

The integration of the financial markets and growth evidence from a global cross-country analysis

Katarzyna Sum*

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Abstract

The article is aimed at investigating the nexus between financial integration and growth and analyzing potential threshold effects in this relation for a sample of 69 countries during the period 1975–2007 by means of dynamic panel model estimation. The investigated thresholds are: financial depth, institutional quality and banking regulatory features. The obtained results confirm the majority of the results of related papers concerning the impact of the respective forms of financial integration on long term economic growth. The study gives also some new results on potential thresholds. The set of exercises points to a significant positive influence of restrictive banking regulation on the financial integration-growth nexus.

Keywords: financial integration, growth regressions, banking regulation

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* Warsaw School of Economics, Chair of International Finance; e-mail: ksum@sgh.waw.pl.

1. Introduction

The integration of international financial markets¹ is becoming an increasingly strong and economically significant process. This concerns several regions of the world – developing and developed countries as well. There are various definitions of financial markets' integration in the economic literature. A commonly held view is that financial integration occurs if potential market participants face the same set of rules, have equal access to financial instruments and are treated equally when they are active on the market (Baele et al. 2004, p. 6). This process requires the opening of the domestic financial markets and institutions to foreign players and permitting domestic subjects to access foreign markets, removing borders to capital flow, removing obstacles and discrimination of foreign players, harmonization of standards and law (García-Herrero, Wooldridge 2007, p. 58). The above mentioned definitions identify financial markets' integration with capital flow liberalization.

Other authors claim that financial integration occurs if the law of one price holds and similar financial instruments are traded at the same price (Adam et al. 2002, p. 4). Taking into account the barriers to the fulfillment of the law of one price one can expect that financial openness relates rather to the activity of domestic actors on international financial markets than to price equalization. Therefore this study focuses on those features of the financial markets which relate to one might say 'weaker' forms of integration than price equalization, namely increasing activity of domestic players on international financial markets.

The real effects of financial markets' integration are a broadly discussed topic in the literature (Edison et al. 2002; Abiad, Leigh, Mody 2007; Bonfiglioli 2008; Kose et al. 2009; Kose, Prasad, Taylor 2009; Kose et al. 2009; Babecky, Komárek, Komárková 2010; Osada, Saito 2010). The related strand of literature identifies several direct and indirect channels through which financial markets' integration can influence 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 (Kose, Prasad, Terrones 2009). Several forms of capital flows trigger the functioning of various channels via which financial integration influences directly the real economy. FDI flows affect several determinants of growth: investment decisions and hence the capital stock, technological innovation and productivity, foreign debt securities enable international risk sharing and efficient capital raising, foreign equity securities enable efficient capital allocation (Osada, Saito 2010). All forms of capital flows mitigate domestic financial constraints and hence contribute to growth positively. 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 (Osada, Saito 2010). Both factors are growth enhancing. Nevertheless increasing financial integration creates the risk of economic volatility and transmission of crises (Bonfiglioli 2008). This channel especially gained attention after the latest global financial crisis from 2007–2009 (Lane 2008).

¹ In this paper the term financial integration, financial openness and financial markets' integration are used interchangeably.

Despite the abundant empirical research on the financial integration-growth nexus there is no consensus about the investigated relation. Respective studies which use various methodologies and datasets point to contradictory results. One of the potential reasons for this discrepancies are thresholds concerning the institutional and regulatory quality which influence the functioning of the transmission channels between financial integration and growth (Glaeser et al. 2004; Kose et al. 2009; Kose Prasad, Taylor 2009). The variety of empirical results concerning the financial integration-growth nexus points to the necessity of further research concerning this topic.

This article is aimed at investigating the nexus between financial integration and growth and analyzing potential threshold effects for a sample of 69 countries during the period 1975–2007 by means of dynamic panel model estimation. Besides the thresholds in the relation between financial integration and growth investigated in the literature – financial depth and institutional quality – an addition is the inclusion of banking regulatory features as a potential threshold.

