cajas* are stakeholder-controlled, private, not-for-profit commercial banks with several missions, including the efficient and financially sustainable provision of banking services, while contributing to financial inclusion of usury avoidance. The not-for-profit condition implies that profits of *cajas* must be either retained as reserves or dedicated to finance social works. Since the banking market was fully liberalized in Spain in the early nineties, the *cajas* have competed with corporate banks in equal grounds. Over the years, *cajas* have profitably increased their market share at the expense of corporate banks in both loans and deposits markets, even though their unique ownership and governance may have induced to believe otherwise.

The *cajas* do not have owners. The rights to decide on strategic and tactical decisions are delegated by law to directors named as trustees of a banking franchise. These trustees cannot receive a salary for their duties neither do they earn a share of the *cajas*' profits (dividends). *Cajas* have three main governing bodies, the general assembly, the board of directors together with the control board, and the management team. The members of the assembly are representatives elected by depositors and employees, plus representatives nominated by public bodies (city halls, regional governments) and by the *cajas*' funding entity. The board of directors and the board of control include members that proportionally represent the interest groups present in the general assembly. The board nominates the management team and management directors have voice but not voting power as board members. In periods of crisis before the recent one many *cajas* merged, mainly within the same political region (Autonomous Community) and *cajas* were proud to say that they had never been rescued with public funds<sup>9</sup>. The *cajas* had to respond to multiple stakeholders from the multiple goals included as part of their mission, mentioned above.

Given their particular nature, it is difficult to know for external observers how *cajas* do actually behave; for example, how important is profit maximization in their business decisions. However, it cannot be ruled out that *cajas* make a good part of business decisions under the criteria of profit maximization for several reasons. First, the *cajas*

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<sup>9</sup>For a historical view of the birth and growth of Spanish *cajas*, see Tedde Lorca (1991), and Comin and Torres (2005).

depended on profits to sustain growth, as the equity to comply with the solvency regulatory capital ratio had to come from retained profits (no share issuance). Second, the provision of public goods as part of the activities of social work increases with the level of profits, for a given retention policy. Third, the competition with profit maximizing corporate banks will demand efficiency in the allocation of resource to preserve market share and being financially sustainable (as private entities they do not receive public subsidies as could be the case among state-owned banks).

After Spain joins the Euro zone, corporate banks and *cajas* faced business opportunities unfeasible until then. The posed question was also the same: will the unique ownership and governance of *cajas* condition their business model choices or will the ownership and governance form will be irrelevant. One the one hand, *cajas* could adopt a business model differentiated from corporate banks because some of the business models involve financial innovations that would be difficult to understand by the representatives of some stakeholder groups. Moreover, financial investors could be reluctant to supply funds to the *cajas*, given the weaknesses attributed to their unique ownership form. One the other hand, *cajas* could choose similar business models than corporate banks if they follow the tradition of competing with banks in equal grounds and with the same competition tools.

To answer this question, we now repeat the analysis presented in the previous section, separating the business models decisions of *cajas* and the decisions of corporate banks. In this respect, Figure 4 and Figure 5 show the mean values of the variables in each cluster for corporate banks and for *cajas*, respectively. Next, in Figure 6 and Figure 7 we show the time evolution from 1999 till 2007 of the assets of corporate banks and the *cajas* in each business model. Finally, Table 8 shows the distribution of bank assets across business models in 1999-2002 and 2003-2007. The observation of these figures and Table 8 makes clear that *cajas* imitated banks in their migration to more market-debt dependent business models after 2002, although with some time lag. In 2007, the year before the crisis starts, the distribution of assets of *cajas* across business models was: 50% in Cluster 4, 40% in Cluster 3 and 10% in Cluster 2, (there were no *cajas* remaining in Cluster 1). In the case of corporate banks, these proportions were 75%, 15% and 8%, respectively (2% of the assets of corporate banks were still in Cluster 1).

In the period between 1999 and 2002 the assets of corporate banks and *cajas* in business models of Clusters 3 and 4 were residual.

The conclusion is then that *cajas* followed corporate banks in the choice of the business models when the conditions of international financial markets allowed them to do so. Corporate banks and *cajas*, all together, in the period between 2003 and 2007, just before the financial crisis, abandoned traditional business models of Deposits Balanced and migrated to more market debt dependent business models.

### *The damages during the crisis*

Each business model gathers banks that follow similar patterns of behavior. If an external shock affects the market equilibrium, all banks with similar business models are likely to experience similar effects from the shock. We now compare the ex-post damages from the financial crisis of corporate banks and *cajas* in the same business model.

Table 9 presents the distribution of *cajas* across clusters, attending to the levels of damages considered in Table 7. In the group of *cajas*, the null hypothesis of independence between the choice of business model and the severity of the ex-post damage is rejected (Pearson correlation test with  $p$ -value of 0.5%). The likelihood of experiencing a severe damage in the crisis is lower in *cajas* with a Balanced business model (27% in Cluster 2) and higher in *cajas* adopting the Market debt business model (100% in Cluster 4). The eight out of eight *cajas* that experience severe damages with the crisis in Cluster 4, contrasts with only two out of seven corporate banks in the same situation in the same Cluster 4. The five corporate banks with minor damages in the crisis in Cluster 4 include the two largest Spanish corporate banks.

More than half of the *cajas* (57%) and similar proportion of the total assets (55%), experience high damage in the crisis (i.e. they belong to groups of severity A and B). The number of independent corporate banks with high damage is four out of eleven, around one third. In terms of assets, damaged corporate banks concentrate around 10% of total assets of all corporate banks. Of the total assets with heavy damages, from corporate banks and *cajas* in categories of damages A and B, 85% belong to *cajas* and

only 15% to corporate banks. Even though the exposition to ex-ante vulnerability of corporate banks and cajas was similar from business model choices in the period 2003 and 2007, the ex-post damages caused by the financial crisis were more severe for cajas than for corporate banks.

*Why did cajas were more damaged by the crisis than corporate banks?*

The evidence that cajas imitated corporate banks in the migration to more market debt dependable business models excludes the explanation that the unique ownership and governance of cajas led cajas to adopt strategic decisions different from those of corporate banks. It could happen, however, that the choice of the business model is not sufficient to explain the ex-ante vulnerability of banks to the crisis. For example, within the same business models, cajas could have had higher credit or insolvency risks than corporate banks. The question we pose is if, controlling for these risk variables, we still cannot reject the hypothesis that the likelihood of experiencing severe damage with the crisis is higher among cajas than among banks.

For this purpose we formulate and estimate a Probit model where the dependent variable *Damage* takes the value of 1 if the bank in the sample belongs to the damage categories of A or B and 0 otherwise. We include the dummy *Caja* as explanatory variable that takes the value of 1 if the bank is a *caja* and 0 otherwise, and a list of risk-related variables, i.e., growth of total assets, proportion of loans to construction and real estate, ratio of non performing loans, solvency ratio and z-score.

We expect that higher rates of growth in total assets (particularly in loans) will imply higher hidden credit risk in the portfolio of bank loans. We also expect that banks more concentrated in construction and real estate loans are more likely to experience serious damages. The ratio of non-performing loans is a measure of revealed credit risk of the portfolio of banks loans before the crisis. Higher values of this ratio anticipate higher likelihood that the damages from a negative external shock will also be higher. The solvency ratio is the ratio of regulatory capital of the bank over its risk weighted assets; higher solvency ratios means that banks have more capital to absorb losses and, thus, it would be negatively associated with the likelihood of a severe damage. Finally, the z-score is an inverse measure of the ex-ante exposure to the risk of default by a bank as it

expresses the ratio between the loss absorbing capacity of the bank (profits plus equity capital) and the variability (standard deviation) of profitability.

The results of the Probit estimation appear in Table 10. Column I is estimated with all the information available between 2003 and 2007, whereas Column II is estimated with the average value of each variable during 2003-2007. In Column III and IV, we present the same estimations that in I and II, but now each observation is weighted by the size of the bank measured by the total assets.

The estimated coefficients of the risk variables are in general statistically significant and with the predicted sign, though the z-score is only statistically significant in Column I. As expected, the likelihood that a bank experiences serious damage with the crisis is positively associated with high growth, higher concentration in construction and real estate loans, and higher non performing loan ratios, in the pre-crisis period. Controlling for these variables of ex-ante vulnerability, the likelihood that cajas experience high damage with the crisis is significantly higher than that of corporate banks<sup>10</sup>.

