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Is Geographic Diversification Associated With Increased Risk? Evidence From the Spanish Banking Crisis

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Abstract

This paper examines the association between geographic diversification and Spanish savings bank (*caja*) failure. The paper focuses on the geographic expansion of *cajas* between 2002 and 2012 and failure of several *cajas* between 2008 and 2011 during the Spanish banking crisis. Employing financial statement and branch location data collected from the CECA, logit models were used to test the association between failure and geographic and cultural diversification. This paper finds that, depending on the model estimated, geographic and cultural diversification of *cajas* either reduced or had no effect on the odds ratio of failure, suggesting that the benefits of asset diversification outweigh the costs and risks associated with entering unfamiliar markets and overcoming linguistic and cultural barriers. Thus, there is evidence that *cajas* may benefit from expanding geographically and into diverse cultural regions. Regulators should not discourage geographic diversification.

1. Introduction

The recent Spanish financial crisis resulted from the bursting of a real estate bubble that appeared as a result of high housing demand. However, the underlying cause of the crisis appears to be the *cajas de ahorros*. These Spanish savings banks experienced the highest numbers of loan defaults and were the main financial institutions requiring bailout funds throughout the crisis. We examine whether the *cajas*' geographic expansion, which started after the fall of the Francisco Franco regime in 1975 and rapidly intensified after Spain joined the EU in 1999, increased risk throughout the Spanish financial system. In particular, we examine whether this geographic expansion is associated with increased failure of *cajas*.

The Spanish Banking Crisis

Under the Franco regime, Spain was closed to international trade and investment. After the fall of the Franco regime in 1975, the Spanish economy slowly began integrating into European markets. Decrees in the late 1970s allowed foreign banks to enter the market. Although these banks held a very low market share, they significantly impacted the development of the Spanish financial system (Berges, Ontiveros, & Valero, 2012). However, full integration of both foreign banks in Spain and Spanish markets with the rest of Europe did not occur until Spain joined the European Union in 1999. Once integrated with the European Union, Spain's economy boomed, greatly impacting its real estate market.

By the end of 2006, Spain had experienced a massive property boom paid for with private debt (Reuters, 2006). In 2007 household debt swelled to 120% of disposable income. Roughly 95% of Spanish mortgages were variable-rate, resulting in ever-increasing payments for homeowners (Johnson & Bjork, 2007). Then, at the end of 2008, the Spanish economy officially entered a recession. To combat it, Prime Minister José Luis Rodríguez Zapatero and the central government approved and implemented a stimulus package valued at €8 billion (The Telegraph, 2012). The need for bailout funds continued throughout the year and Spain created a state-backed bank restructuring fund known as the Fund for Orderly Bank Restructuring (FROB). The fund, which still exists, was designed to provide approximately €99 billion to 45 Spanish *cajas* to help eliminate "…excess capacity in the banking system and make them more efficient" by reducing the number of *cajas* to 15 (The Telegraph, 2012).

Although the country exited recession in during the first quarter of 2010, the ripples of the banking crisis continued during the following year. By this point, bond yields had risen sharply, affecting not only Spain but other EU countries which experienced a spillover effect.

The European Central Bank, the International Monetary Fund, and the European Union began discussions with Spain regarding the economic conditions within the country. At the end of 2011, unemployment reached 22.8% and Spain fell back into recession by the beginning of 2012. A deeply troubled Bankia, created through a merger between CajaMadrid and six smaller *cajas* sought bailout funds equaling €9 billion in 2012 as the economic conditions in Spain worsened, the 10-year government bond yield reached 6.81%, the German 10-year yield peaked at approximately 2% that same year, and Spain ended the year seeking funding from the Eurozone to help "shore-up" its failing banks (The Telegraph, 2012). Spain received funds from the European Stability Mechanism (ESM) set up by the Eurozone. When Spain's ESM assistance program expired at the end of 2013, the country had received a total of €41.3 billion (ESM, 2014).

Cajas de Ahorros

Cajas de ahorros, "boxes of savings", first emerged in 1835 to help promote savings in the Spanish communities. Until the passage of the 1880 *Ley de Cajas de Ahorros* (Law of *Cajas de Ahorros*), *cajas* were regulated and developed by the central government, which at the time was controlled by a monarch and parliament. Prior to the 1880 law, *cajas* were required to operate jointly with *montes de piedad*, which were basically charitable pawnbrokers. Many *cajas* took advantage of the new-found organizational freedom and opened new branches (Comín, 2012b). However, the *cajas* lost much of their operational freedom in 1939 when Francisco Franco took control of the country after the Civil War. The dictatorship required *cajas* to provide funding for what it called "social-welfare projects." Furthermore, Franco and the Spanish national government created a huge deficit that was largely financed by the *cajas*. This continued

until Franco's death in 1975 and the *cajas* became regulated by the Bank of Spain (Comín, 2012b).

In 1977, the *cajas* became equal in operations to Spanish commercial banks, allowing the *cajas* to make their own financial decisions free of government interference. The period following the 1977 legislation was marked by increased *caja* diversification and the geographic expansion of *cajas* to other regions (Comín, 2012b). We investigate whether the recent economic crisis resulted in part from the risk associated with this territorial expansion.

Geographic Diversification

Geographic diversification is normally associated with decreased risk, although there is some debate as to the extent of the risk reduction benefits. Modern portfolio theory (Markowitz, 1959) suggests that diversification of assets typically reduces volatility of earnings and will likely boost capital gains. Moreover, geographic diversification allows small-sized banks to protect against both idiosyncratic and local market risk because such banks are severely impacted by local economic changes and individual loan defaults (Emmons, Gilbert, & Yeager, 2004). As a result of low or even negative correlations between different regions or countries, banks may see increased profit efficiencies from opening new branches (Berger, de Young, & Udell, 2001). Therefore, geographic diversification outside of a bank's original regions should lead to less volatile and even increased earnings.

However, several components of geographic diversification may negate these benefits (Deng & Elyasiani, 2008). Some regulatory measures are linked to the riskiness of a bank's portfolio. Therefore, banks are encouraged by regulators to expand beyond what is efficient (Hayden, Porath, & von Westernhagen, 2007). Furthermore, regulators are more likely to provide bailouts funds when more than one bank fails at any given time. This boosts the banks'

incentive to diversify beyond their optimal levels (Wagner, 2010). Also, as banks expand geographically, management capabilities and operational efficiencies severely decline (Emmons, Gilbert and Yeager 2004; Berger, DeYong and Udell 2001; Buch, Driscoll and Ostergaard 2010).

Since there is still debate on whether or not geographic diversification improves or hurts banks, our research aims to clarify the relationship. The geographic diversification of *cajas* has yet to be studied. Our research will shed light on geographic diversification in an internationally integrated market. Spanish *cajas* are regulated by both the Bank of Spain and the European Central Bank. Thus, our research will introduce new regulatory environments as well as use an underrepresented sample to clarify the debate.

