The real effects of bank branch deregulation at various stages of economic development: The European experience*

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Abstract

This paper provides evidence on the links between financial deregulation and economic performance in a European context. Specifically, we study the relaxation of bank branching restrictions in Spain which triggered off a remarkable inter-regional expansion of savings banks which has been coincidental with an unprecedented period of sustained growth. Although related questions have been largely investigated for the US, the European experiences remain largely unexplored. An additional contribution consists of using quantile regression techniques which do not focus on the "average effect for the average province". This change of focus helps overcoming the difficulties found by previous studies for identifying any strong link between financial deregulation and growth. We also extend the analysis to other measures of economic activity, not only per capita income but also labor productivity and capital intensity. Our main findings indicate that, should bank inter-regional branch deregulation had any positive effect, the most benefited provinces would be the least developed ones in terms of the economic measures considered.

Key words and phrases: bank, branches, growth, province, quantile regression

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Contents

1. Introduction

The connection between finance and economic performance emerged as far as the beginning of last century. As indicated by Schumpeter (1911), financial intermediaries provide crucial services for technological innovation and economic development, leading to faster growth. In contrast, other authors such as Robinson (1952) or Solow (1956) hold more skeptical views, claiming that finance had only dubious effects on economic growth; according to these authors, it is the economy which leads, and finance follows, since economies with good growth prospects develop institutions to support them. While some authors conclude that "despite the advances in the growth literature, the debate over whether financial systems play any causal role in economic growth remains unresolved" (Jayaratne and Strahan, 1996), and even nobel prize winners disagree (Levine, 2003), the most recent contributions provide compelling evidence that financial development exerts a significantly positive effect on economic growth (Levine, 2005; Papaioannou, 2008; Aghion, 2008; Ang, 2008; Demirgüç-Kunt, 2010). Although the recent global financial crisis has shaken the confidence of developed and developing countries alike in the very blueprint of the financial and macropolicies, some authors (Demirgüç-Kunt and Servén, 2010) argue that the "sacred cows" of these policies are still much alive.

An extension of this literature has dealt with the effects of financial (de)regulation affecting banking firms and economic performance. For instance, Levine (1998) found that the legal environment facing banks can have a significant impact on economic growth through its effect on bank behavior.[1] More specifically, a number of papers have provided new evidence that financial markets can directly affect economic growth by studying intrastate and interstate branch reform in the US. As indicated by Clarke (2004), geographic expansion by banks may make lending more productive due to the gains in efficiency and increased product availability (e.g., insurance mutual funds, and variation on basic product lines). The studies by Jayaratne and Stra-

[1]Some contributions have found that the effects of stock market development and banking development on growth can differ remarkably. For instance, Shen and Lee (2006) found that only stock market development has positive effects on growth, whereas the effect of banking development was unfavorable, if not negative.

han (1996), Krol and Svorny (1996), and Strahan (2003), using fixed effects regressions of state panels of economic growth, found positive intercept shifts for states subsequent to years of deregulation. Clarke (2004) augmented the work by Jayaratne and Strahan (1996), yielding consistent results with Jayaratne and Strahan's, i.e., substantial short-run growth effects from branching and banking reform. However, Freeman (2002, 2005) enquires about the validity of these results for a number of reasons such as the bias stemming from contemporaneous correlation between the regressors and the error term of the regression model.

We contribute to this literature in two main ways. First, all those studies analyzing the growth effects of deregulation of state bank branching laws have focused exclusively on the US experience, and much less work has been done in other countries, and extending the results to other contexts may be partly questionable (Jones and Bullen, 1994). However, in the European Union there have also been some similar deregulatory episodes. As surveyed by a plethora of contributions, since the passing of the First Banking Directive in 1977, European Union legislation has been directed consistently toward the reduction of barriers to cross-border banking activity. As indicated by Goddard *et al.* (2010), deregulation of financial markets at the national level has removed many of the lines of demarcation between banks and other financial services firms, and has facilitated cross-border competition. However, despite these developments, European[2] banking markets are still far from being fully integrated (see, for instance Manna, 2004; Cabral *et al.*, 2002), and cross-border activity is still relatively limited.

The largest five banking systems of the European Union are France, Germany, Italy, Spain and the UK, whose main profiles are sketched in Goddard *et al.* (2010), among others (see also Goddard *et al.*, 2001). Although the financial crisis has affected each of them with varying degrees of intensity, one of those where the impact has been higher is the Spanish banking system, partly by the collapse of the property market bubble. One of the most prominent features of the Spanish banking system is its dense branch network, denser than any other European Union country —one

[2]We will refer to "Europe" and "European Union" (made up of 15 countries, i.e., those who were members prior to the last two enlargements) indistinctly, in order to make the exposition clearer.

bank branch for every 1,042 inhabitants in 2009. This high density is one of its most abiding characteristics of the Spanish banking system, which has exacerbated in the last 20 years. Until 1989, the geographical scope of savings banks, which represent a large fraction of Spanish banking firms (the other two being commercial banks and credit cooperatives) was restricted to a locality, province, or region.[3] As indicated by Fuentelsaz and Gómez (2001), the removal of these branching restrictions and the ensuing expansion of many savings banks (whose total number of branches doubled between 1988 and 2009) constitutes a clear parallelism with the US branching deregulation, enabled by the passage of the 1994 Riegle-Neal Interstate Banking and Branching Efficiency Act (IBBEA) that effectively eliminated branching restrictions nationwide. It also constitutes an ideal framework, different to the US one, in which to test the growth effects of financial deregulation.

As a second contribution, our empirical strategy will also differ from that followed by the main contributions in the field. In contrast to the "difference-in-differences" model used by Jayaratne and Strahan (1996), later on extended by Clarke (2004), the fixed-effects model estimated using OLS by Krol and Svorny (1996), or the change-point analysis by Freeman (2005), we propose an alternative strategy in the spirit of Rioja and Valev (2004a), who developed a structure that explicitly allows the effect of finance on growth to differ across various stages of economic development (see also Rioja and Valev, 2004b; Deidda and Fattouh, 2002, 2008). In our case, we will consider the quantile regression approach by Koenker (2001, 2005), which enables the researcher to consider the entire distribution of growth patterns, whereas OLS considers only the distribution mean. This approach has several advantages. Among them, we can stress that it reveals differences in the relationships between the dependent and independent variables at different points in the conditional distribution of the dependent variable, or the fact that the quantile regression coefficient estimates are more robust than the OLS estimates where the mean value of the dependent variable is predicted (Reichstein *et al.*, 2010). This is especially true in the presence of

[3] Commercial banks have had full freedom of establishment since 1974, whereas savings banks had their geographical scope of operations restricted until 1989 (R.D. 1582/1988, December 29$^{\text{th}}$ Law.). See Illueca *et al.* (2009).

non-normal data and outliers.

The advantages of using quantile regression are not only technical but also theoretical. In our specific context, quantile regression would allow to disentangle whether the effect of deregulation is *constant* for all Spanish provinces—whose economic performance varies a great deal across them—or whether the effect is stronger—or weaker—for some of them. Using OLS would implicitly imply postulating that the effect is the same for all provinces regardless of their economic development stage. In contrast, using quantile regression would allow describing the impact of variables not only on the center but also on the tails of the economic performance distribution.

The article is structured as follows. Section 2 reviews the most relevant literature on the links between bank branch deregulation and economic performance. Section 3 provides some insights on the evolution of the Spanish banking sector over the last twenty years. Section 4 provides some details on the models to be estimated, whereas Section 5 describes the most relevant findings. Section 6 presents the conclusions.

2. A brief review of the finance-growth nexus literature

As indicated above, the economic literature on the effects of the financial system on the real economy goes back a century ago when in 1911 Schumpeter argued that efficient financial systems promote innovations; hence, better finance leads to faster growth (Schumpeter, 1911). However, other economists (Robinson, 1952) believed that the causality was reversed; economies with good growth prospects develop institutions to provide the funds necessary to support those good prospects. In other words, the economy leads and finance follows. Some years later Goldsmith (1969), McKinnon (1973), and Shaw (1973) provided empirical evidence that high-growth economies tend to have well-developed financial markets although, as indicated by Jayaratne and Strahan (1996), "this evidence did little to resolve the Schumpeter/Robinson debate". More recent research, as summarized by Levine (2003), found consistent results that countries with well-developed financial markets and institutions tended to grow faster than countries without them, and that financial developments tended to precede economic developments. However, as indicated by

Jayaratne and Strahan (1996), the evidence from cross-country regressions is plagued by omitted variables problems, and must be viewed with "skepticism". This literature has become enormous, and some helpful reviews such as those by Levine (1997), Demirgüç-Kunt and Levine (2001) or Levine (2003, 2005) are quite illustrative.

This vast literature has fleshed out these two potential causal links from financial systems to growth. Financial markets can matter either by affecting the volume of savings available to finance investment or by increasing the productivity (or quality) of that investment. These theories show that an improvement in financial market efficiency can act as a lubricant to the engine of economic growth, allowing that engine to run faster. The accumulated empirical evidence widely supports the Schumpeterian point of view in the sense that financial market development can play an important causal role in driving long-run growth.

In this line, King and Levine (1993) demonstrated that the size and depth of an economy's financial system is positively correlated with its future growth in per capita real income. While this evidence is appealing, it cannot rule out the possibility that financial development and growth are simultaneously driven by a common factor not controlled in the empirical analysis. Some authors (Cetorelli and Gambera, 2001; Rajan and Zingales, 1998) have attempted to overcome this criticism by exploiting cross-industry differences, or by using econometric techniques that allow us to test both directions of the hypothesis (Calderón and Liu, 2003). This literature provide vast evidence showing that high growth economies tend to have well developed financial markets. Levine (1997) and Ang (2008) offer very illustrative surveys of the literature.[4]

A specific branch of this literature, which relies on the aforementioned relationship between financial development and economic growth, is devoted to the analysis of the effects of banking deregulation and, more specifically, the one referred to the number and location of branches and their links with economic growth. The basis of this relationship is that the removal of barriers and the transition from a regu-

[4]Some authors analyze the link between some financial characteristics and economic growth at regional level (Carbó Valverde *et al.*, 2003; Carbó-Valverde and Rodríguez-Fernández, 2004; Fernández de Guevara and Maudos, 2009; Hasan *et al.*, 2009).

lated situation to an unregulated one can foster economic growth by allowing banks to diversify their portfolios, improve the quality of loan structure, reduce risk, develop economies of scale, reduce market power, increase productivity and efficiency, increase the accessibility to bank products, etc. As previously indicated, some relevant contributions in this particular field include Jayaratne and Strahan (1996, 1999), Clarke (2004), Freeman (2002, 2005), Huang (2007), Krol and Svorny (1996), Kroszner and Strahan (1999), or Strahan (2003).

Jayaratne and Strahan (1996) provide evidence that financial markets can directly affect economic growth by studying the relaxation of bank branch restrictions in the United States, finding that income growth increase significantly following intrastate branch reform. The results indicate that improvements in the quality of bank lending, not increased volume of bank lending, appear to be responsible for faster growth. Jayaratne and Strahan (1999) extend these results showing that when branching restrictions were lifted, the efficiency of the banking system improved as the better banks expanded into new markets producing lower loan rates, cost reductions and accelerating the economic growth. Previously, Krol and Svorny (1996) had examined the effect of branching and interstate banking regulations on three measures of state economic activity (real per-capita personal income, real per- capita gross state product, and the employment/population ratio) for the period from 1970 to 1988 in the US, finding an adverse effect of restrictive bank regulation on economic activity. Later, Kroszner and Strahan (1999) measure the consequences for the economic growth and the structure and efficiency of the banking sector across the states of four deregulation indicators (MBHC, branching through merger and acquisition, unrestricted state wide branching, and interstate banking). Their results indicate that branching by merger and acquisition is the most important type of deregulation measured by its consequences for economic growth, banking structure, and bank efficiency, on the contrary branching deregulation appears to have minor effects. Following this line of research, Strahan (2003) analyzed how the removal of limits on bank entry and expansion affected economic performance in the US. Basically, the results suggest that this regulatory change was followed by better performance of the real economy. State economies grew faster and had higher rates of new business formation after this deregulation. At the same time, macro- economic stability improved. More recently, Clarke (2004) analyzed the effects of financial deregulation on economic growth by extending the study of Jayaratne and Strahan (1996) who use a "difference-in-differences" methodology. So, this study instead of using a dummy variable for the deregulation as in Jayaratne and Strahan (1996) uses a continuous variable describing the extent of the banking market for a state's banks. Besides, this study uses a two-stage model to determine whether banking deregulation pro-motes economic growth through its influence on the size of banking markets. The results supports the hypothesis that such deregulation enhances short-run economic growth.

Freeman (2002) has questioned the validity of some of these results. Specifically, he showed that the large growth effects of deregulation of state bank branching laws obtained in some studies (Jayaratne and Strahan, 1996) were biased because bank deregulation took place during a period of economic distress. Robustness tests indicated that although there is a growth effect of branching reform, it is much smaller than initially estimated. In the same sense, Freeman (2005) went even farther demonstrating that previous findings (Jayaratne and Strahan, 1996; Krol and Svorny, 1996; Strahan, 2003) overstated the incremental growth effects of deregulation. Using a different methodology he obtained that stronger growth rates following deregulation were in all cases temporary rather than permanent. Among the revised literature, the literature analyzing the growth effects of bank deregulation in a non-US context is entirely yet to come.

Nevertheless, the literature of deregulation of bank branching, besides of analyzing its effects on economic growth, also study its effects on other aspects such as 1) income distribution; 2) bank efficiency and productivity; 3) entrepreneurship; 4) market power; 5) stability; 6) wealth effects, etc. A summary of these studies follows:

1. Beck *et al.* (2010) analyze the effects of intrastate branch banking reform on <u>income distribution</u>. They find that branch deregulation significantly reduced income inequality by boosting the incomes of lower income workers. The reduction in income inequality is fully accounted for by a reduction in earnings

inequality among salaried workers.