The article is structured as follows. Section two provides a literature review concerning the impact of financial integration on growth. The third section deals with data and measurement issues and presents the empirical specification. The fourth section provides the results. The fifth section concludes.

2. Literature review

The related strand of literature identifies several direct and indirect channels through which financial markets' integration can influence growth. A recent review is provided by Kose et al. (2009, pp. 10–15). The direct transmission channels can be grouped into three categories: mechanisms affecting directly the dynamics of growth according to the neoclassical model, channels enabling international risk sharing and mechanisms affecting macroeconomic volatility. The importance of these transmission channels depends on the form of capital flows and the growth determinants affected. A common finding is that the most significant direct channel are FDI and portfolio equity flows (Bekaert, Harvey, Lundblad 2005; Kose et al. 2009; Osada, Saito 2010). Not only do they affect several determinants of growth (capital stock, and productivity) but they are stable and not easily prone to reversals as well. Moreover they enable transfers of managerial and technological expertise.

Another potential group of transmission channels are international risk sharing possibilities. Growth opportunities may occur as a consequence of reducing the volatility of aggregate consumption and delinking national consumption and income (Kose et al. 2009, p. 3). The significance of this channel depends again on the form of capital flow. While FDI and equity have a positive influence on risk sharing debt flows are an impediment to share consumption risk. The third group of channels concerns the influence of financial integration on macroeconomic volatility. The lack of capital controls can create the risk of global financial destabilization (Rodrik 1998). Debt flows, especially short term are more procyclical and prone to reversals than equity flows and therefore presumed to have a negative influence on economic growth (Kose et al. 2009; Osada, Saito 2010). Although some authors come to the conclusion that capital flow restrictions render economies more prone to crises (Glick, Guo, Hutchison 2004; Edwards 2005). Kose et al. (2009) conclude that these findings may be due to the fact that capital flow

restrictions are introduced by countries with poor economic performance which are *per se* prone to instability.

There is no consensus about the direct financial integration-growth nexus. Respective studies point to various evidence. Osada and Saito (2010) find a positive significant nexus between FDI and equity liabilities and economic growth and a negative impact of debt liabilities. Bekaert, Harvey and Lundblad (2005) who focus on equity markets liberalization obtain a significant positive growth effect by applying *de jure* measures of financial integration. On the other hand Edison et al. (2002) analyze broad measures of financial integration: the accumulated stock of liabilities and the accumulated stock of liabilities and assets, FDI, portfolio, and total financial claims as well as *de jure* measures. They do not find robust evidence for the analyzed nexus by means of several econometric methods. A different approach is undertaken by Bonfiglioli (2008) who focuses on the direct channel of capital flows as a whole and measures their impact on two growth factors – investment and productivity. She finds that international financial integration measured by *de jure* and *de facto* measures has a significant positive effect on productivity but its impact on capital accumulation is insignificant.

The effect of financial integration on growth may be strengthened by indirect channels. Kose, Prasad and Taylor (2009) hold the view that indirect channels enable an even more significant transmission of impulses to the real economy than direct channels. They attribute this strong impact to benefits commonly associated with opening of economies like e.g. the development of the domestic financial sector, macroeconomic discipline, increased competition and reforms which are growth enhancing. Similarly to the direct link – there is no consensus about the indirect financial integration-growth nexus either. E.g. Bonfiglioli (2008) considers a positive channel concerning the impact of financial integration on financial development and the availability of external finance to the private sector but she finds weak support for this hypothesis. Osada and Saito (2010) analyze the impact of FDI and equity liabilities on trade openness and the influence of debt liabilities on the ratio of private domestic credit to GDP. They find that FDI and equity liabilities affect significantly trade openness hence the impact of these capital flows on growth is larger than the one resulting from the direct channel only. On the other hand the indirect effect of debt liabilities on growth is positive but statistically insignificant.

