ÖSTERREICHISCHES INSTITUT
FÜR WIRTSCHAFTSFORSCHUNG

WORKING PAPERS

Geography, Institutions and Principles

Bits and Pieces of Empirical Evidence from Small-scale Banking

Franz R. Hahn

392/2011

Geography, Institutions and Principles

Bits and Pieces of Empirical Evidence from Small-scale Banking

Franz R. Hahn

WIFO Working Papers, No. 392
April 2011

E-mail address: Franz.Hahn@wifo.ac.at

2011/070/W/0

Medieninhaber (Verleger), Hersteller: Österreichisches Institut für Wirtschaftsforschung • 1030 Wien, Arsenal, Objekt 20 • Tel. (43 1) 798 26 01-0 • Fax (43 1) 798 93 86 • http://www.wifo.ac.at/ • Verlags- und Herstellungsort: Wien

Geography, Institutions and Principles

Bits and Pieces of Empirical Evidence from Small-scale Banking

Franz R. Hahn*)

Austrian Institute of
Economic Research
Arsenal, Object 20
1030 Vienna
Austria

Franz.Hahn@wifo.ac.at

Abstract

Theory suggests that cross-border bank lending flow from rich countries to poor countries is facilitated when lending-related legal and social norms are shared and valued equally by both lenders and borrowers. According to this reasoning the fast adoption of Western-style democracy and market economy principles as established by European Union (EU) standards by many of the East European 'transformation countries' since the early 1990s should have raised cross-border lending by banks based in 'old' EU member states to clients resident in new East European EU member states. Exploring cross-border lending activities of Austrian small- to medium-sized regional banks over the period from 1995 to 2008 with panel and spatial econometric techniques this paper provides evidence that is supportive of this presumption.

JEL classification: C23, E51, F33, N20

Keywords: panel econometric analysis, spatial econometric analysis, cross-border bank lending, institutions, neoclassical economics

*) I am very grateful to Christa Magerl for excellent research assistance on this and related projects. Research support from the Anniversary Fund of the Oesterreichische Nationalbank (Project Nr. 13382) is gratefully acknowledged. The usual disclaimer applies.

Geography, Institutions and Principles

Bits and Pieces of Empirical Evidence from Small-scale Banking

1. Introduction

The discrepancy between theory-based predictions and observation-based patterns of international capital flows has been marked as one of the major failings of economic theory (*Lucas*, 1990). According to the law of diminishing marginal returns, economic theory predicts that capital is supposed to flow from capital-rich countries to capital-poor countries. However, in the real world (at least presently) what instead we do observe is a rich-rich affair in international finance. Capital moves lavishly within the OECD region, but only barely between OECD countries and developing countries. Historically, this wasn't always so. During the 'first age' of globalization, from 1870 to World War One (WWI), global capital mobility is said to have been more in line with economic theory than during the 'second age', a century later. As elaborately laid out in *Obstfeld – Taylor* (2005), in the period prior to WWI many peripheral capital-poor countries, above all the New World offshoots of Western Europe, enjoyed a rich and constant inflow of capital supplied exclusively by the then capital rich West European Great Powers (that is, the then highly developed economies with low marginal product of capital).

Reasons, why theory did work then but does not work now, are plenty but the most telling ones are provided by new institutional economics (NIE). Due to this school of thought economic principles linked to international capital transactions only work if poor peripheral countries share (or converge to) the very social and legal norms that are determinant for rich core countries (i.e., strong protection of property rights). This view has forcefully been forwarded more recently, among others, by economic historians such as N. Ferguson (*Ferguson*, 2003) and by theoretical economists such as D. Acemoglu (*Acemoglu*, 2009; *Acemoglu et al.*, 2002), respectively. The former provide evidence that many of the capital-attracting periphery countries in the late 19th century were imperial outposts of the rich European core countries and, thus, shared with them the same legal norms and business culture. The latter authors argue that the early European settlers immigrating to the then sparsely populated, low-developed regions of the Americas and Australia in days of old brought with them institutions of governance that strongly protected property rights thereby laying the groundwork for long-run economic growth in these 'remote regions'. Growth that still keeps unfolding.

With the fall of the 'Iron Curtain' in the late 1980s and the swift convergence of former communist command economies to full-fledged market economies (Westernization of Eastern Europe) history has now provided new institutional economists with another rare and historically unique opportunity to put NIE core propositions to the test within the frame of a natural experiment (that still is evolving for our very eyes). Viewed from the perspective of highly developed countries such as Austria, a further piece of intriguing geographical economics (and politics) also comes into play. For example, Austria shares not only almost two thirds of its border with former command economies (Czech Republic, Slovak Republic, Hungary, and Slovenia) but also the heritage of a common cultural and political past (until 1918, the Habsburg Empire reached far East for centuries).

In this paper we make an attempt to apply the NIE-based approach to explore one of the core questions in international banking, namely, to what extent geography and institutions matter as prime mover of cross-border bank lending. Theory suggests that bank lending is facilitated, among other things, by low information and transactions costs (see, for example, *Freixas – Rochet*, 2008). That is, if information and transaction costs are high lending tends to be low and vice versa. Importantly, information and transactions costs, again among other things, tend to be low when lending-related legal and social norms are strong and, above all, are shared and valued equally by both lenders and borrowers. The latter particularly applies to cross-border bank lending. For example, differences in judiciary between countries are considered to be one of the major obstacles for cross-border banking activities since lack of familiarity with the respective foreign legal order may easily translate into high information and transaction costs all too soon. Further, differences in judiciary among countries tend to be larger (smaller) the smaller (larger) is 'geographical proximity' among them. Hence, the fast adoption of Western-style democracy and market economy principles as established by European Union (EU) standards by many of the East European 'transformation countries' since the early 1990s should have left perceivable footprints in the balance sheets of West-European banks in the form of soaring lending ties with borrowers resident in the respective East European countries[1]).

[1]) Both casual observation and profound analysis confirm that a broad and constant flow of West European capital has been pouring into this region ever since the change of regime in 1989 (see, for example, *Prasad et al.*, 2006).

Even though transaction and information costs play a role in all forms of capital movements, they are most decisive in facilitating cross-border bank lending. Borrowers living and working in their home country have the decisive advantage over their cross-border lenders in that they operate in a social and legal environment they are most likely more familiar with than the lenders, and, most importantly, in case of legal dispute they are most likely provided with an often hardly catchable edge on their lenders. However, this borrowers' advantage tapers off the smaller is the gap between the lenders' and the borrowers' legal and social environment and the stronger is the mutual recognition of both cross-border lenders' and borrowers' rights and duties in the respective judiciaries. Again, this institutional and legal gap may be smaller between neighboring countries than between countries that are separated by continents. Thus, banks are of course more inclined to provide cross-border loans when they are close to their clienteles and the environmental and/or institutional gap on their customers is sufficiently small or negligible. The latter has apparently occurred, in the recent past, between the European Union and many Eastern European countries in general, and between Austria and its neighboring countries to the east, in particular.

