

What borders are (likely) made of?

An analysis of banking integration using European regional data

Massimiliano Affinito* – Matteo Piazza**

Abstract

A large literature over the last decade identified as borders and barriers to the European retail banking integration such different phenomena as linguistic and cultural differences, relationship lending, corporate governance rules, legal and supervisory frameworks. In this paper, we try to evaluate the specific role of some of those barriers using data on *regional* banking structures for nearly one hundred and fifty regions across Europe. If languages, relationship lending, supervisory practices are hindering integration, we should see their footprints on existing banking structures. If local banks arise and thrive because they solve economic frictions, as suggested in the literature, we should find a significant relation between indicators of those frictions (say, information asymmetries) and the number of these banks.

A regional approach has some distinct advantages for this exercise: first, local characteristics that survived national integration are likely to resist European integration as well (the level of integration reached *within* countries may be considered as an upper bound for European banking integration). Second, aggregation at national level could cancel out local characteristics (e.g. firm size) that may be relevant in explaining the shape of banking systems. Our results support the idea that asymmetric information is playing some role in shaping banking systems. We complement our structural analysis with a direct study of the determinant of cross-border branching across European regions.

JEL classification: G21, G28.

Keywords: European banking integration, barriers, asymmetric information.

* University of Rome “Tor Vergata” and Bank of Italy, Research Department.

** Bank of Italy, Research Department.

The opinions expressed in this paper do not necessarily reflect those of the Bank of Italy. We would like to thank, without implicating, for help and comments, Riccardo De Bonis, Marcello Pagnini, Miria Rocchelli, Luigi Federico Signorini and participants at the seminar held at the Research Department of the Bank of Italy and at the XIV International “Tor Vergata” Conference on Banking and Finance (December 2005).

“[...] studies also point to informational and political barriers that limit mergers and acquisition in banking. In particular, there is evidence that [...] even if financial markets become increasingly integrated, *domestic financial institutions do not become redundant*. These results suggest that local financial development and therefore *local banks are an important determinant of a region’s economic success, even in an environment where there are no frictions impeding capital movements*. All in all, *traditional retail loan and deposit business appears to solve economic frictions* in a way that is difficult to reconcile with cross-border expansions comparable to the one observed for wholesale business.”

(ECB, 2004; *italics added*).

“[T]he most common findings in the extant research are that large institutions have comparative advantages in transactions lending to more transparent SMEs based on hard information, while small institutions have comparative advantages in relationship lending to informationally opaque SMEs based on soft information [...]. *A policy implication that might at first blush seem reasonable is that the financial institution structure needs to include a substantial market share for small institutions to meet the demands of informationally opaque SMEs*, since these SMEs may be constrained in the financing they can obtain through the transactions technologies offered by large institutions. *We contend that these findings represent an oversimplification that may be potentially misleading to both researchers and policy makers [...] transactions technologies [exist, that] may be used to supply funding to very opaque SMEs even when relationship lending cannot be effectively employed.*”

(Berger-Udell, 2004; *italics added*)

1. Introduction

The nature of European banking systems and the perspectives for their integration have been the subject of a great deal of academic and institutional attention over the last decade or so, following the launch of the Single Market Program, the inception of the Economic and Monetary Union and the transition to the Euro.¹ A substantial consensus has been reached among researchers and policymakers that small corporate and retail banking markets are far from being fully integrated across Europe. Available evidence supporting this conclusion seems to be robust across different measures of integration, either price convergence or cross-border lending and consolidation (Adam *et al.* 2002).

Factors that contribute to this segmentation have been alternatively called borders or barriers and include such different phenomena as linguistic and cultural differences, relationship lending, corporate governance rules, supervisory and lending practices, and so on (e.g. ECB, 1999 and 2000; the papers in Artis *et al.*, 2000; Ongena-Degryse, 2003). According to a recent survey made by the Committee of European Banking Supervisors (CEBS, 2005), while supervision is not perceived as

¹ For example, the European Central Bank is now publishing an annual report on the EU banking structure and co-launched a research network on capital markets and financial integration on Europe (ECB, 2004, provides a summary of the findings so far).

major obstacle to cross-border consolidation a variety of other factors are, including differences in corporate cultures, fragmented rules in consumer protection, labor codes, local market structures and other legal, cultural and economic differences among countries. Buch (2002) distinguishes between “regulatory” and economic borders and classifies the latter either as “exogenous economic borders” (legal origin and system, corporate governance practices, political frameworks, language or cultural differences) or as “endogenous economic borders” (mainly due to information asymmetries). While different taxonomies could be applied without substantially changing the thrust of the analysis, it is clear that implications for policy are quite different depending on the origin and rationale of the specific factor analyzed. Nevertheless, borders remain an encompassing concept and the jury is still out on deciding which factors are prominent in hampering retail banking markets integration in Europe more than a decade after the inception of the Economic and Monetary Union and more than four years after the launch of the Euro. There seems to be, therefore, some value added in evaluating which factors are actually playing a *major* role in hindering cross-border activity.

In this paper, we try to analyze the differential impact of those borders and barriers that are most frequently mentioned in the literature. We analyze regional data across Europe and we add, to a traditional approach in terms of cross-border operations, partly plagued by the fact that one cannot control for activities that may have been discouraged by these borders and barriers, an analysis focused on the structures of local banking systems.

We argue that an analysis of regional banking systems across Europe may shed some lights on the obstacles to cross-border integration. In fact, it may allow the identification of factors that affect the structure of European local banking systems and that, by their nature, are very likely to also have a different impact on domestic and foreign banks (the most obvious example is language but we would also explore other sources of information asymmetries). Furthermore, European banking markets underwent a very significant phase of consolidation during the last decade (e.g. Gual, 1999; Cabral *et al.*, 2002), albeit mainly limited within national borders. This means that the structures of regional banking markets should now reflect those effects that “survived” this national wave of consolidation and that may show, *a fortiori*, some resilience also to international integration.

We summarize European regional banking structures with three different indicators: the number of banks in each region, the number of branches and their ratio (that we will show later on to be a good proxy of both the local nature of a regional banking system and of the average bank size). If languages, asymmetric information and relationship lending, regulatory and legal rules are indeed “barriers” to EU integration, then we should see their impact on banking structures. If local banks

arise and thrive because of their suitability to solve economic frictions, as suggested in the literature, we should find, *ceteris paribus*, a significant relationship between indicators of those frictions (say, information asymmetries) and the number of these banks.²

Building on the results from our structural analysis, we then turn to an analysis in term of cross-border branching among all regions in our sample. We see these two types of analysis, on structural variables and on cross-border branching, as broad complements: while the analysis for the entire universe of banks may provide more robust inferences than a cross-border analysis in singling out relevant factors shaping the European banking structures, the latter may be necessary to grasp the role of some specific factors operating cross-border. Furthermore, the size of some coefficients could be significantly different within or across borders.

The plan of the paper is as follows: we review the rationale for a regional analysis in the next paragraph. Paragraph 3 illustrates data sources and paragraph 4 provides summary statistics. Paragraph 5 describes the methodology used in the estimation and paragraph 6 summarizes the main empirical findings. The last paragraph concludes.

2. Why do we focus on *regional* banking structures?

We found a regional focus as particularly suitable for our goals on several grounds. A first reason is that most factors that are frequently mentioned as barriers and borders can be probably better investigated at a regional level. Consider, for example, the idea that a matching between small firms and small (local) banks may endogenously arise in banking systems as only small banks can process the “soft” information that would characterize the small firms. The idea of a matching between the size of banks and the size of firms in an economy – basically due to information asymmetries and relationship lending – is not new and it has been backed by some evidence (e.g. Angeloni *et al.*, 1995; Cetorelli, 2001), although it has not been explored for EU regions as far as we know. While relationship lending is suggested as an obstacle to full European banking integration in Berger *et al.* (2003) – where it is claimed that services to small firms are likely to be provided by small banking institutions also in the future – one of the authors (Berger-Udell, 2004) has more recently taken a more skeptical view, as reminded in the initial quote. He contends, as a possible

² The number and average size of banks may indeed summarize quite important characteristics of local economic systems. As a recent research project of the European System of Central Banks highlighted, “[t]he Herfindahl index and the market share of the five largest banks do not contribute to explaining the size of the sacrifice ratio, while the variables related to the *number of credit institutions* operating in the euro-area countries do. Indeed, the smaller the *average size of banks*, the larger the sacrifice ratio” (Berben *et al.* 2004; *italics* added).

oversimplification, the received view that financial structures have to include a substantial market share for small institutions to meet the demands of opaque SMEs. In its view, transaction technologies are now available enabling large banks to overcome informational constraints. There is a merit, therefore, in looking at this issue and we believe that a local focus of the analysis is indeed appropriate, as a higher level of aggregation could cancel out within-country variability. We verify, whether there is any evidence that the structure of banking systems (in terms of size and local nature of the banks) across European regions is significantly affected by the importance of small firms in that region. If this is the case, then one could argue that differences in average firm size across Europe may slow consolidation across the continent due to information advantages enjoyed by small (local) banks in serving those firms.

Similar considerations apply to linguistic and cultural differences. They also are repeatedly mentioned as an important obstacle to cross-border activity in Europe and they, too, can be better investigated at a regional level. In fact, in the EU-15 countries not less than eleven official languages are spoken. This means, however, that linguistic dummies are hardly distinguishable from a country fixed-effect in a cross-country panel regression. At a regional level, instead, we can control for country fixed-effects while still taking advantage of the existence of a non negligible number of regions with linguistic minorities (about 10% of our sample). If linguistic differences are such a serious issue to require separate financial institutions for different linguistic communities, we should expect that regions with linguistic minorities will be characterized, *ceteris paribus*, by a higher number of local banks.

A second reason for our sub-national focus is that the resilience of local characteristics may be more safely assumed at a regional level. In fact, European economic integration is still very much a work in progress and all the more when compared with national unifications across Europe that are now centuries old. In a similar vein, Guiso *et al.* (2004) noted that as Italy “has been unified, from both a political and a regulatory point of view, for the last 140 years [...] the level of integration reached within Italy probably represents an upper bound for the level of integration international financial markets can reach”. Regional traits have been already largely tested by national integration and it may be reasonable to assume as a null hypothesis that they will survive European integration as well. The same presumption might not apply in a European perspective where *local* is often meant to refer to national characteristics.

Finally, also national factors may be better identified in the context of a regional analysis. In fact, it allows the inclusion of country fixed-effects in our regressions, something that cross-country exercise comparing banking structures can hardly omit without incurring in a serious bias. Special legal provisions for mutual and cooperative banks, for example, may affect the overall number of banks in a country if these provisions are intended to shield these banks, at least partially, from the competition of larger banks.

3. Data sources

This work relies on both regional and national data across Europe. We assembled data on the number of banks and branches, and on a large set of real economy and structural data, in 147 regions across Europe, covering all the regions in the EU-15 countries but Luxemburg and Sweden³. Regions were identified using the NUTS2 territorial breakdown (with the exception of Germany and UK where the NUTS1 level – Laender and Regions – has been used)⁴. The following countries are included in the dataset: Austria (9 regions), Belgium (11), Denmark (1), Finland (5), France (22), Germany (16), Greece (13), Ireland (2), Italy (20), The Netherlands (12), Portugal (7), Spain (17), United Kingdom (12).⁵ Our sample includes therefore 11 euro area countries (out of 12) and 2 EU countries not belonging to the euro area (out of 3). Table 1 lists the countries and regions included in our sample.

