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Cross-Country Empirical Studies of Banking Crisis: A Spatial Durbin Model

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Abstract

The paper studies the factors associated with the emergence of banking crises during the process of financial liberalization in a large sample of cross-countries in 1989-1997 using a spatial Durbin model in a panel data econometrics. The empirical results suggest that financial liberalization has the tendency to stimulate the banking instability in economies. Financial liberalization played a significant role in the transmission of the banking crisis to emerging market economies. In addition, the results indicate that tighter entry restrictions and more severe regulatory restrictions on bank activities boost bank fragility; these are consistent with the results obtained by Barth et al. (2004). Then we find evidence that the measures of bank regulation variables also contributed, either positively or negatively, towards the observed crisis outcomes, with poor institutional environment playing a particularly significant role. Besides we find that the impact of the determinants differ slightly between whole sample and emerging economies.

Keywords: Banking crisis, spatial Durbin model, financial liberalization, regulation, institutions

1. Introduction

The financial liberalization around the globe is fueling an active public debate on the impact of financial liberalization on financial stability. Indeed, economic theory provides conflicting predictions about the relationship between the financial liberalization and the competitiveness of the banking industry and banking system fragility. Motivated by public policy debates and ambiguous theoretical predictions, this paper investigates empirically the impact of financial liberalization, bank regulations and whether it depends on institutional characteristics of the banking system stability.

Some theoretical arguments and country comparisons suggest that banking crises are more likely to occur in liberalized financial systems. Alfaro & Hammel (2007), Kim & Kenny (2006), Menzie & Hiro (2005), Bekaert et al (2005), and others, suggest that developing countries should liberalize the financial system to ensure its proper operation and initiate economic growth. According to these authors, financial liberalization reinforces the idea that a free development of the financial sphere would allow the development of the real sphere by an optimal allocation of capital and generate rapid economic growth for developing countries.

However, the desired result was not achieved. On the contrary, that financial liberalization has led to very serious banking crises. Indeed, financial liberalization is a factor in weakening internal and external economies. Recently, Giannetti (2007) advocates that "Financial liberalizations in emerging markets are Often Followed by reckless lending and severe banking crises". Similarly, Aka (2006) states that "In the past five years, Financial Crises Have Several rattled Most Of The Emerging market economies in Asia, Europe, and south America. These crises were deeply related to the process of Financial Liberalization and Financial globalization". A first reading of this statement shows that the contribution of financial liberalization on financial development and economic growth has been strongly challenged. This thesis is corroborated by Daniel & Jones (2006) who found that most banking crises that hit emerging economies had been caused by movements of financial liberalization. In this context, Ranciere et al (2006) have shown that financial liberalization can lead to a higher level of risk, increase the volatility of macroeconomic indicators and increase the probability of occurrence of banking crises. Other studies, in particular those conducted by Barell et al (2006) and Tornell et al (2004) have validated this observation. Finally, Suwanaporn & Menkhoff (2007), Currie (2006), show that financial liberalization pursued in a slightly-developed institutional

environment accentuates the proliferation of banking crises.

The empirical research into the causes and consequences of banking crises in cross-countries has only started to draw professional concentration in the last several years. We look at one of the most central policy questions in front of this empirical study, the responsibility of financial liberalization, in its complete effort to present policy makers with recommendation on preventing crises, determining their beginning earlier, and mitigating their adverse effects. In their pioneering study, of the relation between financial liberalization and banking crisis, Demirgüç-Kunt and Detragiache (1998) examine the empirical relationship between banking crises and financial liberalization using data from 1980 to 1995 for 53 different countries. They find that banking crises are indeed more likely to occur in countries that have liberalized their financial systems, even after controlling for other country characteristics. They also find that the impact of financial liberalization on a fragile banking sector is mitigated by a strong institutional environment. Weller (2001) finds that a banking crisis becomes more likely after domestic financial liberalization.[1]

Eichengreen and Arteta (2002) suggest after the work of Demirgüç-Kunt and Detragiache by distinguishing between the effects of internal and external financial liberalization that is captured by a 0/1 dummy. Furthermore, they find that capital account liberalization does not contribute to a banking crisis but internal financial liberalization does. Noy (2004) considers interactions between domestic financial liberalization and supervision and concludes that, if liberalization is accompanied by insufficient prudential supervision of the banking sector, it will result in excessive risk taking by financial intermediaries and a subsequent crisis.