We tested the association between increased geographic diversification and a higher probability of *caja* failure and the association between higher levels of cultural diversification and a higher probability of *caja* failure. Geographic diversification, in two models, is associated with a decreased in the odds of *caja* failure and is not significant in any other models. Thus, an in geographic diversification by one kilometer is associated with a 0.05% change in the odds ratio and a 0.011% decrease in the odds ratio (Table 4). Similarly, increasing cultural diversification by one percentage point is associated with a 0.872% decrease in the odds ratio at the 5% level of significance. The coefficients on CULTURE in all other models are insignificant. Several other patterns emerged throughout the models. Increasing capital as a percentage of total assets is associated with a decline of approximately 0.22% in the odds of failure in three models and is insignificant in all other models. Unexpectedly, increasing the total assets by 1% from one year to the next reduces the odds ratio by 0.043% or more in Models 1-5 and 7 (Table 3, and Table 5). Lastly, a *caja* headquartered in Galicia has a 111% higher odds of failure relative to all other

regions (Table 4). The remaining control variables (ROA and other regional variables) were not significant in any model.

As a result of the crisis and major *caja* failure between 2008 and 2010, we narrowed the data set to specifically focus on this time period. As seen in most models, neither geographic nor cultural diversification is significant in this model. However, increasing the percent change in total assets by 1% is associated with a 0.042% decrease in the odds ratio (Table 5). Also an increase of 1% in the fixed income ratio is associated with a 24.9% increase in the odds ratio (Table 5).

Therefore, the models indicate that geographic and cultural diversification either decrease or do not impact the odds of failure. Regulators should not discourage *caja* expansion into new territories while promoting increases in total assets to prevent failure.

This paper intends to investigate the association between geographic diversification and *caja* failure. We begin first with a brief history of *caja* development and the appearance of the real estate bubble. We then put forth the current academic discussion of geographic diversification and its association with risk. This will be followed by a discussion of our data and summary statistics. Lastly, we construct econometric models to test our hypotheses and present the results.

2. Development of the *Cajas* and the Real Estate Bubble

Cajas de ahorros first emerged as entities supporting charitable acts and promoting savings within their communities under the passage of legislation in 1835. The main objective of these organizations was to motivate the lower classes to begin saving while providing loans to the “neediest segments of the population”, meaning those under-served by traditional banks. During this time the national government regulated the *cajas* and developed the guidelines their

governing bodies were to follow (Comín, 2012b). After the 1880 *Ley de Cajas de Ahorros*, the *cajas* became more independent from the national government since the *cajas* no longer needed to follow rigid guidelines but rather a basic operational outline (Comín, 2012b).

The Civil War, which broke out in 1936, reduced the savings banks' share of the country's deposits significantly, most likely due to strong ties between the *cajas* and the existing parliamentary government. In 1939, the Franco regime came to power and demanded that the *cajas* provide loans for so-called "social welfare" projects, draining savings banks' capital in the process. These endeavors included education and healthcare projects as well as loans to farmers and businesses aligned with the Ministry of Finance or other parts of the government (Comín, 2012b). Rather than choosing their social and welfare activities, *cajas* transferred money to the Ministry of Labor or funded projects that were mandated directly by the government. From 1947 to 1957 alone, the share of net income *cajas* were required to put towards "National Social Work" grew from 20% to 33% (Comín, 2012b). The majority of the savings banks' profits went into deposit-insurance style reserve funds, representing a type of "guarantee" to depositors.

In addition, the Franco government used the *cajas* to help reduce a national deficit of approximately 1.5% it had generated during its early years in power (Comín, 2012a). Around 1951, a decree from the Ministry of Finance required them to devote a minimum of "60% of their borrowings to the purchase of public funds" (Comín, 2012b). The *cajas* were fully incorporated into the Ministry of Finance after reforms to that agency took effect in 1957. Spanish savings thus began to be regulated by the Ministry of Finance at this time and were used as vehicles of economic policy, supporting public and government-aligned private firm financing. These private companies were selected because the government received "privileged credit" on which interest was below the market rate (Comín, 2012b). This continued until the

1970s, when Franco died and the Spanish monarchy, headed by Prince Juan Carlos, was reinstated, which initiated a push towards democracy in Spain.

In 1971, during the waning years of the Franco government, the Bank of Spain began regulating *cajas*, leveling the playing field across the financial sector. Before this time, the Bank of Spain only regulated the commercial banks. Under the new regulation a "…de-specialization of institutions and a reduction in their mandatory investments" occurred (Comín, 2012b). Home loans represented a large portion of the *cajas*' lending. *Cajas* provided 57.4% of the funding for home purchases in 1976, although the *cajas* continued supporting healthcare, cultural activities and education (Comín, 2012b). The true turning point came in 1977, when the democratic Decree 2290/1977 passed, declaring that Spanish savings banks were equal to commercial banks in all aspects, including the ability to diversify operations and freely make financial decisions. This signaled the start of the expansion and diversification of *cajas.* Almost immediately, *cajas* started opening branches throughout Spain as a way to diversify their balance sheets (Comín, 2012b).

In 1978 foreign banks were allowed to enter the Spanish market (Marín Hernández & Bernabé Pérez, 2005). Competition increased as a result of Spain's financial internationalization. Innovative products that Spain had little knowledge of or experience with entered the markets in the late 1970s and early 1980s as foreign banks brought their home-country practices with them. These included variable-rate mortgages and savings accounts that paid relative high interest rates (Berges, Ontiveros, & Valero, 2012).

Motivated by the accession of Spain into the European community, new regulatory standards were introduced in 1985. Between 1985 and 1987, the Spanish government attempted to prevent economic overheating (Berges, Ontiveros, & Valero, 2012). *Cajas* were required to

put aside reserve funds based on the risks levels of their accounts and loans. Spain passed other regulatory measures during the later 1980s and early 1990s including changing accounting practices for *cajas* (Marín Hernández & Bernabé Pérez, 2005).

The extended period of growth culminated with a 72.66% increase in *caja* branch locations outside the *cajas*' original region between 1999 and 2008 (Gutiérrez 2011, Saurina 2012). However, by the end of 2009, 783 branches closed, 59.4% of them located in areas in which the territorial expansion occurred (Gutiérrez Fernández, Palomo Zurdo, & Romero Cuadrado, 2011). It can be argued that the geographical expansion Spanish savings banks underwent should have reduced risk through the diversification of local economic conditions and clientele. But even with branches throughout the country, the *cajas* suffered substantial losses when the financial crisis unfolded.

There are indications that the financial crisis resulted largely because of a property bubble created by large increases in construction projects. Land reforms under the *Ley del Suelo* (Land Law) in the late 1990s and early 2000s allowed for more centralized planning, in terms of construction projects, that led to the development of the housing bubble (Jesús Güemes, 2011). Both the national and local governments under the passage of these rules could urbanize. More specifically, in 2001 Prime Minister José María Aznar and his government re-defined the soil and land classifications in way that increased the amount of developable land on the market, further promoting construction (Agencia Estatal Boletín Oficial del Estado, 1998).