The regional database Regio, maintained by Eurostat, provides a large amount of information on real economy and structural data, including regional GDPs, number of firms, firms' size, R&S (number of European patent applications to EPO), number of employees in agricultural sector, industrial and service, number of total unemployment, both employment and unemployment rates, households disposable income. Data on surface areas, number of inhabitants, number of households, number of hospital beds, education (number of students), transports (number of vehicles

³ It is customary to refer as EU-15 countries to the fifteen countries that were already EU members prior to the May 2004 enlargement. For Luxemburg and Sweden, we were forced to exclude them from the analysis, due to some missing series.

⁴ NUTS is the French acronym for Nomenclature of Territorial Units for Statistics. It has been defined by Eurostat more than two decades ago in order to provide a single uniform breakdown of territorial units for the production of regional statistics for the European Union. For details, see: europa.eu.int/comm/eurostat/ramon/nuts/introduction_regions_en.html.

⁵ We do not consider six regions that are usually included in the NUTS2 breakdown but that are geographically separated from the mainland. They are the four French départements d'outre-mer and the two Spanish enclaves in North-Africa (Ceuta and Melilla). We also consider jointly the two autonomous provinces of Trento and Bolzano in Italy that are separately coded in NUTS2.

and motorways roads) are also generally available. The number of branches of credit institutions in each European region is also collected from the same source. We collect annual data from 1996 to 2001 where available.

The number of credit institutions in each region is drawn from national data included in the List of Monetary Financial Institutions for five dates (October 1998, June and December 2002, June and December 2003).⁶ We mapped banks to their region of establishment using postal codes as a key.

Data on linguistic minorities were mainly inferred from “Report on the linguistic rights of person belonging to national minorities in the OSCE area” published by the Organization for Security and Co-operation in Europe (OSCE, 1999). Table 2 reports the regions identified as linguistic and cultural minorities areas.

Decisions of supervision Authorities are also often mentioned as barriers to European integration. To verify if there is any evidence that national supervisions contributed shaping regional banking structures, we included among our variables, three indexes of supervisory practices taken from Barth *et al.* (2006). The three indexes are based on a cross-country database on Bank Regulation and Supervision originally collected at the World Bank. The database collects the answers of many supervision authorities around the world to a set of questions on regulatory issues⁷. The values of the three indexes for each country are reported in Table 3. The three index summarizes the restrictiveness of supervision by defining respectively the scope of credit institutions’ activities (e.g. if they are allowed to deal with securities, to sell insurance, etc.), as the attractiveness of entry into a national market may depend on this aspect; the set of general supervisory powers; and the rules applied to entry. While the latter index seems clearly the most relevant for the issues dealt with in this paper and it properly focuses, as the whole database, on questions dealing with both *ex-ante* rules and effective outcomes, it has some distinctive weaknesses as some of these questions have not been answered by all the European countries and, above all, formal rules for entry are basically defined at European level. To check for robustness, we included alternatively all the indexes in our regressions.

⁶ The Monetary Financial Institutions - MFIs - are central banks, resident credit institutions as defined in Community law, and other resident financial institutions whose business is to receive deposits and/or close substitutes for deposits from entities other than MFIs and, for their own account (at least in economic terms), to grant credits and/or make investments in securities. Our dataset is limited to the subset of credit institutions. The List of MFIs can be downloaded from the European Central Bank website. October 1998 was a test date as the MFI List started in 1999.

⁷ The database can be found on the World Bank website or in a CD-ROM attached to the book by Barth et al. (2006).

Finally, we use national data (reported in Table 4) on government ownership of banks, drawn by La Porta *et al.* (2002) for 1995 and by Barth *et al.* (2006) for 2003. The share of the total banking assets held by the state-owned banks in each country is used as a proxy of government's stakes in the banking sector and therefore of its potential incentives to try to influence (e.g. through legislation) the structure of the banking system. Furthermore, if government-owned banks are not maximizing profits, as suggested in part of the literature (e.g. La Porta *et al.*, 2002; Sapienza, 2004), branching decisions could also be affected as a way to establish or consolidate influence in certain geographical areas⁸.

As our variables span only a limited period of time and are not always available for every period, we averaged our observations over our sample period; therefore, our first dataset is a cross-section of 147 regional observations.⁹ A second dataset of almost 19,500 observations (with the dependent variable being the number of *foreign* banks for every pair *home region – host region*) is instead used to study the determinants of cross-border branching.

4. Summary statistics

Table 5 provides summary statistics for the regional variables in our first dataset, broken down by countries. Data show that banking structures in Europe exhibit a significant variability not only across but also within countries¹⁰. A comparison of variability in the number of banks in European regions and USA States shows that, on average, the former is much greater¹¹. Needless to say, the unconditional distribution of banks may simply reflect some underlying characteristics of the economic structure. In fact, one of the main problem found by the literature on integration (Adam *et al.*, 2002) is the lack of a benchmark when indicators different from price is taken into account.

We carried out, only for illustrative purpose, a comparison between European regions and States in the U.S.A., showing how each region (and State) ranks in the overall distribution of the

⁸ We lack, however, the data to verify whether branching decisions of government-owned banks have been affected by the alignment of political majority in a certain region with the central government (along the lines of Sapienza, 2004).

⁹ Data on branches are missing for Greece, Ireland and The Netherlands. Our cross-sectional observations are therefore reduced when using branches (or the ratio between banks and branches) as the dependent variable.

¹⁰ The standard deviation in the number of banks within European countries (i.e. across regions in a country) is, on average, greater (61.30) than the standard deviation of national averages across countries (43.85).

¹¹ Variation coefficients for each country are averaged and compared with the variation coefficient for United States. The resulting European average is 1.52 while the US value is 0.92. Only four small European countries (Austria, Finland, The Netherlands, Portugal) have coefficients of variation smaller than the USA.

number of banks with respect to a benchmark distribution given by the ranking of the same region (or State) in terms of a combined measure of GDP and population. We check whether the decile ranking of a region in the distribution of the number of banks across Europe matches the decile ranking of the same region in the benchmark.¹² A significant difference either at a regional or a national level may signal respectively that regional factors (other than population and GDP) or national factors are playing a significant role in that region or country. Results for Europe, United States and each of the five largest EU countries are illustrated in Figures 1-7.

In USA, central States (particularly Nebraska, Iowa and Kansas) appear “over-banked”, while coastal States have relatively few banks, once GDP and population are taken into account. According to this metrics, in EU-15, Austria seems over-banked while Greece and Belgium appear under-banked. Turning to an intra-country analysis, Germany shows a remarkable homogeneity as a vast majority of its regions are ranked in the same decile in both the distributions.

5. Methodology

Our general specification is as follows:

$$Y_{rc} = f(X_{rc}; Z_c)$$

where r and c are indexing respectively regions and countries. We use alternatively four different dependent variables - the total number of banks, the total number of branches, the ratio between total banks and total branches and the number of foreign banks - for each European region, as they may convey complementary information on different aspects of interest.

The ratio between banks and branches in a region is used as a proxy of both average banks' size and degree of localism of a regional banking system (respectively an inverse and a direct proxy). In fact, the ratio is bounded between zero and one by construction: it will equal zero in a region where no banks are established and will also tend to zero when the number of branches owned by credit institutions established outside the region is disproportionately large with respect to the number of banks established in that region. The ratio will, instead, be equal to one in a region

¹² We choose these two variables for this exercise because these are the variables that seem to have the largest explanatory capacity in a regression of the number of banks on its determinants, both in Europe and USA.

where there are no branches from outside and all the credit institutions have just one single branch (being therefore local almost by definition).¹³

The quality of the approximation for size¹⁴ hinges, instead, upon two assumptions: a) that the average size of branches is not systematically different across regions; b) that the number of branches in a region owned by banks from outside the region is not systematically different.¹⁵ To gauge the accuracy of the approximation for size, we checked the correlation of the ratio between branches and bank (the inverse of our measure) with some standard measures of size, as the average deposits and loans per bank, on Italian regional data as of end-2002. Correlations coefficients over 0.95 for deposits and over 0.8 for loans suggest that the ratio between banks and branches may also serve as a reasonable approximation of size. A greater value of the regional ratio will therefore indicate a relatively smaller average size of banks and a greater degree of localism in that regional banking system.

Covariates are defined either at regional or country level. We include in our list of variables all factors that could bear either on the demand or supply of banking services. Our list of potential variables includes the following¹⁶:

$$X_{rc} = \{population_{rc}, surface\ area_{rc}, GDP\ per\ capita_{rc}, firm\ size_{rc}, dummy\ for\ linguistic\ minorities_{rc}, \\ number\ of\ workers\ employed\ in\ agriculture_{rc}, students/population_{rc}, R\&D_{rc}, dummy\ for\ the \\ region\ of\ the\ country\ capital_{rc}\};$$
$$Z_c = \{supervision\ indexes_c, share\ of\ assets\ held\ by\ government-owned\ banks\ in\ 1995_c\ and\ in\ 2003_c, \\ country\ fixed\ effects_c\}.$$

Our interest is mainly focused on four regressors: our proxy for the firms' size, as a proxy of barriers related to asymmetric information and relationship lending; the dummy for linguistic

¹³ The ratio can be close to zero also when a bank established in a region has a large number of local branches. While locally established, these banks may be less suited than smaller banks to process "soft information", as long as the distance between where the information is gathered and where the lending decision is taken is growing in the average number of branches at bank-level. This is reflected in our ratio indicator as banking systems characterized by the prevalence of unit credit institutions have a greater value of the ratio than regional systems with few large regional banks.

¹⁴ A more standard measure of size as *assets/number of banks* cannot be used as it is not available at regional level.

¹⁵ Interestingly, the condition under b) above is more likely to be satisfied when the ratio is not particularly informative as a proxy of localism, and vice versa. Indeed, to a certain degree, the two interpretations may be thought as complementary.

¹⁶ Given the potential for multicollinearity, we check correlations among variables (e.g. share of employees in agriculture and the gdp per capita) and we performed standard tests (e.g. variance inflation factor) to detect any problem with multicollinearity.

minorities, as a proxy of linguistic and cultural barriers; the supervision practices indexes, as a proxy for supervisory barriers, and the share of total assets held by government-owned banks, as a proxy of possible legal barriers. The remaining regressors are basically included as controls.¹⁷

National and regional differences seems to be properly accounted for by our variables¹⁸. In Figure 8, we plot the residuals for each European region from a log-linear regression to check for any systematic pattern of residuals once all relevant variables are included. The cloud of points makes the regional label codes (listed – with the corresponding region name – in Table 1) scarcely readable near the zero line on the y-axis. Regions that are farthest from this line (i.e. that have residuals greater than zero in absolute value) can however be easily identified.

We use four different regressions models. To investigate the determinants of the number of banks and branches, count data models are a natural choice as standard linear models ignore the discrete and non-negative nature of dependent variables and the heteroskedasticity inherent in count data (Winkelmann, 2003). The Poisson regression model provides a basic framework for this kind of econometric analysis, but it assumes equidispersion (e.g. the variance is equal to the mean). Not surprisingly, in light of the heterogeneity in our sample, a likelihood ratio test rejects the null hypothesis of equidispersion. Hence, we estimate a Negative Binomial regression, a model where the count variable is still assumed to be generated by a Poisson-like process while allowing for overdispersion.¹⁹

To check the robustness of our findings, we also ran a log-linear regression that does not suffer from the shortcomings mentioned above for the linear model, for banks and branches. Although in a log-linear specification “zero” counts are not allowed and ad-hoc transformations (as adding a positive constant to each count) have been shown to induce a potentially significant bias,

¹⁷ The inclusion of most of them is self-explaining. R&D, the shares of student over the total population and the log of the number of agricultural workers should proxy for additional sources of (actual and perspective) demand of banking services, respectively with positive sign (R&D) and negative sign (the number of agricultural workers). The impact of the share of student is *ex-ante* debatable. It could indicate a weaker current demand as typically students do not demand a significant amount of banking products but also a higher perspective demand if returns to schooling are sizable. We also add a dummy for the region of the country capital, to control for the fact that some banks (typically foreign ones) may tend to locate there their headquarters.