The paper is organized as follows: In the next section we present stylized facts featuring the impact of pro-EU convergence of Eastern European countries on the development of cross-border lending of Austrian small- to medium-sized banks over the period from 1995 to 2008. Section 3 carries out detailed panel and spatial econometric analyses that are aimed at underlining, at the multivariate level, the importance of common culture (geographical proximity) and common institutions (legal proximity) for making laws of economics work. To be exact, we use a unique dataset covering more than 500 Austrian small- to medium-sized commercial banks to analyze the impact of EU-centered, institutional convergence of Austria's eastern neighboring countries on the cross-border lending activities of these banks from 1995 to 2008. Section 4 concludes.

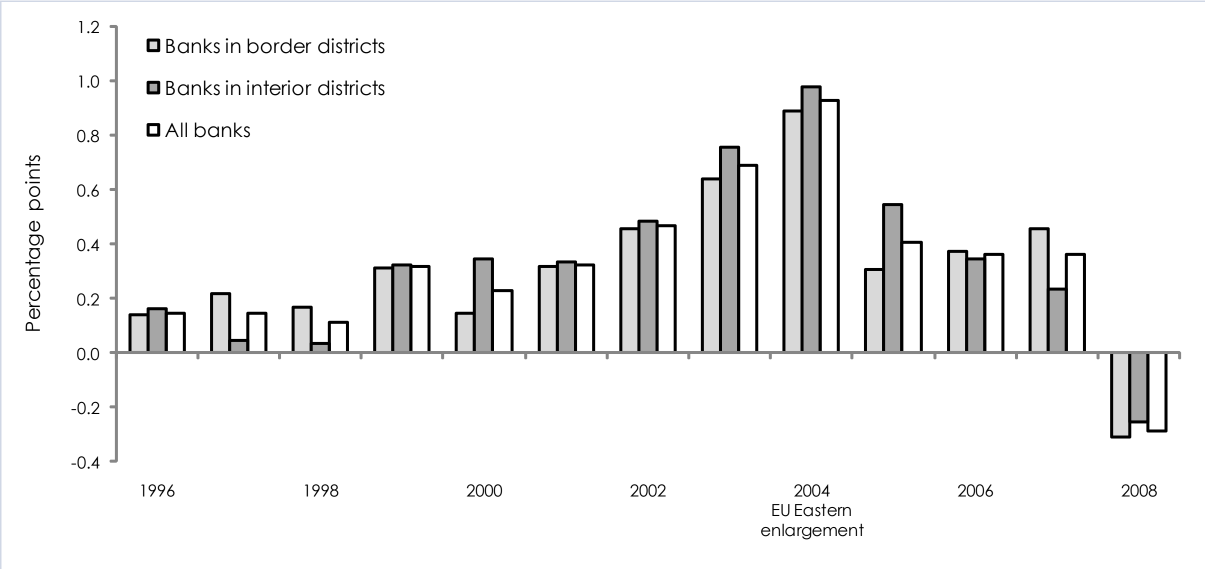
2. Stylized Facts: Cross-border Bank Lending, Geography and Institutional Convergence

The process of EU eastern enlargement began with the start of the accession negotiations between the European Union and a group of 10 European states, including the Czech Republic, Slovak Republic, Hungary, and Slovenia in 1999[2]). These four East European countries share borders with Austria and used to belong to

[2]) It is worth mentioning that the common currency Euro as book money was also introduced in this very year.

the Habsburg Empire until 1918 for centuries. In 2003, the EU accession negotiations were successfully closed and all four countries became EU member countries in 2004.

Figure 1: Cross-border Lending of Austrian Commercial Banks per District
Foreign assets as percent of total assets, annual changes

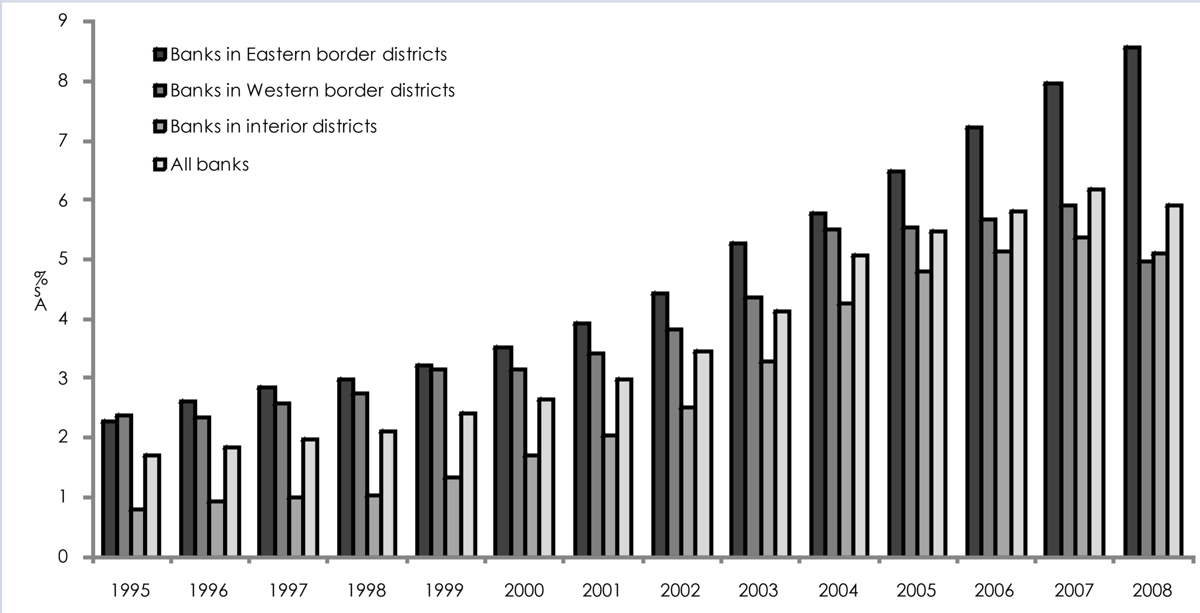


Source: WIFO bank-panel dataset.