Ranciere et al (2006) examine the relationship between financial liberalization and crises and they find that in a large sample of countries, financial liberalization typically leads to financial fragility and occasional financial crises. However, financial liberalization has led to faster long-run growth. Barth et al (2004) study the restrictions on bank activity, entry restrictions, and privatization. They also find that restrictions on banking activity and foreign bank entry stimulate the likelihood of banking crises, whereas government ownership does not have a significant effect on this likelihood.

Tanveer and Haan (2008) focus on the impact of financial liberalization on systemic and non-systemic banking crises for a sub-sample of developing and developed countries covering the period 1981 to 2002. In contrast to conventional wisdom, they adopt the multivariate (two stage) probit modeling and their results consistently suggest that financial liberalization reduces the likelihood of systemic crises. Nevertheless, there is some evidence that the likelihood of non-systemic crisis increases after financial liberalization.

Finally, Apanard et al. (2010) use a recently updated dataset for financial reforms in 48 countries between 1973 and 2005. They argue that banking crises are most likely to occur after some degree, but not full, liberalization. Their empirical results indicate that the relationship between liberalization and banking crises is mainly caused by the strength of capital regulation and supervision. One policy implication of the analysis is that positive growth effects of financial liberalization can be obtained with no a simultaneous increase in the likelihood of banking crises if appropriate institutions are developed.

Overall, this brief survey of the theoretical and empirical literature suggests that there is no consensus what the relation between financial liberalization and financial stability is. In spite of the great number of contributions to this area of study, the evaluation of the impact of the increase in stability continues to be of great importance. This paper contributes to this literature by basing on spatial econometrics approach. Indeed, in period of financial liberalization the release of banking fragility looks through: First the transmission channels of fundamental contagion or interdependence between countries such as macroeconomic similarities, channels of trade2 and financial transfers. On the other hand, the transmission channels of pure contagion, such as endogenous liquidity shocks and information shocks. These transmission channels gave the cause of the failure of econometrics classic for this type of modeling. The classical econometrics was customary in modeling, it has experienced an almost systematic use and several studies have shown that these models may hide important properties such as the spatial autocorrelation that may occur because the data are affected by processes that connect different places through activities in space and the spatial heterogeneity that means that economic behaviors are not stable in the space, this phenomenon is not going

[1]Gruben et al. (2003) deduce that banks are much more possible to fail in a liberalized regime than under financial repression.
[2]For a detailed discussion of trade linkages, see Gerlach and Smets (1995), Eichengreen et al. (1996), and Corsetti et al. (2000).

to be part of this work but it can be integrated as a future extension.

Our results confirm some previous findings in the literature: spatial panel estimates lend support in favor of the determinants of a banking crisis which explicitly take into account 'spatial' interactions among observed countries with trade channels as primordial transmission mechanisms. We find evidence that the data do not support the view that more competition increases fragility. The results indicate that tighter entry restrictions and more severe regulatory restrictions on bank activities boost bank fragility; these are consistent with the results obtained by Barth et al. (2004). Besides, in terms of financial liberalization, there is some evidence that the likelihood of banking crisis increases after financial liberalization.

This paper is organized as follows. Section 2 describes the data set and presents summary statistics. Section 3 contains the main results and section 4summarizes the results with concluding remarks.

2. Methodology and data

Our sampling covers the period 1989-1997. Table 1 describes the variables and their sources and table 2 presents descriptive statistics for the whole sample. Concerning the construction of our panel, we are limited to 49emerging, developed and developing countries (Table 3) those affected by banking crisis.

Table 1-3 (see Appendix)

We adopt nonperforming Loans as a proxy for banking crisis as endogenous variable. Indeed, for the banking crisis the authors use different dates for both the trigger and the resolution oft he same crisis. An alternative approach, suggested by Caprio and Klingebiel (1996) and Demirgu¸c-Kunt and Detragianche (1997), is to adopt the bank nonperforming loan (NPL) to proxy for banking crisis. So we follow this suggestion to use NPL as the proxy of the banking crisis.