¹⁸ The comprehensive set of regional variables - X_{rc} - should mitigate the risk of omitted regional variables though we cannot control for regional effects. We lack, however, data on within-country differences in regulatory and legal systems, if any. We believe that this could actually be an issue only with reference to Germany where the federal structure leaves some degree of autonomy to Länder. We repeated our regression excluding Germany without any significant difference in our results.

¹⁹ Summary statistics suggest that excess zeros are not an issue here but, in any case, we checked – without any substantive change - whether results were sensitive to a different specification (a zero-inflated negative binomial model

here we have just a handful of zero-value observations (five regions when the dependent variable are banks and zero when branches are the dependent variables).

When the dependent variable is the ratio between banks and branches, we use a fractional logit regression model (Papke-Wooldridge, 1996) that fits naturally as the ratio is bounded between 0 and 1.

In the fourth exercise, we analyze cross-border branching across European regions²⁰: the dependent variable here is the number of foreign branches established in each region by banks coming from every foreign region of our sample.²¹ We have, therefore, 19,442 observations for all possible pairs *host region – home region* (Table 6). Not surprisingly, zeros are largely predominant (we have just 208 non-zero observations). Our favorite model is again a count model, but, in order to account for the excess zeros in the sample, we use a two-steps model, known as Zero Inflated Poisson model.²² In the first step, a binary probability logit model determines the probability of a zero outcome; in the second step, a Poisson distribution describes the positive outcomes.

The set of independent variables is slightly different from our previous exercises. We included three different categories of variables that describe respectively some characteristics of the host and the home region (or country) and their links. For the host regions, we use the same set of covariates as in the previous exercises. For the home region, we included country dummies and regional GDP per capita. The third set of regressors include variables linking each pair of regions: trade flows between their countries; measures (drawn from Guiso *et al.*, 2004) of the reciprocal trust between the citizens of the host country and the citizens of the foreign bank's country; and three dummies: existence of a common language between each pair of regions (or, in alternative, country), a dummy for common borders between countries and a dummy for common borders between regions.

where independent variables were assumed to be the same in both steps). We also computed heteroskedasticity-robust standard errors corrected for clustering on country.

²⁰ On this issue see also Focarelli-Pozzolo (2001).

²¹ We deal exclusively with the determinants of the presence of banks from other European countries in each European region of our sample because this is what our regional data allow for (i.e. no banks from the Rest of World are considered). With regard only to our fourth exercise, it has to be noted that there is some potential for confusion in the terminology. The List of MFIs does not report, as foreign banks, subsidiaries of foreign bank (i.e. national banks controlled by foreign shareholders, either banks or other entities), but only branches of foreign banks. However, in line with standard reporting practices, only headquarters are reported: in other words, if, say, Credit Agricole should decide to open more than one branch in Spain, we will still have just one record for C.A. in the Spanish List of MFIs. This induces a potentially significant bias: however, we included a dummy for the capital city to take into account this effect and we checked how relevant was this problem in Italy.

²² See Lambert (1992); and Gobbi-Lotti (2003) for a recent application on Italian banking data.

6. Results

In this paragraph, we comment our main findings, dealing separately with all the four dependent variables we used for our analysis.

Number of banks (Table 7). Per capita gross regional products and population are significant, as expected, with a positive sign. Country fixed-effects are also generally significant and broadly confirm the indications coming from Figure 2. The idea that information asymmetries affect the structure of banking systems is supported by the negative coefficient for the (log) firm size and the positive coefficient for the linguistic minority dummy, both strongly significant. In other words, regions where firms' size is smaller and cultural differences matter tend to have a higher number of banks, supporting the idea that these factors may act as barriers to EU integration. The impact of regional minorities on the number of credit institutions become weaker (but still significant at 10% level) if we exclude from our sample the Italian region Trentino - Alto Adige that has a significant German speaking population and a large number of small local banks. For all these variables, the sign, size and significance of the coefficients are broadly confirmed by the log-linear regression.

The picture is quite different when we move to nationwide variables. In particular, results for supervision variables are quite blurred, possibly due to the low variance of these indexes across EU countries (their average coefficient of variation is around 0.2). The sum of the three different indexes (after a proper normalization) produces an index that shows almost no variability across Europe. For the index summarizing supervisory powers, the coefficient is either negative (in the negative binomial regression) or not significant (in the log-linear specification). Government share is consistently not significant across our different specification.

Number of branches (Table 8). Regional population and gross regional product per capita remain strongly significant and are the main drivers of the high explanatory capacity of the model (adj. R-square above 0.9). Country dummies are, instead, less significant than in the previous regressions, possibly reflecting the fact that branches are likely to endogenously adjust to economic variables much more easily than banks. The linguistic minorities dummy is also generally not significant across different specifications. This finding is not particularly surprising to us: while local banks are typically a product of a local community, branches located in a region may be part of the network either of a local credit institution or of a bank from outside. If the latter case is relevant, the link with the community get lost and this would explain our finding.

Firms' size still has, in the negative binomial regression, a significant negative coefficient that is consistent with the idea that in regions where firms' size is smaller credit institutions need a larger branching network. However, if the effect of prevalence of small firms were only to reduce the geographical reach of each banking entity, we should not observe significant differences in coefficients' size and significance between banks and branches. Instead, its coefficients, both in the negative binomial and the log-linear specifications, are definitely much smaller than those found for the banks and the coefficient also fails to be significant in the log-linear specification. A different effect – like the one we observe – of the information asymmetries variables when comparing branches and banks might, instead, be due to different attitudes towards local firms that local branches may have when compared with local banks. A reason for this may be agency problems: Ferri (1997) shows how turnover of branch manager may have been used in Italy as a mechanism to control collusions between them and borrowers. This may come, however, to the cost of hampering the development of lending relationship. If this is the case, it is not surprising that the impact of firms' size on the number of credit units weakens when we are analyzing branches rather than banks. Indirect support for this possibility comes from the fact that variables proxying for information asymmetries are significant when the dependent variable is the ratio between banks and branches, as we are going to discuss. As for national variables, government share is again not significant while supervisory powers are positively and significantly associated with a greater number of branches.

Banks/branches ratio (Table 9). We already explained why the ratio between banks and branches may be considered a good proxy of both average size and localism of regional banking systems. Results support the idea that linguistic minorities not only may require more banks, as shown in Table 6, but may also favor truly local (i.e. established in that region) banks, as the degree of localism is significantly related to the presence of these minorities. In this case, taking out Trentino - Alto Adige from the sample reduce the size of the coefficient of around one third, but does not modify the significance (at 1% level) of it. Evidence also supports the hypothesis of a matching between firms' size and banks' size (or their local nature). As the firm size grows, the ratio between banks and branches diminishes as predicted by this hypothesis.

Taking into account the caveats previously made, the negative coefficient significantly associated with the extent of supervisory powers would suggest that more regulated banking systems end up being made, on average, of larger banks. Again, we are a little bit unsure about the ability of this index (and more generally of a survey designed for more than 150 countries across the world) to discriminate among European countries. In this regression, the government share is significantly

positive, suggesting that a stronger presence of public banks could reduce, everything else equal, the size of banks.

Before verifying if there is any evidence that factors shaping regional banking systems are also affecting cross-border branching, we had to verify if systems with a stronger local component actually went through a lesser amount of banking consolidation at the national level. We computed a rank correlation on the percentage change in the number of banks occurred between the first (October 1998) and the last date of our sample period (December 2003) and our index of localism (the ratio between banks and branches). The correlation has the expected positive sign; the correlation coefficient is equal to 0.18, significant at the 5% level and the correlation is robust to outliers as size and significance of the correlation remain pretty much unchanged if we exclude the top and bottom deciles of the distribution.

Number of foreign banks (Table 10). The lower panel (logit model) shows the determinants of the decision by foreign banks not to localize in a region (i.e. empty cells); the upper panel (Poisson model) shows the determinants of the number of foreign banks (when observations are non zero). We use a slightly different set of covariates respectively in the logit and in the Poisson model. In the logit model, localization decisions depend positively on population of the host region and on the income of the home region. Geographical contiguity seems also matter as the dummy for neighboring regions is strongly significant. Capital cities also significantly lure foreign branches while regions where agriculture is over-represented tend to be avoided as location for cross-border branching. Consistently with the idea that small firms may be less transparent to outsiders, foreign banks also tend to avoid, *ceteris paribus*, regions where the average size of firms is small, although the statistical significance is low. Finally supervisions indexes do not significantly affect decisions of foreign banks, a finding that could also be due to the fact that branching has not been particularly controversial as an expression of cross-border activity.

In the Poisson model, regional incomes, both host and home, affect positively the number of foreign banks while population and the capital dummy do not impact on it. Trade flows have a significantly positive coefficient, while a higher government market-share discourages the presence of foreign banks.

7. Summing up

In this paper, we investigated the characteristics of the European *regional* banking systems using four structural variables: the number of banks in each region, the number of branches, a *proxy* of both the average bank size and the degree of localism of regional banking systems, and the number of foreign branches in each European region. We argued that this regional analysis may indeed contribute in understanding the role of some factors that are frequently mentioned as hindering integration in the EU retail banking markets, namely information asymmetries - originated by linguistic and cultural differences and by the underlying economic structure- and national supervision practices and corporate governance rules. Econometric results support the idea that both languages and an economic structure made of smaller firms favor, *ceteris paribus*, a more local character of a regional banking system and reduce the average size of its banks. No compelling evidence is instead available with regard to both the indexes of supervision practices and the importance of government-owned credit institutions in banking systems, although some influence can be found. Broadly in line with these findings, a complementary exercise on cross-border branching show that foreign banks tend to avoid regions where the average size of firms is small, and where the market-share of government-owned banks is higher.