2. Some papers analyze the effects of deregulation of branching on bank efficiency and productivity. So, Berger and DeYoung (2001) asses the effects of geographic expansion on bank efficiency in the US case finding that it may be no particular optimal geographic scope for banking organizations (some operate in an efficient manner within a region, while others may operate efficiently on a nationwide or international basis). DeYoung *et al.* (1998) examine the relationship between out-of-state entry and bank cost efficiency. Their results suggest that Riegle-Neal act enhanced competition and improved bank efficiency. Tirtiroglu *et al.* (2005) study the influence of the evolution in intrastate and interstate deregulations on the total factor productivity growth of U.S. commercial banking during 1971–95. Results indicate that relaxing restrictions on intrastate branching expansion had a positive long-run influence upon banks' productivity growth. Jayaratne and Strahan (1999) finds that the removal of branching restrictions leads to a increase on the efficiency of the banking system as the better banks expanded into new markets and increase their market share after branching deregulation. Loan losses and operating costs fell sharply, and the reduction in banks' costs was largely passed on to borrowers in the form of lower loan rates. The relaxation of state limits on interstate banking was followed also by improvements in bank performance. More recently, Guillén (2009) addresses the influence of the state deregulation on commercial banks' efficiency within the US. Results indicate that when the restriction for opening a branch or subsidiary was released, banks were able to improve their efficiency. Finally Illueca *et al.* (2009) also analyze the effects of geographic expansion on efficiency, productivity and technical change for the Spanish saving banks case. Specifically, their results indicate that savings banks that expand geographically outside their natural markets achieve greater productivity gains. In contrast, lower increases in productivity are found in savings banks that expand on a nationwide basis, or that confine their territorial expansions to their traditional markets. This represents the only case focusing on a non-US context.

3. Wall (2004) analyze the influence of branching deregulation on entrepreneurship. Results evidence that banking deregulation led to decreases in entrepreneurship in some US regions and to increases in others.

4. Calem and Nakamura (1988) show that bank branching tends to reduce localized market power by broadening the geographic scope of competition among banks.

5. Some studies analyze the role of branching restrictions in the stability of the banking system through the effect that the removal of these restrictions have in the ability of banks to exploit cost advantages by becoming larger and geographically more diversified. So, Carlson and Mitchener (2005) find that states allowing branch banking had lower failure rates, while those examining individual banks find that branch banks were more likely to fail. Their results suggest that the effects that branching had on competition were quantitatively more important than geographical diversification for bank stability in the 1920s and 1930s. Similarly, Ramírez (2003) investigate the role of bank branching restrictions in the likelihood of state bank failure during 1925-29 finding that branching restrictions were associated with a higher incidence of bank failures since. Shiers (2002) examines the effect of geographic diversity and economic diversity on commercial bank risk and finds that economic diversity reduces bank risk and that branching also reduces bank risk.

6. Some papers analyze the wealth effects of the branching deregulation. So, Carow and Heron (1998) analyze the effect of the Interstate Banking and Branching Efficiency Act. Their results indicate as a consequence of the deregulation that large bank holding companies experience significantly higher returns. Similarly, Fraser *et al.* (1997) examine the wealth effects of a decision by the Office of Thrift Supervision to permit interstate branching for federally chartered savings and loans associations. Results show that large banks experience positive wealth effects.

3. The relaxation of the limits to expand geographically in Spanish banking

In the Spanish banking system there are three main types of firms: private commercial banks, savings banks, and credit cooperatives. Commercial banks are privately owned banks whose shares are in the hands of families, individual investors and institutional investors. Savings banks ("cajas de ahorros") have a peculiar type of ownership. Some authors argue they represent a case of a lack of ownership (Crespí *et al.*, 2004), whose board is composed by representatives of regional governments, local governments, bank clients and other institutions (such as founding institutions). The owners are not represented in the board because savings banks do not issue shares. Credit cooperatives are owned by their associates. The relative importance of the three aggregates is unequal, since credit cooperatives' assets are below 10%, whereas the weight of commercial banks and savings banks is much more similar.

The Spanish banking sector was one of the most regulated in Europe before Spain joined the European Union. Deregulatory initiatives were phased in and culminated in 1989 (see Table 1). Until then, the possibilities of geographical expansion for savings banks were limited to a regional level ("comunidades autónomas"),[5] and to a local level in the case of credit cooperatives, whereas commercial banks have had full freedom of establishment since 1974. As indicated by Fuentelsaz and Gómez (2001), the elimination of savings banks' restriction to expand geographically and the subsequent expansion of most of them (especially the largest ones) constitutes and ideal framework, with similar analogies to the US case (including the number of territorial units, 50 states in the US and 50 provinces in Spain) in which to perform our analysis.

Prior to 1989, Spanish savings banks could not expand outside their home region.[6]

[5] As indicated in Illueca *et al.* (2009), Spanish regions correspond to what in European terminology are known as NUTS2 (Nomenclature des Unités Territoriales Statistiques, or Nomenclature of Territorial Units for Statistics), whereas provinces correspond to NUTS3. There are 17 regions, which contain 50 provinces. However, the number of provinces per region varies greatly from region to region. For instance, the region of Andalusia has eight provinces, whereas other regions such as Murcia, Navarra, or Madrid have a single province. The number of inhabitants also varies markedly across regions and across provinces.

[6] Some exceptions to the law existed because of historical reasons which allowed some particular savings banks to set branches in regions different to their regions of origin.

The complete deregulation culminated in the phaseout of the limits to expand geographically with the passage of the R.D. 1582/1988 December 29th Law, which led to the total removal of barriers to geographic expansion, effectively codifying at the national level what had been occurring at the regional level. This occurred partly as a response to the aspirations of some savings banks—especially the largest—to establish their activities throughout the entire national territory in identical conditions to those that private commercial banks had been enjoying since 1974. In contrast, as indicated by Kroszner and Strahan (1999), smaller banks have usually been the main winners from antibranching laws, which protect them from competition from larger and more efficient banking organizations (Jayaratne and Strahan, 1998; Flannery, 1984; Winston, 1993). It was also a reaction to the perspective of the Single European Market and, consequently, the threat that European financial institutions could enter the Spanish banking industry. However, some authors raised some warnings about a model in which any savings bank could set branches anywhere in the country, recommending another one made up by very few large savings banks of national scope, and smaller savings banks operating at regional level only (Revell, 1989).

The deregulatory initiatives on the geographic expansion of savings banks require a definition of what we will understand as geographic expansion. Some authors (Fuentelsaz and Gómez, 2001; Illueca *et al.*, 2009) define the concepts of "natural" or "original" market, and "other" or "new" markets. We consider a similar yet simpler approach, in order to avoid the problems due to mergers, in which the "new" markets are defined as those *regions* different to each savings bank's home region, i.e., those markets in which the entrance was not allowed before the passing of the R.D. 1582/1988 December 29th Law. Therefore, the variable capturing geographic expansion deregulation, $BRANCH\_OTH$, is the number of out-of-region savings banks' branches (divided by population) in each province. We will also consider the variable $BRANCH\_TOT$ representing the total number of branches, more directly linked to financial development than deregulation *per se*.

As indicated in Table 2, savings banks' geographic expansion policies reacted to deregulation. If we consider the evolution of the three types of institutions in the Spanish banking system, i.e., commercial banks, savings banks, and credit cooperatives, it is observed that the tendencies differ strongly. Overall, the total number of branches has increased steadily from 35,429 by 1992 to 44,085 by 2009, which represents a 24.43% increase. The peak had been reached earlier (in 2008 the total number of branches was 45,662), but the deep international economic and financial crisis has impelled many firms to redefine their expansion strategies—and this tendency is expected to hold in the near future. In some years the increase in the total number of branches has been stunning—for instance, between 2005 and 2007 the number of branches increased by 8.38%, which represents almost 4,000 more branches. In contrast, in some years the number of total branches has declined moderately—for instance, between 1992 and 1993, due to both the economic crisis and the mergers and acquisitions' process that was affecting savings banks, and also in the years of the dot-com crisis.

Taking into account the total number of branches for any of the three aggregates, it is apparent that lifting the restrictions to branching for those institutions that could not do it—savings banks and credit unions—has resulted in these types of firms to follow much different strategies to those of commercial banks. Indeed, the evolution for the aggregate (columns 1 and 2 in Table 2) is the result from very disparate trends for the different types of firms. In the case of savings banks, the number of branches has increased from 14,291 by 1992 to 24,202 by 2009, which represents a 69.35%. The increase would be even higher if we compare 1992 to 2008 (in this case the increase would be of 74.83%!). This has also led this type of firms to increase its share of branches (from 40.34% to 54.90% between 1992 and 2009). In the case of the credit unions, the rise has also been quite remarkable—from 3,080 to 5,043 branches, representing a 63.73% increase. However, the relative importance of this type of institutions is minor, since its share of branches is still limited (11.44%).

The trends for commercial banks have been opposite. As indicated in Table 2 (columns 3, 4 and 5), the number of branches has actually *decreased* from 18,058 to 14,840, representing a –17.82% decline. Most of the decline occurred in the first half of the sample period (between 1992 and 2001), which is the period when savings banks expanded more aggressively (increasing their total number of branches by 38.75%). In contrast, in the second half of the period the total number of branches actually increased slightly (by 0.57%), although the rise would have been much higher had we excluded year 2009 (between 2001 and 2009 the increase was 5.58%). Therefore, although commercial banks and savings banks face the same regulatory regime (the remaining differences are almost entirely restricted to their type of ownership), the opposite branching strategies could suggest that differences are stronger than what one might *a priori* expect.

Therefore, according to the information reported in both Table 2, the expansion strategies for all commercial banks, savings banks and credit unions have differed sharply—especially comparing commercial banks with the other two groups of firms. However, there might have also existed differences *within* groups of firms. As indicated by Illueca *et al.* (2009), the rise in the total number of savings banks' branches between 1992 and 2004 was basically related to the expansion in other markets. However, it could also be corroborated that there were other strategies, as the number of branches that savings banks owned in their natural markets also increased sharply.

More specific information is provided in figures 1 and 2, which contain maps on the evolution of the number of out-of-region savings banks' branches and total savings banks' branches, respectively, between the year previous to the deregulation (1988) and the most recent sample year. We can observe that both have been increasing, especially the out-of-region savings banks' branches.

Following Illueca *et al.* (2009), the strategies followed by the different institutions to expand could be defined as offensive (or aggressive) strategies and defensive strategies. They are clearly different, not only in their implementation but also in their objectives. Defensive strategies would be adopted by companies trying to strengthen their market share in their traditional (original) markets. Offensive strategies are chosen by banks that try to increase their presence in a market in which, previous to 1989, they could not operate (other markets) (Fuentelsaz and Gómez, 1998; Fuentelsaz *et al.*, 2004). This is specially the case of savings banks. These patterns present multiple variations, for several firms adopted mixed strategies. This is the case of Caja Madrid, for example, which has strengthened both its position in its natural market (the autonomous region of Madrid) and in other markets, where it has expanded intensely (Illueca *et al.*, 2009).

4. The growth effects of bank branch reform

4.1. An empirical model of growth

Our empirical strategy follows previous contributions such as Jayaratne and Strahan (1996) and Krol and Svorny (1996) and, to a lesser extent, Clarke (2004). However, the models must vary necessarily because the regulatory variables they use differ with respect to ours.

In other to test the hypothesis that branching deregulations affects the provincial economic performance we regress some measures of regional economic activity on a set of variables related to the branching deregulation and a set of control variables. Control variables are important because the regional economic activity, besides of the branching deregulations, is affected by many other economic determinants and structural differences at regional level. We consider the period 1986–2007. Since savings banks were allowed to set branches nationwide only from 1989 onward we can cover all their post-deregulation performance.

More specifically, our basic model is the following fixed effects regression:

$$y_{it} = \alpha + \beta_i + \gamma_t + \delta BRANCH\_OTH_{it} + \zeta BRANCH\_TOT_{it} + \nu Z_{it} + \epsilon_{it} \qquad (1)$$

The indexes i and t denote province and time respectively. y_{it} is the indicator of economic activity at provincial level (NUTS3 in European terminology). We consider three different measures of economic activity (y_{it}): GDP/N (real per capita GDP); GVA/L (real GDP per worker) and K/L (real provincial capital stock per worker). In some models we also include time and individual effects in other to control for unobserved differences across provinces and time periods. All variables are measured in logs. The province dummy (β_i) captures conditions specific to individual provinces not captures by the regulatory and control variables. The time effects (γ_t) controls for business cycle or other time-varying aggregate effects on state economic activity.

Our key variables are those variables related to branching deregulation: $BRANCH\_OTH$ and $BRANCH\_TOT$. $BRANCH\_OTH$ is the number of provincial branches per capita pertaining to saving banks from outside the region. This variable captures the extent of the effect of the 1989 deregulation in each province in terms of the actual number of branches. The existence of them was only made possible due to the new regulation. Some authors also use similar continuous variables in other to measure the intensity of the deregulation process (Carlson and Mitchener, 2005; Illueca *et al.*, 2009). $BRANCH\_TOT$ is the total number of branches per capita.

Regarding the control variables, a broad set of additional explanatory variables have been included in order to control for the effect of other important determinants of economic performance. We rely basically on the existing literature that has explored regional differences in personal income, rate of growth as well as the literature of the link between financial development and economic growth. On the basis of this literature we include variables that capture the intrinsic economic characteristics of the provinces such as government size, industrial specialization, different kinds of capital, demographic and labor market characteristics as well as indicators of financial development.

So, as in other studies (Calderón and Liu, 2003; Cetorelli and Gambera, 2001; Clarke, 2004) in order to deal with the potential effect of government size we include the variable WF_NON_MKT defined as the share of non-market services on total employment.

Demographic factors may have a significant impact on per capita GDP. For example, differences on population ageing between provinces will affect their labor supply. $WORKFORCE$ tries to reflect this influence of demographic factors on economic development across provinces and it is defined as the ratio between employment and population.

Labor market characteristics can also influence the provincial economic performance. In order to control for structural differences between provincial labor markets

(Beck *et al.*, 2010) the provincial unemployment rate ($UNEMPLOY$) is also considered.

Similarly, as in other papers (Carbó-Valverde and Rodríguez-Fernández, 2004; Carlson and Mitchener, 2005; Cetorelli and Gambera, 2001; Clarke, 2004; Mitchener and Wheelock, 2010) we include some explanatory variables reflecting structural differences between provinces. So, SEC_{ik} are the industrial Gross Value Added (GVA) shares on total GVA at current prices of province i in sector k.

We introduce a set of variables related to the province economic characteristics. So, as in other studies (Calderón and Liu, 2003; Cetorelli and Gambera, 2001; Clarke, 2004) we include a variable to measure the government size. WF_NON_MKT is the percentage employment in the public sector. Similarly, as in other papers (Carbó-Valverde and Rodríguez-Fernández, 2004; Carlson and Mitchener, 2005; Cetorelli and Gambera, 2001; Clarke, 2004; Mitchener and Wheelock, 2010) we include a variable to capture the sectoral specialization. Specifically the variable SEC_{ik} are the percentages of GDP of province i in sector k. Finally $UNEMPLOY$ is the unemployment rate of province (Beck *et al.*, 2010).

Additionally a set of capital stock variables are included. Specifically, we include a measure con social capital of the province ($KSOC$) (Pastor and Tortosa-Ausina, 2008), a measure of the human capital of the population ($HCAP$) as the average schooling years of the population (Calderón and Liu, 2003; Carbó-Valverde *et al.*, 2007; Carbó-Valverde and Rodríguez-Fernández, 2004; Cetorelli and Gambera, 2001; Clarke, 2004; Edison *et al.*, 2002) and some measures of private and public capital. Specifically, as in other studies (Carbó-Valverde and Rodríguez-Fernández, 2004; Edison *et al.*, 2002) we include total investment ($INVEST$), the stock of productive private capital ($CAPITAL$) as well as the stock of public capital ($PUBLIC\_CAP$).