We control for many factors, while the sign of the estimated coefficient for each explanatory variable indicates whether an increase of that explanatory variable increases or decreases the probability of a crisis. Specifically, we begin with the use of the spatial panel model as regression, such as, spatial error model, patial lag model and spatial Durbin model.

We use three measures of bank regulation.

Activity restrictions aggregates measures indicate whether bank activities in the securities, insurance, and real estate markets and ownership and control of nonfinancial firms are (1) unrestricted, (2) permitted, (3) restricted, or (4) prohibited. The aggregate indicator has therefore a possible maximum variation between four and 16, with higher numbers indicating more restrictions on bank activities and nonfinancial ownership and control. If these restrictions sustain banks from entering excessively risky lines of business, then they may encourage banking system stability. If nevertheless, restrictions prevent firms from diversifying outside their traditional lines of business, they may increase the fragility of the system.

Required reserves represent the ratio of bank assets that regulators require banks to hold as reserves. Higher ratios of required reserves affect the banking systems to be more stable since they would have a greater buffer to absorb liquidity shocks. On the other hand, larger required reserves are in addition a tax on the banking system, which may lower profits and raise fragility.

Capital regulatory index is given by the sum of initial capital stringency and overall capital requirements. To the extent that book capital is an accurate measure of bank solvency we expect better capitalized banks to be less fragile.

We also use three additional variables to capture the extent of banking freedom and general economic freedom and the institutional environment.

Banking freedom is an index of the openness of the banking system. It is a composite indicator of whether foreign banks are able to operate freely, the degree of regulation of financial market activities, whether the government influences allocation of credit, and whether banks are free to provide customers with insurance products and invest in securities. Higher values indicate fewer restrictions on banking freedoms.

Economic freedom is an indicator of how a country's policies rank in terms of providing economic freedoms. It is a

composite of ten indicators ranking policies in the areas of trade, government finances, government interventions, monetary policy, capital flows and foreign investment, banking and finance, wages and prices, property rights, regulation, and black market activity. The higher measures of aggregate indicate polices more conducive to competition and economic freedom by diversifying their risks and engage in different activities. However, greater freedoms also allow banks to undertake greater risks, particularly if existing regulations distort risk-taking incentives. Consequently, overall greater freedom may also lead to greater bank fragility.

KKZ_composite is an indicator of the overall level of institutional development constructed by Kaufman et al. (1999). The underlying indicators are voice and accountability, government effectiveness, political stability, regulatory quality, and control of corruption. We expect better institutions to lead to reduced bank fragility, controlling for all other factors.

3. Empirical finding

This section employs the spatial econometrics tools to analyze the period 1989 to 1997, period well-known us banking crisis of South East Asia and Latin America. In its most general form, the selected regression model is given by:

$$y_{it} = \alpha_i + \delta \sum_{j=1}^{N} w_{ij} y_{jt} + x'_{it}\beta + \sum_{j=1}^{N} w_{ij} x_{ijt}\gamma + \varepsilon_{it},$$
$$\varepsilon_{it} \square N(0,1) \qquad (1)$$

Where y is a nonperforming loans variable taking value for any of the entire sample of 49 countries and three country groups, x is the controlled variables defined earlier. W_{ij} is exogenously specified n x n lag weights matrices. As suggested earlier, to test for sources of autocorrelation or interdependence, we can specify weights matrices based on different concepts of 'neighborhood'. In this article, we utilize an exogenously specifying matrices based on international trade data. The matrix is created us: Total international trade-based, (W_T). This matrix adds up exports and imports to form the weights.[3]

Table 4 reports the estimation results when adopting a non-spatial panel data model for the total international trade-based's weights matrices (W_T). We control for different bank regulations and the institutional environment.[4] We include indicators of bank regulations for three reasons. First, controlling for differences in national policies provides a simple robustness test of the relationship between financial liberalization and crises. Second, controlling for regulations provides additional information on the liberalization –stability relationship. Finally, examining the relationship between bank regulations and banking system stability is independently valuable. Countries implement regulations to promote banking system stability. This research provides some information about which policies work.[5]