Summing up, we find that the conclusion that cajas experienced higher damages, even when controlling for the ex-ante risk, cannot be rejected. This finding, together with the conclusion above that cajas with the same business model experience higher damages than corporate banks, confirm that differences in the ex-post damage of cajas cannot be attributed to ex-ante differences in behavior. As anticipated in the introduction, the alternative hypothesis is that the difference in damages can be explained by the rigidities of cajas to promptly and effectively adjust and respond to the crisis, mainly because of their particular ownership and governance. The influence from multiple stakeholders in decision making, the influences from political groups, the no-possibility to issue shares to increase capital or the willingness to maintain the levels of social works increased the costs of collective-decision making and tightened the constraints of

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<sup>10</sup> Sagarra, Mar-Molinero and García-Cestona (2013) provide a comprehensive analysis on the prediction of failure of cajas with the crisis using financial ratios. The classification of cajas in fail or succeed is similar to that used here; they find that ex-ante profitability, solvency and quality of loans are good predictors of failure. Akin et al (2014) provide evidence that more damaged cajas ex-post were more careless in ex-ante loan granting decisions. Neither of them compares cajas with corporate banks as we do here.

these decisions. To prove or provide direct evidence in support of this explanation is difficult with the available information but at this point is the only plausible one.

## **6. Differences among cajas**

Although the legal reforms have led the immense majority of cajas to transfer their banking business to a corporate bank, it is clear from the analysis above that not all cajas made the same choices in terms of migrating to more market-debt business models, neither all of them experience similar damages with the crisis. In this section, we examine possible reasons behind the heterogeneous behavior and performance among cajas.

The collective decision problems from having representatives of several stakeholder groups in the general assembly and boards of directors increases the influence of insiders, managers and employees in the management decisions. Additionally, since the Autonomous Communities tutored the cajas and representatives of political parties were nominated as board members, there is a general presumption that Spanish cajas operated under strong political influences. The heterogeneity observed among cajas in terms of the choice of the business model may then be related with variables indicative of the power of insiders and of the political influence.

The political influences in the management of *cajas* are captured by two dummy variables. One, *Public Origin* takes either value 1 if the caja is one of those originally founded by a public entity, and 0 otherwise (founded by private entity). The other *Political Experience* takes a value equal to one if the chairman of the caja had direct political experience before being appointed to this position and 0 otherwise. The influence of insiders is captured with variables on the human capital of the chairman of the board, and on the compensation of the management team. We consider that lower human capital and higher compensation are indicative of higher insiders control over the nomination and compensation decisions. The human capital of the chairman takes into account formal education and working experience. The *Education* variable takes the value of one if the chairman had postgraduate education and zero otherwise; the variables *Banking (General) experience* take the value of one if the chairman had

managerial experience in banking (non-banking sectors) before occupying the current position and zero if had not. The information needed for the measurement of these variables was obtained by the authors of this paper from web files and press reports referred to the period 2003-2007. The variable *Compensation* is measured by the ratio total compensation to the management team over the total personnel expenditures for the period 2004 to 2007 (data on compensation and personnel expenditures are from company files).

The null hypothesis is that political and insiders' influences will have no effect on the choice of the business model and on the consequences of the choice in terms of severity of damages caused by the crisis. If the hypothesis is rejected then it should be in the direction of higher influences imply higher likelihood of choosing ex-ante more vulnerable business models (belonging to Clusters 3 or 4), and of being severely damaged ex-post (belonging to categories A or B).

Table 11 shows the number of resulting from the cross-tabulation of the types of business models and of the variables of political influence and the characteristic of the chairman, along with the *p*-value of the test of independence. In all cases the null hypothesis of independence is not rejected at *p* < 10% significance levels, so we do not find a statistically significant association between political influence, human capital and the choice of a particular business model.

The relationship between the compensation variable and business model is examined with the use of a simple econometric model that explains *Compensation* as a function of business models (dummy variables Cluster 2, 3 and 4), log of Assets and time dummy variables for the 164 cajas and years observations, in the period 2004-2007)<sup>11</sup>. We find that the coefficients of the dummies that identify Cluster 3 and Cluster 4 are

<sup>11</sup> The complete equation of the model that we estimate can be expressed as follows:

$$Compensation_{it} = \alpha_0 + \alpha_1 Cluster3_{it} + \alpha_2 Cluster4_{it} + \beta \ln Assets_{it} + \sum_{j=2004}^{2007} \delta_j Time_j + \varepsilon_{it}$$

The log of Assets variable is added as explanatory to account for possible economies of scale in the size and cost of the management team (recall that the compensation refers to the total compensation of all members of the management team). The other estimated values, not mentioned in the main text are  $\beta = -1.22$  ( $p < 0.01$ ),  $\delta_1 = 0.192$  ( $p < 0.12$ ),  $\delta_2 = 0.395$  ( $p < 0.10$ ),  $\delta_3 = 0.478$  ( $p < 0.11$ ). The hypothesis of increasing returns to scale in the cost of the management team is confirmed by the negative estimated coefficient of the size variable, and the increasing trend in the estimated coefficient of the time dummy variables suggests that the compensation variable increases over time.



0.378( $p < 0.4$ ) and 0.721 ( $p < 0.10$ ), respectively. Thus, the average compensation of cajas is only statistically different from zero less for cajas in Cluster 4, compared with cajas in Cluster 2 and 3. Therefore, there is some evidence indicating that the management teams of cajas in the business model of Market debt dependency (Cluster 4) earn higher compensation.

Finally, we examine the political and insiders' influences in the likelihood of cajas belonging to the group of high or low damage with the crisis. For this purpose, we estimate a Probit model with dependent variable *Damage* and the *Compensation* and the proxy variables for political and insiders' influences as explanatory variables. The results are shown in Table 12, for different specifications. Neither individually nor jointly are the variables of political influence and human capital of the chairman statistically significant.. A different result is obtained for the variable *Compensation*, whose coefficient is positive and statistically significant. In this case, the null hypothesis of no influence of the compensation variable on the ex-post damages is rejected and there is evidence indicating that those cajas that paid higher salaries to their management teams are more likely to fall ex-post in the category of high damage with the crisis<sup>12</sup>.

The evidence of higher average relative compensation of the management team among cajas in the market-debt dependent business model (Cluster 4), together with the evidence of a positive association between high compensation of the management team and the probability of experiencing a high damage with the crisis, suggests that cajas with high insiders' influences migrated to high market debt dependent business models with the expectation of increasing the compensation of the management team. The evidence corroborates Serra-Ramonedá (2011) insiders' view of the fall of the Spanish cajas, who attributes a large influence of this fall to compensation practices adopted by cajas with the purpose of emulating corporate banks in the pre-crisis period. The evidence is also similar to that in Chang et al (2010) where institutional investors pushed banks managers towards riskier decisions by rewarding for such behavior.

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<sup>12</sup> We have estimated the probit with data pooled for the four years in which we have information on the compensation variable with similar results.

## 7. Conclusion

When Spain joined the Euro banks were freed from financial constraints and new business opportunities arose. This created conditions for a natural experiment to see how banks responded to these new opportunities and if the response was similar among banks of different ownership and governance as it is the case with corporate banks and cajas. This paper documents that shortly after the creation of the Euro, a period of low official interest rates and abundant liquidity worldwide, Spanish banks expanded their balance sheets, lending massively to construction and real estate and financing these loans with funds from debt markets. The result was a migration (with different degrees) of all banks to business models that had been residual in the industry until then. The embedded liquidity risk from the mismatch between short-term market debt and long-term real estate loans turned into insolvency risks when the prices of the assets backing these loans fall substantially with the financial and economic crisis. The systemic banking crisis that followed is compatible with the evidence provided in this paper of a positive association between the severity of the damages experienced with the crisis and the growth of the balance sheet and the reliance on market debt finance.

Both banks and cajas migrated to the more market debt dependent business models, in spite of having very different ownership and governance. Therefore, the response to the softening of the constraints within the Euro was similar for the two ownership forms. In this respect, the pattern observed many years earlier when the internal banking market was fully liberalized (and cajas began to compete with similar strategies and tactics with corporate banks in all retail banking segments) repeated again later when the decision was the choice of the business model. The Spanish case is an example for many years of the irrelevance of ownership and governance form of banks in business decisions and performance. What is new in the crisis is that, even though corporate banks and cajas made similar business model choices in the pre-crisis period, cajas were more severely damaged with the crisis, till the point that the political system decided that cajas should disappear. But if differences in behavior and risk exposure ex-ante do not explain the differences in ex-post damages, then what is the explanation of this decision?

This paper claims that the higher damages of the cajas during the crisis respond to the inferior resilience of the ownership and governance of cajas to external shocks.