References

- Adam K., T. Jappelli, A. Menichini, M. Padula and M. Pagano (2002), *Analyse, Compare and Apply Alternative Indicators and Monitoring Methodologies to Measure the Evolution of Capital Market Integration in the European Union*, Center for Studies in Economics and Finance (CSEF), Department of Economics and Statistics, University of Salerno.
- Angeloni I., L. Buttiglione, G. Ferri, and E. Gaiotti (1995), "The Credit Channel for Monetary Policy Across Heterogeneous Banks: The Case of Italy", Banca d'Italia, *Temi di discussione*, No. 256.
- Angeloni I., A. Kashyap, B. Mojon and D. Terlizzese (2001), "Monetary Transmission in the Euro Area: Where Do We Stand?", *ECB Working Paper Series*, No. 92.
- Artis M., A. Weber and E. Hennessy (2000) (eds.), *The Euro A Challenge and Opportunity for Financial Markets*, Routledge International Studies in Money and Banking.
- Barth J.R., G.J. Caprio and R. Levine (2001), "The Regulation and Supervision of Banks around the World", *World Bank Policy Research Working Paper*, No. 2588, April.
- Barth J.R., G.J. Caprio and R. Levine (2006), *Rethinking Bank Regulation*, Cambridge University Press.
- Berben R-P, A. Locarno, J. Morgan and J. Vallés (2004), "Cross-Country Differences in Monetary Policy Transmission", *ECB W.P.*, No. 400, October.
- Berger A.N., Q. Dai, S. Ongena and D.C. Smith. (2003), "To What Extent Will the Banking Industry be Globalized? A study of bank nationality and reach in 20 European nations." *Journal of Banking and Finance*, No. 27: 383-415..
- Berger A.N., R. DeYoung and G.F. Udell (2001), "Efficiency Barriers to the Consolidation of the European Financial Services Industry", *European Financial Management*, No. 7 (1).
- Berger A.N., R.S. Demsetz and P.E. Strahan (1999), "The Consolidation of Financial Service Industry: Causes, Consequences, and Implications for the Future", *Journal of Banking and Finance*, No. 23, 2-4, February.
- Berger A.N. and G.F. Udell (2004), "A More Complete Conceptual Framework for SME Finance", mimeo.
- Bofondi M. and G. Gobbi (2004), "Bad Loans and Entry into Local Credit Markets", Banca d'Italia, *Temi di discussione*, No. 509.
- Buch C.M. (2001), "Distance and International Banking", *Kiel Institute of World Economics WP*, No.1043, Kiel, Germany.
- Buch C.M. and G.L. De Long (2001), "Cross-Border Bank Mergers: What Lures the Rare Animal?", *Kiel Institute of World Economics WP*, No.1070, Kiel, Germany.
- Cabral I, F. Dierick and J. Vesala (2002), "Banking Integration in the Euro Area", *ECB Occasional Paper*, No. 6.
- Calcagnini G., R. De Bonis and D. Hester (2001), "Perché le banche aprono sportelli? Un'analisi empirica del caso italiano", P. Alessandrini (eds.), *Il sistema finanziario italiano tra globalizzazione e localismo*, il Mulino, Bologna.
- Campa J.M. and I. Hernando (2004), "Shareholder Value Creation in European M&As," *European Financial Management*, Vol. 10, No. 1.
- Cetorelli N.(2001), "Does Bank Concentration Lead to Concentration in Industrial Sectors?", mimeo.

- Committee of European Banking Supervisors (2005), "Technical Advice to the European Commission on a Review of Article 16 of Directive 2000/12/EC".
- Degryse H. and S. Ongena (2003), "The Impact of Technology and Regulation on the Geographical Scope of Banking", mimeo, August.
- ECB (1999), *Possible Effects of EMU on the EU Banking Systems in the Medium to Long Term*, February, Frankfurt.
- ECB (2000), *Mergers and Acquisitions Involving the EU Banking Industry – Facts and Implications*, December, Frankfurt.
- ECB (2003), *Structural Analysis of the EU Banking Sector: Year 2002*, Frankfurt.
- ECB-CFS (2004), *Research Network on Capital Markets and Financial Integration in Europe: Results and Experience after two Years*, December, Frankfurt.
- Ehrmann, M., L. Gambacorta, J. Martinez Pagés, P. Sevestre and A. Worms (2001), "Financial Systems and the Role of Banks in Monetary Policy Transmission in the Euro Area", Banca d'Italia, *Temi di discussione*, No. 432.
- Ferri G. (1997), "Branch Manager Turnover and Lending Efficiency: Local vs. National Banks", *BNL Quarterly Review*, March.
- Focarelli D. and A.F. Pozzolo, (2001), "Where do Banks Expand Abroad? An Empirical Analysis", Banca d'Italia, mimeo.
- Gobbi G. and Lotti (2003), "Entry decisions and Adverse Selection: an Empirical Analysis of Local Credit Markets", Banca d'Italia, mimeo.
- Guiso L., A. Kashyap, F. Panetta and D. Terlizzese (1999), "Will a Common European Monetary Policy have Asymmetric Effects?", Banca d'Italia, *Temi di discussione*, No. 384.
- Guiso L., P. Sapienza and L. Zingales (2004), "Does Local Financial Development Matter?", *Quarterly Journal of Economics*, No. 119 (3).
- Gual J. (1999), "Deregulation, Integration and Market Structure in the European Banking", *CEPR D.P.*, No. 2288.
- Hartmann P., A. Maddaloni and S. Manganelli (2003), "The Euro Area Financial System: Structure, Integration and Policy Initiatives", *ECB W.P.*, No. 230
- Kashyap A.K. and J.C. Stein (1997), "The Role of Banks in Monetary Policy: A Survey with Implications for European Monetary Union", *Economic Perspectives*, Vol. 21, No. 5.
- Lambert D. (1992), "Zero Inflated Poisson Regression, with an Application to Defects in Manufacturing", *Technometrics*, No. 34.
- La Porta, R., F. Lopez de Silanes and A. Shleifer (2002), "Government Ownership Of Banks" *Journal of Finance*.
- OSCE (1999), "Report on the Linguistic Rights of Person Belonging to National Minorities in the OSCE Area", Paris.
- Papke L.E. and J.M. Wooldridge, (1996), "Econometric Methods for Fractional Response Variables with an Application to 401(k) Plan Participation Rates", *Journal of Applied Econometrics*, Vol. 11, No. 6, pp. 619-632.
- Petersen M. and R.G. Rajan (2002), "Does Distance still Matter? The Information Revolution in Small Business Lending", *Journal of Finance*, Vol. 57.
- Rajan R. and L. Zingales (1998), "Financial Dependence and Growth", *American Economic Review*.

Sapienza P. (2004), "The Effects of Government Ownership on Bank Lending", *Journal of Financial Economics*, No. 72 (2), May.

Winkelmann R.(2003), "Econometric Analysis of Count Data", Springer Verlag.

Table 1
Countries and regions included in our estimations

Countries	N.	Regions	Countries	N.	Regions	Countries	N.	Regions		
Austria	9	AT11 Burgenland	Greece	13	GR11 Anat. Makedonia, Thraki	Netherlands	12	NL11 Groningen		
		AT12 Niederösterreich			GR12 Kentriki Makedonia			NL12 Friesland		
		AT13 Wien			GR13 Dytiki Makedonia			NL13 Drenthe		
		AT21 Kärnten			GR14 Thessalia			NL21 Overijssel		
		AT22 Steiermark			GR21 Ipeiros			NL22 Gelderland		
		AT31 Oberösterreich			GR22 Ionia Nisia			NL23 Flevoland		
		AT32 Salzburg			GR23 Dytiki Ellada			NL31 Utrecht		
		AT33 Tirol			GR24 Sterea Ellada			NL32 Noord-Holland		
		AT34 Vorarlberg			GR25 Peloponnisos			NL33 Zuid-Holland		
Belgium	11	BE1 R. de Bruxelles Hoof. Gewest			GR3 Attiki			Portugal	7	PT11 Norte
		BE21 Prov. Antwerpen			GR41 Voreio Aigaio					PT15 Algarve
		BE22 Prov. Limburg (B)			GR42 Notio Aigaio					PT16Centro
		BE23 Prov. Oost-Vlaanderen			GR43 Kriti	PT17Lisboa				
		BE24 Prov. Vlaams Brabant	DE1 Baden-Württemberg	PT18Alentejo						
		BE25 Prov. West-Vlaanderen	DE2 Bayern	PT2 R. Autónoma dos Açores						
		BE31 Prov. Brabant Wallon	DE3 Berlin	PT3 R. Autónoma da Madeira						
		BE32 Prov. Hainaut	DE4 Brandenburg							
		BE33 Prov. Liège	DE5 Bremen							
BE34 Prov. Luxembourg (B)	DE6 Hamburg									
BE35 Prov. Namur	DE7 Hessen									
Danmark	1		Germany	16	DE8 Mecklenburg-Vorpommern	Spain	17			ES11 Galicia
Finland	5	FI13 Itä-Suomi			DE9 Niedersachsen			ES12 Principado de Asturias		
		FI18 Etelä-Suomi-South			DEA Nordrhein-Westfalen			ES13 Cantabria		
		FI19 Länsi-Suomi-West			DEB Rheinland-Pfalz			ES21 Pais Vasco		
		FI1a Pohjois-Suomi			DEC Saarland			ES22 Com. Foral de Navarra		
		FI2 Åland			DED Sachsen			ES23 La Rioja		
France	22	FR1 Île de France			DEE Sachsen-Anhalt			ES24 Aragón		
		FR21 Champagne-Ardenne			DEF Schleswig-Holstein			ES3 Comunidad de Madrid		
		FR22 Picardie			DEG Thüringen			ES41 Castilla y León		
		FR23 Haute-Normandie			Ireland			2	ES42 Castilla-la Mancha	
		FR24 Centre			IE01 Border, Midlands, Western			Italy	20	ES43 Extremadura
		FR25 Basse-Normandie			IE02 Southern and Eastern					ES51 Cataluña
		FR26 Bourgogne			ITC1 Piemonte					ES52 Comunidad Valenciana
		FR3 Nord - Pas-de-Calais			ITC2 Valle d'Aosta					ES53 Illes Balears
		FR41 Lorraine			ITC3 Liguria					ES61 Andalucía
		FR42 Alsace			ITC4 Lombardia					ES62 Región de Murcia
		FR43 Franche-Comté	ITD1 Trentino-Alto Adige	ES7 Canarias (ES)						
		FR51 Pays de la Loire	ITD3 Veneto	U. Kingdom	12	UKC North East				
		FR52 Bretagne	ITD4 Friuli-Venezia Giulia			UKD North West				
		FR53 Poitou-Charentes	ITD5 Emilia-Romagna			UKE Yorkshire and The Humber				
		FR61 Aquitaine	ITE1 Toscana			UKF East Midlands				
		FR62 Midi-Pyrénées	ITE2 Umbria			UKG West Midlands				
		FR63 Limousin	ITE3 Marche			UKH Eastern				
		FR71 Rhône-Alpes	ITE4 Lazio			UKI London				
		FR72 Auvergne	ITF1 Abruzzo			UKJ South East				
		FR81 Languedoc-Roussillon	ITF2 Molise			UKK South West				
		FR82 Prov.-Alpes-Côte d'Azur	ITF3 Campania			UKL Wales				
		FR83 Corse	ITF4 Puglia			UKM Scotland				
	ITF5 Basilicata	UKN Northern Ireland								
	ITF6 Calabria									
	ITG1 Sicilia									
	ITG2 Sardegna									
			13 countries		147 regions					

Table 2

Linguistic and Cultural Minorities

Regional Code	Region
AT11	Burgenland
AT21	Kärnten
DE4	Brandenburg
DED	Sachsen
ITC2	Val d' Aosta/Vallée d'Aoste
ITD1	Trentino Alto-Adige
ITD4	Friuli-Venezia Giulia
ES11	Galicia
ES21	Pais Vasco
ES51	Cataluña
ES52	Comunidad Valenciana
UKL	Wales
UKM	Scotland
UKN	Northern Ireland

Source: Authors' elaborations on OSCE (1999)

Table 3
Supervision restrictiveness indexes

Country	Overall financial restrictiveness	Entry into banking requirements	Official supervisory power
Austria	11	8	13
Belgium	13	8	10
Denmark	14	8	9
Finland	12	6	6
France	9	6	7
Germany	11	7	9
Greece	12	7	12
Ireland	11	0	11
Italy	15	8	7
Netherlands	10	8	5
Portugal	14	7	14
Spain	10	8	9
United Kingdom	7	8	11

Source: Barth *et al.* (2006).