The estimation results are making for the whole sample and the subsamples of emerging markets. Also, table 4 reports the estimation results test results to determine whether the spatial lag model or the spatial error model is more appropriate. When using the classic LM tests and robust LM test, both the hypothesis of no spatially lagged dependent variable and the hypothesis of no spatially auto correlated error term must be rejected at 5% as well as 1% significance, irrespective of the inclusion of spatial and/or time-period fixed effects. This provided that time-period

[3] We can refer to Glick and Rose (1998). The matrix is clearly non-symmetrical $\left(W_{ij} \neq W_{ji}\right)$.

[4] We also controlled for public and foreign ownership.

[5] These specifications exclude GDP per capita since it is also a proxy for the overall institutional environment, including bank regulations.

or spatial and time-period fixed effects are included.[6] Apparently, the decision to control for spatial and/or time-period fixed effects represents an important issue.

Table 4 (see Appendix)

We estimate the following panel model specification:

$$NonPerflon_{[?country=j\ Time=t]} = \beta_0 + \beta_1 \mathrm{ACTRES}_{j,t} + \beta_2 \mathrm{RRES}_{j,t} + \beta_3 \mathrm{CREGI}_{j,t} + \beta_4 \mathrm{BKFR}_{j,t} + \beta_5 \mathrm{ECOF}_{j,t} + \beta_6 \mathrm{KKZ}_{j,t} + \beta_7 \mathrm{LIB}_{j,t} \quad (2)$$

To investigate the (null) hypothesis that the spatial fixed effects are jointly insignificant, one may perform a likelihood ratio (LR) test. The results (33.592, with 49 degrees of freedom [df], $p < 0.01$) indicate that this hypothesis must be rejected. Similarly, the hypothesis that the time-period fixed effects are jointly insignificant must be rejected (36.931, 9df, $p < 0.01$). These test results justify the extension of the model with spatial and time-period fixed effects, which is also known as the two-way fixed effects model (Baltagi, 2005). The results are the same for whole sample and emerging economies' sub-sample.

With respect to the general-to-specific approach adopted by Florax et al., (2003) and Mur and Angula (2009) we now consider the spatial Durbin specification of the determinant of banking fragility. Its results are reported in columns (1) and (2) of Table 5. The first column gives the results when this model is estimated using the direct approach and the second column when the coefficients are bias corrected. The results in columns (1) and (2) show that the difference between the coefficients estimates of the direct approach and of the bias corrected approach are small for the independent variables (X) and σ2. By contrast, the coefficients of the spatially lagged dependent variable (WY) and of the independent variables (WX) appear to be quite sensitive to the bias correction procedure.

Table 5 (see Appendix)

We estimate the following panel spatial model specification:

$$NonPerflon_{[?country=j\ Time=t]} = \mu W_{ij} NonPerflon + \beta_0 + \beta_1 \mathrm{ACTRES}_{j,t} + \beta_3 \mathrm{RRES}_{j,t} + \beta_3 \mathrm{CREGI}_{j,t} + \beta_4 \mathrm{BKFR}_{j,t} + \beta_5 \mathrm{ECOF}_{j,t} + \beta_6 \mathrm{KKZ}_{j,t} + \beta_7 \mathrm{LIB}_{j,t} + \lambda W X \beta \quad (3)$$

To test the hypothesis whether the spatial Durbin model can be simplified to the spatial error model, H0: $\theta+\delta\beta=0$, one may perform a Wald or LR test. The results reported in the second column using the LR test (23.237, 9 df, $p=0.001$) indicate that this hypothesis must be rejected. Similarly, the hypothesis that the spatial Durbin model can be simplified to the spatial lag model, H0: $\theta=0$, must be rejected (LR test: 22.641, 9 df, $p=0.002$). This implies that both the spatial error model and the spatial lag model must be rejected in favor of the spatial Durbin model. The same results' tests are for whole sample and emerging economies' sub-sample.