Figure 1 displays the development of cross-border lending of 543 small- to medium-sized Austrian commercial banks assigned to their home districts from 1995 to 2008. A glance at the graph suggests that cross-border lending activities of all Austrian banks considered accelerated significantly in 1999 (start of the EU accession talks of Austria's eastern neighbors), picked up further momentum around 2004 (Austria's eastern neighbors getting full EU membership status) and then leveled off somewhat on average, but not so with those banks located and operating in the eastern border districts. Of course, the year 2008 marks the onset of the global financial crisis with sharply declining cross-border lending transactions altogether.

Figure 2 opens up somewhat refined vistas on the regionally differing pattern of cross-border lending activities, over time, of the respective Austrian banks. Though credit institutions located in Austria's western and eastern border districts started out with about the same level of cross-border activities in 1995, dynamics set about diverging in 1999 with banks in the Eastern region shooting ahead and gaining even more momentum after 2004. By contrast, banks in western regions instead have steadily slowed down their foreign lending activities since the de jure implementation of the eastern EU enlargement.

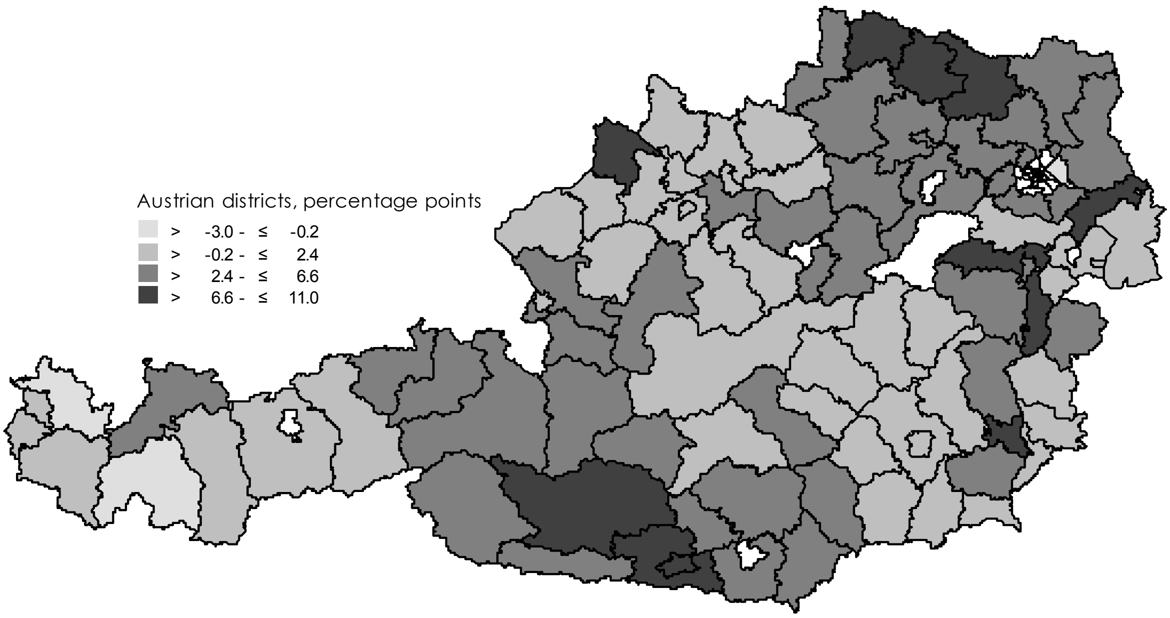
Figure 2: Cross-border Lending of Austrian Commercial Banks per Border District
Foreign assets as percent of total assets



Source: WIFO bank-panel dataset.

A third piece of stylized evidence is provided in Figure 3. Even though we slightly change time windows in this graph it nevertheless becomes evident that it is the eastern region of Austria, particularly those districts close to the state border, where the hot spots in terms of cross-border bank lending activities have been from about 2000 onwards.

Figure 3: Cross-border Lending of Austrian Commercial Banks per District
Foreign assets as percent of total assets (average of banks per district), differences in mean for 1995 through 2001 and 2002 through 2008, respectively



Source: WIFO bank-panel dataset.

3. Econometric Analysis and Findings

3.1 Data and Variables

To check the proposed hypothesis we use a sample consisting of a balanced panel of annual report data of 543 Austrian banks (unfortunately, access to quarterly or monthly data was not made possible). The bank data were extracted from non-consolidated income statement and balance sheet data ranging over 1995 to 2008. The data have been deflated by the GDP deflator, 2005=100, and adjusted for inconsistent data-related outliers, respectively[3]). The dataset is unique in the sense that it provides almost full coverage of the Austrian regional banking at the individual bank level. We will use this specific balanced dataset for all empirical tests conducted in this paper.

[3]) Since we were granted access to the balance sheet and income statement of all Austrian banks, we subjected the reported data at the company level to simple accounting-based consistency checks. If a bank failed this test (i.e., due to incomplete or inconsistent data reporting), it was excluded from the analysis. In order to check for remaining outliers, we consistently apply estimation techniques which are sensitive to outliers.

The choice of a balanced data set entails the advantage that the empirical analysis is not aggravated by cumbersome sample selection issues which might be somewhat subtle, particularly in our case. However, the balanced data set used may generate a selection bias on its own since it has not been adjusted for bank mergers. That is, the data set does not cover both banks not taken over by another bank and banks having taken over other domestic banks since 1995, respectively. Since the majority of the bank mergers in Austria took place among small banks we do not expect a serious selection bias due to severe changes of market behavior of these banks as reflected in changes of business mix and business conduct. What we do expect, however, is a selection bias due to the strong leaning of balanced samples not adjusted for mergers towards overstating well performing firms (i. e., survivor effect)[4]). Further, the data set does not include the largest Austrian banks with a strong foothold in Eastern Europe in the form of subsidiary companies. However, the exclusion of the large Austrian banks from analysis does not lessen the scope of the findings drawn from our data set since these banks, all of which all-finance groups, have not been engaged so much in cross-border lending but rather in providing financial services on site by setting up operating local units (that is, foreign subsidiaries or foreign branches).

In order to evaluate the differences in cross-border lending among various regional banks we classify the overall data set according to three regional sub-areas. That is, districts that are home to regional banks located along the border to the Czech Republic, Slovak Republic, Hungary, and Slovenia are pooled to a homogenous regional entity. Districts that are home to regional banks located along the border to Italy, Liechtenstein, Switzerland, and Germany are grouped likewise. Interior districts, that is, districts whose borders are not part of the state line of Austria, form then the remaining regional area. These geographical entities are represented by the time-invariant, binary variable $GREE$ (eastern border districts), $GREG$ (western border districts), and $BIRG$ (interior districts), respectively[5]).