Table 4
Percentage of bank assets at Government-owned banks

Country	1995	2003
Austria	50.36	0.00
Belgium	27.56	0.00
Denmark	8.87	0.00
Finland	30.65	0.00
France	17.26	0.00
Germany	36.36	42.20
Greece	77.82	22.80
Ireland	4.48	0.00
Italy	35.95	10.00
Netherlands	9.20	3.90
Portugal	25.66	22.80
Spain	1.98	0.00
UK	0.00	0.00

Sources: La Porta *et al.* (2002) and Barth *et al.* (2006).

Table 5a

statistics	Banks	Branches	Banks/ Branches	Firms' size	GDP per capita	Population	Farmers	Area km2	Students
Austria									
N. regions	9	9	9	9	9.0	9	9	9	9
mean	93.6	594.0	0.17	8.66	22.7	896.8	3.07	9,318	186.42
min	34.0	244.5	0.12	7.23	15.2	276.3	1.80	415	106.83
max	153.0	1,202.2	0.25	11.66	32.4	1,598.7	6.63	19,173	377.35
sd	42.0	324.7	0.04	1.37	5.0	527.4	1.79	6,354	113.78
p25	68.6	364.8	0.14	7.53	19.7	511.3	1.80	3,966	106.83
p50	92.8	551.3	0.16	8.68	22.3	662.2	2.68	9,533	155.68
p75	118.4	707.3	0.18	9.10	24.2	1,379.8	3.97	12,648	273.32
Belgium									
N. regions	11	11	11	11	11	11	11	11	11
mean	10.3	567.0	0.02	5.74	21.3	925.7	2.62	2,774	237.50
min	0.0	111.5	0.00	4.44	14.5	243.3	0.40	161	68.04
max	71.4	1,130.0	0.12	7.34	45.2	1,636.5	7.52	4,440	391.53
sd	21.3	336.3	0.03	0.97	8.5	440.0	2.32	1,272	108.52
p25	0.2	154.0	0.00	4.79	16.1	438.5	0.70	2,106	120.55
p50	2.6	566.0	0.01	5.51	19.1	1,005.7	1.30	2,982	260.12
p75	7.0	858.0	0.01	6.75	22.3	1,283.2	4.35	3,786	333.95
Denmark									
N. regions	1	1	1	1	1	1	1	1	1
mean	193.8	2316.3	0.084	7.972	29.11	5280.2	48.3	43094	1258.43

Table 5b

statistics	Banks	Branches	Banks/ Branches	Firms' size	GDP per capita	Population	Farmers	Area km2	Students
Finland									
N. regions	5	5	5	5	5	5	5	5	5
mean	72.8	343.9	0.20	5.00	22.5	1,027.5	7.75	67,629	259.06
min	3.0	31.0	0.10	3.42	13.0	25.3	0.35	1,527	513.30
max	145.4	615.5	0.32	5.77	34.3	2,033.8	11.68	128,294	505.91
sd	55.5	246.7	0.09	1.10	8.8	860.5	4.63	46,361	226.65
p25	46.4	187.0	0.14	4.25	16.2	564.2	6.18	52,636	129.12
p50	60.0	325.7	0.18	5.77	20.7	698.0	9.92	70,294	163.55
p75	109.2	560.5	0.26	5.77	28.5	1,816.0	10.63	85,395	491.56
France									
N. regions	22	22	22	22	22	22	22	22	22
mean	45.0	1,150.9	0.02	5.87	19.4	2,657.2	15.85	24,726	655.63
min	4.2	360.0	0.01	2.53	15.8	260.8	1.85	8,280	54.32
max	607.6	4,433.0	0.14	7.90	33.1	11,012.3	39.28	45,348	2,857.53
sd	126.2	893.0	0.03	1.47	3.4	2,245.5	9.44	11,212	589.62
p25	8.6	613.0	0.01	4.91	17.8	1,421.0	7.48	16,202	348.23
p50	17.2	1,026.0	0.02	6.04	18.8	2,067.7	14.96	25,708	500.92
p75	27.8	1,359.0	0.02	6.95	19.6	2,895.3	19.77	31,582	724.79
Germany									
N. regions	16	16	16	16	16	16	16	16	16
mean	158.3	3,898.4	0.04	10.67	22.7	5,120.7	30.45	22,314	1,054.44
min	18.0	320.3	0.01	8.03	14.9	673.8	1.12	404	141.50
max	592.2	11,658.2	0.10	16.24	40.0	17,933.0	63.65	70,548	3,857.91
sd	181.9	3,750.4	0.02	2.01	6.9	4,732.3	20.09	18,687	1,005.85
p25	34.0	1,092.3	0.02	9.54	15.7	2,147.5	13.84	9,171	440.59
p50	62.8	1,931.0	0.04	10.28	21.8	3,090.6	34.89	20,147	629.91
p75	269.2	6,055.7	0.05	11.11	26.8	6,920.8	47.52	31,778	1,396.30

Table 5c

statistics	Banks	Branches	Banks/ Branches	Firms' size	GDP per capita	Population	Farmers	Area km2	Students
Greece									
N. regions	13	13	13	13	13	13	13	13	13
mean	4.6	n.a	n.a	13.68	9.7	807.4	7.31	10,125	151.38
min	0.0	n.a	n.a	5.50	6.9	184.3	1.45	2,307	30.51
max	45.0	n.a	n.a	23.58	12.3	3,455.7	17.15	18,811	739.62
sd	12.2	n.a	n.a	4.90	1.6	896.1	5.03	5,285	195.55
p25	0.8	n.a	n.a	11.11	8.4	302.7	2.80	5,286	62.39
p50	1.0	n.a	n.a	13.90	9.7	561.8	7.25	9,452	87.71
p75	2.0	n.a	n.a	16.29	10.4	735.3	10.67	14,158	121.57
Ireland									
N. regions	2	2	2	2	2	2	2	2	2
mean	41.2	n.a	n.a	12.76	18.7	1,840.8	12.27	35,143	493.40
min	0.0	n.a	n.a	12.02	15.2	964.5	7.83	26,527	255.77
max	82.4	n.a	n.a	13.50	22.2	2,717.2	16.70	43,758	731.02
sd	58.3	n.a	n.a	1.04	4.9	1,239.3	6.27	12,184	336.05
p25	0.0	n.a	n.a	12.02	15.2	964.5	7.83	26,527	255.77
p50	41.2	n.a	n.a	12.76	18.7	1,840.8	12.67	35,143	493.40
p75	82.4	n.a	n.a	13.50	22.2	2,717.2	16.70	43,758	731.02
Italy									
N. regions	20	20	20	20	20	20	20	20	20
mean	42.1	1,383.0	0.03	3.34	17.5	2,874.4	29.00	15,066	509.30
min	3.4	89.3	0.01	2.12	10.7	119.5	6.33	3,264	14.46
max	178.8	5,322.5	0.14	4.40	24.0	8,979.7	12.23	25,707	1,393.24
sd	43.8	1,265.2	0.03	0.65	4.6	2,317.1	33.40	7,412	420.26
p25	10.7	500.4	0.02	2.82	13.0	1,054.3	6.33	9,075	171.46
p50	29.2	885.1	0.03	3.36	18.3	1,863.8	12.23	14,344	370.67
p75	56.5	2,060.2	0.03	3.96	21.0	4,377.1	34.42	22,559	755.13

Table 5d

statistics	Banks	Branches	Banks/ Branches	Firms' size	GDP per capita	Population	Farmers	Area km2	Students
Netherland									
N. regions	12	12	12	12	12	12	12	12	12
mean	45.0	n.a	n.a	8.90	21.4	1,302.3	6.70	2,824	270.40
min	9.2	n.a	n.a	7.76	16.7	289.0	1.75	1,364	65.80
max	131.4	n.a	n.a	9.88	27.7	3,356.5	24.60	4,989	73.97
sd	36.2	n.a	n.a	0.73	3.6	988.5	6.58	1,190	212.86
p25	16.8	n.a	n.a	8.28	18.8	510.8	2.71	1,979	109.98
p50	39.8	n.a	n.a	8.97	19.8	1,073.7	4.08	2,656	201.39
p75	61.5	n.a	n.a	9.43	24.7	2,102.7	10.12	3,349	402.04
Portugal									
N. regions	7	7	7	7	7	7	7	7	7
mean	29.7	735.5	0.04	5.39	9.4	1,442.4	13.17	13,129	n.a
min	0.0	141.7	0.00	3.71	7.3	238.5	3.57	779	n.a
max	72.6	1,852.0	0.09	6.26	11.5	3,579.8	26.85	26,931	n.a
sd	27.0	718.2	0.03	0.86	1.4	1,528.6	9.86	10,838	n.a
p25	8.4	142.5	0.03	4.89	8.1	247.5	5.15	2,330	n.a
p50	22.8	300.0	0.03	5.59	9.8	480.5	7.28	11,931	n.a
p75	53.2	1,589.3	0.08	6.11	10.1	3,552.2	22.55	23,668	n.a
Spain									
N. regions	17	17	17	17	17	17	17	17	17
mean	22.1	2,260.9	0.01	4.42	13.2	2,309.7	24.62	29,692	520.69
min	1.0	415.7	0.00	3.37	8.4	261.5	2.52	5,014	52.74
max	171.2	7,199.8	0.04	5.71	17.6	7,140.7	155.62	94,193	1,787.13
sd	40.6	1,953.0	0.01	0.66	2.7	2,058.4	36.25	30,418	487.61
p25	4.0	990.0	0.00	3.87	11.1	1,066.3	4.10	7,261	212.31
p50	7.8	1,648.2	0.00	4.40	12.7	1,595.0	15.95	11,317	369.56
p75	18.8	2,924.2	0.01	4.99	15.9	2,715.0	25.88	41,602	563.01

Table 5e

statistics	Banks	Branches	Banks/ Branches	Firms' size	GDP per capita	Population	Farmers	Area km2	Students
United Kingdom									
N. regions	12	12	12	12	12	12	12	12	12
mean	37.9	1,252.9	0.02	10.66	19.4	4,920.1	26.03	20,318	1,290.44
min	4.8	321.8	0.01	9.32	15.9	1,677.2	3.47	1,584	458.23
max	315.8	3,019.2	0.10	12.50	29.5	7,955.3	47.83	78,132	2,042.43
sd	87.7	829.0	0.03	1.07	3.7	1,880.0	13.90	19,119	492.10
p25	8.2	578.2	0.01	9.65	17.1	3,542.3	17.98	13,582	935.99
p50	12.3	1,149.6	0.01	10.80	18.6	5,081.9	24.12	15,597	1,223.86
p75	17.1	1,505.1	0.02	11.52	20.3	6,113.9	39.56	19,944	1,696.82

Table 6**Observations in the cross-border analysis**

	Domestic regions (a)	Other countries' regions (b)	Observations (c=a*b)
Austria	9	138	1,242
Belgium	11	136	1,496
Danmark	1	146	146
Finland	5	142	710
France	22	125	2,750
Germany	16	131	2,096
Greece	13	134	1,742
Ireland	2	145	290
Italy	20	127	2,540
Netherlands	12	135	1,620
Portugal	7	140	980
Spain	17	130	2,210
UK	12	135	1,620
Total	147	1,764	19,442