In Table 5, the third column reports the parameter estimates if we treat μi as a random variable rather than a set of fixed effects. Hausman's specification test can be used to test the random effects model against the fixed effects model (see Lee and Yu, 2010b for mathematical details).[7] The results (-27.659, 14 df, $p<0.015$) indicate that the random effects model must be rejected. Another way to test the random effects model against the fixed effects model is to estimate the parameter "phi" (φ^2 in Baltagi, 2005), which measures the weight attached to the cross-sectional component of the data and which can take values on the interval [0,1]. If this parameter equals 0, the random effects model converges to its fixed effects counterpart; if it goes to 1, it converges to a model without any controls for spatial specific effects. We find phi=0.996, with t-value of 0.00, which just as Hausman's specification test indicates that the fixed and random effects models are significantly different from each other.

[6]Note that the test results satisfy the condition that LM spatial lag + robust LM spatial error = LM spatial error + robust LM spatial lag (Anselin et al., 1996).

[7]Mutl and Pfaffermayr (2010) derive the Hausman test when the fixed and random effects models are estimated by 2SLS instead of ML.

The results of spatial and time period fixed effects, spatial and time period fixed bias-corrected and random spatial effects, fixed time period effects are presented in table 5 for the whole sample and emerging economies' sub-sample.

The coefficient for financial liberalization is negative and consistent with the results obtained by Ranciere et al (2006) and strongly significant in the regression for all countries as well as emerging market countries. For emerging countries, the probability of a crisis is much higher due to an increased level of financial liberalization.

We envision the results of the model estimates of Spatial Durbin. This model, explicitly tests the interaction effect between countries mentioned by several authors such Eichengreen et al. (1996). The effect of the interaction is supported through the channels of trade incorporating the weight matrix of exchange. Respect to Beck et al. (2004) we have several statistically significant variables. This result is obvious in light of the standard panel model estimation inefficient and not aware of the existence of spatial autocorrelation between countries. Moreover, it implies that the bank failure is explained by the contagion effect but also by the role played by institutional development, as indicated in the first column.

The major coefficients of explanatory variables of the model space are statistically significant and values are provided. For the model "two-way fixed effects" (last column Table 3), we notice that the variable financial liberalization is significant and has a negative effect on the dependent variable explaining banking fragility. Financial liberalization reduces the probability of banking crises across countries. This result corresponds to what has been developed in the literature with the work of Kalemli-Ozcan et al (2001).

Table 5 results indicate that the negative relationship between financial system liberalization and the probability of suffering a systemic banking crisis holds even when including measures of the regulatory environment, the general openness of the banking industry, the degree of economic freedom in the economy, and a general index of institutional development. When controlling for capital regulations, reserve requirements, banking freedom, economic freedom and a summary measure of institutional development, liberalization enters positive and significantly at the 5% level.

Table 5 results also indicate that tighter entry restrictions and more severe regulatory restrictions on bank activities boost bank fragility. These are consistent with the results obtained by Barth et al. (2004), who examine the impact of entry restrictions on crises in a purely cross-country investigation. A higher fraction of entry applications denied—a proxy for tighter entry regulations—leads to higher levels of fragility in the banking system. This is consistent with the argument that restricted entry reduces the efficiency of the banking system, also making it more vulnerable to external shocks. Similarly, we find that restrictions on bank activities increase crisis probabilities. This result indicates that overall these restrictions prevent banks from diversifying outside their traditional business, reducing their ability to reduce the riskiness of their portfolios. The required reserves and capital regulatory index enter with significant coefficients.

The variables that capture the general openness and competitiveness of the banking system enter with negative and very significant coefficients, but the general openness of economic enter with positive and significant coefficients. Thus countries with less freedom in banking and generally more competitive economic policies are more likely to experience banking crises. This is the case despite the fact that these policies also tend to reduce entry barriers. The evidence is consistent with theories that emphasize the stabilizing effects of competition, but inconsistent with the many models that stress the destabilizing effects from competition. A better institutional environment is also associated with a lower probability of systemic crisis, as expected.