The variety of empirical results concerning the financial integration-growth nexus may be due to threshold effects in the mentioned relation (Kose, Prasad, Taylor 2009). Countries can reap the benefits or mitigate the negative impact of financial markets integration provided they meet some initial conditions. Generally as important thresholds are considered: the extent of financial sector development, institutional quality and regulation, trade openness, the macroeconomic policy framework and the overall development of an economy (Kose et al. 2009; Kose, Prasad, Taylor 2009). Financial development is commonly measured as private credit and stock market capitalization to GDP. Its significance as a threshold varies across respective studies (Edison et al. 2002; Alfaro et al. 2004; Bekaert, Harvey, Lundblad 2005; Kose, Prasad, Taylor 2009; Osada, Saito 2010). As far as another threshold condition – institutional quality is concerned the empirical evidence on its importance is mixed as well. Institutional quality may refer to: quality of corporate and public governance, the legal framework, property rights protection, the level of corruption, and the degree of government transparency (Kose et al. 2009). Among others Edison et al. (2002), Bekaert, Harvey, Lundblad (2005), Schularick, Steger (2006); Kose, Prasad, Taylor (2009); Osada,

Saito (2010) find a strong positive influence of institutional quality on the financial integration-growth nexus. Other authors e.g. Quinn and Toyoda (2008) obtain a weaker effect. A very broad strand of literature focuses on the role of macroeconomic policies. Several types of prudent policies are stressed to be important thresholds: fiscal policies, monetary policies or exchange rate policies (Rodrik 2005; Kose, Prasad, Taylor 2009).

To examine the relation between financial integration and growth related papers build on the augmented neoclassical model described by Mankiw, Romer and Weil (1992). Numerous growth decomposition exercises point to the existence of significant determinants beside production factors that explain growth differences between countries. The studies show that policies aimed at improving the allocation of capital may contribute to growth even stronger than only boosting capital accumulation (Levine 2001, pp. 688–702). Various modifications of the neoclassical model focused on the role finance, institutions, policies or legal framework as determinants of growth.

An issue which is addressed in growth decomposition exercises are also cross country differences in initial economic conditions and steady states, which are determined by saving and population growth rates. According to the neoclassical model, if countries are in different steady states, the economies do not experience absolute beta convergence of income. Conversely, if they are in the same steady state the neoclassical model predicts absolute beta convergence of income, hence countries with lower GDP per capita tend to grow faster than countries with higher GDP per capita (Mankiw 1995, pp. 284–285). Although one can not assume a common steady state for large country samples. An alternative is to test for conditional beta convergence including variables to control for determinants of the steady state. According to this concept each economy converges to its own steady state.

The above cited related studies point to mixed conclusions about the influence of financial integration on growth. The examination of potential threshold effects becomes crucial to evaluate the real effects of financial markets integration.

3. Empirical specification

3.1. Data

The economic literature defines several *de jure* and *de facto* measures of financial markets integration. A detailed review is provided by Edison et al. (2002). Empirical studies use either proxies for restrictions on capital flows or the stock of foreign assets and liabilities to GDP as measures of financial openness. Following the line of an extensive strand of related literature this paper uses two broad measures of financial markets integration: the Chinn-Ito index and the openness measure provided by the updated Lane and Milesi-Ferretti database. The Chinn-Ito measure reflects the extent and the intensity of capital controls and ‘is based on the binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions’ (Chinn, Ito 2007). The Lane and Milesi-Ferretti measure refers to the stock of foreign assets and liabilities to GDP. This paper uses the broad openness measure provided by the Lane and Milesi-Ferretti database and the narrow measures referring to the respective forms of foreign assets and liabilities – portfolio equity liabilities, portfolio debt liabilities and FDI liabilities.

To account for possible threshold effects in the financial integration of growth nexus it is necessary to consider measures of institutional quality and financial depth. This approach is undertaken in several related papers (Glaeser et al. 2004; Kose, Prasad, Taylor 2009; Osada, Saito 2010). Additionally as a threshold measure an indicator of banking regulatory features is included.