Table 7
Determinants of number of banks at regional level

Negative Binomial model

Banks	Coef.	Robust Std. Err	z	P> z	[95% Conf. Interval]	
GDP per capita (log)	1.371	0.368	3.73	0.000	0.650	2.092
Population (log)	1.193	0.169	7.08	0.000	0.862	1.523
Firms' size (log)	-0.408	0.131	-3.12	0.002	-0.664	-0.151
Linguistic and cultural minorities	0.517	0.247	2.09	0.037	0.032	1.002
Farmers (log)	-0.236	0.152	-1.55	0.121	-0.534	0.062
Capital	0.756	0.391	1.93	0.053	-0.010	1.522
Students/Population	0.614	0.456	1.35	0.178	-0.279	1.507
Official supervisory power	-0.222	0.104	-2.13	0.033	-0.427	-0.017
Government-owned banks '95	0.003	0.012	0.26	0.796	-0.020	0.027
constant	-6.753	1.096	-6.16	0.000	-8.900	-4.606
country dummies						
/lnalpha	-1.512	0.228			-1.959	-1.065
alpha	0.220	0.050			0.141	0.345

Number of observations 140
 Log likelihood -513.045
 Number of clusters (country) 12

Log-linear model

Coef.	Robust Std. Err	t	P> t	[95% Conf. Interval]	
1.174	0.378	3.11	0.010	0.342	2.006
1.267	0.169	7.51	0.000	0.896	1.638
-0.564	0.145	-3.88	0.003	-0.883	-0.244
0.410	0.213	1.93	0.080	-0.058	0.878
-0.316	0.145	-2.17	0.052	-0.636	0.004
0.427	0.479	0.89	0.392	-0.628	1.481
0.572	0.497	1.15	0.274	-0.521	1.666
-0.113	0.102	-1.11	0.290	-0.337	0.111
-0.004	0.012	-0.34	0.743	-0.030	0.022
-6.664	1.459	-4.57	0.001	-9.876	-3.452
R-squared					0.885
Root MSE					0.592

Number of observations 140
 Log likelihood -
 Number of clusters (country) 12

Table 8

Determinants of number of branches at regional level

Negative Binomial model

Branches	Coef.	Robust Std. Err	z	P> z	[95% Conf. Interval]	
GDP per capita (log)	0.696	0.179	3.90	0.000	0.346	1.046
Population (log)	0.953	0.063	15.08	0.000	0.829	1.077
Firms' size (log)	-0.275	0.127	-2.17	0.030	-0.524	-0.027
Linguistic and cultural minorities	0.023	0.067	0.34	0.734	-0.108	0.153
Farmers (log)	-0.017	0.074	-0.24	0.814	-0.162	0.127
Capital	-0.252	0.099	-2.54	0.011	-0.447	-0.057
Students/Population	-4.735	0.686	-6.90	0.000	-6.081	-3.390
Official supervisory power	0.064	0.020	3.14	0.002	0.024	0.104
Government-owned banks '95	-0.002	0.006	-0.41	0.678	-0.014	0.009
constant	-1.304	0.601	-2.17	0.030	-2.483	-0.126
country dummies						
/lnalpha	-2.711	0.227			-3.157	-2.266
alpha	0.066	0.015			0.043	0.104

Number of observations 113
 Log likelihood -788.625
 Number of clusters (country) 9

Log-linear model

Coef.	Robust Std. Err	t	P> t	[95% Conf. Interval]	
0.607	0.217	2.79	0.023	0.106	1.108
0.952	0.077	12.42	0.000	0.775	1.129
-0.142	0.164	-0.86	0.414	-0.521	0.237
0.038	0.073	0.53	0.613	-0.130	0.207
-0.009	0.088	-0.10	0.921	-0.213	0.195
-0.250	0.098	-2.56	0.034	-0.476	-0.024
-4.366	1.359	-3.21	0.012	-7.500	-1.231
0.053	0.026	2.05	0.075	-0.007	0.112
-0.002	0.006	-0.29	0.779	-0.016	0.012
-1.298	0.714	-1.82	0.107	-2.944	0.348
R-squared					0.927
Root MSE					0.297

Number of observations 113
 Log likelihood -
 Number of clusters (country) 9

Table 9

Determinants of ratio (banks/branches) at regional level

Used model: fractional logit

Generalized linear models

Optimization : ML: Newton-Raphson

Variance function: $V(u) = u*(1-u)$ [Bernoulli]

Link function : $g(u) = \ln(u/(1-u))$ [Logit]

Standard errors : Modified Sandwich

Ratio	Coef.	Robust Std. Err	z	P> z	[95% Conf. Interval]	
GDP per capita (log)	0.679	0.290	2.34	0.019	0.110	1.248
Population (log)	0.590	0.236	2.51	0.012	0.129	1.052
Firms' size (log)	-0.685	0.335	-2.05	0.040	-1.341	-0.030
Linguistic and cultural minorities	0.664	0.192	3.45	0.001	0.287	1.040
Farmers (log)	-0.544	0.174	-3.12	0.002	-0.886	-0.202
Capital	-0.365	0.343	-1.06	0.287	-1.036	0.307
Students/Population	13.186	3.856	3.42	0.001	5.629	20.743
Official supervisory power	-0.081	0.031	-2.62	0.009	-0.142	-0.021
Government-owned banks '95	0.020	0.009	2.28	0.022	0.003	0.037
constant	-8.435	1.131	-7.46	0.000	-10.651	-6.219
country dummies						
Number of observations.....	113			BIC.....	0.515	
Log likelihood	-13.075			AIC.....	-457.485	
Residual df.....	97			Pearson.....	1.164	

Table 10

Determinants of the number of foreign banks at regional level

Reference region	Regressors	Coef.	Robust Std. Err	z	P> z	[95% Conf. Interval]	
host	country dummies						
	Population (log)	0.118	0.233	0.51	0.613	-0.338	0.573
	GDP per capita (log)	3.636	0.899	4.05	0.000	1.874	5.398
	Capital	-0.463	0.368	-1.26	0.209	-1.184	0.258
	Government-owned banks '95	-0.057	0.014	-4.13	0.000	-0.083	-0.030
home	country dummies						
	GDP per capita (log)	3.763	0.612	6.15	0.000	2.564	4.963
inter-countries	Trade (log)	0.569	0.256	2.22	0.026	0.067	1.070
	Common language	-0.276	0.333	-0.83	0.407	-0.929	0.377
	Common border countries	-0.098	0.281	-0.35	0.729	-0.649	0.454
	Common border regions	-0.056	0.405	-0.14	0.890	-0.851	0.738
	constant	-28.385	4.078	-6.96	0.000	-36.378	-20.393

inflate

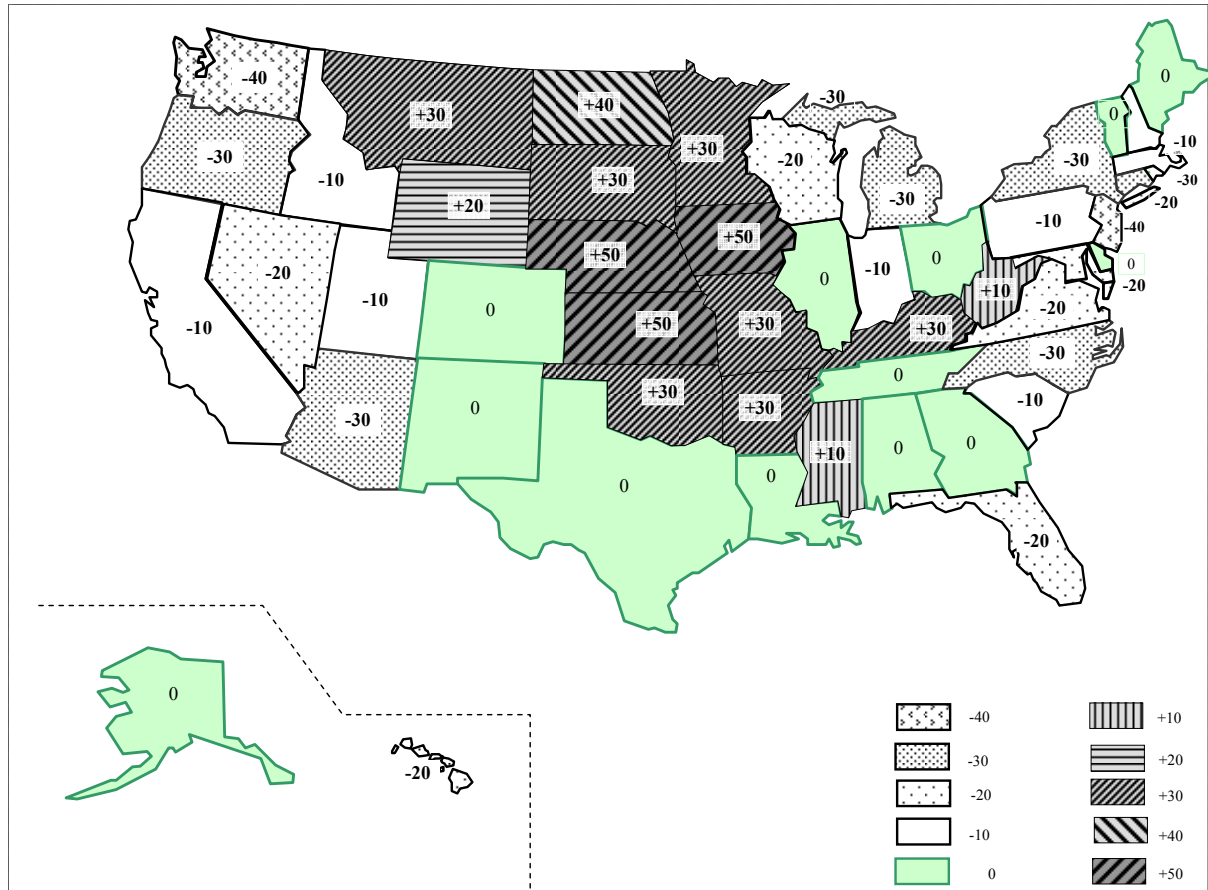
host	country dummies						
	Firms' size (log)	-1.829	1.179	-1.55	0.121	-4.140	0.483
	Population (log)	-2.402	0.472	-5.09	0.000	-3.328	-1.476
	GDP per capita (log)	-1.195	1.337	-0.89	0.371	-3.815	1.425
	Capital	-1.894	0.558	-3.39	0.001	-2.987	-0.800
	Farmers (log)	0.697	0.277	2.51	0.012	0.153	1.241
	Students/population	-1.075	2.586	-0.42	0.677	-6.143	3.992
	Official supervisory power	-0.169	0.188	-0.90	0.369	-0.538	0.200
home	country dummies						
	GDP per capita (log)	-4.030	0.917	-4.39	0.000	-5.827	-2.233
inter-countries	Trust inter countries	-0.549	0.943	-0.58	0.560	-2.398	1.300
	Common language	-0.906	0.597	-1.52	0.129	-2.077	0.265
	Common border countries	-0.692	0.428	-1.61	0.106	-1.531	0.148
	Common border regions	-8.069	1.390	-5.81	0.000	-10.793	-5.345
	constant	45.856	6.691	6.85	0.000	32.741	58.970

Number of obs..... 18462
 Nonzero obs..... 212
 Zero obs 18250
 Inflation model = logit
 LR chi2(32)
 Log likelihood -788.253
 Prob > chi2 0.000

Does banks' distribution reflect population and income levels?

