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THE INTEGRATION OF FINANCIAL MARKETS AND GROWTH – THE ROLE OF BANKING REGULATION AND SUPERVISION

1. Introduction

In the latest years many studies focused on the influence of international financial integration on long term economic growth. Despite the abundant empirical research on this topic there is no consensus about the investigated nexus. Respective studies which use various methodologies and datasets point to contradictory results. One of the potential reasons for these discrepancies are thresholds in the financial integration and economic growth nexus concerning the institutional and regulatory quality[1]. Therefore this article addresses the potential influence of banking regulation as a threshold for the financial integration-economic growth nexus. The paper is structured as follows: section two reviews briefly the related strand of literature. Section three provides the empirical specification and the results. Section four concludes.

[1] M. Kose, E. Prasad, A. Taylor, *Thresholds in the Process of International Financial Integration*, Institute for the Study of Labor (Bonn), IZA Discussion Paper 2009, no. 4133.

2. Literature review

This article borrows from two strands of literature: one concerned with the influence of financial integration on economic growth and the second concerned with banking regulation and its influence on the financial sector outcomes.

The first strand of related literature[2] identifies many possible channels through which financial integration can influence economic growth. First of all financial integration enables the fulfillment of the financial systems' functions internationally. Financial surpluses can be invested more efficiently as the effects of information and transaction costs are mitigated. Financial integration enables also international risk sharing[3]. On the other hand financial integration has a negative influence on the extent of domestic savings as it creates more profitable allocation possibilities of these surpluses. Second of all financial integration affects the real economy also through indirect channels. It contributes to the development of domestic financial markets and stimulates the volume of international trade. Both factors are economic growth enhancing. Nevertheless increasing financial integration creates the risk of economic volatility and transmission of crises.

The functioning of the mentioned transmission channels is influenced by thresholds concerning the institutional and regulatory quality[4]. An important threshold affecting the influence of financial integration on economic growth may be banking regulation and supervision. The lack of prudential supervision may be and impediment to the allocation channel, it may lead to overborrowing and to boom and bust cycles[5]. Although banking regulation seems to be an important threshold to the financial integration and economic growth nexus this two issues have not been analyzed jointly in the literature so far. Therefore this study is based also on a second strand of literature concerned with various features of banking regulation and supervision as factors influencing financial stability[6].This article especially builds on

2 J. Babecký, L. Komárek, Z. Komárková, *Financial Integration of Stock Markets among New EU Member States and the Euro Area*, Warwick Economic Research Papers 2010, no. 849; A. Bonfiglioli, *Financial Integration, Productivity and Capital Accumulation*, "Journal of International Economics" 2008, vol. 76 (2), pp. 337–355; M. Osada, S. Saito, *Financial Integration and Economic Growth: An Empirical Analysis Using International Panel Data from 1974–2007*, Paper for the third annual workshop of the BIS Asian Research Networks held on March 26, 2010, http://www.bis.org/repofficepubl/arpresearch201003.13.pdf.

3 M. Kose, E. Prasad, M. Terrones, *How Does Financial Globalization Affect Risk Sharing? Patterns and Channels*, International Monetary Fund (Washington), Working Papers 2007, no. 07/238.

4 E. Glaeser, R. La Porta, F. Lopez de Silanes, A. Schleifer, *Do institutions cause growth?,* "Journal of Economic Growth" 2004, vol. 9 (3), pp. 271–303.

5 N. Cetorelli, L. Goldberg, *Global Banks and International Shock Transmission: Evidence from the Crisis*, "IMF Economic Review" 2011, vol. 59 (1), pp. 41–76.

6 R. Levine, S. Zervos, *Stock Markets, Banks, and Economic Growth*, "The American Economic Review" 1998, vol. 88 (3), pp. 537–558; N. Loayza, R. Ranciere, *Financial Development, Financial Fragility, and Growth*, "Journal of Money, Credit, and Banking" 2006, vol. 38 (4), pp. 1051–1076; A. Demirgüc-Kunt, E. Detragiache,

the paper of Barth, Caprio and Levine (2004), which investigates the relationship between a broad array of banking regulatory and supervisory practices and banking-sector efficiency and fragility.