Legal and institutional convergence of East-European countries to EU-standards is captured by two binary time-variant variables. The dummy variable $EURO$ captures the period since the begin of the EU accession negotiations of 10 EU-membership aspirants including the Czech Republic, Slovak Republic, Hungary, and Slovenia, in 1999 and the variable HUV marks the period since 2004 when these very countries have finally acquired the status of a full EU member.

[4]) Descriptive statistics of the used balanced panel of Austrian banks are made available on request.

[5]) In the econometric analysis to come, only the time-invariant, binary variable $GREE$ is explicitly used.

The most valuable feature of the balanced design of the data set is that it allows for the construction of a spatial contiguity matrix capturing the connectiveness between the regional banks under study. In so doing, we define bank j to be close or a neighbor to bank i if the two banks either share the same home district or headquarter in districts that share a common border line. If both bank j and bank i meet this requirement element $w_{i,j}$ of the 543×543 - contiguity matrix W is set equal to one. If two banks under consideration miss this requirement we set $w_{i,j} = 0$. By convention the main diagonal of W has only zeros, that is $w_{i,i} = 0$, and the non-diagonal elements $w_{i,j}$ are transformed such that W has row-sums of unity. Standardizing contiguity matrix W that way allows for the convenience of creating new variables that feature the mean of observations from contiguous banks (this follows from multiplying matrix W by a dimension-adequate vector of interest y).

As to the bank-level variables used in this investigation, the variable to be explained is the degree of foreign lending activities of an individual bank. Thus, the left-hand-side variable in our regression analyses is defined by the ratio "foreign assets divided by total assets" at the bank level, denoted $AAQ_{i,t}$, with $i = 1,2,...,543$ and $t = 1995,1996,...,2008$, respectively[6]). Depicting international bank lending based on this ratio has been predetermined by the fact that foreign lending activities of the banks investigated have only been made available to us in the given portmanteau form[7]).

To control for individual bank size, which is frequently associated with a bank's inclination to become international, we use total assets $SPAS_{i,t}$, measuring the $i-th$ bank's total assets at time t (idiosyncratic variables in this study enter into the respective econometric models in log transformation; ditto for $SPAS_{i,t}$).

The ratio of bank lending over deposits, represented by $LDR_{i,t}$, reflects the degree to which a bank provides financial intermediation. We assume that banks with high intermediation power (that is, banks with high LDR-values) be more likely to engage in cross-border lending than banks with low intermediation performance.

---

[6]) Since this ratio is bounded by zero and one we converted the dependent variable into an unbounded variable via logit transformation. Yet sensitivity tests indicate that regression findings remain unaffected by this transformation.

[7]) Due to legal data protection requirements Austrian Central Bank (OeNB) is only eligible to provide access to foreign lending data at the bank level when wrapped up in the sum of all foreign activities on the asset side. However, informal information provided by both bank managers and bank supervisory experts ensures us that the ratio of foreign assets over total assets at the bank level follows very closely the dynamics of foreign bank lending over total assets at the bank level. This particularly applies to the regionally operating banks that are at the center of this analysis.

Control variable $EKQ_{i,t}$ is designed to capture the influence of bank capital on a bank's desire to engage in international activities. The consideration of bank capital as measured by core bank capital over total bank assets is motivated by the presumption that both capital-rich banks and capital-poor banks have their reasons to promote cross-border operations[8]). The former, because well-capitalized banks are assumed to be capable of coping with the assumed higher risks in the foreign markets and, in so doing, to be rewarded with handsome profits. The latter, because undercapitalized banks may have an extra-strong incentive of playing in (riskier) foreign markets with the aim to improve the odds of raising capital (by reaping and retaining the 'wished-for-extra-profit').

The quality of a bank's personnel may also be a driving factor behind the tendency to lend cross-border. In the following, the skills level of a bank's employees, denoted $PM_{i,t}$, is represented by staff costs per employee. The presumption is that staff costs per head and professional skills level are positively related.

As a measure of management efficiency we use the traditional cost-income ratio, denoted $CIR_{i,t}$ [9]). The reading of this indicator is that lower values signal that bank management does a good job et vice versa. Thus, if good bank management affects cross-border lending positively (negatively) then this variable is to enter into the regressions equations with a negative (positive) sign.

For further data details, we refer the reader to the Appendix.

3.2 Models and Tests

The base model used to check if institutional and legal convergence of Austria's eastern neighboring countries towards EU standards has had an impact on the dynamics of cross-border lending activities of Austrian regional banks has the following structure:

$$(1)\qquad AAQ_{i,t} = b_0 + b_1\, CONV_t + \sum_{j=2}^{r} b_j Z_{ij,t} + \nu_t + \eta_i + \varepsilon_{i,t}\,,$$

8) We relate core capital to total assets rather than to risk-weighted assets, as suggested by the Basel Accords, since data on the latter have not been available for all regional banks under study.

9) *Hahn* (2009) uses, as a gauge of management performance, three measures of efficiency: X-efficiency $(XEFF)$, scale efficiency $(SEFF)$, and scale elasticity $(SCALE)$, all of which are computed by methods of Data Envelopment Analysis (DEA). Unfortunately, on the basis of the bank data set used in this study DEA-based efficiency scores fall short of expectations. To be specific, the powers of these indicators as to explaining longitudinal and cross-sectional variation of cross-border lending at the bank level fail to be statistically effective.

where $CONV$ represents those variables (either $EURO$ and HUV or $GREE$, or interactions between the former and the latter, respectively) that reflect legal and institutional convergence towards EU standards. Terms Z_{ij} stand for the logarithm of control variable $SPAS$, LDR, EKQ, PM, and CIR, respectively. Terms v_t and η_i measure unobserved time-specific and bank-specific effects, with time period $t = 1995,...,2008$ and banks $i = 1,2,....,543$, and $\varepsilon_{i,t}$ is the classical disturbance term with $E[\varepsilon_{it}] = 0$ and $Var[\varepsilon_{it}] = \sigma_\varepsilon^2$, respectively.

Methodologically, we basically use two panel-econometric techniques: (a) the standard two-way error component model (that is, the static fixed effects and static random effects estimator), and (b) the dynamic panel General Method of Moments (GMM) two-step system estimator introduced by *Arellano – Bond* (1991), *Arellano – Bover* (1995), and *Blundell – Bond* (1998), respectively. Since the estimators applied are supposed to be sensitive to potential outliers, we used the robust variance estimator of *White* (1980) in the static estimation approach, and the robust variance estimator of *Windmeijer* (2005) in the dynamic system estimation approach.