5. Conclusion

In the present paper we confirmed that spatial panel models constitute a natural framework to analyze the determinants of banking crises. Furthermore, if there is spatial dependence, which is expected in the present setting, after giving the theoretical fundaments presented in the introduction, the spatial panel model is more appropriate. Therefore, the estimation of spatial panel models allowed us to overcome several of the shortcomings present in the previous banking crises empirical literature.

Our empirical findings seem to lend support to the determinants of banking crises. We use spatial panel data models, among which the spatial lag model, the spatial error model, and the spatial Durbin model extended to include spatial

and/or time-period fixed effects or extended to include spatial random effects. Contrasting with previous findings, that financial liberalization contributes to the likelihood of a banking crisis. Then we find evidence that the measures of bank regulation variables also contributed, either positively or negatively, towards the observed crisis outcomes, with poor institutional environment playing a particularly significant role.

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Appendix: Tables 1-5

Table 1: Descriptions and sources of the variables

Variable	Description and source
Nonperforming loans (BNONPERLOAN)	*Bank nonperforming loans to total gross loans are the value of nonperforming loans divided by the total value of the loan portfolio (including nonperforming loans before the deduction of specific loan-loss provisions) FMI.
(A) **Variables of bank regulation**	
Activity restrictions (ACTRES)	*Sum of four measures that indicate whether bank activities in the securities, insurance and real estate markets and ownership and control of nonfinancial firms are (1) unrestricted, (2) permitted, (3) restricted, or (4) prohibited
Required reserves (RRES)	*Ratio of reserves required to be held by banks.
Capital regulatory index (CREGI)	*Summary measure of capital stringency: sum of overall and initial capital stringency. Higher values indicate greater stringency.

(A) **Additional variables, baking freedom, economic freedom and institutional environment.**	
Banking Freedom (BKFR)	*Indicator of relative openness of banking and financial system: specifically, whether the foreign banks and financial services firms are able to operate freely, how difficult it is to open domestic banks and other financial services firms, how heavily regulated the financial system is, the presence of state-owned banks, whether the government influences allocation of credit, and whether banks are free to provide customers with insurance and invest in securities (and vice-versa). The index ranges in value from 1 (very low – banks are primitive) to 5 (very high – few restrictions). Averaged over 1995-97 period.
Economic Freedom (ECOF)	*Composite of 10 institutional factors determining economic freedom: trade policy, fiscal burden of government, government intervention in the economy, monetary policy, capital flows and foreign investment, banking and finance, wages and prices, property rights, regulation, and black market activity. Individual factors are weighted equally to determine overall score of economic freedom. A high score signifies an institutional or consistent set of policies that are most conducive to economic freedom, while a score close to 1 signifies a set of policies that are least conducive. Averaged over 1995-97 period.
KKZ_composite (KKZ)	*Composite of six governance indicators (1998 data): voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and corruption. Individual factors are weighted equally to determine overall score of economic freedom. Higher values correspond to better governance outcomes.
Financial Liberalisation (Official Liberalization)(LIBFULL)	Official Liberalization dates, presented in Table 2, are based on Bekaert and Harvey (2002) A Chronology of Important For the liberalizing countries, the associated Official Liberalization indicator takes a value of one when the equity market is officially liberalized and thereafter, and zero otherwise. For the remaining countries, fully segmented countries are assumed to have an indicator value of zero, and fully liberalized countries are assumed to have an indicator value of one Financial, Economic and Political Events in Emerging Markets,.

Table 2: Countries included

1	Australia	11	Panama	21	Japan	31	Belgium	41	Kenya
2	Autria	12	Peru	22	Jordan	32	Denmark	42	Norway
3	Canada	13	Portugal	23	Korea, Rep.	33	Dominican Republic	43	Nigeria
4	Chile	14	United Kingdom	24	Malaysia	34	Egypt, Arab Rep.	44	Senegal
5	Colombia	15	United States	25	Mexico	35	France	45	South Africa
6	Ecuador	16	Venezuela	26	Netherlands	36	Germany	46	Sweden
7	El Salvador	17	India	27	Philippines	37	Gabon	47	Switzerland
8	Finland	18	Indonesia	28	Singapore	38	Ghana	48	Turkey
9	Greece	19	Ireland	29	Thailand	39	Guatemala	49	Tunisia
10	Lesotho	20	Israel	30	Afrique du Sud	40	Italy		