The proxy for institutional quality is the indicator derived from the World Bank Governance Indicators. The indicator includes measures of: voice and accountability, political instability and violence, government effectiveness, regulatory quality, rule of law and control of corruption (Kaufmann, Kraay, Mastruzzi 2010). The data on these institutional features is available since 1996 and is persistent over time. Due to this fact and also following the line of Kose, Prasad and Taylor (2009) this paper uses the simple average of the indicators.

Financial depth is measured similarly as in related papers by the ratio of private credit to GDP. This data is obtained from the World Bank database.

The indicator of banking regulatory features is computed on the base of Barth, Caprio and Levine (2004) and the latest update of the World Bank Database on Banking Regulation. 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. Following Barth, Caprio and Levine (2004) the absolute and the first principal component versions of the indicators are used in the exercises. The indicator is a fixed institutional country feature due to its persistence over time.

Macroeconomic data is obtained from the Penn World Table Version 7.0. The study also uses data on average schooling years as a proxy for human capital from the Barro and Lee (2000) database.

The study covers 69 countries and the sample period 1975–2007. The applied data is annual. The time scope of the study is limited by data availability for the Lane-Milesi Ferretti measures. The country sample is confined by data availability as well, moreover outliers are excluded. The list of the country sample is presented in Table 1.

Figure 1 and 2 provide some initial evidence from descriptive statistics i.e. the investigated nexus and the influence of banking regulation on this relation. One can glean from Figure 1 that growth rates are quite independent from financial integration measured as the ratio of total foreign liabilities in GDP. The majority of economies with a similar level of financial integration tend to grow at a different pace. Whereas if financial integration is combined with banking regulation one can spot a more differentiated pattern between financial openness and growth rates among the sample countries. This may indicate that banking regulation may be an important threshold in the financial integration-growth nexus.

3.2. Methodology

To investigate the impact of financial integration on growth this paper builds on the augmented neoclassical growth model (Mankiw, Romer, Weil 1992). The empirical specification is based on dynamic panel data estimation. The basic model has the following form:

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

The applied model closely follows the line of a broad strand of related literature (Kose, Prasad, Taylor 2009; Osada, Saito 2010). To eliminate the influence of short term cyclical fluctuations and to account for market structure adjustments five year averages of the underlying data are used. 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_{it} signifies the respective financial integration measures. $MACRO_{it}$ is a vector of control variables which are robust correlates of growth. $INTERACTIVE_{it}$ stands for the respective interactions between the financial integration and threshold variables.

The introduction of the interactive variables allows to link financial integration and threshold measures and to investigate how institutional quality, financial depth and banking regulatory variables affect the marginal effect of financial openness on growth.

To check for a potentially optimal level of the threshold and interactive variables squared values of the variables are included in the second step of the study. Subsequently the basic model is modified as follows:

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

Due to potential endogeneity and because of the inclusion of time invariant variables (data on banking regulation) in the regression the applied estimation technique is the Blundell-Bond system GMM (Roodman 2006; 2008). The robustness check is carried out with random effects estimation. 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 favor of the alternative hypothesis that at least one panel is stationary.

The threshold of financial depth and institutional quality has been investigated carefully by Kose, Prasad and Taylor (2009). This study takes into account the conditions analyzed by the mentioned authors but focuses particularly on banking regulatory features as a threshold. Therefore, in the first step of the study the country sample is divided by the restrictiveness of banking regulation – above and below the within group median (Table 1). This exercise is aimed at investigating whether there is an obvious difference in the impact of financial integration on growth in the two groups of countries which would be conducive to the significance of banking regulation as a threshold. Subsequently tests for unconditional and conditional convergence are performed in both groups of economies.

In the second step a set of regressions conforming to the basic empirical specification for the whole country sample is performed. The respective financial integration measures included are: the broad stock of foreign liabilities to GDP, portfolio equity liabilities, portfolio debt liabilities and FDI liabilities and the Chinn-Ito measure. Due to potential collinearity the measures are included

separately in the regressions. This approach assumes a linear interaction between the financial integration and threshold variables.

In the third step another set of regressions is performed this time conforming to the modified empirical specification and allowing for a quadratic interaction between the financial integration and threshold variables.