Therefore, the general lesson is that ownership and governance matter more in bad times than in good times. This implies that if a particular ownership form of banks is less resilient to external shocks then, in prevention of high potential damages ex-post, it is recommendable to behave differently and be more conservative in risk taking decisions ex-ante. At least half of the Spanish cajas failed in this diagnosis and followed corporate banks to the most vulnerable business model when they could.

Although the crisis of the Spanish banking industry has been mostly considered a crisis of the cajas, the truth is that not all cajas migrated to the most vulnerable business model. The heterogeneity observed among cajas in the pre-crisis period has been examined in the paper under the lens of two variables, political influences and insiders' influences in decision-making. We find no supportive evidence that potentially higher political influences and less human capital of the chairman of the board led to choices of more vulnerable ex-ante business models, and to higher ex-post damages. What we find is that the probability of a caja belonging to the category of high damage increases with the relative compensation of the management team. Therefore, we find supportive evidence that the compensating system induced growth and risk-taking behavior in the management team of those cajas that ended up more damaged.

The results of the paper suggest that the discrimination of capital regulation among banks should be extended to different types of ownership and governance. In this respect, the trade off may be between stakeholder banks that may have advantages in good times (for example contributing to financial inclusion), and corporate banks more resilient in bad times. They also justify a close attention by regulators of compensation practices adopted by boards of banks as they may have the power to induce managers' decisions and behavior beyond what could be expected from the ownership form of the bank.

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**Table 1.**Average values of the variables used in the cluster analysis by business model<sup>1</sup>: 1992-2007

|                       | Period 1992-94       |                       |                       |                       |
|-----------------------|----------------------|-----------------------|-----------------------|-----------------------|
|                       | Cluster 1            | Cluster 2             | Cluster 3             | Cluster 4             |
| Equity/Assets         | 0.067                | 0.061 <sup>+</sup>    | 0.074 <sup>+</sup>    | 0.060                 |
| Loans/Assets          | 0.299 <sup>+++</sup> | 0.493 <sup>++</sup>   | 0.508 <sup>++</sup>   | 0.389 <sup>+++</sup>  |
| Loans/Deposits        | 0.447 <sup>+++</sup> | 0.690 <sup>+++</sup>  | 1.341 <sup>+++</sup>  | 2.377 <sup>+++</sup>  |
| Net Interbank/Assets  | 0.238 <sup>+++</sup> | 0.116 <sup>+++</sup>  | -0.050 <sup>++</sup>  | -0.075 <sup>++</sup>  |
| Bank Loans/Assets     | 0.310 <sup>+++</sup> | 0.173 <sup>++</sup>   | 0.131 <sup>++</sup>   | 0.179 <sup>+</sup>    |
| Securitiz/Assets      | 0.000                | 0.000                 | 0.000                 | 0.000                 |
| Observations          | 56                   | 168                   | 36                    | 16                    |
| Share in total assets | 0.167                | 0.730                 | 0.085                 | 0.018                 |
|                       | Period 1995-98       |                       |                       |                       |
|                       | Cluster 1            | Cluster 2             | Cluster 3             | Cluster 4             |
| Equity/Assets         | 0.065 <sup>+</sup>   | 0.059 <sup>+</sup>    | 0.059                 | 0.064                 |
| Loans/Assets          | 0.353 <sup>+++</sup> | 0.552 <sup>++</sup>   | 0.488 <sup>++</sup>   | 0.516 <sup>+</sup>    |
| Loans/Deposits        | 0.517 <sup>+++</sup> | 0.862 <sup>+++</sup>  | 2.435 <sup>+++</sup>  | 4.306 <sup>+++</sup>  |
| Net Interbank/Assets  | 0.195 <sup>+++</sup> | 0.051 <sup>+++</sup>  | -0.079 <sup>++</sup>  | -0.106 <sup>++</sup>  |
| Bank Loans/Assets     | 0.273 <sup>+++</sup> | 0.144 <sup>+</sup>    | 0.154 <sup>+</sup>    | 0.130 <sup>+</sup>    |
| Securitiz/Assets      | 0.000                | 0.000                 | 0.000                 | 0.000                 |
| Observations          | 162                  | 297                   | 35                    | 28                    |
| Share in total assets | 0.221                | 0.760                 | 0.014                 | 0.005                 |
|                       | Period 1999-2002     |                       |                       |                       |
|                       | Cluster 1            | Cluster 2             | Cluster 3             | Cluster 4             |
| Equity/Assets         | 0.063                | 0.060                 | 0.066                 | 0.062                 |
| Loans/Assets          | 0.436 <sup>+++</sup> | 0.692 <sup>++</sup>   | 0.696 <sup>++</sup>   | 0.609 <sup>+++</sup>  |
| Loans/Deposits        | 0.665 <sup>+++</sup> | 1.016 <sup>+++</sup>  | 1.760 <sup>+++</sup>  | 3.231 <sup>+++</sup>  |
| Net Interbank/Assets  | 0.094 <sup>+++</sup> | -0.012 <sup>+++</sup> | -0.176 <sup>+++</sup> | -0.249 <sup>+++</sup> |
| Bank Loans/Assets     | 0.252 <sup>+++</sup> | 0.097 <sup>+++</sup>  | 0.141 <sup>++</sup>   | 0.176 <sup>++</sup>   |
| Securitiz/Assets      | 0.005 <sup>+</sup>   | 0.019 <sup>+++</sup>  | 0.010 <sup>+</sup>    | 0.000                 |
| Observations          | 178                  | 195                   | 43                    | 24                    |
| Share in total assets | 0.286                | 0.674                 | 0.035                 | 0.005                 |
|                       | Period 2003-2007     |                       |                       |                       |
|                       | Cluster 1            | Cluster 2             | Cluster 3             | Cluster 4             |
| Equity/Assets         | 0.052 <sup>+</sup>   | 0.060 <sup>+++</sup>  | 0.051 <sup>++</sup>   | 0.046 <sup>++</sup>   |
| Loans/Assets          | 0.282 <sup>+++</sup> | 0.698 <sup>+++</sup>  | 0.768 <sup>++</sup>   | 0.754 <sup>++</sup>   |
| Loans/Deposits        | 0.635 <sup>+++</sup> | 1.064 <sup>+++</sup>  | 1.518 <sup>+++</sup>  | 2.299 <sup>+++</sup>  |
| Net Interbank/Assets  | 0.095 <sup>++</sup>  | 0.028 <sup>++</sup>   | -0.061 <sup>+++</sup> | -0.129 <sup>+++</sup> |
| Bank Loans/Assets     | 0.408 <sup>+++</sup> | 0.101 <sup>++</sup>   | 0.075 <sup>+++</sup>  | 0.095 <sup>++</sup>   |
| Securitiz/Assets      | 0.001 <sup>+++</sup> | 0.015 <sup>+++</sup>  | 0.035 <sup>++</sup>   | 0.077 <sup>++</sup>   |
| Observations          | 57                   | 168                   | 149                   | 85                    |
| Share in total assets | 0.050                | 0.230                 | 0.410                 | 0.310                 |

Differences in mean values of the variables across clusters have been tested. The number of cross super-indexes (<sup>+</sup>, <sup>++</sup>, <sup>+++</sup>) indicates the number of bilateral comparisons for which the average of a cluster is statistically different at 10% significance level.

<sup>1</sup>Each cluster represents a business model. In particular, cluster 1 refers to the *retail-deposits* business model; cluster 2 to the *retail-balanced* model; cluster 3 to the *retail-diversified* model and cluster 4 to the *retail-market* model.



**Table 2.**

Transition matrix of banks across business models: period 2003-2007 compared to period 1999-2002.

|                             |           | Business Model in 2003-2007 |           |           |           | Total |
|-----------------------------|-----------|-----------------------------|-----------|-----------|-----------|-------|
|                             |           | Cluster 1                   | Cluster 2 | Cluster 3 | Cluster 4 |       |
| Business Model in 1999-2002 | Cluster 1 | 28.6                        | 42.9      | 17.9      | 10.7      | 100   |
|                             | Cluster 2 | 4.20                        | 10.4      | 56.3      | 29.2      | 100   |
|                             | Cluster 3 | 0                           | 7.70      | 15.4      | 76.9      | 100   |
|                             | Cluster 4 | 0                           | 14.3      | 0         | 85.7      | 100   |
|                             | Total     | 10.4                        | 19.8      | 35.4      | 34.4      | 100   |

Percentage of assets that remain in the business models they were in 1999-2002 (in the main diagonal), and percentage that migrate to other models in 2003-2007.