3. Methodology and the results

Following the line of an extensive strand of related literature this study uses as financial integration measure the annual stock of foreign assets and liabilities to GDP provided by Lane and Milesi-Ferretti (2008). The macroeconomic data is taken from PWT 7.0 and the World Bank database. The study uses also the average years of schooling as a proxy for human capital- a measure provided by Barro and Lee (2000) and an indicator of institutional quality provided by Kaufmann, Kraay and Mastruzzi (2010)[7]. The study covers the period of 1975–2007 and a sample of 69 countries.

To investigate the role of banking regulation and supervision the study uses a broad set of indicators computed on the base of the paper by Barth, Caprio and Levine (2004)[8] and the latest update of the World Bank Banking Regulatory Database (2008). The latter encompasses indicators of: regulatory restrictions on bank activities and the mixing of banking and commerce, regulations on domestic and foreign bank entry, regulations on capital adequacy, deposit insurance system regulation, supervisory power, loan classification stringency, provisioning standards, and diversification guidelines, regulations fostering information disclosure and private-sector monitoring of banks and government ownership. The study uses the respective detailed regulatory elements and the broad banking regulation as a whole as indicators. The measures of banking supervision, entry into banking, banking activity, capital requirements, private monitoring and deposit insurance indicate regulation stringency. Higher indicators stand for greater stringency. In the case of foreign bank ratio, government owned bank ratio and banking concentration pure numbers are computed. Following Barth, Caprio and Levine (2004) the paper uses the absolute and the first principal component versions of the indicators. The reported results are principal component versions but the exercises are performed for absolute versions as well.

Table 1 presents the correlation coefficients between the respective forms of banking sector features.

Basel Core Principles and bank soundness. Does compliance matter?, "Journal of Financial Stability" 2011, vol. 7 (4), pp. 179–190.

[7] D. Kaufmann, A. Kraay, M. Mastruzzi, *The Worldwide Governance Indicators, Methodology and Analytical Issues*, World Bank (Washington), Policy Research Working Paper 2010.

[8] J. Barth, G. Caprio, R. Levine, *Bank regulation and supervision: what works best?*, "Journal of Financial Intermediation" 2004, vol. 13, pp. 205–248.

Table 1. Correlation among banking sector features

	Banking supervision	Foreign banks	Government banks	Banking concentration
Banking supervision	1			
Foreign banks	–0.13	1		
Government banks	0.19*	–0.25***	1	
Banking concentration	0.04	0.3***	–0.08	1
Entry into banking	0.01	0.12	–0.27***	–0.05
Banking activity	0.07	0.04	0.04	0.01
Capital requirements	–0.27***	–0.06	–0.04	–0.18
Private monitoring	–0.19*	–0.02	0.12	0.10
Deposit insurance	0.20	–0.02	–0.10	–0.24

Continuation of Table 1

	Entry into banking	Banking activity	Capital requirements	Private monitoring	Deposit insurance
Entry into banking	1				
Banking activity	–0.01	1			
Capital requirements	0.1	0.05	1		
Private monitoring	0.1	0.04	–0.19*	1	
Deposit insurance	–0.17*	0.13	0.16	–0.07	1

* significance at 0,1 level, ** significance at 0,05 level, *** significance at 0,01 level
Source: authors coputations based on: J. Barth, G. Caprio, R. Levine, *Bank regulation and supervision: what works best?*, "Journal of Financial Intermediation" 2004, vol. 13, pp. 205–248 and the World Bank Banking Regulatory Database (2008).