Construction and its share of national economic production influenced the *cajas*' movement to new regions. As less-skilled workers immigrated to Spain and construction jobs were created in suburbanizing rural areas, the *cajas* moved into those regions, looking for new depositors and borrowers. Increasing population density of a particular region was associated

with the entry of *cajas* into that area, supporting the claim that expansion focused on raising more capital and expanding operations (Gutiérrez Fernández, Palomo Zurdo, & Romero Cuadrado, 2011).

Certain areas of Spain, including Madrid, Barcelona, Murcia, Castellón, Valencia, Almería, and Cataluña, experienced enormous influxes of construction projects that brought numerous workers to these areas. These new projects increased salaries in the regions and disproportionately boosted the demand for homes and mortgages (Campos Echeverría, 2008). In Madrid, for example, the median salary exceeded that of the Extremadura region in western Spain by 47% in 2006, while the home purchase price in the same year was 210% more than in Extremadura (Campos Echeverría, 2008). Clearly, the higher salary level in Madrid indicates the ability to purchase a higher-value home, but the increase in housing prices far exceeded the increase in salaries. This resulted in a large dispersion of purchasing power throughout the various regions of Spain (Campos Echeverría, 2008). An interested individual was unlikely to afford a home that jumped in price by 210% when his or her yearly salary rose by only 47%. Moreover, prices in Madrid and other city areas caused many recent migrants to those cities to return home or move to regions with lower prices. It is this movement of people that seemed to lead to lower home demand in more populated regions and the shift in *cajas*' branches to more remote regions of Spain (Campos Echeverría, 2008).

While the political dynamics in Spain played an important role in the development of the property bubble and crisis, a full analysis is beyond the scope of this paper. However, the debate surrounding the crisis' origins and the impact policy played on the severity of it is worth noting. Some argue that the financial sector fell victim to problems created in other parts of the Spanish economy primarily because *cajas* were still responsible for full payment of covered bonds. These

instruments are used to finance housing loans; thus, are backed by mortgages. However, the strict regulation on covered bonds created no incentive for *cajas* to provide mortgages to those unable to pay them (The Pain in Spain, 2008). This indicates that the loan defaults experienced by *cajas* were largely related to another factor in the economy.

Construction and its effects appear to be the key player in the financial crisis. When projects throughout the country stopped, consumption declined while unemployment rose. With workers unable to pay back their mortgages, the Spanish *cajas* absorbed the delinquencies. Moreover, the low level of consumption brought the economy to a halt (Tremlett, 2009). To prevent further collapse, the government sought external funding. However, the government received very little assistance because of conditions both within and outside the country. Prime Minister Rodríguez Zapatero blamed the international credit crunch, which started in 2008, for the worsening conditions in Spain. In doing so, the government ignored the large amounts of debt builders owed to *cajas* (Tremlett, 2009).

Meanwhile, unemployment continued to rise throughout the country causing GDP to decline as consumption dissipated (Murado, 2012). The governments of Prime Ministers Rodríguez Zapatero and Mariano Rajoy had limited mobility in terms of their response to the looming problems because of Spain's EU membership. For example, a devaluation of the currency, which would improve the country's competitiveness and boost exports, was not an option because the devaluation would spread to other EU nations (The Pain in Spain, 2008). Thus, another method to prevent total economic failure was needed in Spain.

In 2011, as the government transitioned from Prime Minister Rodríguez Zapatero to the government of newly-elected Prime Minister Rajoy, the emphasis shifted to tax breaks. Rajoy faced serious problems since the target deficit negotiated between Rodríguez Zapatero and the

EU was set at 4.4% for the year. In order to meet such a level, Rajoy would either need to implement higher tax policies or cut government spending by nearly €17bn (Tremlett, 2011). It appears as if the government initially focused on cutting spending throughout the country. Thus, they ignored the main catalyst for the crisis: large amounts of unemployed construction workers and loans held by builders.

3. Theory and Literature Review

Portfolio theory (Markowitz, 1959) concludes that asset diversification in many cases boosts capital gains, lowers volatility of earnings, and decreases risk. It follows that geographic diversification of bank portfolios will lead to reduced risk, increased capital gains, and increased revenues for banks. Normally, geographic diversification allows a bank to reduce its idiosyncratic and local market risk. Moreover, low correlations between loan returns may boost profit efficiency. Yet the benefits of geographic diversification may come with downside risks. During territorial expansion, cultural and linguistic barriers may make it difficult for banks operating in new regions to make prudent lending and operational decisions. Management therefore must overcome cultural, language, and regulatory differences to boost profits and reduce risk. Lastly, some regulatory practices are set up in such a way that banks benefit from diversifying both their portfolios and geographic locations beyond optimal levels.

Small-sized banks generally concentrate lending in one geographic region, boosting the banks' ability to monitor borrowers closely and build long-standing relationships in which the lender understands the borrowers' history. However, the banks may then experience both idiosyncratic and local market risk since individual loan defaults and local economic changes will have an outsized impact on the bank's portfolio (Emmons, Gilbert, & Yeager, 2004). It is therefore not surprising that small banks may desire to expand geographically in order to

diversify their portfolios in search of lower earnings volatilities. Geographic expansion may improve profit efficiency because of the low or even negative correlations between loans and securities in different regions or countries (Berger, de Young, & Udell, 2001). Diversification across regions may also help banks achieve economies of scale, because expansion will come at a lower cost after the initial investment into infrastructure is made (Berger, Hasan, & Zhou, 2010). Expanding not just from region to region but to other countries will reduce market risk, especially when the correlation between two countries' economic performance is low.

Wagner (2010) presents a theory that shows, ironically, how diversification within banks can lead to strong similarities among banks and, hence, greater systemic risk. Because the market or regulator may dictate the types of assets held in a portfolio or the types of loans dispersed, banks will begin investing in similar assets or loans, causing increased correlations between firms. Markets made up of these similar institutions have greater probabilities of systemic crises, meaning the costs truly outweigh the benefits (Wagner, 2010).

As banks spread across geographical lines, profitability may also decline as management fights to overcome the costs and risks incurred with such expansions. When small banks open branches across wide geographical areas, the operational inefficiencies and management challenges created may outweigh the small decrease in local market risk (Emmons, Gilbert, & Yeager, 2004). The management of these banks, particularly those intending to expand to new countries, face challenges that include the inability to monitor from a distance; differences in culture, language, currency, and regulatory structure; and rules meant to deter foreign competitors (Berger, de Young, & Udell, 2001). Another important challenge for banks expanding geographically is to develop the trust of the residents of the new country or region. Managers influence employee's performances, which in turn influence customers' perceptions of

the bank. Poor management may therefore indirectly cause residents of a new market to lose trust in a bank (Buch, Driscoll, & Ostergaard, 2010).