**Table 3.**

Average values of size and growth indicators across business models. Spanish banks: 1992-2007

|                                | Cluster 1           | Cluster 2           | Cluster 3          | Cluster 4          |
|--------------------------------|---------------------|---------------------|--------------------|--------------------|
| <i>Size</i>                    |                     |                     |                    |                    |
| Assets per bank (m€)           | 12.1 <sup>++</sup>  | 13.7 <sup>++</sup>  | 27.9 <sup>++</sup> | 41.2 <sup>++</sup> |
| <i>Annual growth rates of:</i> |                     |                     |                    |                    |
| Assets                         | 11.0 <sup>+++</sup> | 14.9 <sup>+++</sup> | 19.4 <sup>++</sup> | 20.9 <sup>++</sup> |
| Loans                          | 15.6 <sup>++</sup>  | 18.8 <sup>+</sup>   | 21.8 <sup>+</sup>  | 22.1 <sup>+</sup>  |
| Number of branches             | 0.6 <sup>+++</sup>  | 3.4 <sup>+</sup>    | 0.4 <sup>+</sup>   | 3.1 <sup>+</sup>   |

Differences in mean values of the variables across clusters have been tested. The number of cross super-indexes (+, ++, +++) indicates the number of bilateral comparisons for which the average of a cluster is statistically different at 10% significance level.

**Table 4.**

Average values of indicators on market and product specialization across business models<sup>1</sup>. Spanish banks: 1992-2007

|                                     | Cluster 1            | Cluster 2           | Cluster 3           | Cluster 4           |
|-------------------------------------|----------------------|---------------------|---------------------|---------------------|
| <i>Loan markets (%)<sup>1</sup></i> |                      |                     |                     |                     |
| Firms                               | 42.7 <sup>++</sup>   | 48.7 <sup>++</sup>  | 52.7 <sup>++</sup>  | 53.8 <sup>++</sup>  |
| Construction and Real State         | 6.8 <sup>+++</sup>   | 24 <sup>++</sup>    | 28.3 <sup>++</sup>  | 26.6 <sup>++</sup>  |
| Consumer                            | 26.3 <sup>+++</sup>  | 12.2 <sup>++</sup>  | 11.1 <sup>++</sup>  | 17.3 <sup>+++</sup> |
| Governments                         | 0.10 <sup>+++</sup>  | 2.50 <sup>+++</sup> | 1.50 <sup>+++</sup> | 0.7 <sup>+++</sup>  |
| Mortgage loans                      | 18.2 <sup>+++</sup>  | 38.4 <sup>+++</sup> | 36.1 <sup>++</sup>  | 29.0 <sup>+++</sup> |
| <i>Customers base</i>               |                      |                     |                     |                     |
| Size of branches (m.Euros)          | 376.1 <sup>+++</sup> | 26.2 <sup>++</sup>  | 31.3 <sup>++</sup>  | 89.6 <sup>+++</sup> |
| Branches in towns <1000h            | 0.00 <sup>+++</sup>  | 26.0 <sup>++</sup>  | 21.0 <sup>++</sup>  | 8.83 <sup>+++</sup> |
| Growth of branches out of origin    | 0.02 <sup>+++</sup>  | 0.14 <sup>+</sup>   | 0.15 <sup>++</sup>  | 0.115 <sup>++</sup> |
| Deposits per account                | 12.02 <sup>+</sup>   | 9.30 <sup>+++</sup> | 11.8 <sup>++</sup>  | 13.66 <sup>++</sup> |
| Loans per account                   | 97.64 <sup>++</sup>  | 51.9 <sup>+++</sup> | 71.3 <sup>+++</sup> | 97.1 <sup>++</sup>  |
| <i>Revenues and price (%)</i>       |                      |                     |                     |                     |
| Fees/Ordinary margin                | 59.4 <sup>+++</sup>  | 23.8 <sup>++</sup>  | 26.9 <sup>+++</sup> | 34.0 <sup>+++</sup> |
| Interest rate of loans              | 8.20 <sup>+++</sup>  | 6.40 <sup>++</sup>  | 6.20 <sup>++</sup>  | 5.80 <sup>++</sup>  |
| Interest rate of deposits           | 1.90 <sup>++</sup>   | 1.80 <sup>++</sup>  | 2.20 <sup>+++</sup> | 2.90 <sup>+++</sup> |

<sup>1</sup> Percentage of total loans

Differences in mean values of the variables across clusters have been tested. The number of cross super-indexes (+, ++, +++) indicates the number of bilateral comparisons for which the average of a cluster is statistically different at 10% significance level.

**Table 5.**

Average values of performance variables across business models. Spanish corporate banks and *cajas*:1992-2007.

|  | Cluster 1           | Cluster 2           | Cluster 3          | Cluster 4           |
|--|---------------------|---------------------|--------------------|---------------------|
| <i>Solvency (regulatory) and liquidity</i> |                     |                     |                    |                     |
| Solvency ratio (%)                         | 14.2 <sup>+</sup>   | 11.8 <sup>++</sup>  | 11.0 <sup>++</sup> | 9.7 <sup>+++</sup>  |
| Equity/Regulatory capital (%)              | 67.4                | 65.4 <sup>++</sup>  | 55.3 <sup>+</sup>  | 57.5 <sup>+</sup>   |
| Liquid assets/Assets (%)                   | 7.60 <sup>+</sup>   | 8.60 <sup>++</sup>  | 5.20 <sup>+</sup>  | 4.60 <sup>+</sup>   |
| <i>Operating efficiency</i>                |                     |                     |                    |                     |
| Operating costs/Operating margin (%)       | 62.7 <sup>++</sup>  | 59.4 <sup>++</sup>  | 53.3 <sup>++</sup> | 49.4 <sup>++</sup>  |
| Total Factor Productivity                  | 5.88                | 0.29 <sup>+</sup>   | 4.01               | 9.82 <sup>+</sup>   |
| <i>Rates of return</i>                     |                     |                     |                    |                     |
| Accounting ROA (%)                         | 0.80                | 0.93                | 0.98               | 1.03                |
| ROA (before) (%)                           | 1.06 <sup>++</sup>  | 1.28 <sup>+</sup>   | 1.37 <sup>+</sup>  | 1.49 <sup>+</sup>   |
| Accounting ROE (%)                         | 14.7                | 12.5 <sup>++</sup>  | 15.2 <sup>++</sup> | 17.7 <sup>++</sup>  |
| <i>Risk</i>                                |                     |                     |                    |                     |
| Z-score (accounting)                       | 38.3 <sup>++</sup>  | 51.6 <sup>+</sup>   | 55.6 <sup>++</sup> | 71.7 <sup>++</sup>  |
| Z-score (before)                           | 30.0 <sup>+</sup>   | 41.0 <sup>+++</sup> | 40.0 <sup>++</sup> | 27.0 <sup>++</sup>  |
| RWA/Assets (%)                             | 23.7 <sup>+++</sup> | 76.3 <sup>++</sup>  | 79.1 <sup>++</sup> | 62.2 <sup>+++</sup> |
| NP Loans/Loans (%)                         | 1.79                | 0.77 <sup>+</sup>   | 0.67               | 0.58 <sup>+</sup>   |

Each cluster represents a business model. In particular, cluster 1 refers to the *retail-deposits* business model; cluster 2 to the *retail-balanced* model; cluster 3 to the *retail-diversified* model and cluster 4 to the *retail-market* model. Differences across clusters have been tested. The number of star-superindexes (<sup>+</sup>, <sup>++</sup>, <sup>+++</sup>) indicates the number of bilateral comparisons for which the average of a cluster is statistically different at 10% significance level.

**Table 6.**

Comparative performance among dominant business models: 1999-2002 *versus* 2003-2007.

|  | Period 1999-2002 |           | Period 2003-2007 |           |           |
|--|------------------|-----------|------------------|-----------|-----------|
|  | Cluster 1        | Cluster 2 | Cluster 2        | Cluster 3 | Cluster 4 |
| Loans Const. & RE Firms <sup>1</sup> (%) | 26.8             | 33.3      | 49.2             | 53.9      | 49.4      |
| Assets rate of growth (%)                | 11.5             | 11.4      | 15               | 19.4      | 20.1      |
| Equity/Assets (%)                        | 6.21             | 6.12      | 5.97             | 5.08      | 4.51      |
| Accounting ROA (%)                       | 0.71             | 0.93      | 0.62             | 0.6       | 0.62      |
| Z-score (accounting)                     | 36.0             | 36.0      | 39.3             | 35.2      | 35.3      |
| ROA (before) (%)                         | 0.92             | 1.48      | 1.28             | 1.37      | 1.49      |
| Z-score (before)                         | 33.0             | 53.0      | 58.0             | 40.0      | 27.0      |

<sup>1</sup> As a percentage of total loans

Each cluster represents a business model. In particular, cluster 1 refers to the *retail-deposits* business model; cluster 2 to the *retail-balanced* model; cluster 3 to the *retail-diversified* model and cluster 4 to the *retail-market* model.