In the fourth step the regressions are performed for the two country samples separately. As the last step of the study robustness checks for subsamples – industrialized, emerging and other developing economies are performed. All regressions are estimated in Stata12.

4. Results

The test results for unconditional and conditional convergence are presented in Table 3. The exercise is aimed at checking whether there are differences in average growth rates within two groups of countries – with restrictive banking regulation (over the median) and with lax banking regulation (below the median) over the period 1975–2007. For what concerns unconditional convergence the coefficients are negative and statistically significant for both groups which is consistent with the prediction of the neoclassical growth model. The obtained results do not point to significant differences in average growth rates between countries with restrictive banking regulation and countries with less stringent regulation. This effect is sustained after the inclusion of additional variables and testing for conditional convergence.

In the next step of the study four panel regressions are performed conforming to the basic empirical specification for the whole country sample. The Hausman specification test points to the right selection of the model. The Sargan test for overidentifying restrictions points to the right selection of instruments when applying the GMM method. Table 4 provides the estimation results for the baseline model with a linear interaction between financial integration and the respective threshold variables. Due to collinearity the interactive variables are included in separate regressions. The first three regressions include a broad financial integration measure – total foreign liabilities to GDP. In the fourth regression the Chinn-Ito index is applied instead. For each regression the GMM estimation result are provided in the first row and the random effect estimation result as a robustness check in the second row.

The results for the first panel indicate that the initial level of real GDP per capita, the level of CPI inflation, population growth and gross fixed capital formation to GDP matter significantly for growth. The coefficients for the first three mentioned variables are negative the one of the last variable positive, which is consistent with economic theory. The robustness of these results is shown also by means of a random effect estimation. Also the average years of schooling has a significant and positive coefficient when using the GMM estimator, but it turns insignificant though stays still positive after switching to the random effects estimator. Financial depth has an insignificant negative coefficient. The financial integration indicator – the ratio of total foreign liabilities to GDP has a significant negative impact on long term growth. The banking regulatory measure has a positive significant sign, which might indicate that stricter banking regulation contributes to long term growth positively. The results for the financial integration and banking regulatory measures lack robustness when switching to the random effects estimation. As far as

the interactive variable is concerned – both methods show that banking regulation turns the negative influence of financial integration on growth into positive though this effect is statistically insignificant.

In the second panel financial integration (the ratio of total foreign liabilities to GDP) and financial depth are interacted. The estimates of the macroeconomic variables coefficients confirm the robustness of the results obtained in the first panel with both estimation methods. As far the financial integration indicator is concerned the both methods indicate a negative insignificant influence on long term growth. Similarly as in the first panel banking regulation has an significant positive coefficient. Moreover financial depth has an insignificant negative impact on long term growth. The coefficient of the interactive variable between financial integration and financial depth is negative and insignificant which might imply that greater financial depth does not alter the negative impact of financial integration on growth.

In the third panel financial integration and institutional quality are interacted. Institutional quality is negative but insignificant in three out of four panels. Financial integration has again a significant negative sign. The coefficient of the interaction term shows that high institutional quality can turn this negative impact to significant and positive although this result lacks robustness.

In the fourth panel the total foreign liabilities measure is replaced by the Chinn-Ito index and linked again with banking regulation. The results show that *de jure* openness doesn't matter for growth. The negative sign indicates that bigger restrictions on capital flows might imply lower growth rates. The interactive term has a negative sign and is statistically insignificant which might signify that restrictive banking regulations do not alter the negative influence of the restrictions on capital flows.

So far one can draw the conclusion that financial integration has a negative impact on long term growth. Moreover the only significant and robust threshold variable seems to be banking regulation. It's impact on the overall effect of financial integration on long term growth is positive.

In the next step of the study another set of regressions is performed but this time the broad financial integration measure is split into three indicators: portfolio equity liabilities, portfolio debt liabilities, foreign direct investment liabilities. The results are provided in Table 5. The coefficients of the financial integration measure show that portfolio equity liabilities had a positive and significant impact on long term growth, while foreign direct investment had a positive and insignificant influence. For portfolio debt liabilities the obtained result is insignificant and negative.