Finally, many studies (Carbó-Valverde and Rodríguez-Fernández, 2004; Cetorelli and Gambera, 2001; Edison *et al.*, 2002) use to include some indicators of financial development. So $DEPOSITS$, $LOANS$ are the ratio of deposits and loans per capita, respectively.

4.2. Quantile regression

The OLS regressions constitute a useful starting point for analyzing the deregulation of bank branching restrictions on provincial economic performance. Typically, OLS or a variant of instrumental variables is used to estimate the effect of a set of explanatory variables on economic performance. However, in the context of cross-country growth regressions, some problems arise related to the lack of robustness when including various additional conditioning sets of explanatory variables (Levine and Renelt, 1992), the biased coefficient estimates due to omitted variables (partially solved by Caselli *et al.*, 1996), or the possibility of parameter heterogeneity (Durlauf and Johnson, 1995). In the particular context we are dealing with, Freeman (2002, 2005) has pointed out a series of problems affecting the methods and evidence reported by Jayaratne and Strahan (1996), Strahan (2003) and Krol and Svorny (1996). In Freeman (2002) it is demonstrated that, in contrast to Jayaratne and Strahan's work, deregulation was itself endogenous to state economic conditions, resulting in biased estimates of the effect of deregulation on state economic growth. Later on, Freeman (2005), using recent developments in the estimation of structural change in economic time series, demonstrated that stronger income growth rates associated with state bank branch deregulation were temporary rather than permanent.

However, Freeman's methods cannot be seamlessly extended to our setting because the bank branch deregulatory initiatives in the US have not been entirely analogous to the Spanish ones. As indicated by Kroszner and Strahan (1999), bank branch regulation in the US operated on a state-by-state basis, and deregulation took place gradually across the states, whereas in the Spanish case it operated in a national basis.[7] Although one may argue that deregulation *de facto* may have differed strongly across provinces (as opposed to *de jure* deregulation), the analogy between the US and Spain is not complete and considering other methods could be more appropriate.

We propose using quantile regression methods (Koenker, 2001). Quantile regression is a way to estimate the conditional quantiles of a response variable distribution

[7] As indicated by Freeman (2005), the preemptive deregulation of the financial system in the Northeast and the Middle Atlantic appears to have had little to do with the reactive deregulation in the Southwest and Rocky Mountain states.

in the linear model that provides a more complete view of likely causal relationships between variables. As indicated above, all the variables affecting economic performance are not measured and included in the regression models and, as a consequence, there may be weak or no predictive relationship between the *mean* of the response variable distribution and the set of covariates. However, there might be stronger, useful predictive relationships with other parts of the response variable distribution. Focusing exclusively on changes in the means may underestimate, overestimate, or fail to distinguish real nonzero changes in heterogeneous distributions (Cade and Noon, 2003). This is especially problematic for regression models with heterogeneous variances, which use to plague social sciences, and implies that there is more than a single slope (rate of change) describing the relationship between a response variable and predictor variables measured on a subset of these factors.

In addition, complicated changes in central tendency, variance and shape of distributions are the norm in econometric models applied to observational data due to model misspecification, which can be caused because of not using the appropriate functional forms, or because relevant variables are not included in the model. An interesting advantage of quantile regression is that no specification of how variance changes are linked to the mean is required, nor is there any restriction on the exponential family of distributions—i.e., no assumptions required. As summarized by Cade and Noon (2003), quantile regression models are especially useful under some circumstances including when the response variable is affected by more than one factor, when factors vary in their effect of the response, when not all factors are measured, or when the multiple limiting factors interact.

An additional advantage of quantile regression is that, whilst the optimal properties of standard regression estimators are *not* robust to moderate departures from normality, quantile regression yields coefficient estimates which are more robust than their OLS-counterparts to both outliers and heavy-tailed distributions (Coad and Rao, 2008). As shown in Figure 4, which reports densities estimated via kernel smoothing, this is precisely our case, since the distribution of GDP/N, GVA/L and K/L are clearly non-normal.[8]

The most important advantage, however, is that whilst conventional regressions focus on the *mean*, quantile regressions are able to describe the entire distribution of the conditional variable. This may be relevant in our setting, since bank branch deregulation may have affected differently poorer and richer provinces. Quantile regression helps in this task, since it allows estimating different coefficients for different quantiles of the conditional distribution. Since quantile regression also drops the assumption that the error terms are identically distributed at all points of the conditional distribution, it will be possible to control for the different effects of deregulation for the different provinces, and to consider the possibility that the estimated slope parameters vary at different quantiles of the conditional economic performance (GDP/N, GVA/L, or K/L) distributions (Coad and Rao, 2008). As indicated in Section 3, these issues may be relevant in the Spanish case, where provinces differ in many respects, so that *expanding* the conclusions across them may be misleading (Casetti, 1972). Indeed, disparities in the economic performance of European regions *within* nations may be quite high—and, in the case of Spain, they still are (Tortosa-Ausina *et al.*, 2005). As indicated by Quah (1996), per capita income differences across European regions within nations are higher than when comparing each region to its surrounding regions, regardless of their host nation.

With respect to the basic OLS regression model (1) described in Section 4.1, the quantile regression model we use in this paper specifies the τ^{th} quantile of the conditional distribution of y_i given $\boldsymbol{x}$ as a linear function of the covariates

As described by Koenker and Bassett (1978), the estimation is done by minimizing the following equation:

$$\underset{\boldsymbol{\beta}\in\mathbb{R}^k}{\text{Min}} \sum_{i\in\{i:y_i\geq \boldsymbol{x}'\boldsymbol{\beta}\}} \tau|y_i-\boldsymbol{x}'\boldsymbol{\beta}| + \sum_{i\in\{i:y_i<\boldsymbol{x}'\boldsymbol{\beta}\}} (1-\tau)|y_i-\boldsymbol{x}'\boldsymbol{\beta}| \tag{2}$$

[8]Some methods in the field of nonparametric statistics and econometrics have been proposed designed to test formally whether two distributions differ statistically considering the *entire* distributions and not only some of their moments. See Li (1996), Li *et al.* (2009). Most of these methods are described in detail in Li and Racine (2007). Applying the Li (1996) test resulted in statistically significant departures from normality.

where k is the number of explanatory variables, and τ represents the vector containing each quantile. The vector of coefficients $\boldsymbol{\beta}$ to be estimated will differ depending on the particular quantile.

As shown in Figure 5, which reports estimated coefficients using quantile regression for the basic model in which a single regressor is considered, the estimated coefficients for the different values of τ differ greatly for each of the dependent variables considered. Although a thorough analysis will be carried out when discussing the results, this constitute evidence that the effect on the dependent variable of the covariates of interest can vary remarkably depending on *which* provinces we are focusing, i.e., depending on the conditional distribution of the dependent variable.

The algorithm used to compute the fit is the Barrodale and Roberts algorithm described in detail in Koenker and d'Orey (1987), which is quite efficient for problems up to several thousands observations (which is our case). The algorithm implements a scheme for computing confidence intervals for the estimated parameters based on inversion of a rank test described in Koenker (1994). In can also be used to compute the full quantile regression process. For additional details see the documentation of the `quantreg` package for `R` (Koenker, 2010). Other methods such as the Frisch-Newton interior point method are more appropriate when the number of observations is very high (see Portnoy and Koenker, 1997).

5. Did bank branch deregulation affect provincial economic performance?

As a first step to analyze the effect of savings banks' deregulation we estimate the simplest model linking provincial GDP per capita to evolution of the number of out-of-region savings' bank branches per capita. The OLS results (Table 4, Model 1) indicate that deregulation has a significant positive effect on economic development also in Spain. The results from quantile regressions (Figure 6a) show that this *average* positive effect varies a great deal across provinces depending on their degree of economic development. Figure 6a and its decreasing pattern illustrate this fact clearly.

For the less developed provinces the effect is much more sizeable (with an estimate close to 0.10) that for the richer provinces. In fact, for the upper percentiles there is no significant effect at all. It seems that allowing new entrants to open branches was especially effective in those provinces with a low per capita GDP. This makes sense because those are precisely the areas which a less developed financial system to begin with.

The next logical step is to consider explicitly the role of banking density in order to estimate the effect of deregulation. A positive effect of $BRANCH\_TOT$ means that new bank branches foster development irrespectively of the savings bank's origin. Now any positive effect coming from $BRANCH\_OTH$ will represent a special additional effect of new branches due to the deregulation process above the standard effect of any new branch.

Table 4 (Model 2) shows the OLS results. As we can see we still estimate a significant positive effect of deregulation on GDP per capita. However this effect is now smaller. It fells from 0.022 to 0.017. Furthermore, total branches per capita have an even bigger significant positive effect. All in all new branches due to deregulation have an special positive effect on per capita GDP. Turning our attention to the quantile regressions (Figure 6b) we observe again the decreasing pattern of deregulation on GDP with a zero effect for the top richest provinces. Figure 7a shows a similar pattern for the effect of total branches. It is significant over most of the distribution, but the magnitude is also decreasing. Actually it disappears completely for the richest provinces.

The conclusions from these results seem to be quite clear. Financial development (in fact, banking development) has a significant positive effect on income. This effect is even stronger for branch expansion due to deregulation. However, our quantile results stress that any potential positive effects from banking density tend to vanish after achieving a certain level of development. Since most of Spanish provinces were below such a level, deregulation had a global positive effect in Spain.

These results broadly agree with the initial evidence obtained for the US (Jayaratne and Strahan, 1996; Krol and Svorny, 1996; Strahan, 2003). However, more recent evidence (Freeman, 2002, 2005) has challenged the robustness of those previous results on different grounds.

Even without the US precedent it would be only advisable to check the robustness of our preliminary results supporting the hypothesis that deregulation fosters economic development. For that reason we add some additional explanatory variables to see if we keep estimating a positive effect for our deregulation variables. In Model 3 we control for labor market features (UNEMPLOY), demographic factors (*WORKFORCE*) and size of government. These structural variables are significant and their inclusion tends to reduce the effect of the branching variables. Now $BRANCH\_OTH$ is significant only at a 10% confidence level and the point estimate falls from 0.017 to 0.004. $BRANCH\_TOT$ is still significant but its parameter falls from .310 to .128. Our quantile results (Figure 6c) show that $BRANCH\_OTH$ has still a significant and positive effect, but only for the less developed provinces. For $BRANCH\_TOT$ now the quantile results show first an increasing and then a decreasing effect that disappears for the richest provinces.

In Model 4 we add some specialization variables which account for the different industrial composition of each economy. While these variables are significant (Model 4, Table 4), deregulation loses all its significance. On the other hand, the parameter for $BRANCH\_TOT$ remains significant and its point estimate even rises slightly (from 0.125 to 0.147). Our quantile results show (Figure 6d) that deregulation is not significant for any level of development, although the estimate tend to be closer to being significant in the case of the less developed provinces. The opposite happens with the richer provinces. In the case of $BRANCH\_TOT$ (Figure 7c) the effect is significant for all provinces, but less so both for the less and the more developed provinces. The effect is stronger for middle income provinces.

Model 5 includes also other variables mainly related to capital accumulation (social capital, human capital, gross investment, physical capital and public capital) and banking activity (deposits and loans). If deregulation had a positive effect after controlling for those factors, it would mean that such a positive effect would work through an efficiency channel. Deregulation would imply not only simply more credit and more investment, but better credit allocation and better investment. Table 4 shows that most of the new variables are significant, but $BRANCH\_OTH$ is not. On the other hand the parameter for $BRANCH\_TOT$ is smaller than before (0.04 instead of 0.138).

The results of the quantile regressions (Figure 6e) show that $BRANCH\_OTH$ is close to be significant for the less developed provinces. Interestingly, Figure 7d shows a new pattern for the effect of $BRANCH\_TOT$. After controlling for the credit and accumulation variables that effect exists only for the richest provinces.

This change in the effect of an increase of the branch density points to a qualitative difference in the way it affects economic performance. For the less developed provinces more branches seem to operate through a quantity effect (raising the amount of loans, investment and so on) but to lack any quality effect (no apparent improvement in screening and the allocation of funds to the best investment projects and so on). $BRANCH\_TOT$ is significant for those provinces when capital accumulation and loan activity is not included, but this significance vanishes after adding them. On the other hand, for the more developed provinces we get the opposite result. In that case $BRANCH\_TOT$ is not significant (or has a smaller effect than in less developed provinces) when we do not control for loan and investment variables. However, $BRANCH\_TOT$ remains significant when controlling for loan and investment variables. All this supports the hypothesis of a quality effect for the richer provinces.

Finally, Model 6 includes time and provincial dummies. Time dummies control for the effect of any temporal shocks common for all provinces. Provincial dummies control for any constant characteristic specific to individual provinces not captured for our explanatory variables. $BRANCH\_OTH$ remains non-significant and $BRANCH\_TOT$ remains significant and even increases its estimated effect (from 0.040 to 0.079). Therefore, our previous comments to Model 5 hold in qualitative terms.

Those are the results about per capita GDP. Now we shift to the analysis of economic performance in terms of labor productivity. Maybe deregulation has special positive economic effects but they do not show much when looking at per capita GDP because of other counterbalancing forces. Table 5 shows the OLS results on the determinants of the level of labor productivity. The quantile regression results for this variable are shown by figures 8 and 9 (for the detailed quantile results see tables A.1–17 in Appendix A). Overall these results are quite similar to those obtained for per capita GDP. $BRANCH\_OTH$ seems to have a significant positive effect on labor productivity (see Table 5, Models 1-3) but this significance is lost after controlling for structural composition (see Table 5, Model 4) and remains so when controlling for capital accumulation, financial variables (bank loans and deposits) and time and provincial dummies (see Table 5, Models 5-6). Quantile results show a declining pattern over the conditional distribution, indicating a positive effect of $BRANCH\_OTH$ in the less productive provinces before controlling for accumulation and loan and deposit activity (Figure 8, Models 1-4). After adding those additional variables (Figure 8, Model 5) $BRANCH\_OTH$ is not significant for any type of province—although the quantile estimates are closer to be positive for the less productive provinces. In contrast, $BRANCH\_TOT$ has a mean positive effect according to the OLS results and this result seems to be robust to the inclusion of our controls (see Table 5, Models 1-6). These new variables only tend to lower the size of the positive effect. Figure 9 shows for $BRANCH\_TOT$ the same changing pattern discussed above about per capita GDP. Before including investment and loans variables, the total number of branches has a positive effect only for provinces with low and average productivity, but not for the most productive ones (Figure 9, Models 2-3) or at least more sizeable (Figure 9, Model 4). After including those control variables $BRANCH\_TOT$ has a especially positive effect precisely in the high productivity provinces. This evidence is suggestive of a quality effect of branches on labor productivity in the more productive provinces. This finding is in line with some of the results of Jayaratne and Strahan (1996), who observed improvements in loan quality but no consistent increase in lending after branch reform, which may suggest that bank monitoring and screening improvements are the key to the observed growth increases. On the other hand in the least productive provinces, a quantity effect would dominate any positive effect coming from more branches.