Although it appears to have little impact in Spain, other literature notes that regulatory incentives, including capital requirements or dynamic provisioning, boost banks' need to diversify or focus their portfolios. Under such regulations, banks attempt to alter their asset riskiness since these requirements are directly related to portfolio risk (Hayden, Porath, & von Westernhagen, 2007). Regulators are also more likely to bail out banks during joint failures (when two or more banks fail together), boosting the incentives for banks to diversify beyond optimal levels and according to regulator recommendations (Wagner, 2010). This type of regulatory incentive does not benefit banks that have relatively undiversified portfolios with low levels of downside risk. For example, specialized banks with portfolios concentrated in a single lending sector may exhibit lower downside risk because their staffs are able to better utilize their knowledge of that sector and reduce agency problems, as suggested by corporate finance theory. Diversification can also increase risk if banks enter sectors with relatively high downside risks (Hayden, Porath, & von Westernhagen, 2007).

To summarize, the theoretical literature related to geographic diversification has produced mixed predictions. Portfolio theory indicates that low correlations between returns in different markets will benefit the expanding bank. Yet cultural and linguistic differences may lead banks to make riskier loans and manage operations less efficiently. Similarity among banks that have all diversified increases the possibility of systemic risk. Finally, regulations may inadvertently cause banks to engage in riskier practices.

Turning to the empirical literature, Bos and Kolari (2005) find "net positive diversification benefits" in data from 1995-1999 on multibillion dollar European and American

banks. Similarly, Berger and de Young (2001) found that for 7,000 U.S. commercial banks from 1993 to 1998, expanding to nearby states or regions was associated with higher efficiency levels and organizational control over affiliates; however this efficiency diminishes as distance of the branches from headquarters increases. Small banks, with less than $100 million in assets, are especially impacted by the distance of branches from top management. Efficient management tends to offset these effects, implying that proper oversight during geographic expansion is important.

Stiroh (2004) investigated the impact of diversification strategies on small banks with less than $300 million in assets from 1984-2000 and found improved performance as measured by higher returns and lower return volatility for only the largest of those banks. The smallest banks had no change in risk, and in some cases their risk increased. Stiroh concludes that as a bank expands operations to diversify revenue, the bank's comparative advantage in local knowledge and relationship lending declines, and the bank may struggle to compete. These results indicate that it may be more beneficial for banks, in particular small banks, to specialize in providing services to a distinct and localized area.

Hayden *et al.* (2007) found that for 983 German banks between 1996 to 2002, the impact of all types of diversification on banks' returns changes according to the risk of unexpected loss. For instance, sectorial focus improves profitability for low-risk banks but becomes increasingly negative for banks with higher risk levels. Geographic diversification, however, leads to lower returns. Moreover, the authors found that diversification in general cuts profits in German banks while focusing increases profits.

Management's primary goal of overseeing operations as a means to increase efficiency and shareholder wealth may suffer as geographic distance increases as a result of unfamiliar

markets. In a study of 88 Chinese banks from 1996-2006, Berger, Hasan and Zhou (2010) found that Chinese banks suffer when managerial expertise is poor. Deng and Elyasiani (2008) researched the distance between branches and the bank holding company headquarters in the U.S. between 1994 and 2005 and found that higher distance leads to greater risk. They also noted that when branches are opened in remote regions that are either unknown to the holding company or too far away for proper oversight, mergers may increase risks Although entering a foreign country normally increases a firm's profitability, if the foreign entity begins expanding within the new country, it may experience reduced profits (Berger, Hasan, & Zhou, 2010). As noted before, entering an unfamiliar market may reduce profitability because management may lack proper techniques to combat the negative costs of geographic diversification. It is therefore crucial that the merging firms have experience in the geographic locations they enter.

Efficiencies may decrease when moving across domestic borders because language, culture, and regulatory structures may vary between states or provinces (Berger & de Young, 2001). In particular, in their study of the effects of geographic expansion on bank efficiency for 7,000 US banks between 1993 and 1998, Berger and de Young find the more geographically diversified a bank, the more profit efficiencies diminish. Moreover, a study by Bos and Kolari (2005) of US and European banks between 1995 and 1999 that "…an increase of total distance within the banking organization of 1,000 miles would decrease profit efficiency by about 0.016% and vice versa for a decrease in distance". Therefore, expanding domestically leads to lower efficiencies in part because of possible language, cultural, or regulatory differences.

Emmons *et al*. (2004) find that geographic expansion reduces risk less than increasing bank size among rural banks. However, they find that urban banks actually benefit from diversification outside their labor market areas. An explanation of the results is that geographic

expansions reduce efficiencies and profits when the bank now must monitor and operate from afar. Staff in different locations may compete against one another, and upper level managers may not want to move to new locations. This will boost costs for the firm and may lead to a higher manager turnover rate which reduces the individualized attention on which the bank was founded, as Berger, de Young and Udell (2001) argue. Ideally, Emmons *et al.* conclude, banks should first look for expansion opportunities within the community or region instead of moving outside their markets.

Thus, the empirical literature on geographic diversification is also inconclusive. Although there is evidence that for multibillion dollar banks geographic diversification increases profits, there is little evidence that expansion benefits smaller banks. Past research also indicates that management must deal with cultural differences in order to prevent increased risks.

Since *cajas* range in size from small, community-based savings banks to multibillion dollar firms, we hope to investigate how geographic diversification impacted this wide range of banks. Also, since *cajas* began as rural banks, our research will shed light on how rural banks adjust in internationally integrated markets. Moreover, there are strong cultural and linguistic differences in Spain. Spain has four national recognized languages while the heritage of the Spanish people is extremely diverse.

Hypotheses

Based on the theory and literature discussed in this section, we have formulated several hypotheses. The catalyst to the first hypothesis is geographic diversification, which appears to have had a large impact on the Spanish economy and, in particular, *cajas*. We will be testing the following question: (1) Does geographic diversification increase the probability of failure in a *caja*?

Spain's regions are culturally and linguistically diverse. As we have mentioned above, difference in culture and language may make it harder for *cajas* to operate efficiently. Therefore we will be testing the following: (2) Do cultural differences increase the possibility of failure in a *caja*?

4. Data and Summary Statistics

To analyze how geographic distance impacted loan types and loan risk, we collected data from the *Confederación Española Cajas de Ahorros'* (CECA's) year-end reports for 2002-2012. All *cajas* must register and report to the CECA, which resembles an American industry trade group. These reports contain information pertaining to individual *cajas,* including their financial statements, management profiles, branch locations, and loan types. We therefore defined "*caja*" as any savings bank with data in the CECA reports during our sample period. For each *caja*, we gathered financial statement data on cash, deposits, total assets, total liabilities, net income, retained earnings, fixed income investments, and total equity.

Failure

Throughout the crisis, numerous *cajas* closed or merged with other *cajas*. To measure failure (FAILURE) we created a dummy variable. FAILURE is equal to one the last year a *caja* operates before closing or merging with another *caja*; otherwise FAILURE is equal to zero.