Table 3: Summary statistics

	BFREE2	CAPITALR	CROSSID	ECON2	KK_COMPO	LIB	RR	RESTRICT
Mean	3.508129	5.560976	21	3.401423	0.579512	0.924119	10.8872	9.341463
Median	3.33333	6	21	3.46667	0.63	1	8	9
Maximum	5	8	41	4.5	1.72	1	43	14
Minimum	2	2	1	2.183333	-1	0	0	5
Std. Dev.	0.838891	1.640915	11.84822	0.555601	0.784358	0.265167	10.89098	2.517858
Skewness	0.085351	-0.307756	-3.16E-17	-0.28319	-0.201451	-3.20323	0.892335	-0.011007
Kurtosis	2.467978	2.434158	1.798571	2.221169	1.786503	11.26068	3.125201	2.084266
Jarque-Bera	4.799873	10.74763	22.19275	14.25819	25.13665	1680.205	49.21115	12.90045
Probability	0.090724	0.004636	0.000015	0.000801	0.000003	0	0	0.00158
Sum	1294.5	2052	7749	1255.125	213.84	341	4017.375	3447
Sum Sq. Dev.	258.9758	990.878	51660	113.5987	226.4003	25.87534	43649.77	2332.976
Observations	441	441	441	441	441	441	441	441

Table 4: Estimation results I-Bank crisis, regulation, institutions and liberalization: W_T

Determinants	1		2		3		4	
	Pooled OLS		Spatial fixed effects		Time-period fixed effects		Spatial and time-period fixed effects	
	WS	EMG	WS	EMG	WS	EMG	WS	EMG
Intercept	14.93	14.047						
	[2.797]	[2.754]						
Activity restrictions	-0.27	-0.300	-0.132	-0.868	-0.883	-0.817	-0.729	-0.271
	[-1.228]	[-1.481]	[-0.613]	[-0.625]	[-3.362]	[-3.461]	[-2.791]	[-2.871]
Required reserves	0.216	0.221	0.211	1.111	0.244	1.244	0.232	0.267
	[4.822]	[4.721]	[4.761]	[4.541]	[5.007]	[5.107]	[4.756]	[4.326]
Capital regulatory index	-0.242	-0.114	-0.182	0.814	-0.566	-0.534	-0.466	0.434
	[-0.897]	[-1.041]	[-0.660]	[-1.360]	[-1.956]	[-1.856]	[-1.561]	[-1.651]

Financial Liberalisation	-5.238	-5.987	-5.683	-4.453	-4.388	-3.228	-4.841	-3.921
	[-2.964]	[-2.922]	[-3.229]	[-3.242]	[-2.534]	[-2.524]	[-2.797]	[-2.456]
Banking Freedom	-3.22	-3.34	-2.611	-1.612	-4.162	-3.542	-3.508	-2.778
	[-4.431]	[-4.532]	[-3.516]	[-3.216]	[-5.353]	[-5.213]	[-4.322]	[-4.341]
Economic Freedom	4.303	4.203	3.971	4.922	4.698	5.694	4.406	4.678
	[2.684]	[2.782]	[2.529]	[2.319]	[2.986]	[2.246]	[2.847]	[2.427]
KKZ_composite	-5.778	-5.521	-5.761	-4.731	-7	-6.567	-7.008	-6.868
	[-5.572]	[-4.207]	[-5.657]	[-5.247]	[-6.210]	[-6.341]	[-6.240]	[-6.143]
R 2	0.343	0.321	0.345	0.324	0.314	1.321	0.304	0.304
LogL	-1253.8	-1352.8	-1252.8	-1234.8	-1252.8	-1246.8	-1277.8	-1277.8
LM spatial lag	1.672	1.682	4.064	4.364	5.303	5.325	6.218	6.218
LM spatial error	6.274	7.254	6.638	6.728	7.398	7.374	8.287	8.287
Robust LM spatial lag	1.071	1.391	0.796	1.496	0.211	0.101	0.03	0.03
Robust LM spatial error	5.673	5.972	5.369	6.239	4.096	4.186	6.069	6.069

P-values are in the hook. WS: whole sample, EME: Emerging Market Economics.