Table 6 shows the OLS results for provincial capital intensity. $BRANCH\_OTH$ has a significant positive effect (Models 1-3) until variable of industrial composition are considered. After that addition there is no significant effect (Models 4-6). Looking at the quantile results (Figure 10) we observe that $BRANCH\_OTH$ tends to have a positive significant effect especially for the provinces with less capital intensity (Figure 10, Models 1-3). That result holds even when controlling for industrial composition (Figure 8, Model 4). When capital variables are considered this positive effect for the bottom provinces disappears (Figure 8, Model 5). $BRANCH\_TOT$ has a significant (and rather sizeable) effect on capital intensity according to OLS results (Table 6, Models 1-5) until adding the full set of controls (including time effects and provincial dummies). Then $BRANCH\_TOT$ loses all its significance (Table 6, Model 6). According to the quantile results (Figure 11) $BRANCH\_TOT$ has a positive effect which rises with the level of capital intensity of the province (Figure 11, Model 5).

As a result of the process of deregulation savings banks were able to establish branches outside their regions. Our initial results showed a strong economic effect of this kind new branches established by external savings banks well above the effect of the other branches. Those results are not robust to a more detailed and complete analysis. There is no significant special effect linked to this particular type of branches on the levels of per capita GDP, labor productivity or capital intensity. Furthermore, quantile results show that those hypothetical special effects would be more probable in the less developed provinces than in the richer ones.

However, the geographical deregulation in Spain has fostered a huge increase in branch density. Our results do show robust evidence of a positive effect of more branches (from "deregulated" savings banks or otherwise, it does not matter) on the levels of per capita GDP and labor productivity (the evidence on capital intensity being less conclusive). In that somewhat more traditional sense deregulation would have fostered economic development in Spain. Our quantile results show this effect working through "more banking and more investment" in the less developed provinces and through "better banking and better investment" in the more developed provinces. Therefore the effect of deregulation (and financial and banking development) seems to vary according to the type of economy that experiences it.

An additional and important question is the permanent or transitory character of the effects of deregulation. For example in the US after initial findings (Jayaratne and Strahan, 1996; Krol and Svorny, 1996; Strahan, 2003) suggesting a persistent positive effects, more recent results (Clarke, 2004; Freeman, 2005) show that spatial deregulation has only short-run effects on economic growth.

Our previous results refer to potential effects of the level of branch density on the level of per capita GDP, labor productivity and capital intensity. They are useful to test any potential effect on short-run economic growth (temporary effects on growth). In order to address any possible permanent effect on economic growth we will use the rate of growth of per capita GDP (Table 7 and Figures 12–13), labor productivity (Table 8 and Figures 14–15) and capital intensity (Table 9 and Figures 16–17) as dependent variables. Looking at the OLS estimates for $BRANCH\_OTH$ and $BRANCH\_TOT$ we can see that there is no significant positive effect in any of the models for any of the variables (Tables 7–9). The most complete quantile specification (Model 5, Figures 14–17) confirms that result. Any effect of branch density or branch deregulation on economic growth would be only temporary. This should not come as a surprise. It would be very strange indeed for an increase in the number of branches in a territory to produce a permanently higher rate of growth. It makes much more sense for that type of change to have a temporary effect on the rate of growth (something compatible with a permanent increase on income levels).

6. Conclusions

This article has analyzed the effects of bank branch deregulation, a particular stem of the finance-growth nexus literature, in a European context. Specifically, we examine the effects of the deregulation that culminated in the phaseout of inter-regional banking restrictions which affected Spanish savings banks until the passage of the law effectively codifying at national level what had been occurring at the regional level. Although the issue has been examined thoroughly in the US context, the empirical evidence available for other countries is non-existent.

The literature focusing in the US reports mixed results. The pioneering studies concluded that economic growth accelerated following intrastate branching reform (Jayaratne and Strahan, 1996) and that statewide branching and interstate banking improved the performance of a state's economy (Krol and Svorny, 1996). However, more recent studies (Freeman, 2002, 2005) stressed the fragility of previous findings, largely based on estimation issues.

Our contribution to this literature is twofold. First, the extension to the European context is relevant for a host of reasons. Among them, apart from the fact that previous results would be further validated when focusing in a different context, it is also important considering that the crisis is affecting severely some of the largest European banking sector. The stress tests carried out by the Committee of European Banking Supervisors in June 2010 on 91 banks, which were conducted on a bank-by-bank basis and using bank's specific data and supervisory information on banks from 20 EU Member States, have reported evidence that the crisis is more severe for some institutions. In the particular case of Spain, the only institutions failing the tests were savings banks—those which benefited from the removal of geographic restrictions on inter-regional bank branching. Our second contribution consists of using an alternative empirical strategy which allows estimating the effects of deregulation at different stages of economic development. Specifically, we used quantile regression, which allows a detailed analysis for the different conditional quantiles of the distributions. With this instrument it is possible to uncovering situations where an *average* effect hides relevant information for different parts of the distribution. In our particular context, the average effect of deregulation on economic performance might vary across provinces, providing a rather incomplete picture of the underlying relationship between the two variables.

The results have been explored in several directions, since we consider different variables for measuring economic activity (not only per capita income but also labor productivity and capital intensity ratios), the dependent variables are examined both as levels and growth rates, and the regressions are run using both OLS and quantile regression. Our most basic OLS models suggest that the impact of deregulation, in terms of the existence of out-of-region branches in each province, is positive and significant when analyzing its impact on the three measures of economic activity considered (GDP per capita, labor productivity and capital intensity). However, this is an *average* effect which does not report information for the upper and lower tails of the distribution, i.e., for poorer and richer provinces. The quantile regressions indicate that the impact of deregulation is much more beneficial for low-income provinces, a result that can be extended for labor productivity and capital intensity.

Although the significance of the effect is dimmed once control variables are phased in, the general sign of the relationship persists: if bank branch deregulation has had any positive effect, the most benefitted provinces have been the least developed ones in terms of the three economic measures considered.

A. Additional tables

Tables A.1–A.6 report analogous information to that reported in figures 6–17.

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Table 1: Main deregulatory initiatives in the Spanish banking sector (source: Bernad *et al.* (2008))

Year	Most relevant changes
1974	Freedom of banks to open branches nationwide More than two year loan and deposit rate free
1977	More than one year loan and deposit rates free Savings banks only: foreign exchange business permitted.
1978	Entry of foreign banks permitted (some restrictions apply in the retail segment)
1981	All assets' rates allowed to vary freely More than six months and 1 million peseta (approx. 6000€) Liabilities' side commissions free
1985	Savings banks allowed to set branches within their home regions ("comunidades autónomas") Equalization of the investment coefficient for banks, savings banks, and credit unions
1987	All interest rates and commissions free
1989	Savings banks allowed to set branches nationwide

Table 2: Number of branches in the Spanish banking sector by type of institution (source: Bank of Spain and own elaboration)

Year	Total		Commercial banks			Savings banks			Credit unions		
	Number	% change	Number	% change	Share	Number	% change	Share	Number	% change	Share
1986	30961		16518			11061			3382		
1987	31500	1.7	16498	-0.1	52.4	11754	6.3	37.3	3248	-4.0	10.3
1988	31972	1.5	16691	1.2	52.2	12252	4.2	38.3	3029	-6.7	9.5
1989	32735	2.4	16677	-0.1	50.9	13168	7.5	40.2	2890	-4.6	8.8
1990	33478	2.3	16917	1.4	50.5	13642	3.6	40.7	2919	1.0	8.7
1991	34873	4.2	17824	5.4	51.1	14031	2.9	40.2	3018	3.4	8.7
1992	35429	1.6	18058	1.3	51.0	14291	1.9	40.3	3080	2.1	8.7
1993	35193	-0.7	17636	-2.3	50.1	14485	1.4	41.2	3072	-0.3	8.7
1994	35544	1.0	17557	-0.4	49.4	14880	2.7	41.9	3107	1.1	8.7
1995	36251	2.0	17842	1.6	49.2	15214	2.2	42.0	3195	2.8	8.8
1996	37079	2.3	17674	-0.9	47.7	16094	5.8	43.4	3311	3.6	8.9
1997	37634	1.5	17530	-0.8	46.6	16636	3.4	44.2	3468	4.7	9.2
1998	38639	2.7	17450	-0.5	45.2	17582	5.7	45.5	3607	4.0	9.3
1999	38986	0.9	16905	-3.1	43.4	18337	4.3	47.0	3744	3.8	9.6
2000	38967	0.0	15811	-6.5	40.6	19268	5.1	49.4	3888	3.8	10.0
2001	38676	-0.7	14756	-6.7	38.2	19829	2.9	51.3	4091	5.2	10.6
2002	38673	0.0	14072	-4.6	36.4	20326	2.5	52.6	4275	4.5	11.1
2003	39405	1.9	14074	0.0	35.7	20871	2.7	53.0	4460	4.3	11.3
2004	40230	2.1	14168	0.7	35.2	21503	3.0	53.5	4559	2.2	11.3
2005	41599	3.4	14533	2.6	34.9	22410	4.2	53.9	4656	2.1	11.2
2006	43286	4.1	15096	3.9	34.9	23418	4.5	54.1	4772	2.5	11.0
2007	45086	4.2	15542	3.0	34.5	24591	5.0	54.5	4953	3.8	11.0
2008	45662	1.3	15580	0.2	34.1	24985	1.6	54.7	5097	2.9	11.2
2009	44085	-3.5	14840	-4.7	33.7	24202	-3.1	54.9	5043	-1.1	11.4
Average change 1986–1999	1.66		0.17			3.68			0.73		
Average change 1999–2009	1.24		-1.29			2.81			3.02		
Average change 1986–2009	1.55		-0.46			3.46			1.75		

Table 3: Definition and sources for the relevant variables

Variable	Description/source
GDP/N	Real per capita GDP. GDP at constant prices (provincial level) from Spanish National Bureau of Statistics (INE, http://www.ine.es)
GVA/L	Real GDP per worker. GDP at constant prices (provincial level) and population from Spanish National Bureau of Statistics (INE, http://www.ine.es). Employment from Fundación Bancaja-Ivie. Employment from Fundación Bancaja-Ivie (http://www.ivie.es).
K/L	Real provincial capital stock per worker.
BRANCH_OTH	Number of provincial branches per capita pertaining to saving banks from outside the region. Bank of Spain (www.bde.es) and the Spanish Confederation of Savings Banks' yearbooks (www.ceca.es).
BRANCH_TOT	Total number of branches per capita (provincial level). Bank of Spain. (www.bde.es).
WF_NON_MKT	Government size defined as the share of non-market services on total employment (provincial level). Fundación Bancaja-Ivie (http://www.ivie.es).
WORKFORCE	Ratio of employment over population (provincial level). Spanish Labor Force, Spanish National Bureau of Statistics (INE, http://www.ine.es).
UNEMPLOY	Unemployment rate (provincial level).. Spanish Labor Force, Spanish National Bureau of Statistics (INE, http://www.ine.es).
SEC	Industrial Gross Value Added (GVA) shares (provincial level). Agriculture, energy and mining (SEC2), manufacturing (SEC3), construction (SEC4), market services (SEC5) and non-market services (SEC6). Regional Accounts, Spanish National Bureau of Statistics (INE, http://www.ine.es).
KSOC	Social Capital (provincial level). Estimación del capital social en España (Fundación BBVA, www.fbbva.es).
HCAP	Average years of schooling per worker (provincial level). Series de capital humano en España y su distribución provincial (Fundación Bancaja-Ivie). (http://www.ivie.es).
INVEST	Per capita gross investment at constant prices (provincial level). Fundación BBVA (www.fbbva.es).
CAPITAL	Total stock of capital per capita at constant prices (provincial level). Fundación BBVA (www.fbbva.es).
PUBLIC_CAP	Stock of public capital per capita at constant prices (provincial level). (Fundación BBVA, www.fbbva.es).
DEPOSITS	Total deposits per capita on banks (provincial level). Bank of Spain (www.bde.es).
LOANS	Total banking credits to the private sector per capita (provincial level). Bank of Spain (www.bde.es) .

Table 4: Determinants of provincial GDP/N, levels

	Dependent variable: *GDP/N*					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
(Intercept)	9.442***	9.126***	8.020***	7.416***	7.444***	7.785***
	(0.009)	(0.027)	(0.068)	(0.087)	(0.100)	(0.249)
BRANCH_OTH	0.022***	0.017***	0.004*	0.001	−0.002*	0.000
	(0.004)	(0.004)	(0.002)	(0.002)	(0.001)	(0.001)
BRANCH_TOT		0.310***	0.128***	0.138***	0.040***	0.079***
		(0.025)	(0.021)	(0.016)	(0.015)	(0.024)
WF_NON_MKT			1.769***	8.410***	2.566***	−0.297
			(0.436)	(0.474)	(0.415)	(0.250)
WORKFORCE			3.265***	1.523***	0.353***	0.773***
			(0.123)	(0.112)	(0.096)	(0.099)
UNEMPLOY			0.889***	−0.133	−0.853***	−0.820***
			(0.311)	(0.236)	(0.176)	(0.143)
SEC2				1.114***	0.318***	−0.538***
				(0.110)	(0.097)	(0.119)
SEC3				1.687***	0.619***	−0.629***
				(0.091)	(0.084)	(0.101)
SEC4				0.223	−1.587***	−0.256**
				(0.196)	(0.166)	(0.118)
SEC5				1.595***	0.458***	−0.829***
				(0.087)	(0.083)	(0.071)
SEC6				−0.885***	−1.080***	−0.736***
				(0.225)	(0.165)	(0.117)
KSOC					−0.026***	−0.077***
					(0.007)	(0.011)
HCAP					0.023***	0.031***
					(0.008)	(0.006)
INVEST					0.124***	−0.002
					(0.017)	(0.009)
CAPITAL					0.210***	0.357***
					(0.027)	(0.046)
PUBLIC_CAP					−0.073***	0.017
					(0.017)	(0.022)
DEPOSITS					−0.017	0.032**
					(0.016)	(0.016)
LOANS					0.083***	0.067***
					(0.015)	(0.018)
R^2	0.031	0.148	0.624	0.826	0.916	0.986
$\bar{R}^2$	0.030	0.147	0.622	0.824	0.914	0.985
σ	0.261	0.246	0.164	0.112	0.074	0.031
F	35.186	94.578	358.552	509.657	587.804	724.993
p	0.000	0.000	0.000	0.000	0.000	0.000
Log-likelihood	−83.634	−15.177	428.974	847.277	1118.397	1973.586
Deviance	74.982	65.504	28.953	13.420	5.078	0.821
AIC	173.267	38.354	−843.947	−1670.555	−2198.794	−3773.172
BIC	188.276	58.322	−809.002	−1610.649	−2106.742	−3351.673
N	1100	1088	1088	1088	939	939
Time effects	NO	NO	NO	NO	NO	YES
Individual (province) effects	NO	NO	NO	NO	NO	YES

*, ** and *** denote significance at 10%, 5%, and 1% levels, respectively. Standard errors are reported in parentheses.