**Table 7**

Severity of ex-post damages in the crisis by business models. Spanish corporate banks and *cajas*(number of banks and %).

|                        | Cluster 1 | Cluster 2 | Cluster 3 | Cluster 4 | Total |
|------------------------|-----------|-----------|-----------|-----------|-------|
| Merged or acquired (A) | 0         | 4         | 8         | 5         | 17    |
| High capital need (B)  | 0         | 0         | 8         | 5         | 13    |
| Minor capital need (C) | 0         | 7         | 4         | 0         | 11    |
| No capital needs (D)   | 2         | 2         | 7         | 5         | 16    |
| Total                  | 2         | 13        | 27        | 15        | 57    |
| (A+B)/Total (%)        | 0%        | 30.8%     | 59.3%     | 66.7%     | 52.6% |

Each cluster represents a business model. In particular, cluster 1 refers to the *retail-deposits* business model; cluster 2 to the *retail-balanced* model; cluster 3 to the *retail-diversified* model and cluster 4 to the *retail-market* model.

The hypothesis of independency of the distribution of observations in rows and columns is rejected. The  $p$ -value of the  $\chi^2$ Pearson is 0.010

**Table 8**

Distribution of bank assets across business models by ownership form (%)

|                 | Period 1999-2002 |           |           |           |
|-----------------|------------------|-----------|-----------|-----------|
|                 | Cluster 1        | Cluster 2 | Cluster 3 | Cluster 4 |
| Corporate Banks | 25.9             | 70.2      | 3.3       | 0.5       |
| Cajas           | 31               | 67.6      | 1.4       | 0         |

|                 | Period 2003-2007 |           |           |           |
|-----------------|------------------|-----------|-----------|-----------|
|                 | Cluster 1        | Cluster 2 | Cluster 3 | Cluster 4 |
| Corporate Banks | 9.6              | 13.1      | 38.8      | 38.4      |
| Cajas           | 0                | 34.6      | 42.9      | 22.5      |

Each cluster represents a business model. In particular, cluster 1 refers to the *retail-deposits* business model; cluster 2 to the *retail-balanced* model; cluster 3 to the *retail-diversified* model and cluster 4 to the *retail-market* model.

**Table 9**

Business models and severity of ex-post damages in the crisis: *cajas*(number of *cajas* and %)

|                        | Cluster 1 | Cluster 2 | Cluster 3 | Cluster 4 | Total |
|------------------------|-----------|-----------|-----------|-----------|-------|
| Merged or acquired (A) | 0         | 3         | 8         | 3         | 14    |
| High capital need (B)  | 0         | 0         | 7         | 5         | 12    |
| Minor capital need (C) | 0         | 7         | 4         | 0         | 11    |
| No capital needs (D)   | 0         | 1         | 6         | 0         | 7     |
| Total                  | 0         | 11        | 25        | 8         | 44    |
| (A+B)/Total (%)        | 0         | 27.3%     | 60.0%     | 100%      | 57.0% |

Each cluster represents a business model. In particular, cluster 1 refers to the *retail-deposits* business model; cluster 2 to the *retail-balanced* model; cluster 3 to the *retail-diversified* model and cluster 4 to the *retail-market* model.

The hypothesis of independency of the distribution of observations in rows and columns is rejected. The  $p$ -value of the  $\chi^2$ Pearson is 0.005.

**Table 10**

Comparison of the likelihood of experiencing higher damage with the crisis between cajas and corporate, 2003-2007.

|                            | I                     | II                   | III                   | IV                   |
|----------------------------|-----------------------|----------------------|-----------------------|----------------------|
| Caja                       | 0.703 ***<br>(0.233)  | 0.601<br>(0.449)     | 1.572 ***<br>(0.307)  | 1.681 **<br>(0.680)  |
| Assets rate of growth (%)  | 2.828 ***<br>(1.060)  | 14.17 **<br>(5.740)  | 2.346 *<br>(1.380)    | 18.77 **<br>(7.511)  |
| Loans Const. & RE Firms(%) | 2.918 ***<br>(0.925)  | 4.479 *<br>(2.361)   | 5.070 ***<br>(1.662)  | 4.812<br>(4.203)     |
| NP Loans/Loans (%)         | 102.0 ***<br>(24.03)  | 196.4 ***<br>(70.32) | 200.8 ***<br>(53.78)  | 317.5 **<br>(129.2)  |
| Solvency ratio (%)         | -17.91 ***<br>(4.740) | -11.02<br>(10.50)    | -31.94 ***<br>(9.782) | -59.52 **<br>(28.84) |
| Z-score (before)           | -0.003 *<br>(0.002)   | -0.005<br>(0.007)    | 0.003<br>(0.003)      | 0.007<br>(0.009)     |
| Pseudo R <sup>2</sup>      | 22.5%                 | 34.5%                | 42.7%                 | 58.0%                |
| Observations               | 273                   | 54                   | 274                   | 54                   |

Dependent variable *Damage* takes the value of 1 if the bank belongs to categories A or B of high damages and 0 otherwise. Columns I and III are estimated with pooled data from 2003-2007 and II and IV are estimated with the average values of the variables during 2003-2007.

(\*\*\*)= statistically significant at 1%; (\*\*)= statistically significant at 5%; (\*)= statistically significant at 10%. Standard errors in parentheses..

**Table 11**

Cross tabulation of number of cajas according to political influences and human capital of chairman and choice of the business model.

|                       | Value of<br>Dummy | Cluster 2 | Cluster 3 | Cluster 4 | <i>p</i> -value |
|-----------------------|-------------------|-----------|-----------|-----------|-----------------|
| Public Origin         | 0                 | 5         | 11        | 3         | 0.93            |
|                       | 1                 | 6         | 14        | 5         |                 |
| Education             | 0                 | 7         | 16        | 5         | 0.99            |
|                       | 1                 | 4         | 9         | 3         |                 |
| Political Influence   | 0                 | 5         | 10        | 2         | 0.65            |
|                       | 1                 | 6         | 15        | 6         |                 |
| Banking<br>Experience | 0                 | 8         | 16        | 5         | 0.86            |
|                       | 1                 | 3         | 9         | 3         |                 |
| Management<br>Exper   | 0                 | 6         | 26        | 6         | 0.66            |
|                       | 1                 | 5         | 9         | 2         |                 |

*Political Influence* identifies banks with a CEO with political experience, *Education* is a dummy that identifies banks with a CEO with postgraduate formation, *PublicOrigin* identifies banks whose original funding is a public entity; *Banking Experience* informs of whether the top manager had previous experience in the banking sector, before being appointed as CEO; *Management Exper* identifies those top managers that had previous experience in management in non-banking sectors. *P-values* correspond to the Pearson correlation test of independence among variables.

**Table 12**

Political and insiders' influence variables as determinants of the severity of damages