The further step of the study is aimed at identifying a potentially optimal level of the interaction between financial integration and the respective threshold variables by including squared values of the interactive terms in the regression. The results are presented in Table 6. Regression one includes the squared interactive term between the broad financial integration measure and banking regulation. Although financial integration has a negative significant coefficient when linked with the squared value of banking regulation and institutional quality it becomes positive though still insignificant. This might point to an optimal threshold level of banking regulation and institutional quality in the investigated nexus. The threshold effect of financial depth is insignificant and does not alter the sign of the financial integration coefficient.

In the following step of the study the country sample is split again into economies with restrictive and lax banking regulation. The regressions include the broad *de facto* financial

integration measure and its interaction term with banking regulation. The results (Table 7) point to slight differences in the role of financial integration and banking supervision between the two groups. In countries with restrictive banking regulation financial integration contributes to growth significantly and negatively. When interacted with banking regulation the coefficient becomes positive and significant. This might indicate that in countries with more restrictive banking regulation more stringent regulations help to mitigate the negative effects of financial integration on growth and even turn it positive. As far as the country group with lax banking regulation is concerned the estimation points to a positive relation between financial integration and growth but the effect is insignificant. Banking regulation has a positive and significant coefficient. The interaction term has a positive sign as well.

In the last step of the study robustness checks for subsamples are performed. The basic sample is divided into industrialized, emerging and developing countries. The results are presented in Table 8. The results point to differences in the role of macroeconomic variables as well as financial integration and threshold variables in growth regressions between the respective country groups. Broad financial integration has a positive and insignificant influence on growth in industrialized countries while a negative and insignificant in emerging and developing economies. The results for portfolio equity liabilities and FDI liabilities are robust – both of these variables have positive signs in all country groups. In the case of portfolio debt liabilities a negative coefficient is obtained for industrialized and emerging countries while a positive for developing countries. The coefficient for banking regulation stays positive for the industrialized and emerging country group while it is negative but insignificant for the developing country group. As far as the interaction of financial integration and banking regulation is concerned the results are robust only for the industrialized and developing countries sample – the interactive variable has a positive sign. For the emerging economies sample the negative effect of financial integration on growth is not mitigated by banking regulation.

The results are to be treated with caution due to methodological caveats. The individual effects for all countries are negative and significant (Table 9). The effects vary independently from the region or level of development. The weakest effects are observable for the United Kingdom -0.1334901, Sweden -0.1515445 and Pakistan -0.1804126 whereas the strongest for the USA -1.098448 and Malaysia -1.186456. This may point to country specific significant country features which are not included in the model.

Moreover, one has to point out similarities and differences in comparison with related papers which use similar methodologies. As far as the nexus between broad financial integration and long term is concerned the results are in line with the previous studies results – the relation is negative. Also the results for the respective forms of financial integration are confirmed – portfolio equity liabilities and FDI liabilities have a positive influence on growth while portfolio debt liabilities a negative impact. A similar result is reported by Edison et al. (2002); Edwards (2005); Kose et al. (2009) and Osada, Saito (2010).

For what concerns the potential threshold variables the study gives partially contradictory results to previous papers. Although financial depth has similarly as in the study of Kose, Prasad and Taylor (2009) a negative effect on long term growth it does not seem to have positive threshold effects as obtained by the mentioned authors. This result is also in contrast with the result of the exercise of Osada and Saito (2010) where the authors obtain a positive impact of financial depth on growth. In terms of other thresholds the study gives similar results to related papers on the role of

institutional quality. This feature seem to have a positive but insignificant effect on the financial integration-growth nexus as in the paper of Glaeser et al. (2004), Kose, Prasad, Taylor (2009) and Osada, Saito (2010). The differences in the results may be due to the different time and country samples.