Summary statistics indicate that there is significant positive correlation between banking supervision and the ratio of government owned banks. In contrast- supervision is significantly negatively correlated with capital requirement stringency and private monitoring restrictiveness. The ratio of foreign owned banks is positively correlated with banking concentration. This may be due the fact that foreign banks are owned by a limited number of international investors. One can glean from the table that entry into banking stringency is negatively correlated with the ratio of government owned banks. The entry into banking stringency is also negatively correlated

with the deposit insurance restrictiveness. There is also significant negative correlation between capital requirements stringency and the extent of private monitoring.

To investigate the impact of financial integration on growth this paper builds on the augmented neoclassical growth model[9]. The empirical specification closely follows the line of the mentioned related studies. The specification is based on dynamic panel data estimation. The basic model has the following form:

$$\Delta y_{it} = \alpha_1 y_{0it} + \alpha_2 \Delta POP_{it} + \alpha_3 INV_{it} + \alpha_4 HC_{it} + \alpha_5 FI_{it} + \alpha_6 MACRO_{it} + \alpha_7 BR_{it} + \alpha_8 FIBR_{it} + \xi_i + \eta_t + \varepsilon_{it} . \quad (1)$$

To eliminate the influence of short term cyclical fluctuations and to account for market structure adjustments the estimation is based on five year averages of the underlying data. Growth rates (Δy_{it}) are defined as the log difference of real GDP per capita, y_{0it} denotes the log of real GDP per capita five years prior to period t and accounts for the convergence effect. ΔPOP_{it} stands for the log difference of population, INV_{it} denotes the gross fixed capital formation ratio to GDP, HC_{it} stands for the average years of schooling as a proxy for human capital, FI signifies the financial integration measure. $MACRO_{it}$ is a set of control variables which are robust correlates of growth. BR_{it} signifies the respective banking regulatory variables $FIBR_{it}$ stands for the interactions between financial integration and banking regulation.

The introduction of the interactive variables allows to investigate how banking regulatory variables affect the marginal effect of financial openness on growth. To check for a potentially optimal level of banking regulation squared values of the variables are included in the second step of the study. Subsequently the basic model is modified as follows:

$$\Delta y_{it} = \alpha_1 y_{0it} + \alpha_2 \Delta POP_{it} + \alpha_3 INV_{it} + \alpha_4 HC_{it} + \alpha_5 FI_{it} + \alpha_6 MACRO_{it} + \alpha_7 BR_{it}^2 + \alpha_8 FIBR_{it}^2 + \xi_i + \eta_t + \varepsilon_{it} . \quad (2)$$

Due to potential endogeneity and because of the inclusion of time invariant variables in the regression the applied estimation technique is the Blundell-Bond system GMM. The Hausman test points to the right selection of the estimator, the Sargan test does not allow to reject the null hypothesis of the validity of instruments. For what concerns the stationarity of the data the Fisher type ADF test with one lag shows that in the case of all variables one can reject the null hypothesis that all panels contain a unit root in favour of the alternative hypothesis that at least one panel is stationary.

In the first step of the study a set of ten regressions conforming to the baseline model (1) is estimated. The main results are shown in Table 2 and 3. In the second step of the study the estimation is performed by means of 5 regressions conforming

[9] G. Mankiw, D. Romer, D. Weil, *A Contribution to the Empirics of Economic Growth*, "The Quarterly Journal of Economics" 1992, vol. 107 (2), pp. 407–437.

to the modified model (2) with squared interactions. In the third step robustness checks for subsamples are performed. The basic sample is divided into industrialized, emerging and developing economies.