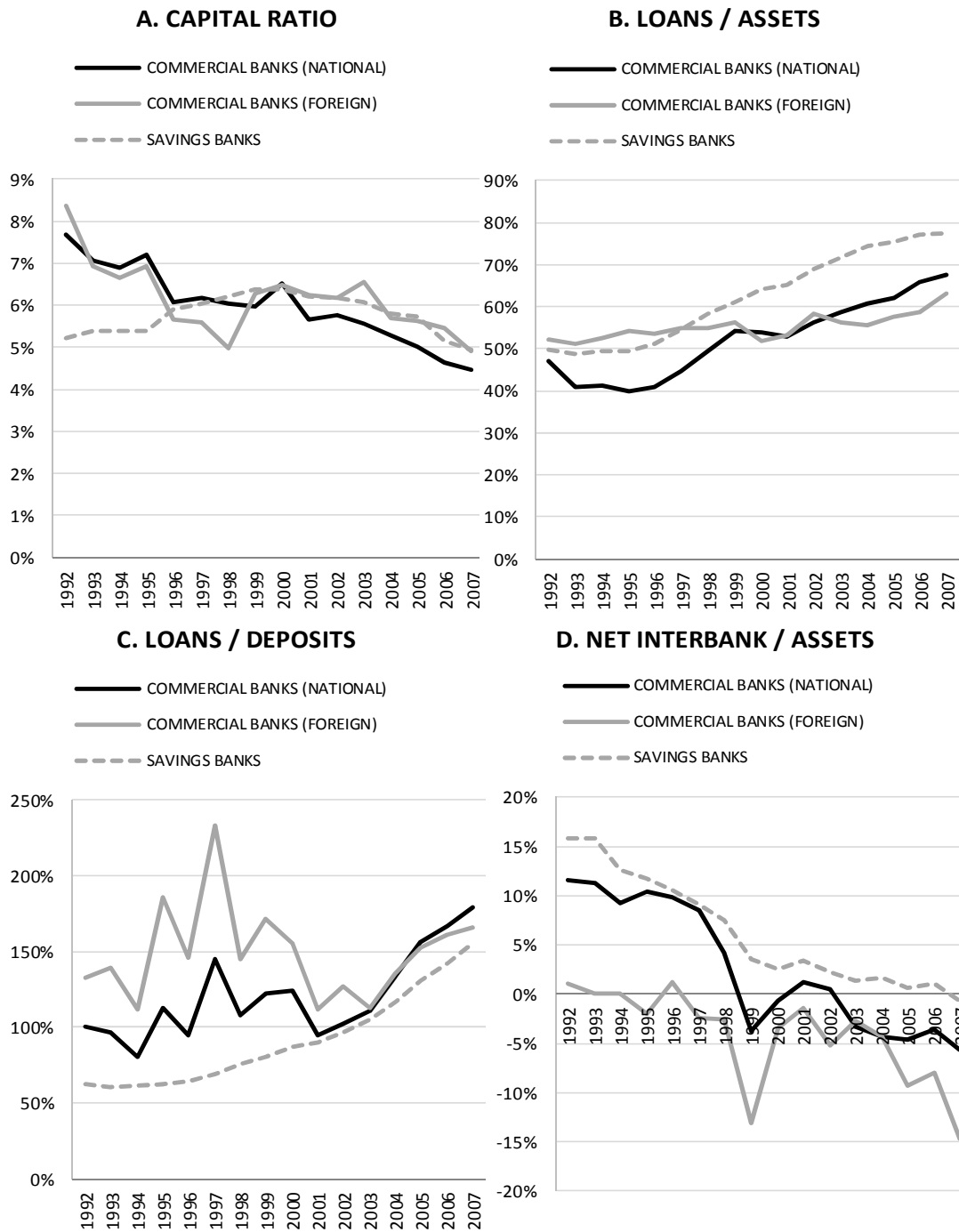
|                       | I       | II      | III      | IV      | V        | VI      |
|-----------------------|---------|---------|----------|---------|----------|---------|
| Compensation          | 0.280 * | 0.243 * | 0.280 ** | 0.252 * | 0.283 ** | 0.258 * |
|                       | (0.148) | (0.139) | (0.138)  | (0.135) | (0.140)  | (0.137) |
| Public Origin         | 0.308   | 0.264   | 0.540    | 0.458   | 0.601    | 0.505   |
|                       | (0.491) | (0.475) | (0.413)  | (0.406) | (0.411)  | (0.405) |
| Education             | -0.218  | -0.171  | -0.172   | -0.131  |          |         |
|                       | (0.432) | (0.443) | (0.423)  | (0.431) |          |         |
| Political Influence   | -0.003  | -0.011  |          |         |          |         |
|                       | (0.445) | (0.447) |          |         |          |         |
| Banking Experience    | -0.383  | -0.285  | -0.287   | -0.214  |          |         |
|                       | (0.434) | (0.460) | (0.435)  | (0.439) |          |         |
| Management Exper      | -0.513  | -0.406  |          |         |          |         |
|                       | (0.517) | (0.490) |          |         |          |         |
| Pseudo R <sup>2</sup> | 15.1%   | 12.3%   | 13.2%    | 11.4%   | 12.1%    | 10.3%   |
| Observations          | 44      | 164     | 44       | 164     | 44       | 164     |

Dependent variable *Damage* takes the value of 1 if the bank belongs to categories A or B of high damages and 0 otherwise. *Political Influence* identifies banks with a CEO with political experience, *Education* is a dummy that identifies banks with a CEO with postgraduate formation, *PublicOrigin* identifies banks whose original funding is a public entity; *Banking Experience* informs of whether the top manager had previous experience in the banking sector, before being appointed as CEO; *Management Exper* identifies those top managers that had previous experience in management in non-banking sectors. *Compensation* is measured by the ratio total compensation to the management team over the total personnel expenditures. Columns I, III and V are estimated with the average values of the variables during 2003-2007 and Columns II, IV, VI are estimated with pooled data from 2003-2007.

(\*\*)= statistically significant at 1%; (\*)= statistically significant at 5%; (ˆ)= statistically significant at 10%. Standard errors in parentheses.

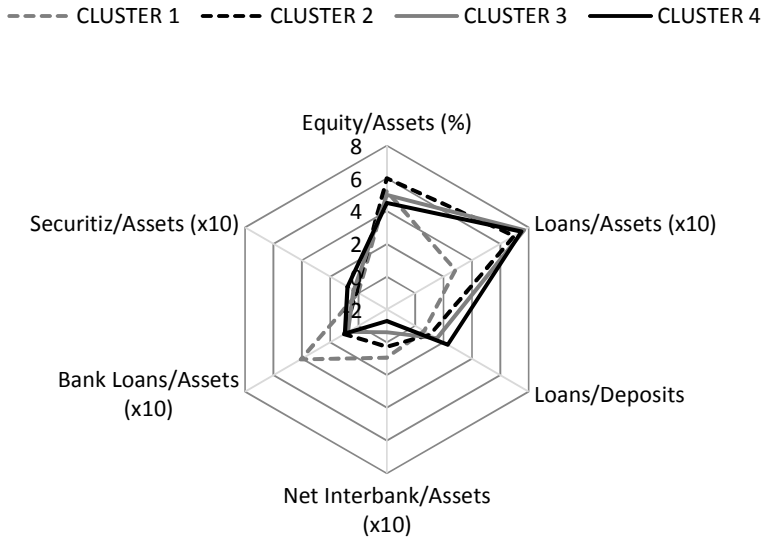
**Figure 1**

Time evolution of the assets-weighted average of variables used to identify business models.



**Figure 2**

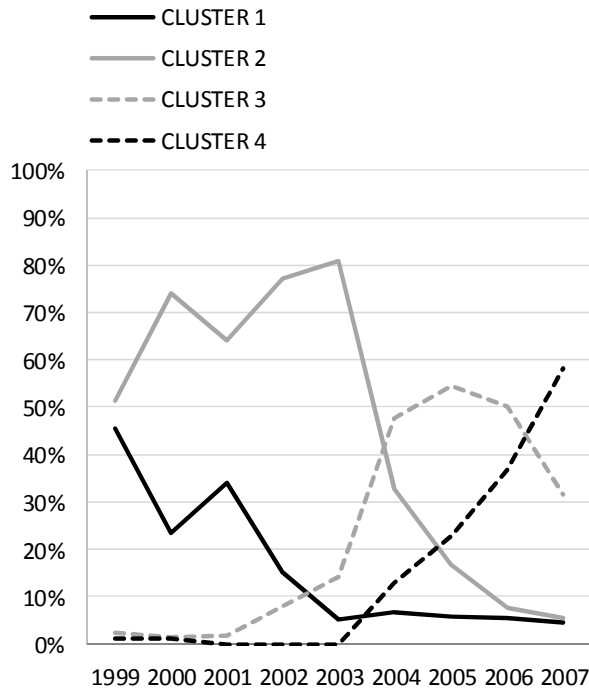
Average values of the variables used to construct the clusters across business models<sup>1</sup>.  
All banks: Period 2003-2007



<sup>1</sup>Each cluster represents a business model. In particular, cluster 1 refers to the *retail-deposits* business model; cluster 2 to the *retail-balanced* model; cluster 3 to the *retail-diversified* model and cluster 4 to the *retail-market* model.

**Figure 3**

Time evolution of the distribution of assets across business models<sup>1</sup>. All banks.