Table 5: Determinants of provincial GVA/L, levels

	Dependent variable: *GVA/L*					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
(Intercept)	10.402***	10.300***	9.902***	9.270***	9.367***	10.166***
	(0.006)	(0.019)	(0.069)	(0.089)	(0.103)	(0.240)
BRANCH_OTH	0.009***	0.008***	0.005**	0.002	−0.002	0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
BRANCH_TOT		0.101***	0.125***	0.147***	0.057***	0.045*
		(0.017)	(0.022)	(0.017)	(0.016)	(0.023)
WF_NON_MKT			1.597***	8.151***	2.131***	−0.513**
			(0.441)	(0.484)	(0.428)	(0.241)
WORKFORCE			0.577***	−1.289***	−2.490***	−2.186***
			(0.124)	(0.114)	(0.099)	(0.096)
UNEMPLOY			1.384***	0.217	−0.538***	−0.321**
			(0.315)	(0.241)	(0.182)	(0.138)
SEC2				1.014***	0.219**	−0.998***
				(0.112)	(0.100)	(0.115)
SEC3				1.706***	0.622***	−0.908***
				(0.093)	(0.087)	(0.097)
SEC4				0.389*	−1.493***	−0.283**
				(0.200)	(0.171)	(0.114)
SEC5				1.718***	0.562***	−0.857***
				(0.089)	(0.086)	(0.068)
SEC6				−0.864***	−0.994***	−0.564***
				(0.229)	(0.170)	(0.113)
KSOC					−0.020***	−0.041***
					(0.007)	(0.011)
HCAP					0.026***	0.029***
					(0.009)	(0.006)
INVEST					0.125***	0.016*
					(0.017)	(0.009)
CAPITAL					0.214***	0.426***
					(0.028)	(0.044)
PUBLIC_CAP					−0.073***	0.064***
					(0.017)	(0.021)
DEPOSITS					−0.034**	−0.002
					(0.017)	(0.016)
LOANS					0.084***	0.010
					(0.016)	(0.017)
R^2	0.013	0.042	0.083	0.568	0.799	0.972
$\bar{R}^2$	0.012	0.041	0.079	0.564	0.796	0.969
σ	0.171	0.169	0.165	0.114	0.077	0.030
F	14.622	24.010	19.657	141.422	215.784	343.805
p	0.000	0.000	0.000	0.000	0.000	0.000
Log-likelihood	381.962	392.791	416.531	825.427	1090.088	2008.762
Deviance	32.160	30.944	29.623	13.970	5.393	0.762
AIC	−757.924	−777.582	−819.062	−1626.853	−2142.176	−3843.525
BIC	−742.914	−757.613	−784.117	−1566.948	−2050.125	−3422.026
N	1100	1088	1088	1088	939	939
Time effects	NO	NO	NO	NO	NO	YES
Individual (province) effects	NO	NO	NO	NO	NO	YES

*, ** and *** denote significance at 10%, 5%, and 1% levels, respectively. Standard errors are reported in parentheses.

Table 6: Determinants of provincial capital intensity (K/L), levels

	Dependent variable: K/L					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
(Intercept)	12.060***	11.729***	11.196***	9.935***	9.787***	12.871***
	(0.007)	(0.021)	(0.072)	(0.117)	(0.120)	(0.162)
BRANCH_OTH	0.021***	0.015***	0.008***	0.003	0.001	−0.000
	(0.003)	(0.003)	(0.003)	(0.002)	(0.001)	(0.000)
BRANCH_TOT		0.325***	0.318***	0.421***	0.177***	0.018
		(0.020)	(0.023)	(0.022)	(0.018)	(0.020)
WF_NON_MKT			5.487***	9.572***	1.018**	−0.437**
			(0.470)	(0.634)	(0.507)	(0.212)
WORKFORCE			0.496***	−1.185***	−2.440***	−2.538***
			(0.130)	(0.149)	(0.117)	(0.084)
UNEMPLOY			1.330***	0.773**	0.776***	−0.155
			(0.336)	(0.316)	(0.216)	(0.120)
SEC2				2.234***	1.703***	0.601***
				(0.147)	(0.104)	(0.095)
SEC3				1.927***	1.216***	0.292***
				(0.121)	(0.094)	(0.085)
SEC4				2.479***	0.605***	−0.253**
				(0.263)	(0.202)	(0.100)
SEC5				2.007***	1.434***	−0.130**
				(0.116)	(0.090)	(0.060)
SEC6				0.096	−0.284	−0.307***
				(0.300)	(0.202)	(0.099)
KSOC					−0.040***	−0.041***
					(0.009)	(0.009)
HCAP					0.006	0.004
					(0.010)	(0.005)
INVEST					0.289***	0.052***
					(0.018)	(0.008)
PUBLIC_CAP					0.215***	0.150***
					(0.019)	(0.018)
DEPOSITS					0.080***	−0.079***
					(0.020)	(0.014)
LOANS					−0.011	0.061***
					(0.019)	(0.015)
R^2	0.037	0.218	0.334	0.554	0.830	0.987
$\bar{R}^2$	0.036	0.217	0.331	0.550	0.827	0.985
σ	0.219	0.197	0.182	0.149	0.091	0.026
F	44.342	158.239	113.304	133.853	281.561	758.131
p	0.000	0.000	0.000	0.000	0.000	0.000
Log-likelihood	116.372	233.757	324.695	531.193	927.076	2125.462
Deviance	54.996	44.183	37.657	23.993	7.632	0.594
AIC	−226.743	−459.513	−635.390	−1038.385	−1818.151	−4078.923
BIC	−211.601	−439.365	−600.131	−978.480	−1730.945	−3662.269
N	1150	1138	1138	1088	939	939
Time effects	NO	NO	NO	NO	NO	YES
Individual (province) effects	NO	NO	NO	NO	NO	YES

*, ** and *** denote significance at 10%, 5%, and 1% levels, respectively. Standard errors are reported in parentheses.

Table 7: Determinants of GDP/N, growth rates

	Dependent variable: $(GDP/N)_t/(GDP/N)_{t-1}$					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
(Intercept)	1.028^{***}	1.030^{***}	1.078^{***}	1.079^{***}	1.183^{***}	0.912^{***}
	(0.001)	(0.003)	(0.013)	(0.024)	(0.039)	(0.206)
BRANCH_OTH	−0.001	−0.001	−0.000	−0.000	−0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
BRANCH_TOT		−0.002	0.000	−0.001	0.004	−0.004
		(0.003)	(0.004)	(0.004)	(0.006)	(0.020)
WF_NON_MKT			-0.171^{**}	-0.228^{*}	−0.227	0.015
			(0.082)	(0.128)	(0.162)	(0.207)
WORKFORCE			-0.103^{***}	-0.100^{***}	−0.013	-0.137^{*}
			(0.023)	(0.030)	(0.037)	(0.082)
UNEMPLOY			-0.105^{*}	-0.141^{**}	-0.149^{**}	0.019
			(0.057)	(0.063)	(0.069)	(0.118)
*SEC*2				−0.034	−0.049	0.024
				(0.029)	(0.038)	(0.099)
*SEC*3				0.015	−0.014	0.240^{***}
				(0.024)	(0.033)	(0.084)
*SEC*4				−0.039	−0.029	0.140
				(0.054)	(0.064)	(0.098)
*SEC*5				−0.003	−0.018	0.272^{***}
				(0.023)	(0.032)	(0.059)
*SEC*6				0.054	−0.008	0.295^{***}
				(0.060)	(0.064)	(0.097)
KSOC					-0.007^{***}	0.012
					(0.003)	(0.009)
HCAP					0.014^{***}	−0.002
					(0.003)	(0.005)
INVEST					0.004	0.016^{**}
					(0.006)	(0.008)
CAPITAL					−0.007	0.026
					(0.011)	(0.038)
PUBLIC_CAP					−0.002	0.017
					(0.006)	(0.018)
DEPOSITS					-0.015^{**}	−0.005
					(0.006)	(0.013)
LOANS					−0.007	-0.026^{*}
					(0.006)	(0.015)
R^2	0.002	0.003	0.037	0.044	0.050	0.305
$\bar{R}^2$	0.001	0.001	0.032	0.034	0.033	0.235
σ	0.030	0.030	0.030	0.029	0.029	0.026
F	2.482	1.437	7.824	4.682	2.878	4.398
p	0.115	0.238	0.000	0.000	0.000	0.000
Log-likelihood	2192.449	2168.600	2186.472	2190.299	2003.532	2149.853
Deviance	0.944	0.931	0.900	0.893	0.771	0.564
AIC	−4378.899	−4329.201	−4358.943	−4356.598	−3969.065	−4125.705
BIC	−4364.029	−4309.420	−4324.328	−4297.257	−3877.013	−3704.206
N	1050	1038	1038	1038	939	939
Time effects	NO	NO	NO	NO	NO	YES
Individual (province) effects	NO	NO	NO	NO	NO	YES

*, ** and *** denote significance at 10%, 5%, and 1% levels, respectively. Standard errors are reported in parentheses.

Table 8: Determinants of GVA/L, growth rates

	Dependent variable: $(GVA/L)_t/(GVA/L)_{t-1}$					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
(Intercept)	1.009^{***}	1.003^{***}	1.064^{***}	1.054^{***}	1.104^{***}	0.525^{**}
	(0.001)	(0.004)	(0.015)	(0.028)	(0.046)	(0.259)
BRANCH_OTH	-0.001^{*}	-0.001^{**}	-0.001	-0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
BRANCH_TOT		0.006	0.002	0.001	-0.001	-0.025
		(0.004)	(0.005)	(0.005)	(0.007)	(0.025)
WF_NON_MKT			-0.412^{***}	-1.003^{***}	-0.111	0.165
			(0.100)	(0.154)	(0.190)	(0.260)
WORKFORCE			-0.070^{**}	0.083^{**}	0.231^{***}	0.407^{***}
			(0.028)	(0.037)	(0.044)	(0.103)
UNEMPLOY			-0.204^{***}	-0.205^{***}	-0.156^{*}	-0.194
			(0.070)	(0.077)	(0.081)	(0.149)
SEC2				0.020	0.107^{**}	-0.131
				(0.035)	(0.045)	(0.124)
SEC3				-0.045	0.097^{**}	0.227^{**}
				(0.029)	(0.038)	(0.105)
SEC4				-0.143^{**}	0.071	-0.080
				(0.065)	(0.076)	(0.123)
SEC5				-0.074^{***}	0.072^{*}	0.077
				(0.028)	(0.038)	(0.074)
SEC6				0.264^{***}	0.238^{***}	0.500^{***}
				(0.073)	(0.076)	(0.122)
KSOC					-0.009^{***}	0.011
					(0.003)	(0.012)
HCAP					-0.004	0.003
					(0.004)	(0.007)
INVEST					-0.002	0.026^{***}
					(0.008)	(0.010)
CAPITAL					-0.023^{*}	0.066
					(0.012)	(0.047)
PUBLIC_CAP					0.011	0.039^{*}
					(0.008)	(0.023)
DEPOSITS					0.001	-0.010
					(0.008)	(0.017)
LOANS					-0.012^{*}	-0.021
					(0.007)	(0.019)
R^2	0.003	0.005	0.035	0.077	0.169	0.307
$\bar{R}^2$	0.002	0.003	0.030	0.068	0.154	0.237
σ	0.037	0.037	0.036	0.036	0.034	0.032
F	3.395	2.755	7.387	8.570	11.043	4.437
p	0.066	0.064	0.000	0.000	0.000	0.000
Log-likelihood	1977.676	1955.647	1971.140	1994.488	1851.954	1936.746
Deviance	1.421	1.404	1.362	1.302	1.064	0.889
AIC	-3949.352	-3903.293	-3928.281	-3964.977	-3665.908	-3699.491
BIC	-3934.482	-3883.513	-3893.665	-3905.636	-3573.857	-3277.992
N	1050	1038	1038	1038	939	939
Time effects	NO	NO	NO	NO	NO	YES
Individual (province) effects	NO	NO	NO	NO	NO	YES

*, ** and *** denote significance at 10%, 5%, and 1% levels, respectively. Standard errors are reported in parentheses.

Table 9: Determinants of K/L, growth rates

	Dependent variable: $(K/L)_t/(K/L)_{t-1}$					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
(Intercept)	1.018***	1.012***	1.039***	1.026***	1.083***	0.817***
	(0.001)	(0.004)	(0.016)	(0.030)	(0.047)	(0.182)
BRANCH_OTH	−0.000	−0.000	−0.000	−0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
BRANCH_TOT		0.005	−0.004	−0.002	−0.012*	−0.002
		(0.004)	(0.005)	(0.006)	(0.007)	(0.022)
WF_NON_MKT			−0.167	−0.813***	0.092	0.400*
			(0.103)	(0.160)	(0.198)	(0.238)
WORKFORCE			0.009	0.147***	0.201***	0.536***
			(0.029)	(0.038)	(0.046)	(0.095)
UNEMPLOY			−0.188**	−0.151*	−0.142*	−0.312**
			(0.073)	(0.080)	(0.084)	(0.134)
SEC2				0.005	0.025	−0.347***
				(0.037)	(0.041)	(0.107)
SEC3				−0.058*	0.058	−0.087
				(0.031)	(0.037)	(0.095)
SEC4				0.008	0.075	−0.257**
				(0.067)	(0.079)	(0.112)
SEC5				−0.074**	0.031	−0.204***
				(0.029)	(0.035)	(0.067)
SEC6				0.223***	0.220***	0.165
				(0.076)	(0.079)	(0.111)
KSOC					−0.004	−0.008
					(0.003)	(0.010)
HCAP					−0.014***	0.009
					(0.004)	(0.006)
INVEST					0.008	0.049***
					(0.007)	(0.008)
PUBLIC_CAP					−0.002	0.041**
					(0.007)	(0.020)
DEPOSITS					0.010	−0.019
					(0.008)	(0.015)
LOANS					−0.016**	0.001
					(0.007)	(0.017)
R^2	0.000	0.002	0.015	0.060	0.165	0.467
$\bar{R}^2$	−0.001	−0.000	0.010	0.051	0.150	0.414
σ	0.039	0.039	0.039	0.038	0.036	0.030
F	0.008	0.945	3.217	6.870	11.372	8.891
p	0.928	0.389	0.007	0.000	0.000	0.000
Log-likelihood	2012.526	1992.929	2000.011	2025.623	1807.722	2018.176
Deviance	1.659	1.634	1.612	1.538	1.170	0.747
AIC	−4019.053	−3977.858	−3986.022	−4027.246	−3579.444	−3864.353
BIC	−4004.044	−3957.890	−3951.077	−3967.341	−3492.238	−3447.698
N	1100	1088	1088	1088	939	939
Time effects	NO	NO	NO	NO	NO	YES
Individual (province) effects	NO	NO	NO	NO	NO	YES

*, ** and *** denote significance at 10%, 5%, and 1% levels, respectively. Standard errors are reported in parentheses.