Although the static, fixed effects model captures a specific endogeneity problem caused by the presence of time-constant omitted variables, the GMM-based estimator can be used for controlling for a rather general form of joint endogeneity when equation (1) is given a dynamic structure. To be specific, the GMM system estimator is capable of controlling for potential consistency losses due to simultaneity (that is, explanatory variables are simultaneously determined with the dependent variable) and/or two-way causality between the explanatory variables and the dependent variable, respectively.

As specification tests for the GMM system estimator, we apply a Sargan test of over-identifying restrictions and a test of lack of residual serial correlation. The former examines the fitness of the lagged explanatory variables as appropriate instruments and the latter test examines the validity of the moment conditions assumed[10]). For example, a persistent serial correlation of the residuals indicates that unobserved, firm-specific effects are still present.

Since the standard fixed-effects estimator does not identify time-invariant regressors the impact of 'geographical closeness' as represented by time-invariant, binary variables $GREE$ (eastern border districts), $GREG$ (western border districts), and $BIRG$ (interior districts), respectively cannot be accounted for in the static version of model (1). In order to obtain consistent estimates of coefficients of time-invariant

[10]) The null hypothesis of the Sargan test is that the instruments used are not correlated with the residuals. The null hypothesis of the serial correlation test is that the errors in the first-difference regression exhibit no first-order and second-order serial correlation.

variables in a static environment we apply the Hausman-Taylor estimator. This estimator is instrument-variable based and is built on the (somewhat) narrowing assumption that some specified regressors be uncorrelated with the fixed effects (see, *Cameron – Trivedi*, 2010, p. 290). The latter assumption can be tested by a Sargan test (this test, of course, will be applied in the following).

However, the stylized facts presented in section 2 suggest that there is some deeper 'spatial structure' in the dynamics of cross-border lending that can only be captured partly, if at all, by either model just outlined. In addition to time-related dependency there also seems to be a stark space-related dependency at work that may have been paramount for the cross-border lending behavior of the Austrian regional banks since 1995.

As mirrored in Figure 2 cross-border lending activities of the banks located in the eastern border regions of Austria seem to have also stimulated the foreign lending activities of those banks that headquarter in districts farther away from Austria's border to the East. This 'spatial dependency' is best be captured by a model with a spatial lag structure (or a spatial autoregressive (SAR) model). In SAR models the dependent variable is affected, in addition to a set of exogenous control variables, by spatially lagged values of the dependent variable. Formally, in our case the respective spatially lagged values of the dependent variable $AAQ_{i,t}$ are generated by multiplying the contiguity matrix W by $AAQ_{i,t}$. With this added spatial structure, model (1) takes the following SAR form with space-specific (that is, time-invariant) effects and time-specific effects, respectively:

$$(2) \quad AAQ_{i,t} = b_0 + b_1\ CONV_t + \rho \sum_{j=1}^{N} w_{i,j} AAQ_{i,t} + \sum_{j=2}^{r} b_j Z_{ij,t} + \nu_t + \eta_i + \varepsilon_{i,t}\ ,$$

where $w_{i,j}$ is an element of the spatial weights matrix W reflecting the degree of spatial closeness among the regional banks under consideration. The coefficient ρ represents the spatial autoregressive impact of the dependent variable on itself.

The spatial structure as represented in model (2) requires estimation techniques which are capable of coping with distortions caused by the spatially lagged dependent variable. These distortions are similar in nature to those which emerge in time-dynamic settings in the form of inconsistent coefficient estimates. In the econometrics literature spatial panel estimation techniques have been developed that provide consistent estimators for models that are structured like regression equation (2). *Elhorst* (2003) and *LeSage – Pace* 2009), for example, give a competent review of econometric techniques that allow not only for the introduction of the spatially lagged dependent variable but also for the presence of spatial and time-specific effects. Note vector η_i in model (2) now reflects spatial effects represented through the 'geographic coordinates' of the regional banks under study[11]).

Model (2) reflects the interactions of cross-border lending activities among neighboring banks but does not allow for testing whether there is a linkage between spatial interaction and institutional convergence of Austria's eastern neighbors toward EU norms that has governed the banks' foreign lending behavior unequally across regions. In order to capture this spatial-institutional link we need to extend the spatial lag model (2) to a model with two different spatial regimes as suggested in *Elhorst – Fréret* (2009). In following their suggestion, we introduce a binary variable $d_{i,t}$ that equals one at time $t = 1999, ..., 2008$ (period from start of EU accession negotiations of eastern EU-membership aspirants to closing year of investigation) or at time $t = 2004, ..., 2008$ (period from start of eastern EU-enlargement to closing year of investigation) when banks headquarter in an eastern border district of Austria, and equals zero if they are not. More formally, $d_{i,t}$ is set to 1 (to 0) when interaction variable $EURO \times GREE$ or $HUV \times GREE$ equals 1 (0). The interaction specification $EURO \times GREE$ allows for testing whether already the EU accession negotiations stimulated foreign lending activities of Austrian regional banks located in the eastern border districts to such an extent that their behavior induced banks located in the interior districts to do the same by strongly following the strategy of their regional rivals. The model specification $HUV \times GREE$ allows for testing this nexus in relation to the completion of eastern EU enlargement.

The two-regime spatial lag model with spatial and time-specific effects introduced in *Elhorst – Fréret* (2009) and adapted to our setting then takes the following form:

$$(3) \qquad AAQ_{i,t} = b_0 + \rho_1 d_{i,t} \sum_{j=1}^{N} w_{i,j} AAQ_{i,t} + \rho_2 (1 - d_{i,t}) \sum_{j=1}^{N} w_{i,j} AAQ_{i,t} + \sum_{j=1}^{r} b_j Z_{ij,t} + \nu_t + \eta_i + \varepsilon_{i,t} \,,$$

where coefficient ρ_1 reflects the degree of spatial-institutional interaction in cross-border lending related to regional banks located in eastern border districts since 1999 and/or 2004, respectively. Likewise, coefficient ρ_2 values the very same nexus as to regional banks with headquarter in interior districts or western border districts, respectively.

---

[11]) To be specific, for estimating versions of both model (2) and the following two-regime spatial lag model (3) we use Matlab codes, made available by J. P. Elhorst on his website (http://www.regroningen.nl/elhorst/software.shtml).

Consequently, if ρ_2 exceeds (falls below) ρ_1 in a statistical sense then this suggests that cross-border lending activities of banks located in interior and western districts have been stronger positively affected by the foreign lending behavior of their rival banks than the banks located in districts along the eastern border of Austria (et vice versa). Whether this expectation is supported by the data will be tested in the next section as will be checked if model (3) with fixed spatial and fixed time-period effects is the best model specification to replicate both the spatial structure and the time structure of the data under study.