Table 5: Estimation results II: Bank crisis, regulation, institutions and liberalization: W_T

Determinants	1		2		3	
	Spatial and time period effects		Spatial and time-period fixed effects		Random spatial effects, fixed	
	WS	EMG	WS	EMG	WS	EMG
W*Npl	0.245	0.323	-0.008	-0.892	-0.078	-0.922
	[2.719]	[2.834]	[-0.088]	[-0.178]	[-0.773]	[-0.633]
Activity restrictions	-0.43	-0.47	-0.775	0.345	-0.774	-0.126
	[-1.778]	[-1.788]	[-2.744]	[-2.984]	[-2.946]	[-2.656]
Required reserves	0.232	0.212	0.234	0.264	0.234	0.244
	[4.877]	[4.437]	[4.393]	[4.393]	[4.720]	[4.650]
Capital regulatory index	-0.31	-0.32	-0.485	-0.415	-0.485	-0.515
	[-1.082]	[-1.082]	[-1.515]	[-1.615]	[-1.627]	[-1.637]
Financial Liberalisation	-5.296	-4.566	-4.751	-4.551	-4.754	-3.744
	[-3.081]	[-3.341]	[-2.542]	[-2.312]	[-2.733]	[-2.623]
Banking Freedom	-3.221	-2.231	-3.512	-3.312	-3.511	-3.521
	[-4.332]	[-4.452]	[-4.062]	[-4.122]	[-4.362]	[-4.351]

Economic Freedom	4.11	4.21	4.459	4.449	4.474	5.774
	[2.655]	[2.455]	[2.700]	[2.560]	[2.910]	[2.810]
KKZ_composite	-6.314	-5.544	-7.097	-7.217	-7.101	-6.021
	[-5.873]	[-5.433]	[-5.872]	[-5.212]	[-6.311]	[-6.011]
W*Activity restrictions	0.906	0.936	-0.401	-0.329	-0.441	0.329
	[2.176]	[2.346]	[-0.501]	[-0.611]	[2.176]	[2.132]
W*Required reserves	0.073	0.173	0.071	0.171	0.086	1.216
	[0.628]	[0.738]	[0.332]	[0.512]	[0.628]	[0.634]
W*Capital regulatory index	0.186	0.126	0.016	0.017	-0.093	-0.907
	[0.225]	[0.345]	[0.300]	[0.321]	[-0.077]	[-0.037]
W*Financial Liberalisation	-5.668	-5.218	3.566	3.562	3.005	2.005
	[-1.437]	[-1.217]	[0.660]	[0.620]	[0.597]	[0.584]
W*Banking Freedom	2.337	2.327	1.213	1.223	1.947	1.647
	[1.093]	[1.193]	[0.481]	[0.451]	[0.403]	[0.402]
W*Economic Freedom	0.997	1.097	3.634	3.624	4.02	4.02
	[0.278]	[0.378]	[0.622]	[0.322]	[0.278]	[0.128]
W*KKZ composite	4.01	4.21	-3.95	-3.91	-4.449	-4.449
	[1.784]	[1.684]	[-0.852]	[-0.822]	[-1.029]	[-1.219]
phi					0.996	0.996
					[8.421]	[8.511]
Sigma 2	53.082	53.322	58.141	58.211	53.082	54.082
R 2	0.437	0.447	0.465	0.545	0.309	0.409
Corrected R2	0.375	0.515	0.308	0.312	0.307	0.127
LogL	-1226	-1243	-1216	-1270	-1216	-1245
LR_spatial_lag	23.017	23.237	23.017	24.017	36.852	37.852
	[0.001]	[0.001]	[0.001]	[0.001]	[0.004]	[0.004]
LR_spatial_error	21.891	22.641	21.891	23.491	31.385	32.215
	[0.002]	[0.002]	[0.002]	[0.002]	[0.003]	[0.023]

P-values are in the hook. WS: whole sample, EME: Emerging Market Economics.