Table 2. Baseline regression results

	1	2	3	4	5
Initial log real GDP per capita	–0.06**	–0.02**	–0.02**	–0.01*	–0.02**
Population growth	–10.61***	–10.60***	–10.59***	–10.61***	–10.92***
Average years of schooling	0.06***	0.05***	0.03	0.03	0.05**
Gross fixed capital formation	0.01***	0.01***	0.01***	0.01***	0.01***
Openness	10(–4)	–0.00	–0.00	–0.00	–0.00
Inflation	$-2*10^{(-4)}$ ***	$-2*10^{(-4)}$ ***	$-2*10^{(-4)}$ ***	$-2*10^{(-4)}$ ***	$-2*10^{(-4)}$ ***
Institutional quality	0.01	–0.01	–0.06	–0.01	–0.03
Financial integration	–0.04***	–0.05***	–0.01	–0.04**	–0.04**
Financial depth	$-10^{(-4)}$	$-10^{(-4)}$	$-2*10^{(-4)}$	$-10^{(-4)}$	$-3*10^{(-4)}$
Broad banking regulation	0.02***				
Banking supervision		–0.01*			
Foreign banks ratio			0.06		
Government owned banks ratio				0.03	
Banking concentration					0.07
Interaction with broad banking regulation	$4*10^{(-3)}$	0.0053	0.0141**	0.02***	0.01

Table 3. Baseline regression results (cont.)

	6	7	8	9	10
Initial log real GDP per capita	–0.02***	–0.017***	–0.02***	–0.02***	–0.02***
Population growth	–10.56***	–10.58***	–10.49***	–10.55***	–10.49***
Average years of schooling	0.05***	0.05***	0.06***	0.05***	0.05***
Gross fixed capital formation	0.01***	0.01 ***	0.01***	0.01***	0.01***
Openness	0.00	0.00	0.00	0.00	0.00
Inflation	$-2*10^{(-4)}$ ***	$-2*10^{(-4)}$ ***	$-2*10^{(-4)}$ ***	$-2*10^{(-4)}$ ***	$-2*10^{(-4)}$ ***
Institutional quality	–0.01	–0.01	–0.03	–0.02	–0.01
Financial integration	–0.04***	–0.04***	–0.05***	–0.05***	–0.04***
Financial depth	0.00	0.00	0.00	0.00	0.00
Entry into banking	0.19				
Banking activity		0.02			
Capital requirements			0.13**		
Private monitoring				–10.99	
Deposit insurance					0.49
Interaction with broad banking regulation	0.01	0.01	0.01	0.01	0.01

Table 4. The results of the regression with quadratic interaction

	1	2	3	4	5	6
Initial log real GDP per capita	–0.21***	–0.21***	–0.21***	–0.21***	–0.21***	–0.21***
Population growth	–10.01***	–10.09***	–10.06***	–10.05***	–10.07***	–10.05***
Average years of schooling	0.04***	0.04***	0.04***	0.04***	0.04***	0.04***
Gross fixed capital formation	0.01***	0.01***	0.01***	0.01***	0.01***	0.01***
Openness	0.00	0.00	0.00	0.00	0.00	0.00
Inflation	$-10^{(-4)}$ ***	$-10^{(-4)}$ ***	$-10^{(-4)}$ ***	$-10^{(-4)}$ ***	$-10^{(-4)}$ ***	$-10^{(-4)}$ ***
Institutional quality	–0.02	–0.02	–0.02	–0.02	–0.02	–0.02
Financial integration	–0.03	–0.02	–0.07	–0.03	–0.03	–0.03
Financial depth	0.00	0.00	0.00	0.00	0.00	0.00
Broad banking regulation square	0.00					
Banking supervision square		0.00				
Entry into banking square			0.64			
Banking activity square				0.00		
Capital requirements square					–0.33	
Deposit insurance square						–80.69

	1	2	3	4	5	6
Interaction term square	2*10(–4) ***	0.00	0.00	0.00	0.00	10(–4)