Geographic Distance

To measure geographic diversification, we estimated the weighted average distance between each *caja's* headquarters and its branches (GEODIST). The CECA reports give the number of branches each *caja* operates in each of Spain's 50 provinces and two autonomous cities. We obtained latitude and longitude coordinates for each of the 50 province's largest cities, the location of the two autonomous cities, and each caja's headquarters city. We then used the

Haversine formula (Appendix A: Haversine Formula) to calculate the distance between each branch and headquarter city. Then, a weighted average distance to branches for each *caja* for every year was calculated using the following formula[1]:

$$\sum_{i=1}^{53} \frac{Distance_i * Number\ of\ Branches_i}{Total\ Number\ of\ Branches}$$

Distance$_i$ is the distance between the caja's headquarters and city *i* and *Number of Branches*$_i$ is the number of branches the caja operates in city *i*.

Cultural Variables

There are found major languages in Spain including Castilian Spanish, the official language, (74% of the population speaks this language), Catalan (17%), Galician (7%), and Basque (2%) (Central Intelligence Agency, 2014). To account for the cultural and linguistic differences between Spanish regions, a cultural diversification variable was created. To do this, the "home cultural region" was defined as the province in which the *caja* has its headquarters. All branch locations outside the "home cultural region" were considered "foreign" branches, because they were locations in which the culture and language was likely to be significantly different from those in the home region. We calculated the cultural diversification variable for each *caja* as the number of branches outside the home cultural region divided by the *caja's* total number of branches.

Control Variables

We computed a measure of leverage risk (CAPITAL) as a control variable that could influence *caja* insolvency. CAPITAL was calculated as the total equity as a percentage of total

[1] Some international trade researchers, such as Nitsch (2000), estimate the remoteness of a country using the formula: $R_i = (\Sigma_k[Y_k/D_{ik}])^{-1}$. Remoteness of a country is equal to the reciprocal of country k's GDP divided by the distance between country i and k summed over all trading partners of country i (Nitsch 2000). However, since the regions of Spain are relatively connected and since the formula provides information on intra-country trading, we decided to measure distance as described.

assets (shareholder equity ratio). The lower the equity capital ratio, the more likely the *caja* is to become insolvent in the near future. We also employed the percent change in total assets from year to year (%CHANGE) another measure of risk. This measure will be large for *cajas* that expanded rapidly. Rapid growth could be the result of a risky growth strategy and, hence, associated with a greater likelihood of failure. The fixed income ratio (FIR) is the ratio of fixed income to total assets. Fixed income represents income from bonds and other investments with regular returns that are liquid and easily sold on the market. If demand for cash is high, these securities can be sold quickly and prevent fire-sale losses. Therefore, a higher fixed income should lower the probability of *caja* failure (Cole & Wu, 2009). Lastly, we used return on assets (ROA) as a measure of risk. ROA is calculated as the ratio of net income to total assets.

Regional Variables

Another catalyst to the crisis and the creation of the housing bubble was the increase in housing prices spurred by very high demand. However, the unequal increase in housing prices between 1987 and 2004 demonstrates that regional variation is present. Housing prices increased substantially during this period in Cataluña (620%), Madrid (570%), Baleares (540%), Castilla y León (286%), Galicia (232%), and Extremadura (218%), whereas the nationwide median housing growth from 1997 to 2006 was only 183.5% (Campos Echeverría, 2008). As a result of the crisis, housing prices dropped. These autonomous regions or communities would most likely have seen the largest drops in prices, whereas all other regions (the base case) would have seen lower price declines. The Insituto Nacional de Estadística (National Statistical Institute) published the January 2013 population figures indicating that Spain's total population fell at 47.13 million people. Approximately 46% of the Spanish population lives in the autonomous regions of Cataluña (16.03%), Madrid (13.78%), Baleares (2.36%), Castilla y León (5.35%),

Galicia (5.87%), and Extremadura (2.34%). This indicates that 21.6 million people were impacted by the large drops in housing prices during the financial crisis (Insituto Nacional de Estadística, 2013). Therefore, we created dummy variables for each of these regions.

Summary Statistics

There were 436 observations for the 2002-2012 period. However, the sample used for in model testing included 376 observations because of lagging several control variables. Based on our summary statistics for the population (Table 1), it is evident that *cajas* suffered during the crisis. Approximately 74% of *cajas* failed. Many *cajas* reduced retained earnings to zero in order to support operations. In some cases the retained earnings fell below zero. Not surprisingly, cash balances ranged from zero to €11 trillion. Cash levels fell to zero for several *cajas* around the 2009 to 2011 period. These *cajas* most likely used their extra cash to support their short-term liabilities, i.e. deposits to customers. During this period, loans payments most likely declined as a result of loan defaults. Loans represent the *cajas*' primary assets. These assets and their related payments allow the *cajas* to support deposit withdrawals. Without these payments, the *cajas* resorted to using cash to pay their liabilities. It is crucial to note that the mean loan amount exceeded the deposits. In other words, the main liability driver exceeded the main asset class by nearly €1 trillion. The ratio of deposits to loans (0.91) demonstrates how loan defaults may have impacted the *cajas*. *Cajas* fund loans using the money received through deposits, then the payments they receive from those loans is used to support daily withdrawals. When loans exceed the amount of deposits and borrowers consistently make payments on time, the *caja* will not likely resort to cash or other easily convertible assets to support deposits. However, as the loans' variable interest rates and payment amounts increased, many borrowers became delinquent.

Therefore, the *cajas* needed to use other funding to support deposits. Moreover, with borrowers using more funds to pay their loans, deposits decreased, resulting in less funding for loans.

5. Econometric Model

In this section, we present econometric models to test the hypotheses discussed in Section 3. We tested the models outlined below using logit estimation. Therefore, the estimated coefficients are the effects of the independent variables on the log odds ratio of failure. [2] We transform the coefficients using the exponential function to give us the effects on the odds ratio. All financial variables were lagged by one year since the previous year's performance generally has the greatest influence on the likelihood of failure in the following year.

To test the possibility of a *caja* failing as a result of geographic diversification, we estimate a model that includes the standard control variables (CAPITAL, %CHANGE, FIR, ROA) along with GEODIST and the regional dummies:

$$FAILURE_{it} = \beta_0 + \beta_1 GEODIST_{it-1} + \beta_2 CAPITAL_{it-1} + \beta_3 \%CHANGE_{it-1} + \beta_4 FIR_{it-1} + \beta_5 ROA_{it-1} + \beta_6 CATALUNA_{it} + \beta_7 MADRID_{it} + \beta_8 BALEARES_{it} + \beta_9 GALICIA_{it} + \beta_{10} EXTREMADURA_{it} + \varepsilon_{it-1} \quad (1)$$

To test the possibility of a *caja* failing as a result of cultural diversification, we substitute the cultural diversification variable (CULTURE) for the geographical diversification variable:

$$FAILURE_{it} = \beta_0 + \beta_1 CULTURE_{it-1} + \beta_2 CAPITAL_{it-1} + \beta_3 \%CHANGE_{it-1} + \beta_4 FIR_{it-1} + \beta_5 ROA_{it-1} + \beta_6 CATALUNA_{it} + \beta_7 MADRID_{it} + \beta_8 BALEARES_{it} + \beta_9 GALICIA_{it} + \beta_{10} EXTREMADURA_{it} + \varepsilon_{it-1} \quad (2)$$

To test the effect of both geographic diversification and cultural diversification on the probability of *caja* failure, we include both GEODIST and CULTURE in the model:

$$FAILURE_i = \beta_0 + \beta_1 GEODIST_{it-1} + \beta_2 CULTURE_{it-1} + \beta_3 CAPITAL_{it-1} + \beta_4 \%CHANGE_{it-1} + \beta_5 FIR_{it-1} \beta_6 ROA_{it-1} + \beta_7 CATALUNA_{it} + \beta_8 MADRID_{it} + \beta_9 BALEARES_{it} + \beta_{10} GALICIA_{it} + \beta_{11} EXTREMADURA_{it} + \varepsilon_{it-1} \quad (3)$$

[2] Odds ratio = p/(1-p), where p is the probability of failure.