Table A.1: Determinants of GDP/N, regression quantiles

Model	Covariates	Quantile (τ)						
		0.05	0.10	0.25	0.50	0.75	0.90	0.95
Model 1	*BRANCH_OTH*	0.067***	0.052**	0.078***	0.044***	0.027***	0.008	0.002**
	(s.e)	(0.010)	(0.025)	(0.004)	(0.008)	(0.004)	(0.007)	(0.001)
Model 2	*BRANCH_OTH*	0.032	0.048***	0.053***	0.038***	0.017**	0.000	0.002
	(s.e)	(0.020)	(0.006)	(0.010)	(0.006)	(0.007)	(0.008)	(0.003)
	BRANCH_TOT	0.399***	0.330***	0.307***	0.298***	0.238***	0.240***	0.033
	(s.e)	(0.047)	(0.035)	(0.030)	(0.033)	(0.034)	(0.039)	(0.058)
Model 3	*BRANCH_OTH*	0.024***	0.018**	0.007*	0.004	0.000	0.001***	0.002***
	(s.e)	(0.003)	(0.008)	(0.004)	(0.004)	(0.003)	(0.000)	(0.000)
	BRANCH_TOT	0.133***	0.128***	0.178***	0.143***	0.114***	0.037*	− 0.011
	(s.e)	(0.033)	(0.032)	(0.025)	(0.023)	(0.024)	(0.021)	(0.016)
Model 4	*BRANCH_OTH*	0.008	0.001	0.003	0.003***	0.000	−0.005**	−0.005
	(s.e)	(0.007)	(0.003)	(0.004)	(0.001)	(0.001)	(0.002)	(0.005)
	BRANCH_TOT	0.081**	0.124***	0.144***	0.178***	0.095***	0.090***	0.094***
	(s.e)	(0.036)	(0.031)	(0.021)	(0.017)	(0.015)	(0.016)	(0.011)
Model 5	*BRANCH_OTH*	0.000	−0.001	−0.003	−0.003***	−0.003	−0.002	−0.003
	(s.e)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.003)	(0.003)
	BRANCH_TOT	0.017	0.020	0.000	0.000	0.025	0.080***	0.071***
	(s.e)	(0.021)	(0.019)	(0.014)	(0.018)	(0.017)	(0.021)	(0.023)

*, ** and *** denote significance at 10%, 5%, and 1% levels, respectively. Standard errors are reported in parentheses.

Table A.2: Determinants of GVA/L, levels, regression quantiles

Model	Covariates	Quantile (τ)						
		0.05	0.10	0.25	0.50	0.75	0.90	0.95
Model 1	$BRANCH\_OTH$	0.057***	0.037***	0.009***	0.013***	0.010**	0.000	0.001***
	(s.e)	(0.004)	(0.010)	(0.003)	(0.000)	(0.005)	(0.002)	(0.000)
Model 2	$BRANCH\_OTH$	0.046***	0.031***	0.012***	0.012***	0.003	0.000*	0.001***
	(s.e)	(0.008)	(0.007)	(0.003)	(0.004)	(0.004)	(0.000)	(0.000)
	$BRANCH\_TOT$	0.231***	0.218***	0.138***	0.095***	0.090***	− 0.009	− 0.028**
	(s.e)	(0.056)	(0.035)	(0.023)	(0.021)	(0.021)	(0.009)	(0.014)
Model 3	$BRANCH\_OTH$	0.015	0.020***	0.009**	0.005**	0.001	0.001***	0.002***
	(s.e)	(0.013)	(0.007)	(0.004)	(0.002)	(0.003)	(0.000)	(0.000)
	$BRANCH\_TOT$	0.114***	0.159***	0.197***	0.144***	0.073***	0.006	− 0.031
	(s.e)	(0.041)	(0.022)	(0.022)	(0.021)	(0.023)	(0.022)	(0.023)
Model 4	$BRANCH\_OTH$	0.020***	0.014**	0.006*	0.004	0.001	− 0.003	− 0.004
	(s.e)	(0.006)	(0.006)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)
	$BRANCH\_TOT$	0.107***	0.126***	0.166***	0.181***	0.072***	0.079***	0.079***
	(s.e)	(0.029)	(0.028)	(0.019)	(0.016)	(0.020)	(0.021)	(0.018)
Model 5	$BRANCH\_OTH$	0.001	0.000	−0.003**	−0.002***	−0.004	−0.003**	−0.002***
	(s.e)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.002)	(0.008)
	$BRANCH\_TOT$	0.070***	0.057***	0.055***	0.041***	0.049***	0.082***	0.095***
	(s.e)	(0.017)	(0.020)	(0.012)	(0.020)	(0.018)	(0.019)	(0.017)

*, ** and *** denote significance at 10%, 5%, and 1% levels, respectively. Standard errors are reported in parentheses.

Table A.3: Determinants of K/L, levels, regression quantiles

Model	Covariates	Quantile (τ)						
		0.05	0.10	0.25	0.50	0.75	0.90	0.95
Model 1	*BRANCH_OTH*	0.089***	0.069***	0.052***	0.024***	0.016***	0.007	0.009**
	(s.e)	(0.011)	(0.005)	(0.003)	(0.003)	(0.002)	(0.005)	(0.003)
Model 2	*BRANCH_OTH*	0.047***	0.039***	0.019***	0.009	0.014***	0.009***	0.010***
	(s.e)	(0.014)	(0.008)	(0.005)	(0.005)	(0.001)	(0.000)	(0.003)
	BRANCH_TOT	0.391***	0.293***	0.322***	0.326***	0.287***	0.296***	0.367***
	(s.e)	(0.070)	(0.038)	(0.029)	(0.029)	(0.023)	(0.026)	(0.036)
Model 3	*BRANCH_OTH*	0.035***	0.031***	0.010**	0.002	0.005***	0.007***	0.009***
	(s.e)	(0.008)	(0.005)	(0.004)	(0.004)	(0.000)	(0.002)	(0.000)
	BRANCH_TOT	0.382***	0.406***	0.341***	0.298***	0.241***	0.273***	0.341***
	(s.e)	(0.036)	(0.029)	(0.026)	(0.026)	(0.027)	(0.032)	(0.038)
Model 4	*BRANCH_OTH*	0.018***	0.009*	0.011**	0.004	− 0.001	− 0.006**	− 0.003
	(s.e)	(0.006)	(0.005)	(0.004)	(0.004)	(0.004)	(0.003)	(0.005)
	BRANCH_TOT	0.328***	0.405***	0.413***	0.428***	0.425***	0.501***	0.498***
	(s.e)	(0.031)	(0.027)	(0.019)	(0.030)	(0.025)	(0.020)	(0.028)
Model 5	*BRANCH_OTH*	0.003***	0.001	0.002	0.001***	0.003***	−0.002	−0.003
	(s.e)	(0.000)	(0.005)	(0.003)	(0.000)	(0.000)	(0.005)	(0.004)
	BRANCH_TOT	0.023	0.093***	0.123***	0.149***	0.245***	0.257***	0.324***
	(s.e)	(0.022)	(0.019)	(0.019)	(0.022)	(0.018)	(0.025)	(0.025)

*, ** and *** denote significance at 10%, 5%, and 1% levels, respectively. Standard errors are reported in parentheses.

Table A.4: Determinants of GDP/N, growth rates, regression quantiles

Model	Covariates	Quantile (τ)						
		0.05	0.10	0.25	0.50	0.75	0.90	0.95
Model 1	$BRANCH\_OTH$	0.001	0.001	0.000	0.000	-0.002^{***}	-0.004^{***}	-0.006^{***}
	(s.e)	(0.002)	(0.001)	(0.000)	(0.001)	(0.001)	(0.002)	(0.002)
Model 2	$BRANCH\_OTH$	0.001	0.001	0.000	0.000	-0.002^{**}	-0.004^{***}	-0.006^{**}
	(s.e)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.002)	(0.003)
	$BRANCH\_TOT$	−0.004	−0.007	−0.004	−0.004	0.002	0.001	0.002
	(s.e)	(0.006)	(0.005)	(0.004)	(0.003)	(0.004)	(0.007)	(0.012)
Model 3	$BRANCH\_OTH$	0.000	0.000	0.000	0.000	−0.001	−0.002	−0.002
	(s.e)	(0.002)	(0.001)	(0.000)	(0.000)	(0.001)	(0.002)	(0.002)
	$BRANCH\_TOT$	−0.006	−0.007	−0.002	0.000	0.000	0.002	0.007
	(s.e)	(0.007)	(0.006)	(0.005)	(0.004)	(0.005)	(0.006)	(0.010)
Model 4	$BRANCH\_OTH$	0.000	0.000	0.000	0.000	−0.001	−0.002	−0.001
	(s.e)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.003)	(0.001)
	$BRANCH\_TOT$	0.001	0.003	−0.001	−0.002	0.000	0.000	−0.005
	(s.e)	(0.006)	(0.006)	(0.004)	(0.004)	(0.006)	(0.008)	(0.007)
Model 5	$BRANCH\_OTH$	0.000	0.000	0.000	−0.000	−0.002	-0.001^{**}	−0.001
	(s.e)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
	$BRANCH\_TOT$	−0.005	0.012^{*}	0.013^{**}	0.003	0.003	−0.009	−0.007
	(s.e)	(0.011)	(0.007)	(0.006)	(0.005)	(0.008)	(0.007)	(0.015)

*, ** and *** denote significance at 10%, 5%, and 1% levels, respectively. Standard errors are reported in parentheses.

Table A.5: Determinants of GVA/L, growth rates, regression quantiles

Model	Covariates	Quantile (τ)						
		0.05	0.10	0.25	0.50	0.75	0.90	0.95
Model 1	*BRANCH_OTH*	− 0.000	0.000	− 0.000	− 0.002**	− 0.003***	− 0.004***	− 0.005*
	(s.e)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)
Model 2	*BRANCH_OTH*	0.000	0.000	0.000	− 0.003***	− 0.004***	− 0.005***	− 0.005**
	(s.e)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)
	BRANCH_TOT	− 0.009	− 0.006	0.004	0.011**	0.012**	0.022***	0.024*
	(s.e)	(0.011)	(0.007)	(0.005)	(0.005)	(0.006)	(0.008)	(0.013)
Model 3	*BRANCH_OTH*	0.000	0.000	0.000	−0.001**	−0.003*	−0.005***	−0.008***
	(s.e)	(0.001)	(0.001)	(0.001)	(0.000)	(0.002)	(0.002)	(0.002)
	BRANCH_TOT	−0.030***	−0.023***	−0.008	0.003	0.018**	0.022**	0.023*
	(s.e)	(0.010)	(0.007)	(0.006)	(0.005)	(0.008)	(0.010)	(0.013)
Model 4	*BRANCH_OTH*	0.000	0.000	0.000	−0.001	−0.002***	−0.004***	−0.005*
	(s.e)	(0.002)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)
	BRANCH_TOT	−0.026**	−0.025***	−0.007	−0.003	0.012**	0.017	0.042***
	(s.e)	(0.011)	(0.008)	(0.005)	(0.006)	(0.006)	(0.011)	(0.011)
Model 5	*BRANCH_OTH*	0.000	0.000	0.000	0.000	−0.001	0.000	0.000
	(s.e)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)	(0.003)
	BRANCH_TOT	−0.016	−0.007	−0.001	−0.005	0.006	0.005	0.019
	(s.e)	(0.014)	(0.010)	(0.005)	(0.007)	(0.008)	(0.011)	(0.011)

*, ** and *** denote significance at 10%, 5%, and 1% levels, respectively. Standard errors are reported in parentheses.

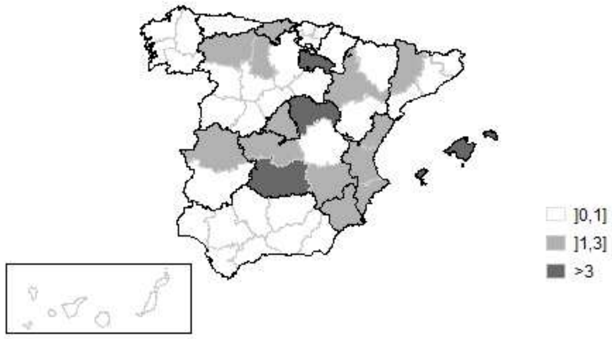
Table A.6: Determinants of K/L, growth rates, regression quantiles

Model	Covariates	Quantile (τ)						
		0.05	0.10	0.25	0.50	0.75	0.90	0.95
Model 1	*BRANCH_OTH*	0.000	0.001	0.001	$-$ 0.001	$-$ 0.001	$-$ 0.003***	$-$ 0.005**
	(s.e)	(0.002)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.002)
Model 2	*BRANCH_OTH*	$-$ 0.000	0.000	0.001	$-$ 0.001	$-$ 0.001	$-$ 0.003***	$-$ 0.006**
	(s.e)	(0.000)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)
	BRANCH_TOT	0.005	0.005	0.002	0.009*	0.007	$-$ 0.004	0.004
	(s.e)	(0.007)	(0.005)	(0.004)	(0.005)	(0.006)	(0.007)	(0.020)
Model 3	*BRANCH_OTH*	0.000	0.000*	0.001	$-$0.001	$-$0.001	$-$0.003	$-$0.004
	(s.e)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)
	BRANCH_TOT	$-$0.019**	$-$0.017***	$-$0.012**	$-$0.001	0.009	$-$0.002	0.000
	(s.e)	(0.009)	(0.006)	(0.005)	(0.006)	(0.007)	(0.010)	(0.014)
Model 4	*BRANCH_OTH*	0.000	0.000**	0.001	0.000	0.000	$-$0.004*	$-$0.004*
	(s.e)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.002)	(0.002)
	BRANCH_TOT	$-$0.011	$-$0.019***	$-$0.011**	$-$0.001	0.005	0.012	0.007
	(s.e)	(0.008)	(0.004)	(0.005)	(0.006)	(0.009)	(0.011)	(0.015)
Model 5	*BRANCH_OTH*	0.000	0.000	0.001	0.001	$-$0.001	$-$0.004**	$-$0.004***
	(s.e)	(0.000)	(0.000)	(0.007)	(0.001)	(0.001)	(0.010)	(0.001)
	BRANCH_TOT	$-$0.019**	$-$0.018*	$-$0.012	$-$0.011*	$-$0.013	0.000	0.002
	(s.e)	(0.009)	(0.010)	(0.007)	(0.006)	(0.009)	(0.010)	(0.012)

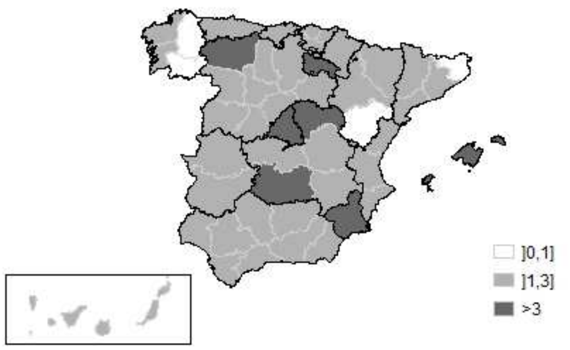
*, ** and *** denote significance at 10%, 5%, and 1% levels, respectively. Standard errors are reported in parentheses.