Table 5. Robustness checks for subsamples

	1	2	3	4	5
Initial log real GDP per capita	0.32*** 0.32*** –0.04	0.28*** 0.35*** –0.07	0.16** 0.36*** –0.05	0.22 0.36*** 0.09	0.20*** 0.36*** 0.08
Population growth	–0.54 –10.60*** –10.04***	–0.49 –10.63*** –0.87*	–0.71* –10.84*** –0.50	–0.60 –10.67*** –0.65	–10.20*** –10.73*** –10.17
Average years of schooling	0.03** –0.03 0.05	0.03** –0.03 0.05	0.02 –0.02 0.04	0.02 –0.03 0.06	0.01 –0.03 0.07*
Gross fixed capital formation	0.02*** 0.02*** 0.01***	0.02*** 0.02*** 0.01***	0.01*** 0.02*** 0.01***	0.01*** 0.02*** 0.01***	0.01*** 0.02*** 0.01***
Openness	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00
Inflation	0.00 –10(–4) *** –10(–4) *	0.00 –10(–4) *** –10(–4) *	0.01** –10(–4) *** –10(–4) ***	0.01*** –10(–4) *** 0.00	0.00 –10(–4) *** 0.00
Institutional quality	–0.03 –0.01 0.01	0.00 –0.01 0.02	0.00 0.02 0.04	0.04 0.01 0.01	0.01 0.01 0.00
Financial integration	0.02 –0.01 –0.03	0.03 –0.01 –0.04	0.01 –0.01 –0.10***	0.00 –0.01 –0.09***	0.02 –0.01 –0.09***
Financial depth	–0.01** 0.00 0.00	–0.01** 0.00 0.00	–0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00
Broad banking regulation	0.01 0.01** –0.02*				
Banking supervision		–0.01* 0.00 0.00			
Foreign banks			0.01 0.03 –0.07		

	1	2	3	4	5
Government owned banks				0.09 0.10 0.03	
Banking concentration					0.01 0.03 –0.04
Interaction term	–0,013 –0,01 0,01	–0,01 –0,01 0,01	0,01 –0,01 0,01	0,01 –0,01 0,01	0,01 –0,01 0,01

	6	7	8	9	10
Initial log real GDP per capita	0.30*** 0.35*** 0.08	0.30*** 0.36*** 0.08	0.30*** 0.35*** 0.07	0.31*** 0.34*** 0.05	0.27*** 0.35*** 0.08
Population growth	–0.46 –10.77*** –0.90*	–0.48 –10.69*** –0.89*	–0.48 –10.67*** –0.84*	–0.45 –10.65*** –0.85*	–0.66* –10.70*** –0.87*
Average years of schooling	0.03** –0.03 0.06	0.03** –0.03 0.06	0.06* –0.03 0.06	0.03** –0.03 0.06	0.03** –0.03 0.06
Gross fixed capital formation	0.02*** 0.02*** 0.01***	0.02*** 0.02*** 0.01***	0.02*** 0.02*** 0.011***	0.02*** 0.02*** 0.01	0.02*** 0.02*** 0.01***
Openness	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00
Inflation	0.00 $-10^{(-4)}$ *** $-10^{(-4)}$*	0.00 $-10^{(-4)}$ *** $-10^{(-4)}$*	0.00 $-10^{(-4)}$ *** $-10^{(-4)}$*	0.00 $-10^{(-4)}$ *** $-10^{(-4)}$*	0.00 $-10^{(-4)}$ *** $-10^{(-4)}$ *
Institutional quality	–0.02 –0.01 0.01	–0.02 –0.01 0.01	–0.02 0.00 0.00	–0.02 –0.02 0.01	–0.04 –0.01 0.01
Financial integration	0.03 0.00 –0.03	0.03 0.00 –0.04	0.03* 0.00 –0.04	0.03* 0.00 –0.04	0.03* 0.00 –0.04
Financial depth	$-5*10^{(-4)}$* 0.00 0.00	$-5*10^{(-4)}$ * 0.00 0.00	$-4*10^{(-4)}$* 0.00 0.00	0.00 0.00 0.00	$-6*10^{(-4)}$ ** 0.00 0.00
Entry into banking regulation	–0.14 –0.15 –0.26				

	6	7	8	9	10
Banking activity regulation		0.00 –0.01 0.01			
Capital requirements			–0.07* –0.06 0.14		
Private monitoring				–20.08 –10.09 –20.80	
Deposit insurance					–0.76*** –0.08 –0.14
Interaction term	0.00 –0.01 0.01	0.00 0.01 0.00	0.00 –0.01 0.00	0.00 –0.01 0.01	0.00 –0.01 0.01

The estimates in the respective rows are computed for industrialized, emerging and developing countries.