3.3 Findings

The estimates of model (1) drawn from robust fixed effects panel estimator are reported in Table 1. Standard diagnostics (i.e., Hausman tests) suggest that the model version with fixed bank-specific effects is superior to alternative versions, particularly to those with random effects.

Table 1: Robust Fixed-effects Estimates
With bank-specific effects

Dependent Variable	AAQ
R^2	0.229
Number of observations	7,602
Number of banks	543
Time period	1995 to 2008

Variable	Coefficient	t-statistic	p-values
$lspas_t$	4.221	4.43	0.000
$lldr_t$	0.823	0.74	0.457
$lekq_t$	-2.027	-4.61	0.000
lpm_t	-1.696	-1.36	0.174
$lcir_t$	-2.570	-2.28	0.023
HUV_t	2.269	10.49	0.000
$EURO_t$	0.464	1.98	0.048
$cons$	-5.493	-1.07	0.286
Hausman test		72.52	0.000

The estimates reported corroborate (that is, do not reject) the expectation that bank size $SPAS$ affects positively and significantly cross-border lending activities, as measured by AAQ. Interestingly, bank capital EKQ tends to mitigate foreign lending suggesting that expanding loan activities beyond border may likely to be driven by search for profits in order to improve banks' capital base via higher earnings retention. Bank management efficiency, as measured by the cost-income ratio CIR, may spur on lending abroad as reflected by the minus sign of the respective coefficient (being significant at the 1 percent significance level). Most importantly, the coefficients of both key variables HUV and $EURO$ are highly significant, do have the expected sign, and indicate strongly that both EU accession talks and EU accession of Austria's eastern neighbors lifted up cross-border lending activities of Austrian regional banks substantially. The estimates reflect quite clearly that EU accession triggered the far greater positive impulse on foreign lending activities than the convergence period prior to EU-accession. This is in line with the stylized facts presented in the preceding section.

The estimates for an extended version of model (1) gained from the Hausman-Taylor estimator are presented in Table 2. In contrast to the base model, the specification has been expanded by adding the time-invariant, binary variable $GREE$ and $KONK\_04$, respectively, and the time-variant variable SUM_MED. The first of the former variables represents the border districts along the eastern border of Austria (already mentioned above), the second marks those districts with highly competitive local bank markets (for the definition, see Appendix). The latter time-variant variable measures the deviation of each bank's foreign lending activities AAQ_i at time t from the median value of AAQ_i at time t. This variable is supposed to measure whether foreign lending activities of Austria's regional banks are driven by an unobserved common factor. SUM_MED enters the regression equation lagged (by one year).

The chosen specification assumes that HUV, $EURO$ and SUM_MED be time-variant exogenous, $GREE$ and $KONK\_04$ be time-invariant exogenous, and the idiosyncratic controls be time-variant endogenous, respectively. This specification is supported by the Sargan-Hansen test as reported in Table 2.

The estimates show that the main findings drawn from model (1) also hold in a setting with richer structure. Most interestingly, geographical closeness to the eastern border has a big say when it comes to explaining higher foreign lending activities of regional banks in Austria from 1996 to 2008. Though the positive impact of EU accession of the neighboring eastern countries on Austria's regional banks' foreign lending activities remains unchanged the estimations reflect quite clearly that banks located in the eastern border districts boosted foreign lending activities much stronger than the banks farther away from the eastern border (that is, the coefficient of $GREE$ is positive and highly significant). Further, the estimate for the coefficient of variable

SUM_MED underlines significance and indicates by its sign that there appears to be no common factor at work driving the regional banks' foreign lending activities. The estimates for the coefficient of $KONK\_04$ signals that banks facing strong local competition are more inclined to lend abroad than banks operating in less competitive local environments.

Table 2: Hausman-Taylor Estimates

Dependent variable	AAQ
Number of observations	7,059
Number of banks	543
Time period	1996 to 2008

Variable	Coefficient	t-statistic	p-value
Time-variant exogenous			
HUV_t	1.599	20.97	0.000
$EURO_t$	0.361	4.70	0.000
SUM_MED_{t-1}	0.818	116.76	0.000
Time-variant endogenous			
$lspas_t$	3.098	12.66	0.000
$lldr_t$	0.661	3.47	0.001
$lekq_t$	0.072	0.51	0.608
lpm_t	-0.559	-1.95	0.051
$lcir_t$	0.198	0.78	0.435
Time-invariant exogenous			
$GREE$	1.148	4.36	0.000
$KONK\_04$	2.196	7.28	0.000
$cons$	-11.037	-6.97	0.000
Sargan-Hansen test		4.370	0.037

Not surprisingly, the richer structure of the model specification has partly diminished the role of the idiosyncratic variables in explaining the foreign lending orientation of the regional banks. Only $SPAS$ and LDR remain statistically significant. However, quality of personnel as indicated by the sign of the estimate of the coefficient PM

seems to hamper rather than foster foreign lending activities. This finding proves to be rather robust as the subsequent spatial-based regressions will show.

In Table 3, the estimates for the dynamic specification of model (1) are reported. Obviously, the findings support the assumption that foreign lending activities of Austria's regional banks can be sufficiently well portrayed by a stochastic trend following a random walk process with drift that is governed by the convergence process of East European countries toward EU standards as depicted by $EURO$.

Table 3: Robust Two-step Arellano-Bond System Estimates

Dependent variable	AAQ
Number of observations	7,059
Number of banks	543
Time period	1996 to 2008

Variable	Coefficient	t-statistic	p-value
AAQ_{t-1}	1.008	31.16	0.000
$lspas_t$	0.161	0.65	0.514
$lldr_t$	0.161	0.59	0.557
$lekq_t$	-0.310	-0.90	0.371
lpm_t	-0.765	-0.64	0.522
$lcir_t$	1.023	2.48	0.013
HUV_t	0053	0.46	0.647
$EURO_t$	0.259	2.54	0.011
$cons$	3.493	0.70	0.487
Arellano-Bond test: serial correlation of residuals			
$AR(1)$		-3.16	0.000
$AR(2)$		0.33	0.735
$AR(3)$		0.69	0.491
Sargan test		409.351	0.100

In the presented dynamic setting, the bank-specific control variables under study lose importance as factors of explaining Austria's regional banks foreign lending activities altogether. Though the chosen specification is supported by standard diagnostics (i.e., Arellano-Bond test and Sargan test, respectively) we do consider this approach as unfit to fully capture the underlying spatial dependence as a driver of the foreign lending activities of the banks under examination.