Figure 1: Number of out-of-region savings banks' branches ($BRANCH\_OTH$) per 10,000 inhabitants

(a) 1988

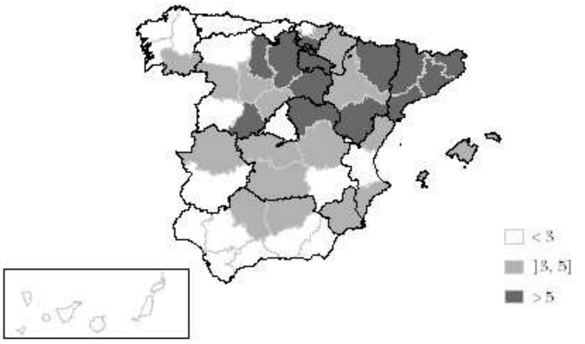


(b) 1998



(c) 2008

Figure 2: Number of total branches (*BRANCH_TOT*) per 10,000 inhabitants

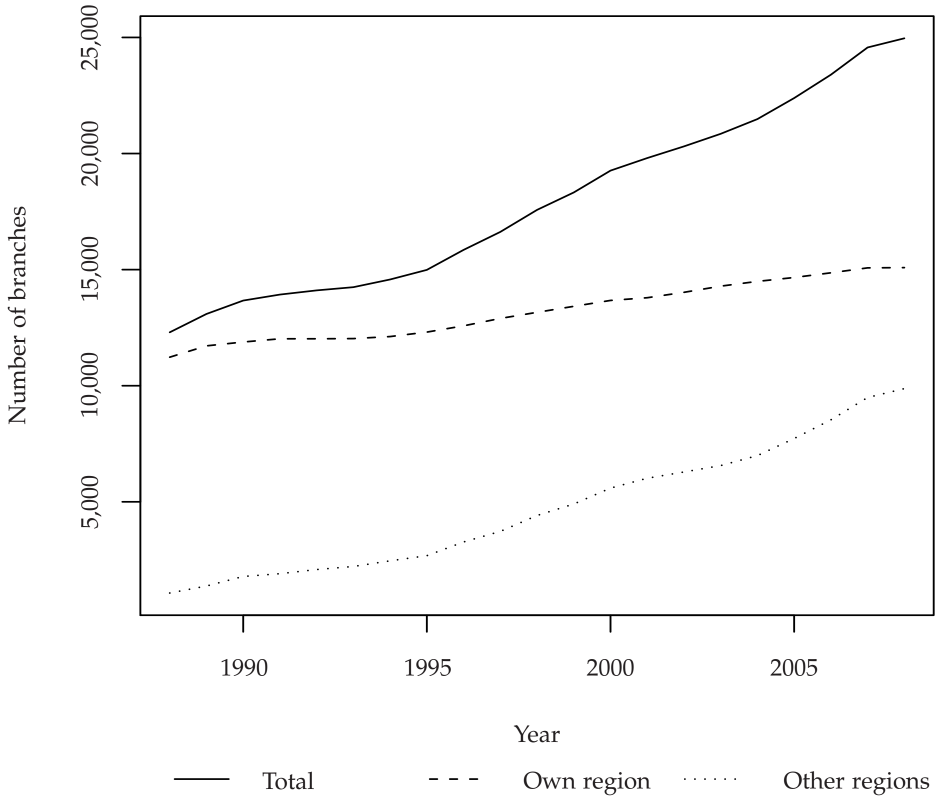


(a) 1988

(b) 1998

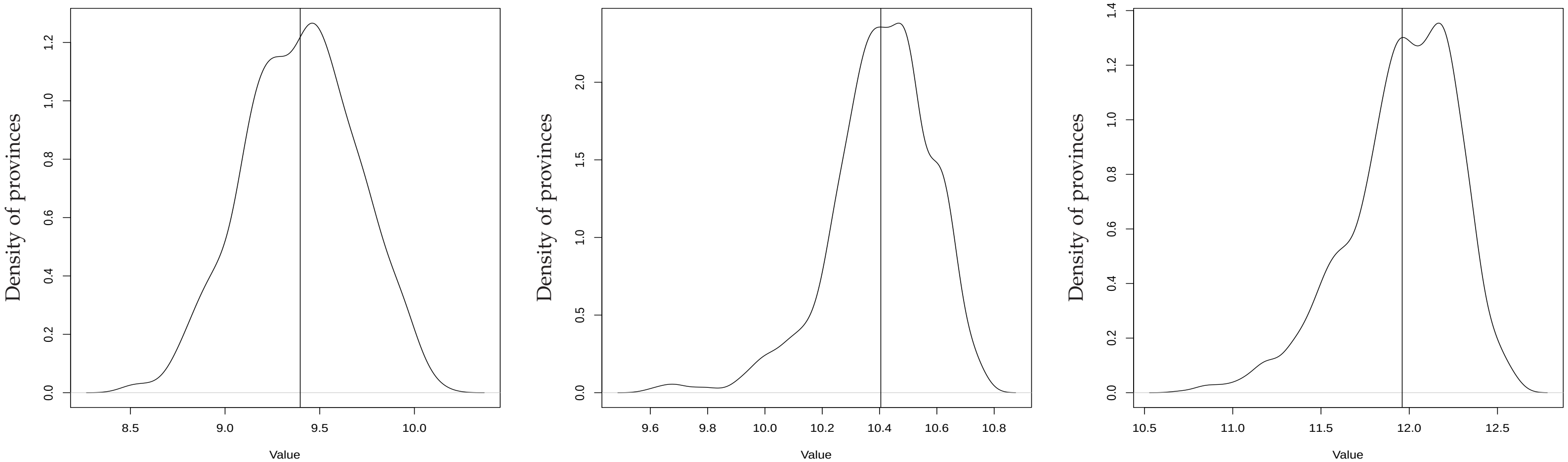
(c) 2008

Figure 3: Number of branches according to geographic location, savings banks (1988–2008)



Source: Spanish confederation of savings banks (Confederación Española de Cajas de Ahorros)

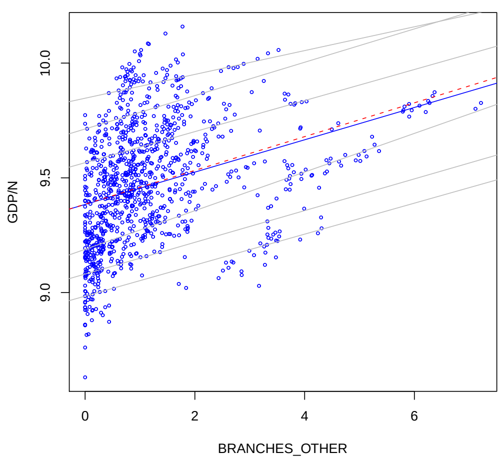
Figure 4: Kernel density plots of the empirical GDP/N, GVA/L and K/L distributions, 1986–2007 (log-scale)



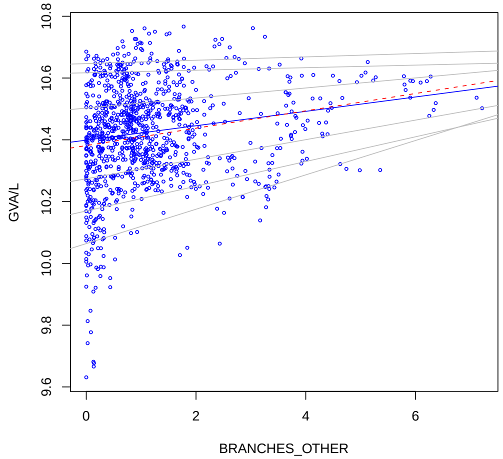
(a) GDP/N **(b)** GVA/L **(c)** K/L

Notes: All figures contain densities estimated using kernel density estimation for the three selected variables (in log-scale, in real terms), for all sample years. The vertical line in each plot represents the average for each of the variables. We chose a Gaussian kernel, and the bandwidths were implemented using the plug-in methods of Sheather and Jones (1991).

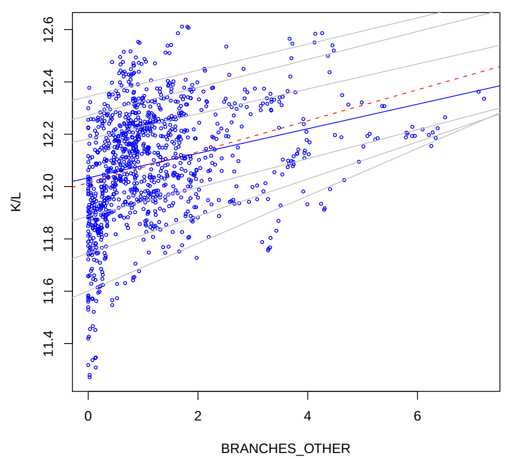
Figure 5: Estimation of Model 1 (effect on the deregulation variable *BRANCHES_OTH*) for different quantiles ($\tau \in \{.05, .10, .25, .50, .75, .90, .95\}$)



(a) *GDP/N*



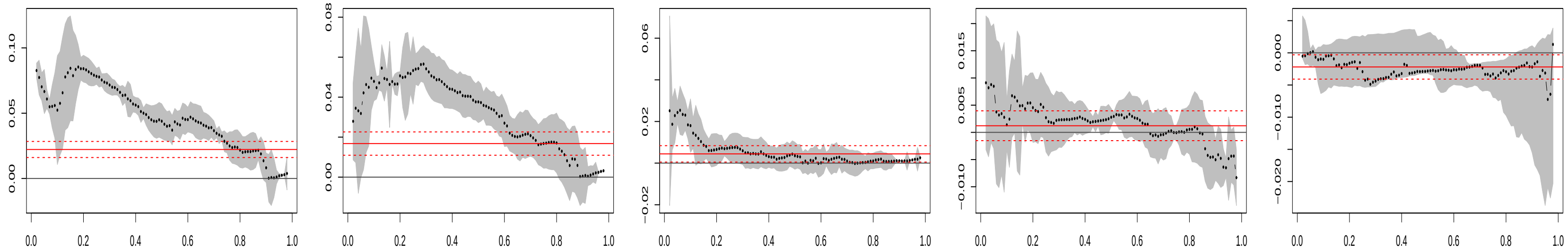
(b) *GVA/L*



(c) *K/L*

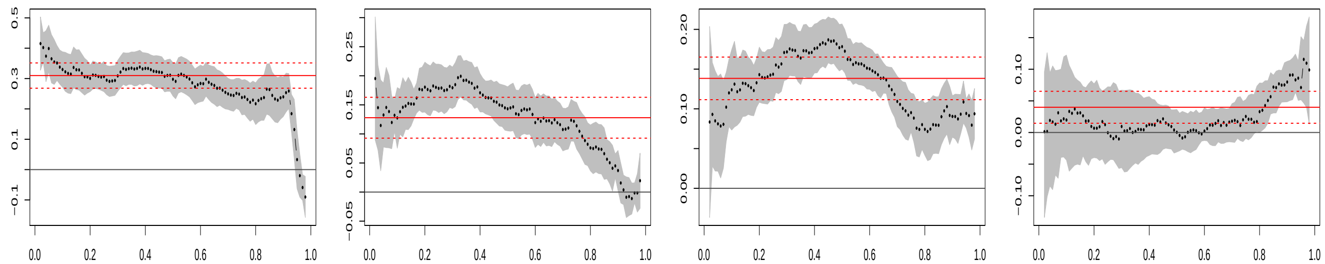
Notes: superimposed in the plot (in grey) are seven estimated quantile regression lines corresponding to the quantiles ($\tau \in \{.05, .10, .25, .50, .75, .90, .95\}$). The line corresponding to the median regression is represented by the blue solid line. The OLS estimated coefficient for the *BRANCHES_OTH* variable is represented by the dotted line in red.

Figure 6: Regression quantiles, GDP/N, levels, *BRANCH_OTH*



(a) Model 1 **(b)** Model 2 **(c)** Model 3 **(d)** Model 4 **(e)** Model 5

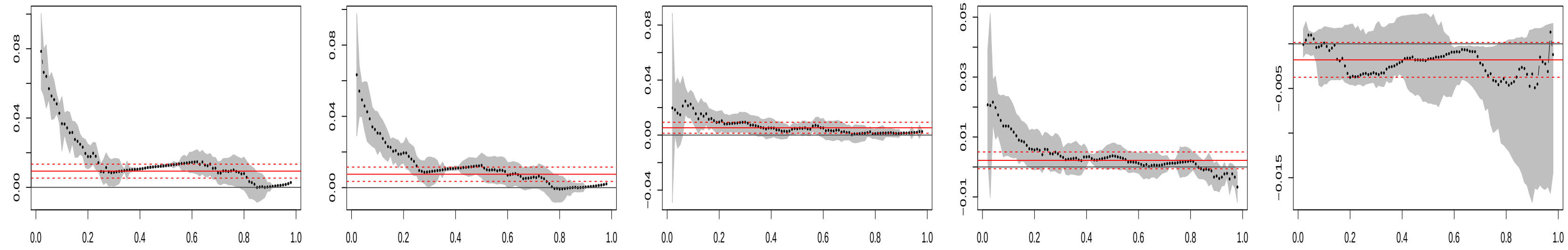
Figure 7: Regression quantiles, GDP/N, levels, *BRANCH_TOT*



(a) Model 2 **(b)** Model 3 **(c)** Model 4 **(d)** Model 5

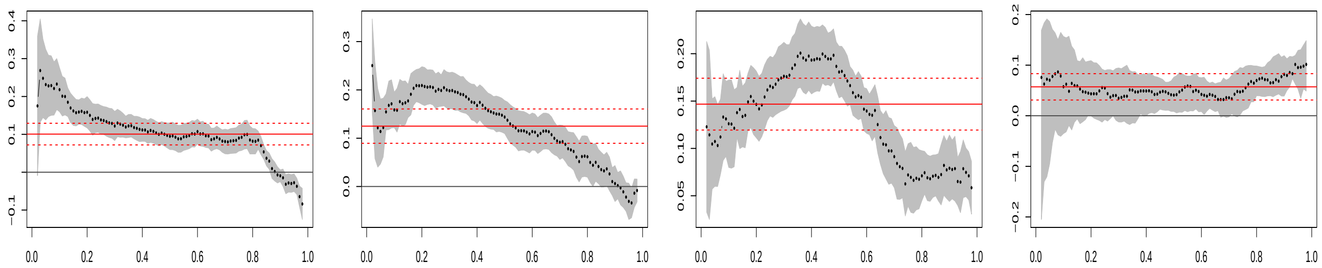
Notes: the slopes corresponding to the deregulation covariates (*BRANCH_OTH* and *BRANCH_TOT*) of the estimated linear quantile regression for each model are plotted as a function of τ (i.e., the different quantiles), represented in the horizontal axis. The vertical axis represents the values of the slope coefficients for each quantile (τ).