4. Conclusions and further research

The results of the baseline regression are presented in tables 2 and 3. The exercise confirms the results of the majority of related studies concerning the negative relation between financial integration and long term growth. This effect is significant for nine out of ten regressions. The coefficients of the control variables are in line with those obtained in similar papers. As far as the banking regulatory measures are concerned the exercise points to a positive and significant impact of overall banking regulation restrictiveness on growth. The estimation points moreover to a significant positive effect of capital requirements stringency on growth.

In contrast- the influence of banking supervision restrictiveness on growth is negative and significant. Other banking regulatory features seem not to matter for growth, neither do general banking sector features like foreign banks ratio, government owned banks ratio or banking concentration.

The coefficient of the interactive term is positive in all regressions and significant in two out of ten panels. This result might imply that strict banking regulation turns the negative impact of financial integration on growth positive.

Table 4 presents the results for the regression with the quadratic interaction between financial integration and banking regulation. The sign of the coefficient of the financial integration variable is again negative. The coefficients of the squares of the respective banking regulatory variables are positive yet insignificant. The quadratic interactive term is positive as well. This confirms the result obtained in the first step of the study that restrictive banking regulation may turn the negative impact of financial

integration on growth into positive. The result may indicate moreover that there is an optimal level of banking regulation, although this effect is statistically insignificant.

The tables 5 and 6 provide the robustness checks for subsamples. The results differ depending on the group of countries investigated. Financial integration seems to have a positive insignificant effect on growth in industrialized countries, a negative insignificant impact in emerging countries and a negative significant influence in developing countries. Similarly varies the importance of banking regulatory features. Restrictive banking regulation contributes to growth significantly and positively in emerging countries while significantly and negatively in developing countries. Its impact on long term growth in industrialized countries is positive and insignificant. On the other hand banking supervision has a negative significant coefficient for the industrialized countries' sample while it remains positive and insignificant for emerging and developing economies. The industrialized countries are also characterized by a negative significant relation between capital requirements stringency and deposit insurance extent and growth. In emerging economies this impact is negative and insignificant in both cases, for the developing countries stringent capital requirements have a positive insignificant impact on growth while deposit insurance a negative insignificant effect.

One can also glean from table 5 and 6 that the results concerning the interactive term obtained in the first step of he study are only robust for the developing country sample. Here the positive coefficient of the interactive variable may suggest that stringent banking regulation mitigates the negative influence of financial integration on growth in those countries. In emerging economies stringent banking regulation seems not to affect the negative impact of financial integration on growth since the coefficient is negative. For the industrialized country sample no robust conclusions can be drawn about the role of the interactive term.

The analyzed topic surely needs further research. The role of banking regulation in shaping the real effects of financial markets integration has gained on importance especially after the latest global financial crisis from 2007–2009. A serious limitation to the study is the constraint that the data on banking regulation is cross sectional and does not reflect the recent changes in the regulatory framework. Nevertheless the results of the study may be a point of departure for further research on the emerging discussion about the role of banking regulation in the financial integration- growth nexus.

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Summary

The integration of international financial markets and growth – the role of banking regulation and supervision

The study is aimed at investigating the role of banking regulation and supervision in the relation between financial integration and long term growth by means of dynamic panel model estimation. The study covers a sample of 69 countries during the period 1975–2007. The study gives some new results on the impact of banking regulation on the investigated relation. Banking regulation can turn the negative impact of financial integration on growth into positive. Moreover the results indicate that the respective banking regulatory features play various roles in shaping the effects of financial integration on growth.

Keywords: financial integration, banking regulation, banking supervision, growth
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