Estimating model (2) allows for portraying a simple version of spatial dependency among regional banks with respect to their foreign lending behavior. Table 4 surveys the estimates for model (2) under the assumption that there is spatial autoregressive dependency among banks and their foreign lending behavior as designed by contiguity matrix W. In addition, there is assumed a separate stimulating effect prompted by the interaction of geographic closeness to the eastern neighboring countries (as represented by $GREE$) and institutional alignment to EU standards (as represented by HUV), respectively. Diagnostics such as a Likelihood-ratio test and a Hausman test, respectively, suggest that a SAR model with spatial fixed and time-period fixed effects may be a good representation of the underlying data.

Table 4: Pooled Model with Spatially Lagged Dependent Variable with Spatial and Time Period Fixed Effects

Dependent variable	AAQ
R^2	0.819
Number of observations	7,602
Number of banks	543
Time period	1995 to 2008
Log-likelihood	-19,181.508

Variable	Coefficient	t-statistic	p-value
$lspas_t$	2.734	6.273	0.000
$lldr_t$	1.584	5.585	0.000
$lekq_t$	-1.677	-7.999	0.000
lpm_t	-1.689	-3.943	0.000
$lcir_t$	-2.954	-7.528	0.000
$HUV_t \times GREE$	0.163	0.981	0.327
$W \times AAQ_t$	0.481	18.209	0.000
Likelihood-ratio test		11,643.026	0.000
Hausman test		17.706	0.013

As to the idiosyncratic controls, the estimates for model (2) confirm the findings drawn from the static panel model (1). The estimates for the controls are statistically significant and have the same sign as in the regression based on model (1). In addition, the evidence is also strongly supportive of the view that spatial dependence affects foreign lending behavior of Austria's regional banks positively. That is to say, regional banks' foreign lending activities are being affected positively and significantly by the foreign lending behavior of their local competitor banks. However, we find no evidence in favor of the expectation that the geographic-institutional linkage as expressed by $HUV \times GREE$ exerts an independent positive impact on foreign lending[12]). Though the coefficient of the interaction variable has the expected positive sign the estimate cannot be taken as different from zero at the standard significance levels. The low statistical significance of the gained estimate may be caused by the fact that the chosen specification fails to properly account for asymmetric spatial dependency between regional banks operating along the eastern border of Austria and those banks that are farther away from the eastern border. Stylized facts as captured in Figure 3 suggest that as to foreign lending activities regional banks headquartering in districts farther away from the eastern border line appear to be more likely to follow their neighboring competitor banks than banks located in the border districts.

Model (3), closely related to the yardstick competition literature as reviewed in Elhorst – Fréret (2009), is designed such that the asymmetric spatial structure reflected in the data can be thoroughly explored with spatial panel econometric techniques. For this purpose, we change level of observation by averaging bank-level data over all banks located in a district. In so doing, potential disturbing noise that may blur asymmetric spatial dependency at the bank level is expected to be filtered out of the data. Certainly, this requires a restriction of contiguity matrix W to dimension 94×94 (mirroring the number of districts covered).

The estimates for the two-regime SAR model (3) are reported in the Tables 5A and 5B, respectively. The specification chosen is strongly supported by standard diagnostic checks. Most importantly, sign and significance of the estimates for the coefficients ρ_1 and ρ_2, respectively, strongly confirm the expectation that foreign lending activities of regional banks located farther away from the eastern border are more positively affected by their competitors' behavior than is the case with respect to the foreign lending behavior of regional banks operating closer to the eastern border. That is to say, foreign lending behavior of the former banks is assumed to have been much more directly driven by the geographic-institutional linkage proposed in this paper than the latter regional banks as is reflected by spatial-autoregressive coefficient ρ_2 significantly exceeding its companion coefficient ρ_1.

[12]) No evidence is found either when the spatial-institutional linkage is represented by $EURO \times GREE$.

Table 5A: Two-Regime Pooled Model with Spatially Lagged Dependent Variable with Spatial and Time Period Fixed Effects

Dependent variable	AAQ
R^2	0.820
R^2 adjusted	0.805
Number of observations	1,316
Number of regions	94
Time period	1995 to 2008
Log-likelihood	-2,528.924
Regime dummy	$EURO_t \times GREE$

Variable	Coefficient	t-statistic	p-value
$lspas_t$	3.723	5.571	0.000
$lldr_t$	1,502	2.621	0.009
$lekq_t$	-2.271	-6.777	0.000
lpm_t	-1.115	-2.119	0.034
$lcir_t$	0.707	0.865	0.387
$d \times W \times AAQ_t$	0.232	6.116	0.000
$(1-d) \times W \times AAQ_t$	0.435	4.594	0.000
Test: $\rho_1 - \rho_2$	-0.203	-1.980	0.048

Table 5B: Two-Regime Pooled Model with Spatially Lagged Dependent Variable with Spatial and Time Period Fixed Effects

Dependent variable	AAQ
R^2	0.845
R^2 adjusted	0.830
Number of observations	1,316
Number of regions	94
Time period	1995 to 2008
Log-likelihood	-2,527.839
Regime dummy	$HUV_t \times GREE$

Variable	Coefficient	t-statistic	p-value
$lspas_t$	3.733	5.623	0.000
$lldr_t$	1,502	2.629	0.009
$lekq_t$	-2.262	-6.739	0.000
lpm_t	-1.107	-2.106	0.035
$lcir_t$	0.718	0.879	0.379
$d \times W \times AAQ_t$	0.227	6.056	0.000
$(1-d) \times W \times AAQ_t$	0.460	4.566	0.000
Test: $\rho_1 - \rho_2$	-0.233	-2.129	0.032

4. Conclusion

With the fall of the 'Iron Curtain' in the late 1980s and the swift convergence of former communist command economies to full-fledged market economies (Westernization of Eastern Europe) history has provided applied economics with the unique opportunity to test core economic propositions within the frame of a natural experiment. Against this background an attempt is made to explore a core question in international banking, namely, to what extent geography and institutions matter as prime mover of cross-border bank lending. Theory suggests that cross-border bank lending flow from rich countries to poor countries is facilitated when lending-related legal and social norms are shared and valued equally by both lenders and borrowers. Accordingly, the fast adoption of Western-style democracy and market economy principles as established by European Union (EU) standards by many of the East European 'transformation countries' since the early 1990s should have raised cross-border lending by banks based in 'old' EU member states to clients resident in new East European EU member states. By taking this hypothesis to the data covering cross-border lending activities of Austrian small- to medium-sized regional banks over the period from 1995 to 2008 this paper shows that foreign lending of Austrian small- to medium-sized banks has indeed been strongly positively affected by the swift alignment particularly of Austria's eastern neighboring countries (Czech Republic, Slovak Republic, Hungary, and Slovenia) to EU norms. We consider this outcome as a piece of evidence that is strongly in line with the view that geography and institutions matter when it comes down to making economic laws work.