Figure 1

United States of America



Differences between the decile rankings of a region in the distribution of the number of banks and the decile ranking of the same region in the distribution of a summary measure of population and GDP. Regions with positive value have a relatively larger number of banks, once population and regional GDP are taken into account.

Figure 2

European Union 15

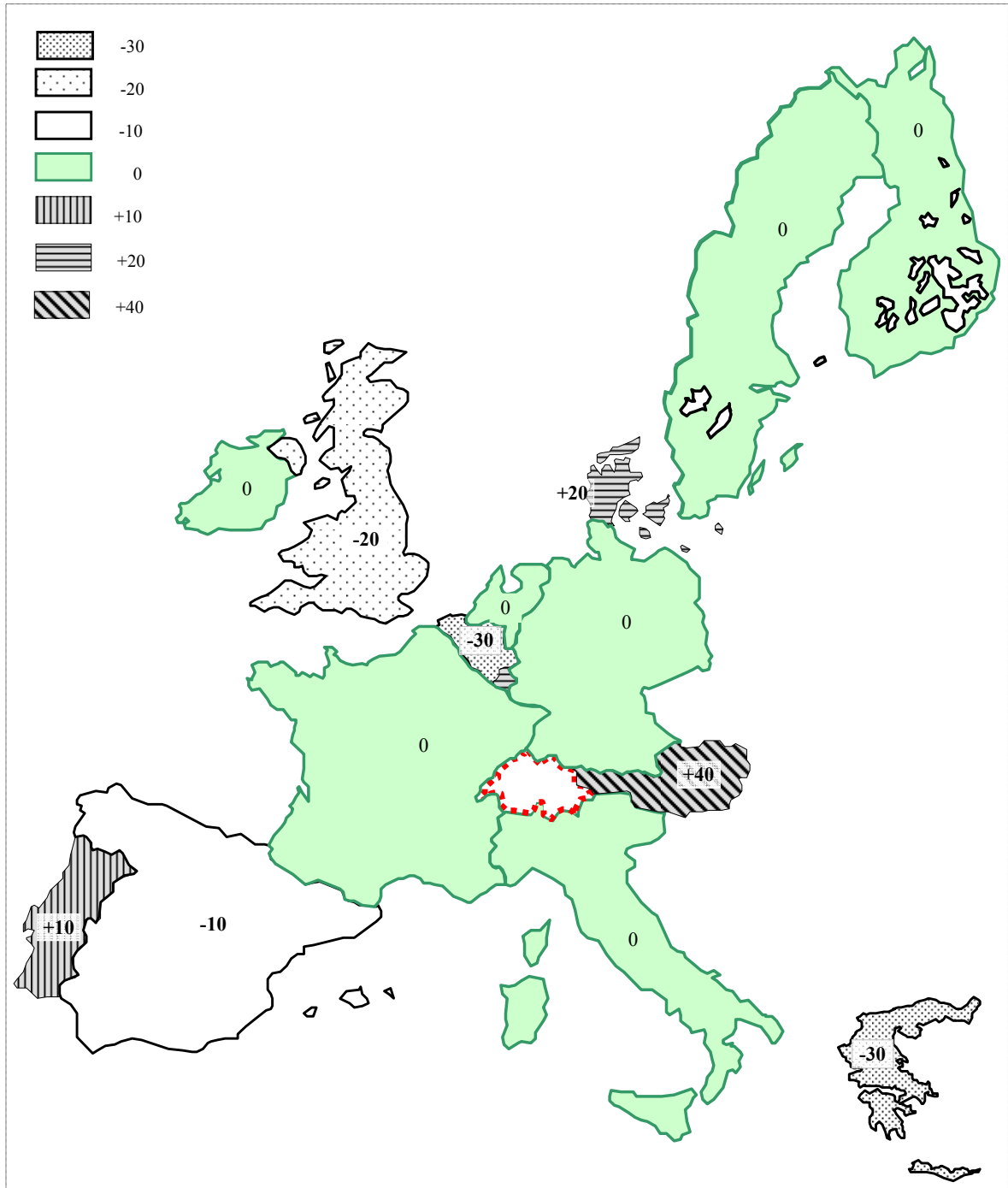