Figure 8: Regression quantiles, GVA/L, levels, *BRANCH_OTH*



(a) Model 1 **(b)** Model 2 **(c)** Model 3 **(d)** Model 4 **(e)** Model 5

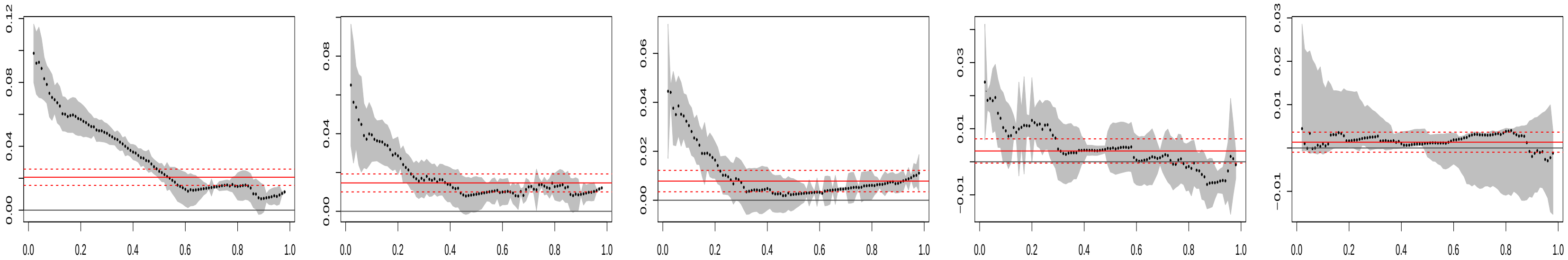
Figure 9: Regression quantiles, GVA/L, levels, *BRANCH_TOT*



(a) Model 2 **(b)** Model 3 **(c)** Model 4 **(d)** Model 5

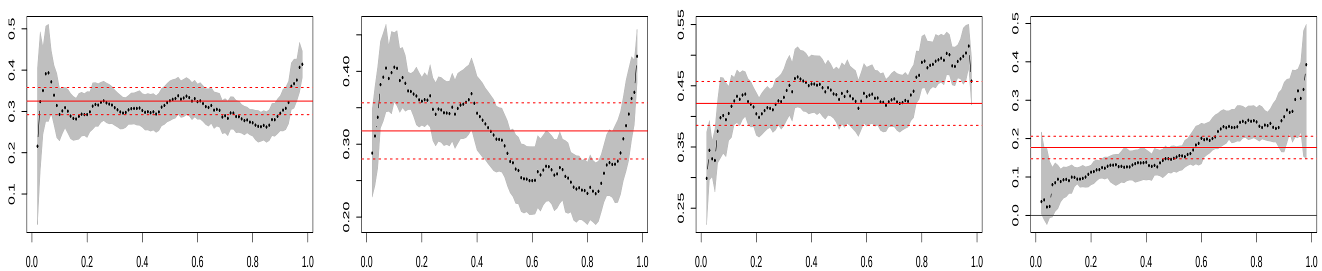
Notes: the slopes corresponding to the deregulation covariates (*BRANCH_OTH* and *BRANCH_TOT*) of the estimated linear quantile regression for each model are plotted as a function of τ (i.e., the different quantiles), represented in the horizontal axis. The vertical axis represents the values of the slope coefficients for each quantile (τ).

Figure 10: Regression quantiles, K/L, levels, *BRANCH_OTH*



(a) Model 1 **(b)** Model 2 **(c)** Model 3 **(d)** Model 4 **(e)** Model 5

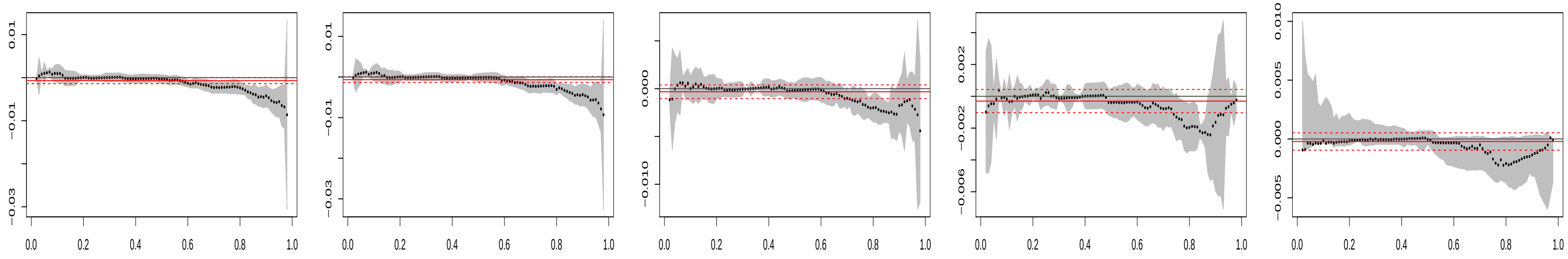
Figure 11: Regression quantiles, K/L, levels, *BRANCH_TOT*



(a) Model 2 **(b)** Model 3 **(c)** Model 4 **(d)** Model 5

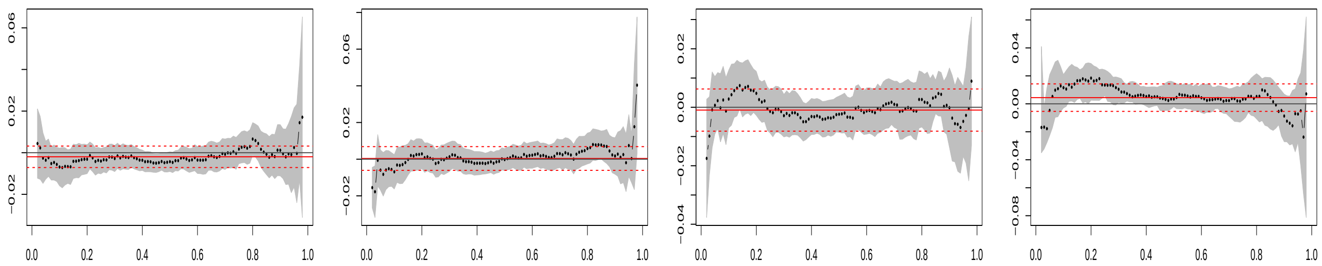
Notes: the slopes corresponding to the deregulation covariates (*BRANCH_OTH* and *BRANCH_TOT*) of the estimated linear quantile regression for each model are plotted as a function of τ (i.e., the different quantiles), represented in the horizontal axis. The vertical axis represents the values of the slope coefficients for each quantile (τ).

Figure 12: Regression quantiles, GDP/N, growth rates, $BRANCH\_OTH$



(a) Model 1 **(b)** Model 2 **(c)** Model 3 **(d)** Model 4 **(e)** Model 5

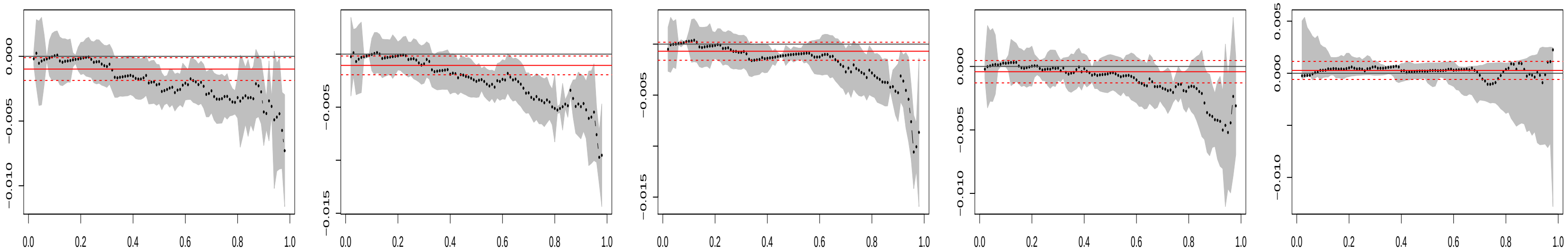
Figure 13: Regression quantiles, GDP/N, growth rates, $BRANCH\_TOT$



(a) Model 2 **(b)** Model 3 **(c)** Model 4 **(d)** Model 5

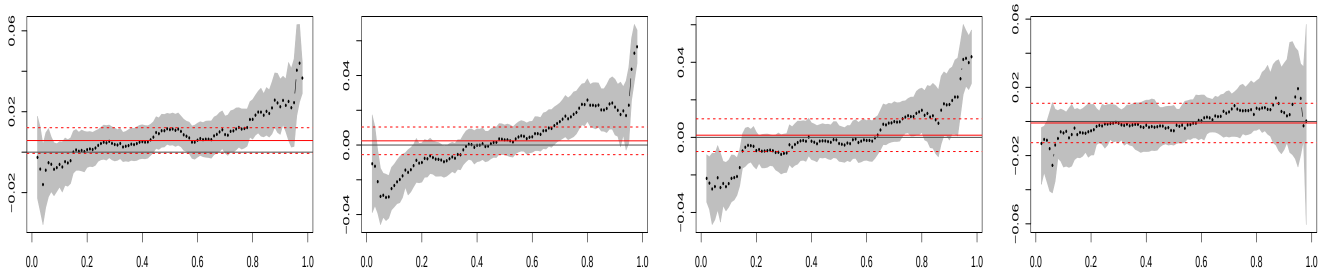
Notes: the slopes corresponding to the deregulation covariates ($BRANCH\_OTH$ and $BRANCH\_TOT$) of the estimated linear quantile regression for each model are plotted as a function of τ (i.e., the different quantiles), represented in the horizontal axis. The vertical axis represents the values of the slope coefficients for each quantile (τ).

Figure 14: Regression quantiles, GVA/L, growth rates, $BRANCH\_OTH$



(a) Model 1 **(b)** Model 2 **(c)** Model 3 **(d)** Model 4 **(e)** Model 5

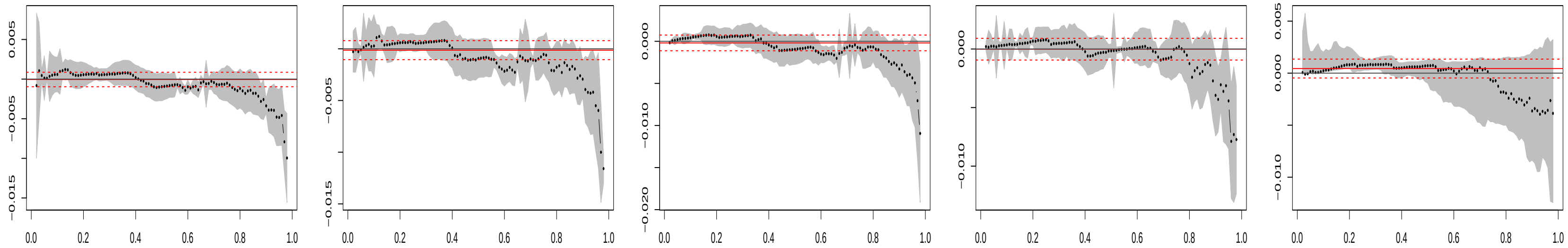
Figure 15: Regression quantiles, GVA/L, growth rates, $BRANCH\_TOT$



(a) Model 2 **(b)** Model 3 **(c)** Model 4 **(d)** Model 5

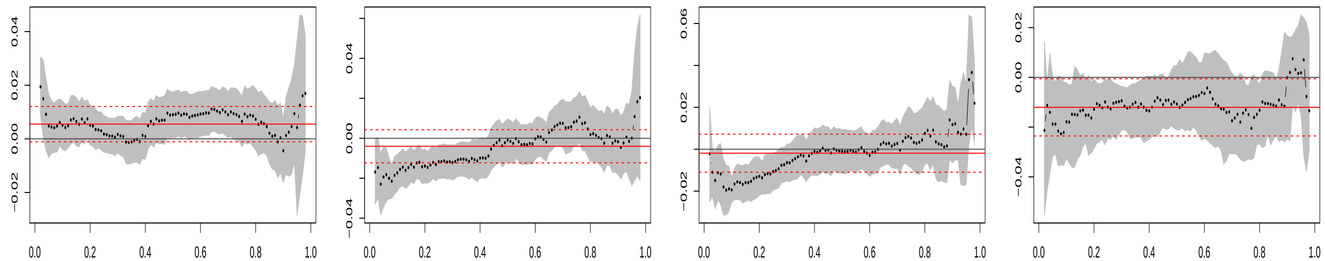
Notes: the slopes corresponding to the deregulation covariates ($BRANCH\_OTH$ and $BRANCH\_TOT$) of the estimated linear quantile regression for each model are plotted as a function of τ (i.e., the different quantiles), represented in the horizontal axis. The vertical axis represents the values of the slope coefficients for each quantile (τ).

Figure 16: Regression quantiles, K/L, growth rates, *BRANCH_OTH*



(a) Model 1 **(b)** Model 2 **(c)** Model 3 **(d)** Model 4 **(e)** Model 5

Figure 17: Regression quantiles, K/L, growth rates, *BRANCH_TOT*



(a) Model 2 **(b)** Model 3 **(c)** Model 4 **(d)** Model 5

Notes: the slopes corresponding to the deregulation covariates (*BRANCH_OTH* and *BRANCH_TOT*) of the estimated linear quantile regression for each model are plotted as a function of τ (i.e., the different quantiles), represented in the horizontal axis. The vertical axis represents the values of the slope coefficients for each quantile (τ).