Since most *caja* failures occurred between 2008 and 2010, the years of the crisis, a dummy variable (CRISIS) was created to test the impact of the crisis on failure. CRISIS is equal to one if the year is equal to 2008, 2009, or 2010. The following models were created to test the probability of *caja* failure:

$$FAILURE_{it} = \beta_0 + \beta_1 GEODIST_{it-1} + \beta_2 CULTURE_{it-1} + \beta_3 CAPITAL_{it-1} + \beta_4 \%CHANGE_{it-1} + \beta_5 FIR_{it-1} \beta_6 ROA_{it-1} + \beta_7 CATALUNA_{it} + \beta_8 MADRID_{it} + \beta_9 BALEARES_{it} + \beta_{10} GALICIA_{it} + \beta_{11} EXTREMADURA_{it} + \beta_{12} CRISIS_{it} + \varepsilon_{it-1} \quad (4)$$

The geographic variables were removed because *cajas* in other regions had also failed and the previous model did not indicate that having a headquarters in one of these regions was significant.

$$FAILURE_i = \beta_0 + \beta_1 GEODIST_{it-1} + \beta_2 CULTURE_{it-1} + \beta_3 CAPITAL_{it-1} + \beta_4 \%CHANGE_{it-1} + \beta_5 FIR_{it-1} \beta_6 ROA_{it-1} + \beta_7 CRISIS_{it} + \varepsilon_{it-1} \quad (5)$$

We also estimated the model with dummy variables for each year in the sample. The following model was estimated; however the maximum likelihood estimate may not exist:

$$FAILURE_i = \beta_0 + \beta_1 GEODIST_{it-1} + \beta_2 CULTURE_{it-1} + \beta_3 CAPITAL_{it-1} + \beta_4 \%CHANGE_{it-1} + \beta_5 FIR_{it-1} \beta_6 ROA_{it-1} + \beta_7 CATALUNA_{it} + \beta_8 MADRID_{it} + \beta_9 BALEARES_{it} + \beta_{10} GALICIA_{it} + \beta_{11} EXTREMADURA_{it} + \beta_{12} 2004_i + \beta_{13} 2005_i + \beta_{14} 2006_i + \beta_{15} 2007_i + \beta_{16} 2008 + \beta_{17} 2009_i + \beta_{18} 2010_i + \beta_{19} 2011_i + \beta_{20} 2012_i + \varepsilon_{it-1} \quad (6)$$

Lastly, we estimated Model 3 on data from the crisis years 2008-2010:

$$FAILURE_i = \beta_0 + \beta_1 GEODIST_{it-1} + \beta_2 CULTURE_{it-1} + \beta_3 CAPITAL_{it-1} + \beta_4 \%CHANGE_{it-1} + \beta_5 FIR_{it-1} \beta_6 ROA_{it-1} + \beta_7 CATALUNA_{it} + \beta_8 MADRID_{it} + \beta_9 BALEARES_{it} + \beta_{10} GALICIA_{it} + \beta_{11} EXTREMADURA_{it} + \varepsilon_{it-1} \quad (7)$$

6. Empirical Results

Recall the two major hypotheses of the paper: increased geographic diversification is associated with a higher probability of failure and a higher level of cultural differences between a caja and its branches lead to a higher probability of failure. In two of the eight models tested, the hypothesis was rejected since higher geographic diversification (GEODIST) was associated with

a reduction in the probability of caja failure. In Model 1, the model that excludes the cultural diversification variable (CULTURE), an increase in geographic diversification by one kilometer is associated with a very small, 0.05%, change in the odds ratio (10% level of significance). Lastly, in Model 6, the model that includes GEODIST, CULTURE, and the annual dummy variables, a one kilometer increase in geographic diversification is associated with a 0.011% decrease in the odds ratio at the 10% level of significance (Table 4). Although the change appears small for one kilometer, increasing the distance by 100 kilometers reduces the odds ratio by 5%. Model 6, however may not present accurate results because the maximum likelihood estimate may not exist. One possible reason for the lack of validity may be the large number of variables included in the model. The two models described above indicate that geographic expansion had negative impact on the odds of *caja* failure. These results contact with those above, Gutiérrez *et al.* (2011) who found that 59.4% of the branches that closed during the crisis were located in areas where territorial expansion occurred. One driver behind the difference may be that Gutiérrez considered individual branches while our model focuses on the entire *caja*. Another difference may be that geographic expansion helped but branches in the furthest regions were first to close in the crisis. Furthermore, geographic diversification may lower risk of *caja* failure because the *caja* is protected from idiosyncratic and local market risk. The coefficients of GEODIST are not statistically significant in any other models.

Cultural differences impact *caja* failure in one of the models tested. As with increasing geographic diversification, increasing cultural differences is associated with a lower odds ratio in that model. The odds ratio decreases by 0.872%, at the 5% level of significance, in response to a one percentage point increase in this measure of culture diversification in Model 3, which includes CULTURE but excludes GEODIST. The coefficients on CULTURE in all other

models are insignificant. Low or even negative correlations in asset returns between regions may explain this result. Moreover, moving to "diverse" provinces may not provide large changes in language since the national language in the country is Castilian Spanish and many businesses operate using the official language.

Both GEODIST and CULTURE are significant when the association between these variables and failure is tested separately. However, in those models where GEODIST and CULTURE are both present, neither variable is significant. After testing the correlation of these two explanatory variables, there is evidence of positive correlation (0.76509) between GEODIST and CULTURE. As a result of both GEODIST and CULTURE being constructed, in part, using the ratio of branches to total branches, this correlation most likely exists.