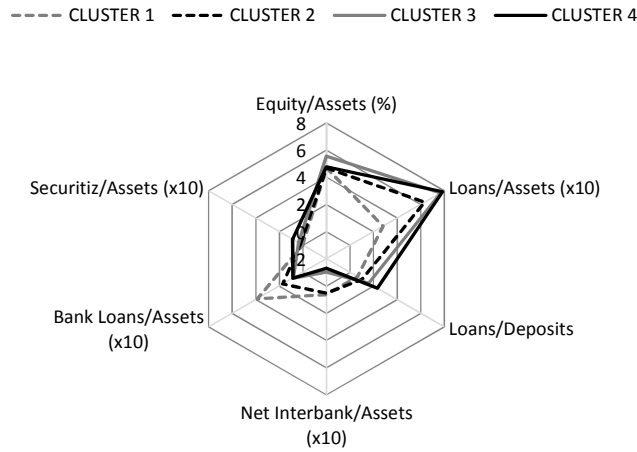


<sup>1</sup>Each cluster represents a business model. In particular, cluster 1 refers to the *retail-deposits* business model; cluster 2 to the *retail-balanced* model; cluster 3 to the *retail-diversified* model and cluster 4 to the *retail-market* model.



**Figure 4**

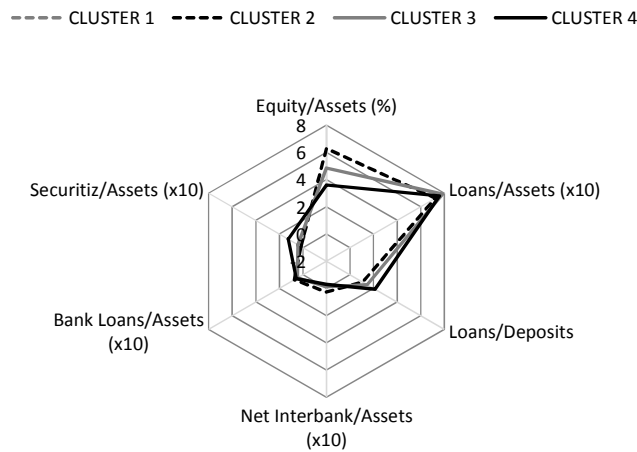
Average values of the variables used to construct the clusters across business models<sup>1</sup>.  
Corporate banks.



<sup>1</sup>Each cluster represents a business model. In particular, cluster 1 refers to the *retail-deposits* business model; cluster 2 to the *retail-balanced* model; cluster 3 to the *retail-diversified* model and cluster 4 to the *retail-market* model.

**Figure 5**

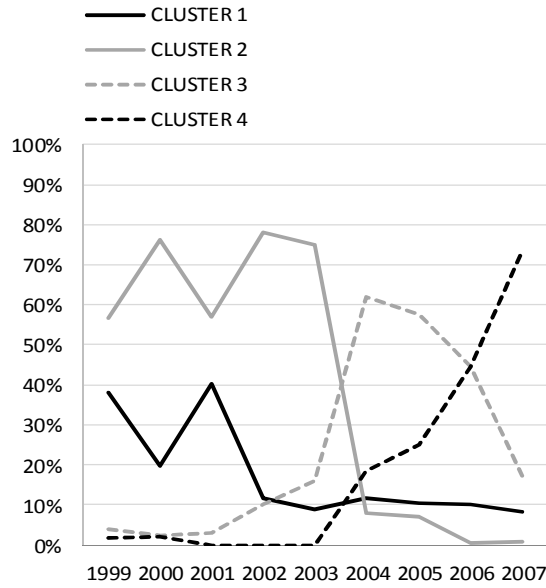
Average values of the variables used to construct the clusters across business models<sup>1</sup>.  
Savings banks.



<sup>1</sup>Each cluster represents a business model. In particular, cluster 1 refers to the *retail-deposits* business model; cluster 2 to the *retail-balanced* model; cluster 3 to the *retail-diversified* model and cluster 4 to the *retail-market* model.

**Figure 6**

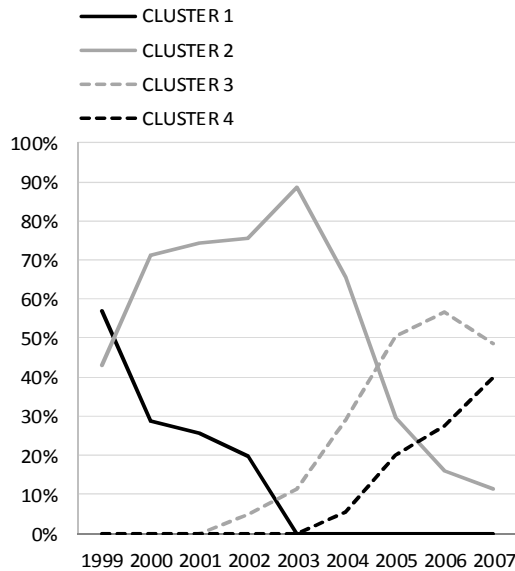
Time evolution of the distribution of bank assets across business models<sup>1</sup>. Commercial Banks.



<sup>1</sup>Each cluster represents a business model. In particular, cluster 1 refers to the *retail-deposits* business model; cluster 2 to the *retail-balanced* model; cluster 3 to the *retail-diversified* model and cluster 4 to the *retail-market* model.

**Figure 7**

Time evolution of the distribution of bank assets across business models<sup>1</sup>. Cajas.



<sup>1</sup>Each cluster represents a business model. In particular, cluster 1 refers to the *retail-deposits* business model; cluster 2 to the *retail-balanced* model; cluster 3 to the *retail-diversified* model and cluster 4 to the *retail-market* model.

## Appendix A

### A.1. Definitions of the main variables

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|   |   |
|---|---|
| <i>Size and growth</i>                                |   |
| Assets  | Volume of total assets at book value  |
| Growth rate loans (%)                                 | Year-by-year rate of growth of loans granted by the bank, where the stock of loans at book value  |
| Growth rate branches (%)                              | Year-by-year growth rate of the total number of branches of the bank.   |
| <i>Loan markets</i>                                   |   |
| Construc&RE Firms (%)                                 | Proportion of real-estate loans in the loan portfolio of the bank   |
| Governments (%)                                       | Proportion of loans to government institutions in the loan portfolio of the bank  |
| Mortgage loans (%)                                    | Proportion of mortgages in the loan portfolio of the bank   |
| <i>Customer base</i>                                  |   |
| Average size of branches                              | Ratio of bank's assets with respect to the number of braches  |
| Braches in towns <1000inh                             | For every bank and year, we aggregate the number of branches in towns smaller than 1000 inhabitants, using municipality-level information from the the Branches Registry of Banco de España. Information on the size (inhabitants) is taken from the Spanish Statistical Institute (INE). |
| Growth out of region branches (%)                     | Using municipality-level information from the the Branches Registry of Banco de España, we aggregate the number of branches out of the origin province and compute the year-by-year rate of growth.   |
| Deposits per account (%)                              | Amount of deposits divided by the number of sight accounts  |
| Loans per account (%)                                 | Volume of loans divided by the number of loan accounts  |
| <i>Product and price</i>                              |   |
| Fees/Inter. Margin (%)                                | Net commissions with respect to intermediation margin, both taken from the bank's profit and losses account.  |
| Loans interest rate (%)                               | Yearly average of marginal interest rates set by banks to new loan operations granted every month.  |
| Deposits interest rate (%)                            | Yearly average of marginal interest rates of new deposits collected every month.  |
| <i>Solvency and liquidity</i>                         |   |
| Solvency ratio (%)                                    | Regulatory capital ratio of the bank at consolidated level  |
| Equity/Regulatory capital                             | Ratio of equity capital to regulatory capital.  |
| Liquid assets/Assets (%)                              | Sum of cash, reserves in central bank and bonds issued by the Government with respect to total assets   |
| <i>Rates of return</i>                                |   |
| ROA (accounting) (%)                                  | Profitability of the bank measured by the return on assets. It is calculated as net profits divided by total assets of the bank.  |
| ROA (before) (%)                                      | Return on assets calculated as net profits before interests, taxes and depreciation divided by total assets of the bank.  |
| ROE (accounting) (%)                                  | It is the profitability of the bank measured by the return on equity. It is calculated as net profits divided by the equity of the bank.  |
| <i>Operating efficiency</i>                           |   |
| Operating costs/Oper margin (%)                       | Ratio of operating costs divided by the operating margin  |
| Total Factor Productivity                             | Measure of Total Factor productivity of the bank in logs. It is obtained as a residual of a measure of raw productivity after controlling for differences and changes in the business models and observed characteristics of banks (Martin-Oliver et al, 2013).                           |
| <i>Risk</i>   |   |
| Z-score   | Z-score of the bank, in the numerator the sum of the capital ratio and the accounting ROA and in the denominator the standard deviation of ROA computed with the last 5 years of the bank information   |
| Z-score (before)                                      | Z-score, computed with the ROA (before)   |
| RWA/Assets (%)  | Measure of the risk profile of the bank, defined as the ratio of the risk-weighted assets (i.e. denominator of the regulatory capital ratio) and the book value of the assets   |
| NPL ratio (%)   | Ratio of non-performing loans with respect to total loans, from information of the Credit Register  |
| <i>Financial Structure</i>                            |   |
| Securitiz/Assets                                      | Proportion of ABS and MBS to total assets   |
| Equity/Asset (%)                                      | Ratio of equity capital to total assets of the bank   |
| Loans/Assets (%)                                      | Weight of the loans in the assets of the bank   |
| Loans/Deposits (%)                                    | Volume of loans with respect to the volume of deposits  |
| Net Interbank/Assets (%)                              | Net borrowing position of the bank in interbank markets as a percentage of book value total assets.   |
| Bank Loans/Assets (%)                                 | Gross borrowing of the bank to other banks as a percentage of total assets.   |
| <i>Measure of damages during the crisis</i>           |   |
| Damage  | Dummy variable that identifies banks either acquired or absorbed (A) or banks with high capital requirements after the stress test, including nationalized ones (B)   |
| <i>Characteristics of Executives and Compensation</i> |   |
| Compensation  | Measured by the ratio total compensation to the management team (from reports of stock regulator, CNMV) over the total personnel expenditures for the period 2004 to 2007   |
| Salaries (m€)   | Personnel Expenses, in millions of euros, as a size variable to compare with the compensation of the management team  |
| Political Influence                                   | This variable identifies banks with a CEO with political experience.  |
| Public Origin   | Dummy variable that identifies banks whose original funding is public, as in García-Cestona an Surroca  |
| Education   | Education is defined as a dummy variable that identifies banks with a CEO with postgraduate formation.  |
| Banking Experience                                    | Identifies banks whose top manager had previous experience in banking before becoming president of the company  |
| Management Exper                                      | Identifies banks whose top manager had occupied charges of responsibility in non-banking organizations before becoming the president of the caja  |