References

Abiad, A., Leigh, D., Mody, A., "Financial Integration, Capital Mobility, and Income Convergence", Economic Policy, 2009, (April), 241-305.

Acemoglu, D., Introduction to Modern Economic Growth, Princeton University Press, Princeton, NJ, 2009.

Acemoglu, D., Johnson, S., Robinson, J. A., "Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution", Quarterly Journal of Economics, 2002, 117, (November), 1231-1294.

Arellano, M. I., Bond, S. R., "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations", Review of Economic Studies, 1991, 58(2), 277-297.

Arellano, M. I., Bover, O., "Another Look at the Instrumental Variables Estimation of Error-components Models", Journal of Econometrics, 1995, (68), 29-51.

Baldwin, R. E., Blundell, R., Bond, S. R., "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models", Journal of Econometrics, 1998, (87), 115-144.

Baltagi, B. H., Econometric Analysis of Panel Data, Third Edition, John Wiley & Sons, New York, 2005.

Blundell, R., Bond, S., GMM estimation with persistent panel data: an application to production functions, Paper presented at the Eighth International Conference on Panel Data, Göteborg University, June 11-12, 1998.

Cameron, A. C., Trivedi, P. K., Microeconometrics Using Stata, Revised Edition, Stata Press, 2010.

Degryse, H., Kim, M., Ongena, S., Microeconometrics of Banking: Methods, Applications, and Results, Oxford University Press, Oxford, 2009.

Elhorst, J. P., "Specification and Estimation of Spatial Panel Data Models", International Regional Science Research, 2003, 26(3), 244-268.

Elhorst, J. P., Fréret, S., "Evidence of Political Yardstick Competition in France Using a Two-Regimes Spatial Durbin Model with Fixed Effects", Journal of Regional Science, 2009, 49(5), 931-951.

Ferguson, N., Empire: The Rise and Demise of the British World Order and the Lessons for Global Power, Basic Books, New York, 2003.

Freixas, X., Rochet, J. C., Microeconomics of Banking, Second Edition, MIT Press, Cambridge, MA, 2008.

Hahn, F. R., "A Note on Management Efficiency and International Banking – Some Empirical Panel Evidence", Journal of Applied Economics, 2009, 22(1), 69-81.

Lee, L. F., "Asymptotic Distributions of Quasi-maximum Likelihood Estimators for Spatial Autoregressive Models", Econometrica, 2004, 72(6), 1899-1925.

LeSage, J., The Theory and Practice of Spatial Econometrics, Department of Economics, University of Toledo, Ohio, February, 1999.

LeSage, J., Pace, K. R., Introduction to Spatial Econometrics, CRC Press, Taylor&Francis Group, London, 2009.

Lucas, R. E., "Why Doesn't Capital Flow from Rich to Poor Countries?", American Economic Review, 1990, 80(May), 92-96.

Maechler, A. M., Ong, L. L., "Foreign Banks in the CESE Countries: In for a Penny, in for a Pound?", IMF Working Paper, 2009, (54).

Obstfeld, M., Taylor, A. M., Global Capital Markets: Integration, Crisis, and Growth, Cambridge University Press, New York, 2005.

Prasad, E., Rajan, R., Subramanian, A., Patterns of International Capital Flows and Their Implications for Economic Development, Research Department, IMF, September, 2006.

White, H., "A Heteroskedasticity-consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity", *Econometrica*, 1980, (48), 817-838.

Windmeijer, F., "A Finite Sample Correction for the Variance of Linear Efficient Two-step GMM Estimators", Journal of *Econometrics*, 2005, (126), 25-51.

Appendix

Variable

$AAQ_{i,t}$	Total foreign assets in percent of total assets of bank i at time t
$SUM\_MED_{i,t}$	Deviation of $AAQ_{i,t}$ from the median AAQ_t in percentage points
$KONK\_04_i$	Market share of each bank (as measured by number of its branches) being smaller than 10% of its local market (as measured by the total number of branches in its home district) in 2004
HUV_t	Time-variant binary variable coding the period of EU membership of Czech Republic, Hungary, Slovak Republic, and Slovenia
$GREE_i$	Time-invariant binary variable coding Austrian districts sharing the border line with Czech Republic, Hungary, Slovak Republic, and Slovenia
$EURO_t$	Time-variant binary variable coding the period since the start of EU accession talks of Czech Republic, Hungary, Slovak Republic, and Slovenia
$lspas_{i,t}$	Total assets of bank i at time t deflated by GDP deflator, 2000=100, in logarithm
$lldr_{i,t}$	Loan-deposit ratio of bank i at time t, in logarithm
$lekq_{i,t}$	Core capital over total assets of bank i at time t, in logarithm
$lpm_{i,t}$	Staff costs, deflated by GDP deflator, 2000=100, per employee borne by bank i at time t, in logarithm
$lcir_{i,t}$	Cost-income ratio of bank i at time t, in logarithm
W	543×543 (or 94×94) contiguity matrix capturing the connectiveness between the 543 regional banks (or 94 districts) under study. Bank (district) j is defined to be close or a neighbor to bank (district) i if the two banks share the same home district or if the two banks (districts) headquarter in districts that share a common border line. If both bank (district) j and i meet this requirement element $w_{i,j}$ of the 543×543 (or 94×94) contiguity matrix W is set equal to one. If two banks (districts) under consideration miss this requirement we set $w_{i,j} = 0$. By convention the main diagonal of W has only zeros, that is $w_{i,i} = 0$, and the non-diagonal elements $w_{i,j}$ are transformed such that W has row-sums of unity.
$d_{i,t}$	$d_{i,t}$ is set to 1 when interaction variable $EURO_t \times GREE$ (or $HUV_t \times GREE$) equals 1. Otherwise $d_{i,t}$ is set to 0.

Table A1: Descriptive statistics

Variable	Mean	Standard deviation	Minimum	Maximum
AAQ	3.687	7.070	0.000	99.378
SPAS	119.159	155.874	7.556	2.018.648
LDR	0.731	0.271	0.094	2.582
EKQ	7.387	2.644	1.700	22.079
CIR	0.689	0.099	0.306	1.704
PM	59.269	9.251	19.382	203.248

Number of observations	7,602
Number of banks	543
Time period	1995 to 2008