Throughout the models, there are several patterns in the control variables. As expected, increased capital as a percentage of total assets is associated with a decrease in the probability of failure in Models 1, 2, and 3. That is, for every 1 percentage point increase in the capital ratio, the odds ratio decreases by 0.22%, 0.251%, and 0.249%, respectively. The coefficients for CAPITAL in all other models are insignificant. Moreover, increasing the total assets by 1% from one year to the next reduces the odds ratio by 0.043% or more from Models 1-5 and 7 (Table 3, and Table 5). This result is unexpected and may occur because the strongest *cajas* grew quickly while weaker *cajas* did not expand as rapidly. Lastly, being headquartered in Galicia is significant in Model 6, although the validity of this model is questionable because of the large number of variables estimated (degrees of freedom is equal to 21) (Table 4). A *caja* headquartered in this region has 111% greater odds of failure relative to the base case (every region apart from those included as dummy variables). During the housing boom, Galicia experienced a 232% increase in housing prices. When the market collapsed, this region likely

saw large drops in housing prices, leaving individuals with large debt and little equity. Moreover, two of the three of the *cajas* located in Galicia failed during the crisis which may artificially increase the significance of the coefficient. The remaining control variables (ROA and other regional variables) were not significant in any model.

The crisis strained the economy and financial sector in Spain. As a result, most *cajas* that experienced failure did so between 2008 and 2010. In the initial models, including the non-crisis years may dampen the significance of the coefficients. However, narrowing the data set to look specifically at the crisis years (2008-2010), neither GEODIST nor CULTURE is significant which is broadly consistent with results of the other models. These results also contradict our two hypotheses. Two variables are significant in the model: %CHANGE and FIR. %CHANGE is significant at the 10% level in Model 7, increasing total assets by 1% from one year to the next results in a 0.042% decrease in the odds ratio (Table 5). FIR is significant at the 5% level. For every 1% increase in the fixed income ratio, the odds ratio increases by 24.9% (Table 5). Theory dictates that an increase in fixed income to total assets will reduce failure since it will provide a buffer from fire-sales during high withdrawal periods. One explanation of the increase in failure in this model may be that cajas reduced asset levels overall including cash levels to try and prevent failure. Therefore, the ratio increased as a result of a smaller total asset level, not increasing fixed income.

Overall, the models indicate that both geographic diversification and cultural differences either decrease or have no effect on the likelihood of *caja* failure. Therefore, *cajas* should continue expanding into new regions. The results also suggest that *cajas* focus on increasing their total assets from year to year in order to further prevent failure while increasing their

shareholder's equity ratio. Lastly, it appears that *cajas* in regions outside of Galicia were less likely to fail.

7. Conclusion

Cajas de ahorros expanded into new geographic and cultural regions following the collapse of the Franco regime in 1975. Spain's economy boomed, particularly when the nation joined the EU in 1999. But a property bubble emerged in 2006, and household debt swelled to 120% of disposable income. By the end of 2008, the Spanish central bank declared a recession. *Cajas* experienced large defaults during this financial crisis that lasted from 2008 till 2011. Numerous *cajas* failed resulting in either complete operational closure or emergency mergers.

Many *cajas* underwent a significant shift toward geographic diversification in the years before the crisis. Much debate in the academic literature surrounds the impact of geographic diversification. Several studies have indicated that geographic diversification lowers risk by reducing the volatility of earnings and protecting against idiosyncratic and local market risk through imperfect correlations in asset returns among regions (Markowitz 1959, Emmons *et al*. 2004, Berger *et al.* 2001). However, others have found that geographic diversification increases risk when, perhaps encouraged by regulators, banks diversify beyond optimal levels (Hayden *et al.* 2007, Wagner 2010, Emmons *et al.* 2004). As a result of this debate, this paper studied the geographic diversification of *cajas* and its association with *caja* failure. Our evidence supports the argument that geographic diversification either has no effect on or reduces risk as measured by the odds of failure. A factor related to geographic diversification is cultural diversification. Cultural diversification can increase risk for banks if language, culture, or regulatory structures significantly vary between states or provinces. These differences will reduce efficiencies throughout the bank (Berger and de Young 2001). We also analyzed the impact of cultural

difference on likelihood of failure, hypothesizing that greater cultural diversification resulted in a higher probability of failure. Results indicated that increasing cultural diversification reduces the odds of failure. The prominence of a national culture and the use of an official language may result in the reduction of the culture differences between Spanish regions. Thus, both our hypotheses were rejected.

The evidence presented here implies that policy makers should not restrict geographic and cultural diversification. We suggest that future research focuses on gathering improved data, especially for Spanish *cajas*. Researchers should also investigate the association between geographic and cultural factors and *caja* profitability since ROA was not significant in any of the models. Moreover, researchers should examine failures during crises in other countries as a means to better understand the geographic diversification debate. Lastly, an examination of international banking overall would be of interest because banks operating in more than one country may present more compelling evidence on the impact of cultural and geographic diversification on risk levels and bank failure.

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Table 1: Summary statistics

Variable	N	Mean	Standard Deviation	Minimum	Maximum
GEODIST	436	104.03	105.96	0	625.11
CULTURE	436	0.396	0.261	0	1
RETEARN	436	897,984	1,481,064	-3,075,618	11,298,000
CASH	436	407,184	971,574	0	11,791,586
LOANS	436	16,572,286	28,815,608	8795	228,925,369
TOTALASSET	436	23,621,830	42,447,483	81,764	335,675,311
LIABILITY	436	22,256,368	40,668,177	9,024	314,531,836
EQUITY	436	1,361,726	2,268,144	-6,187,818	21,143,475
NETINCOME	419	121,401	288,866	-1,139,862	3,382,481
FIXEDINCOME	436	509,182	1,141,766	0	6,673,316
ROA	376	0.67	0.75	-7.45	8.61
CAPITAL	379	8.21	7.88	-6.37	104.14
%CHANGE	379	19.81	94.97	-96.70	1370.53
FIR	379	2.46	3.64	0	35.49

GEODIST represents weighted average distance between a caja and its branches. CULTURE is the ratio of branches outside the caja headquarters to total branches. RETEARN represents a caja's retained earnings. CASH is the cash and cash equivalents on a caja's balance sheet. TOTALASSET is the sum of all assets on the balance sheet. LIABILITY represents both short and long-term liabilities on a caja's balance sheet. EQUITY is the shareholder's equity level from the balance sheet. NETINCOME represents a caja's total earnings. FIXEDINCOME represents the level of fixed income securities held by a caja. ROA measures return on assets. CAPITAL is the shareholder equity ratio. %CHANGE represents change in total assets from one year to the next. FIR is the ratio of fixed income to total assets.

Table 2: Regression results for Models 1-3.