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## A.2. Descriptive Statistics of the main variables

|   | Mean   | Std.Dev. | P10 <sup>th</sup> | P25 <sup>th</sup> | P50 <sup>th</sup> | P75 <sup>th</sup> | P90 <sup>th</sup> |
|---|--------|----------|-------------------|-------------------|-------------------|-------------------|-------------------|
| <i>Size and growth</i>                                |        |          |                   |                   |                   |                   |                   |
| Assets (m€)   | 24,400 | 51,300   | 1,380             | 3,573             | 8,207             | 18,800            | 57,600            |
| Growth rate loans (%)                                 | 0.176  | 0.080    | 0.075             | 0.121             | 0.167             | 0.227             | 0.288             |
| Growth rate branches (%)                              | 0.035  | 0.030    | 0.000             | 0.010             | 0.028             | 0.057             | 0.081             |
| <i>Loan markets</i>                                   |        |          |                   |                   |                   |                   |                   |
| Construc&RE Firms <sup>1</sup> (%)                    | 0.263  | 0.111    | 0.142             | 0.195             | 0.256             | 0.331             | 0.388             |
| Governments <sup>1</sup> (%)                          | 0.018  | 0.017    | 0.000             | 0.003             | 0.014             | 0.027             | 0.042             |
| Mortgage loans <sup>1</sup> (%)                       | 0.365  | 0.127    | 0.190             | 0.283             | 0.367             | 0.441             | 0.498             |
| <i>Customer base</i>                                  |        |          |                   |                   |                   |                   |                   |
| Average size of branches (m€)                         | 42.93  | 104.81   | 12.03             | 15.58             | 20.78             | 29.95             | 43.36             |
| Branches in towns <1000inh                            | 20.71  | 35.742   | 0                 | 0                 | 7                 | 28                | 56                |
| Growth out of region branches (%)                     | 0.136  | 0.130    | 0.000             | 0.024             | 0.100             | 0.223             | 0.366             |
| Deposits per account (%)                              | 36.26  | 17.58    | 14.47             | 22.34             | 33.70             | 50.218            | 65.55             |
| Loans per account (%)                                 | 68.14  | 36.92    | 30.28             | 40.79             | 58.47             | 83.515            | 116.2             |
| <i>Product and price</i>                              |        |          |                   |                   |                   |                   |                   |
| Fees/Inter. Margin (%)                                | 0.269  | 0.165    | 0.133             | 0.169             | 0.236             | 0.321             | 0.396             |
| Loans interest rate (%)                               | 0.063  | 0.017    | 0.044             | 0.052             | 0.060             | 0.072             | 0.083             |
| Deposits interest rate (%)                            | 0.021  | 0.007    | 0.015             | 0.017             | 0.019             | 0.024             | 0.032             |
| <i>Solvency and liquidity</i>                         |        |          |                   |                   |                   |                   |                   |
| Solvency ratio (%)                                    | 0.111  | 0.024    | 0.090             | 0.098             | 0.110             | 0.120             | 0.132             |
| Equity/Regulatory capital                             | 0.600  | 0.219    | 0.352             | 0.455             | 0.588             | 0.728             | 0.941             |
| Liquid assets/Assets (%)                              | 0.065  | 0.049    | 0.013             | 0.028             | 0.057             | 0.087             | 0.132             |
| <i>Rates of return</i>                                |        |          |                   |                   |                   |                   |                   |
| ROA (accounting) (%)                                  | 0.010  | 0.005    | 0.005             | 0.007             | 0.009             | 0.011             | 0.017             |
| ROA (before) (%)                                      | 0.014  | 0.008    | 0.009             | 0.010             | 0.012             | 0.015             | 0.020             |
| ROE (accounting) (%)                                  | 0.146  | 0.075    | 0.083             | 0.106             | 0.129             | 0.174             | 0.242             |
| <i>Operating efficiency</i>                           |        |          |                   |                   |                   |                   |                   |
| Operating costs/Opermargin (%)                        | 0.548  | 0.167    | 0.378             | 0.486             | 0.557             | 0.624             | 0.669             |
| Total Factor Productivity                             | 0.030  | 0.217    | -0.240            | -0.094            | 0.034             | 0.147             | 0.303             |
| <i>Risk</i>   |        |          |                   |                   |                   |                   |                   |
| Z-score   | 56.80  | 132.8    | 14.42             | 21.02             | 33.40             | 57.98             | 88.24             |
| Z-score (before)                                      | 37.84  | 25.89    | 11.15             | 19.56             | 30.65             | 50.33             | 72.59             |
| RWA/Assets (%)  | 0.743  | 0.205    | 0.485             | 0.674             | 0.778             | 0.839             | 0.912             |
| NPL ratio (%)   | 0.007  | 0.005    | 0.003             | 0.004             | 0.006             | 0.008             | 0.012             |
| <i>Financial Structure</i>                            |        |          |                   |                   |                   |                   |                   |
| Securitiz/Assets                                      |        |          |                   |                   |                   |                   |                   |
| Equity/Asset (%)                                      | 0.054  | 0.022    | 0.029             | 0.037             | 0.049             | 0.068             | 0.086             |
| Loans/Assets (%)                                      | 0.747  | 0.122    | 0.623             | 0.695             | 0.766             | 0.817             | 0.899             |
| Loans/Deposits (%)                                    | 1.462  | 0.482    | 0.929             | 1.103             | 1.338             | 1.686             | 2.166             |
| Net Interbank/Assets (%)                              | -0.022 | 0.104    | -0.206            | -0.054            | -0.003            | 0.034             | 0.096             |
| Bank Loans/Assets (%)                                 | 0.079  | 0.077    | 0.018             | 0.033             | 0.055             | 0.098             | 0.157             |
| <i>Characteristics of Executives and Compensation</i> |        |          |                   |                   |                   |                   |                   |
| Compensation management (m€)                          | 3,296  | 4,247    | 830               | 1,274             | 2,096             | 3,553             | 5,639             |
| Salaries (m€)   | 174.5  | 328.0    | 10.53             | 31.80             | 70.17             | 152.1             | 349.1             |
| Political Influence                                   | 0.576  | 0.495    | 0                 | 0                 | 1                 | 1                 | 1                 |
| Public Origin   | 0.397  | 0.510    | 0                 | 0                 | 0                 | 1                 | 1                 |
| Education   | 0.375  | 0.485    | 0                 | 0                 | 0                 | 1                 | 1                 |
| Banking Experience                                    | 0.335  | 0.473    | 0                 | 0                 | 0                 | 1                 | 1                 |
| Management Exper                                      | 0.357  | 0.480    | 0                 | 0                 | 0                 | 1                 | 1                 |