Figure 3

Germany

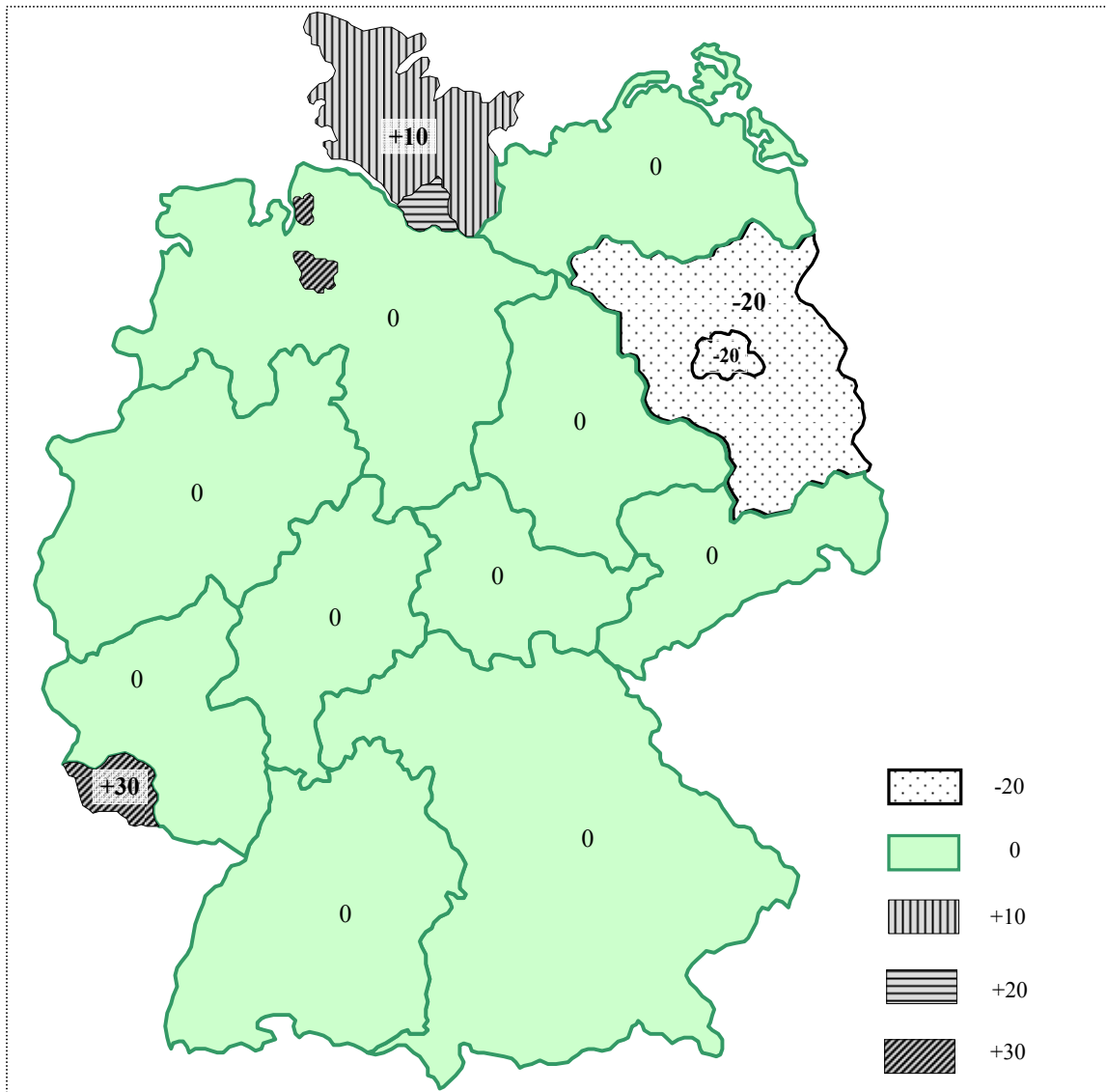


Figure 4

France

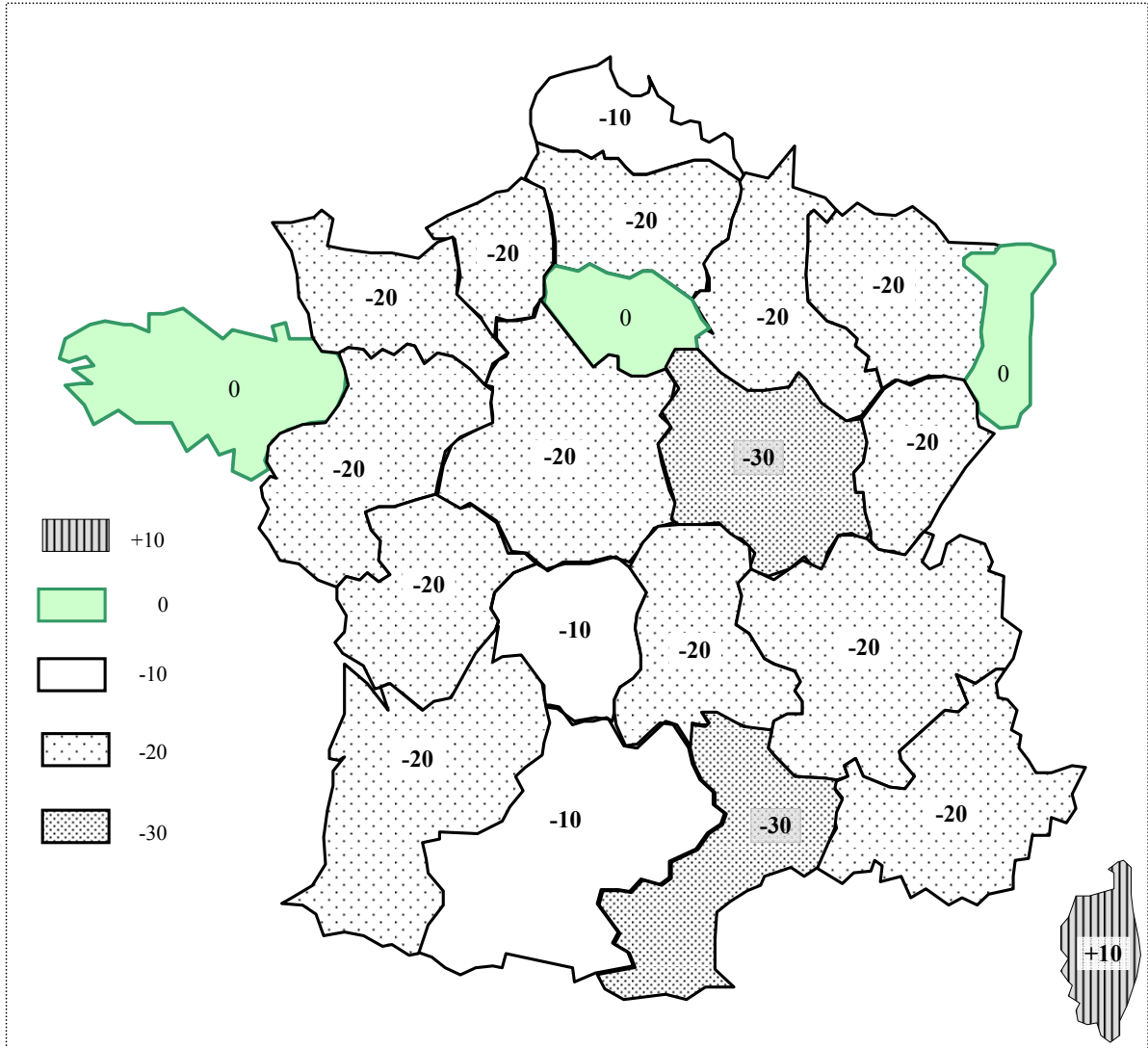


Figure 5

United Kingdom

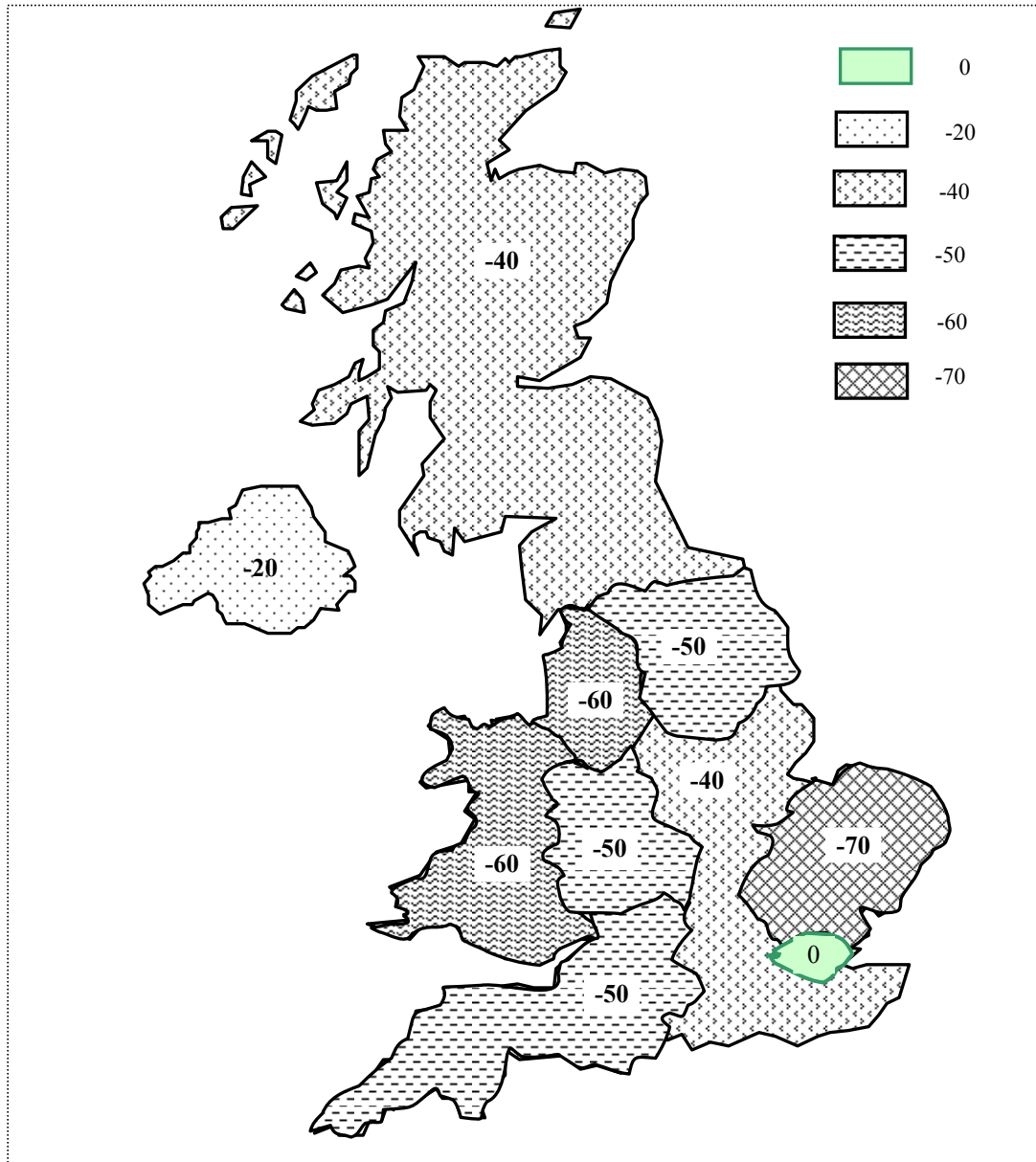


Figure 6

Italy

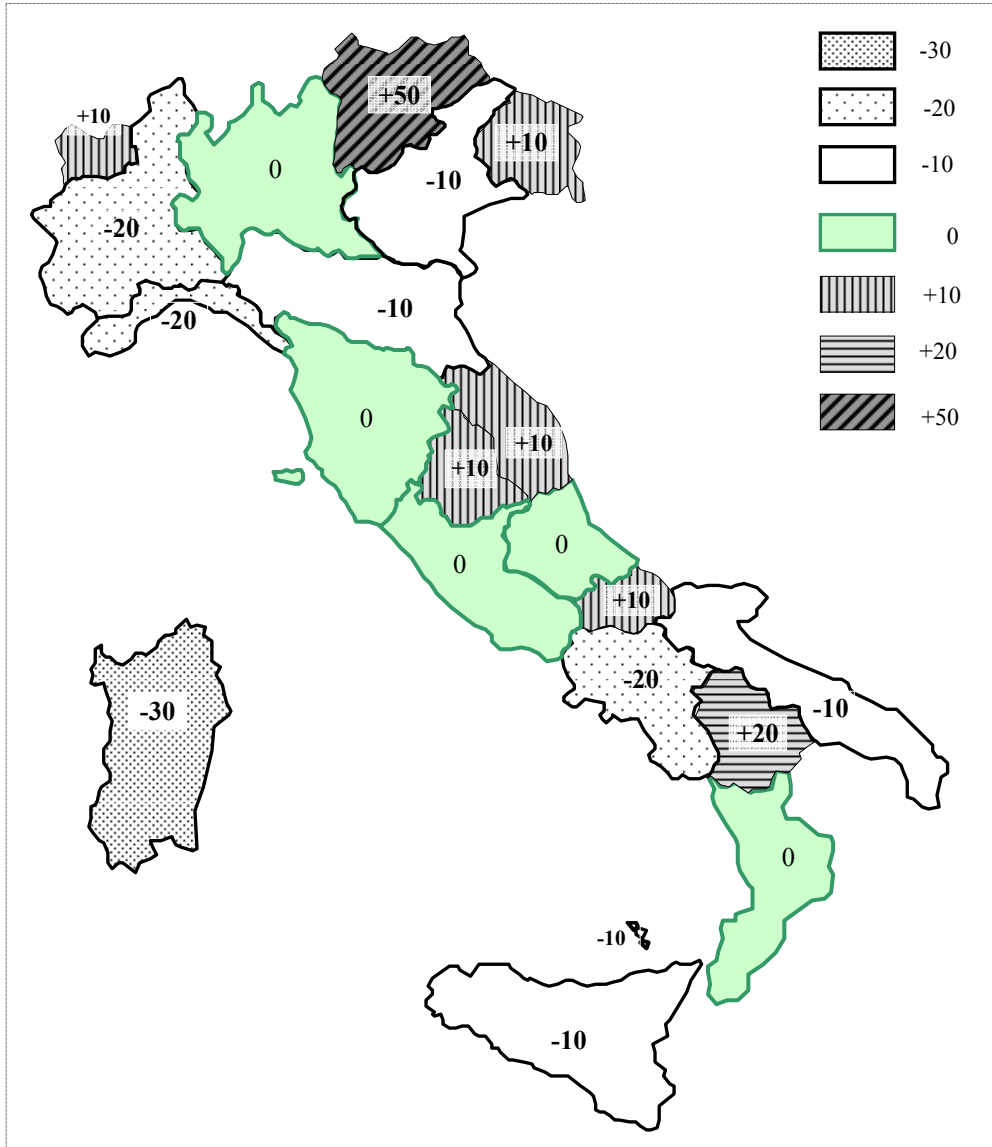


Figure 7

Spain

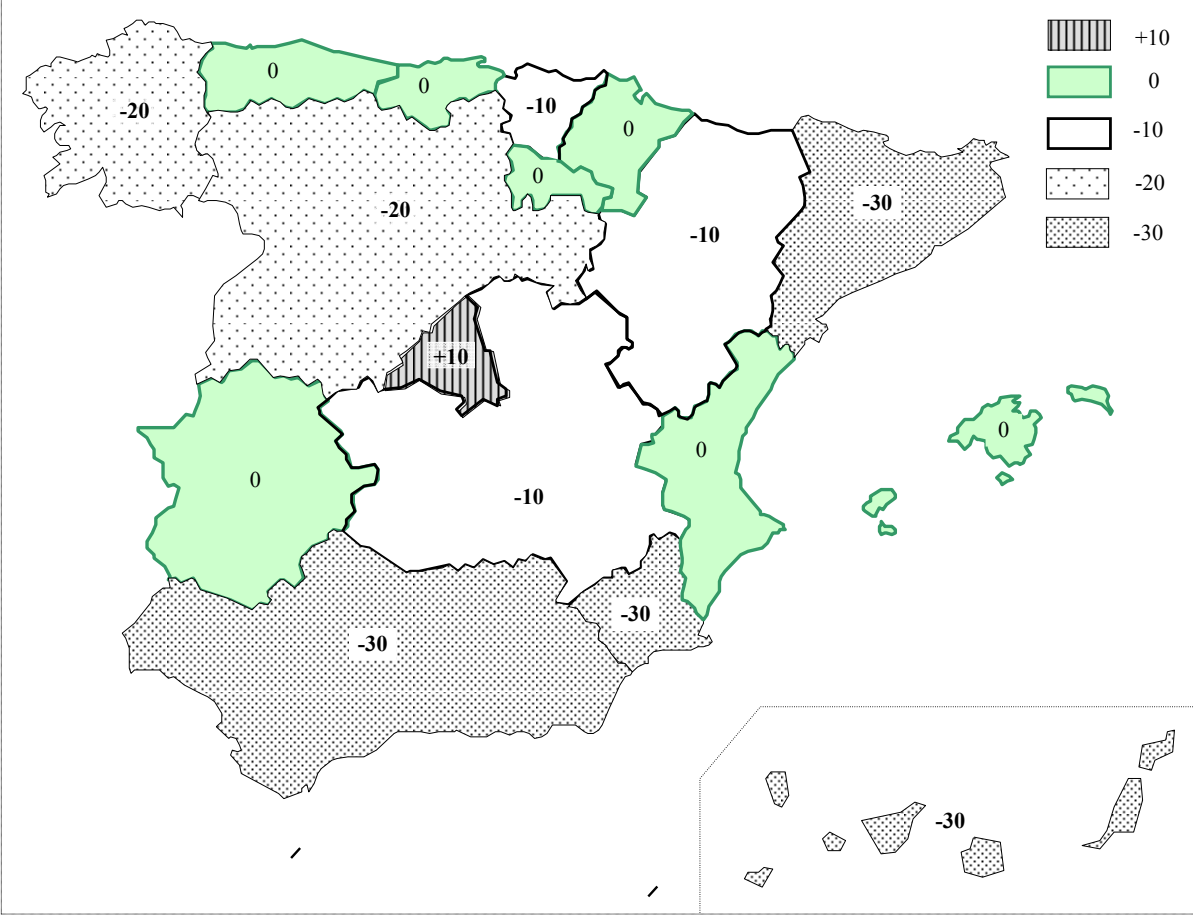


Figure 8
Residuals for each European region
(from a log-linear regression of log-number of banks on relevant regressors)