	Model 1		Model 2		Model 3	
Variable	Coefficient	Odds Ratio	Coefficient	Odds Ratio	Coefficient	Odds Ratio
INTERCEPT	0.1513	-	0.727	-	0.6979	-
	(0.0494)		(0.8608)		(0.7691)	
GEODIST	-0.00487*	0.995	-	-	-0.00078	0.999
	(3.3719)				(0.0445)	
CULTURE	-		-2.0752**	0.126	-1.8495	0.157
			(5.2605)		(1.7631)	
CAPITAL	-0.2508**	0.778	-0.2893***	0.749	-0.2867***	0.751
	(5.8946)		(7.1518)		(6.9374)	
%CHANGE	-0.0456***	0.955	-0.0429***	0.958	-0.434***	0.957
	(11.0871)		(10.0048)		(9.9124)	
FIR	-0.00921	0.991	0.0135	1.014	0.011	1.011
	(0.0203)		(0.0436)		(0.0279)	
ROA	0.2936	1.341	0.2844	1.329	0.2876	1.333
	(0.9905)		(0.9304)		(0.9483)	
MADRID	0.5996	1.821	0.3303	1.35	0.3671	1.444
	(0.2625)		(0.0710)		(0.0983)	
CATALUNA	-0.0482	0.953	-0.2634	0.768	-0.2431	0.784
	(0.0102)		(0.2862)		(0.2351)	
GALICIA	0.8869	2.428	0.6926	1.999	0.7487	2.114
	(0.9518)		(0.6099)		(0.6570)	
BALEARES	-1.2259	0.293	-1.6243	0.197	-1.6008	0.202
	(1.2368)		(2.0880)		(2.0039)	
EXTREMADURA	0.4214	1.524	0.4275	1.533	0.4224	1.526
	(0.2614)		(0.2695)		(0.2629)	
CASTILLA	0.0415	1.042	0.1776	1.194	0.158	1.171
	(0.0048)		(0.0859)		(0.0665)	
# of Observations	376		376		376	
Likelihood	211.791		210.117		210.07	
Likelihood Ratio	34.4249		36.0988		36.145	

*, **, *** denotes significance at the 10%, 5%, and 1% level respectively.
These models present logit model results. All variables are lagged one year except the region and time dummies. Refer to Table 1 for variable details.

Table 3: Regression results for Models 4 and 5

	Model 4		Model 5	
Variable	Coefficient	Odds Ratio	Coefficient	Odds Ratio
INTERCEPT	-2.6073**	-	-2.732***	-
	(5.7406)		(8.8177)	
GEODIST	0.000003206	1	0.000655	1.001
	(0)		(0.0378)	
CULTURE	-1.8279	0.161	-1.4464	0.235
	(1.3416)		(1.1925)	
CAPITAL	-0.0825	0.921	-0.0907	0.913
	(0.5549)		(0.8566)	
%CHANGE	-0.0326**	0.968	-0.0307**	0.97
	(6.0758)		(6.1946)	
FIR	0.0948	1.099	0.0979	1.103
	(1.8373)		(2.0314)	
ROA	-0.0813	0.922	-0.0193	0.981
	(0.0483)		(0.0027)	
MADRID	0.5053	1.658	-	-
	(0.1665)			
CATALUNA	0.1131	1.12	-	-
	(0.0420)			
GALICIA	1.1779	3.248	-	-
	(1.3838)			
BALEARES	-1.1671	0.311	-	-
	(0.9680)			
EXTREMADURA	0.2351	1.265	-	-
	(0.0695)			
CASTILLA	0.0231	1.023	-	-
	(0.0014)			
CRISIS	2.7422	15.522	2.7177***	15.146
	(23.6913)		(24.2949)	
# of Observations	376		376	
Likelihood	176.711		179.497	
Likelihood Ratio	69.5049		66.7188	

*, **, *** denotes significance at the 10%, 5%, and 1% level respectively.
These models present logit model results. All variables are lagged one year except the region and time dummies. Refer to Table 1 for variable details.

Table 4: Regression results for Model 6

	Model 6	
Variable	Coefficient	Odds Ratio
INTERCEPT	-15.467	-
	(0.0043)	
GEODIST	-0.0108*	0.989
	(3.4737)	
CULTURE	0.1275	1.136
	(0.0034)	
CAPITAL	-0.0751	0.928
	(0.2605)	
%CHANGE	-0.0102	0.99
	(0.4405)	
FIR	-0.0272	0.973
	(0.0743)	
ROA	1.0468	2.848
	(1.6378)	
MADRID	1.3687	3.93
	(0.5977)	
CATALUNA	1.2925	3.642
	(2.6268)	
GALICIA	4.7136***	111.456
	(8.4178)	
BALEARES	-2.0557	0.128
	(2.1056)	
EXTREMADURA	0.0458	1.047
	(0.0014)	
CASTILLA	-0.0109	0.989
	(0.0002)	
# of Observations	376	
Likelihood	97.906	
Likelihood Ratio	148.3092	

*, **, *** denotes significance at the 10%, 5%, and 1% level respectively.
These models present logit model results. All variables are lagged one year except the region and time dummies. Refer to Table 1 for variable details.

Model 6 Continued		
Variable	Coefficient	Odds Ratio
2004	-0.623	0.94
	(0)	
2005	0.0564	1.058
	(0)	
2006	11.419	>999
	(0.0024)	
2007	0.2306	1.259
	(0)	
2008	0.1852	1.203
	(0)	
2009	14.7739	>999
	(0.0040)	
2010	17.4996	>999
	(0.0056)	
2011	16.0862	>999
	(0.0047)	
2012	2.563	12.974
	(0)	
# of Observations	376	
Likelihood	97.906	
Likelihood Ratio	148.3092	

*, **, *** denotes significance at the 10%, 5%, and 1% level respectively.
These models present logit model results. All variables are lagged one year except the region and time dummies.
Refer to Table 1 for variable details.

Table 5: Regression results for Model 7

	Model 7	
Variable	Coefficient	Odds Ratio
INTERCEPT	0.2316	-
	(0.0459)	
GEODIST	0.000217	1
	(0.0019)	
CULTURE	-2.1677	0.114
	(1.2101)	
CAPITAL	-0.01733	0.841
	(1.3951)	
%CHANGE	-0.0432*	0.958
	(2.8617)	
FIR	0.2221**	1.249
	(5.5162)	
ROA	0.3062	1.358
	(0.3222)	
MADRID	1.0395	2.828
	(0.6021)	
CATALUNA	0.1969	1.218
	(0.0919)	
GALICIA	1.9184	6.81
	(2.4997)	
BALEARES	-0.8856	0.412
	(0.4704)	
EXTREMADURA	0.6392	1.895
	(0.4262)	
CASTILLA	0.6443	1.905
	(0.8441)	
# of Observations	123	
Likelihood	122.556	
Likelihood Ratio	20.5057	

*, **, *** denotes significance at the 10%, 5%, and 1% level respectively.
These models present logit model results. All variables are lagged one year except the region and time dummies. Refer to Table 1 for variable details.

Appendix A: Haversine Formula

The Haversine formula employs location coordinates to measure distance between two locations given the spherical nature of the Earth. The formula below was used to calculate distance between each *caja's* headquarters and its branches. These distance measures were used to estimate the weighted average distance that represents geographic diversification (Sinnott, 1984).

Haversine Formula

$$a = \sin^2(\Delta\varphi/2) + \cos(\varphi 1).\cos(\varphi 2).\sin^2(\Delta\lambda/2)$$

$$c = 2.\text{atan2}(\sqrt{a}, \sqrt{(1-a)})$$

$$d = R.c$$

Where φ is latitude, λ is longitude, R is earth's radius (mean radius = 6,371km).