5. Conclusions

Recent research on the relation between financial integration and growth indicates that there are large discrepancies between theory and empirical evidence. While the theoretical literature identifies many direct and indirect mechanisms, through which financial openness contributes to growth positively, empirical studies point to a weak or even negative nexus. As shown also in this study a possible reason for these discrepancies are thresholds in the mentioned relation. The aim of this study was to investigate the nexus between financial integration and growth and to analyze potential threshold effects for a sample of 69 countries during the period 1975–2007. The obtained results confirm the majority of the results of related papers concerning the relation between broad financial integration measured as the ratio of total foreign liabilities to GDP and also its respective forms and long term growth. The study gives also some new results on potential thresholds. Besides the thresholds investigated till now – financial depth and institutional quality, banking regulatory features are taken into consideration. The set of exercises points to the significant positive influence of restrictive banking regulation on the relation between financial integration and growth.

This result surely needs further investigation. 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. New regulations introduced after its emergence i.a. the planned reforms within the Basel III framework will surely influence the circumstances on global financial markets and therefore might shed new light on the relation between financial openness and growth. In these terms a serious limitation to the study was the constraint of data availability on financial integration till 2007. Moreover a drawback is also the fact 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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Appendix

Table 1
Country sample

Countries with restrictive banking regulation	Countries with lax banking regulation
Algeria Argentina Cameroon Colombia Congo Denmark Dominican Republic Egypt Finland Ghana Guatemala Honduras Indonesia Israel Ivory Coast Jamaica Kenya Lesotho Malaysia Mauritius Pakistan Peru Philippines Portugal Salvador Spain Switzerland Syria Thailand Togo Uganda USA Venezuela Zimbabwe	Australia Austria Bangladesh Belgium Benin Bolivia Botswana Brazil Canada Costa Rica France Germany Greece India Ireland Italy Japan Jordan Korea Mali Mexico Mozambique Netherlands New Zealand Nicaragua Niger Norway Panama Papua New Guinea Senegal South Africa Sweden Trinidad and Tobago UK Uruguay

Table 2
Country subsamples

Industrialized countries	Emerging countries	Other developing countries
Australia	Argentina	Algeria
Austria	Brazil	Bangladesh
Belgium	Colombia	Benin
Canada	Egypt	Bolivia
Denmark	India	Botswana
Finland	Indonesia	Cameroon
France	Israel	Congo
Germany	Jordan	Costa Rica
Ireland	Malaysia	Dominican Republic
Japan	Pakistan	Ghana
Netherlands	Peru	Guatemala
New Zealand	Philippines	Honduras
Norway	South Africa	Ivory Coast
Portugal	Thailand	Jamaica
Spain	Venezuela	Kenya
Sweden		Lesotho
Switzerland		Mali
UK		Mauritius
USA		Mozambique
		Nicaragua
		Niger
		Panama
		Papua New Guinea
		Salvador
		Senegal
		Syria
		Togo
		Trinidad and Tobago
		Uganda
		Uruguay
		Zimbabwe

Table 3
Unconditional and conditional convergence

Variable	Unconditional convergence		Conditional convergence	
	countries with restrictive banking regulation	countries with lax banking regulation	countries with restrictive banking regulation	countries with lax banking regulation
Initial log real GDP per capita	-0.1360519***	-0.059261*	-0.1912219***	-0.1621911***
Population growth			-0.9288922***	-0.7854474***
Average years of schooling			0.0249697*	0.040144***
Gross fixed capital formation to GDP			0.0078204***	0.0131723***

*** significance at 0.01 level, * significance at 0.1 level

Table 4
The baseline regressions

	Interaction of broad financial integration with banking regulation	Interaction of broad financial integration with financial depth	Interaction of broad financial integration with institutional quality	Interaction of the Chinn-Ito indicator with banking regulation
Initial log real GDP per capita	-0.0155789** -0.0269167***	-0.0144113* -0.027373***	-0.007477 -0.0286916***	-0.0181229** -0.0259789***
Population growth	-1.614392*** -0.8278205***	-1.627022*** -0.8261565***	-1.521677*** -0.833358***	-1.557012*** -0.772426***
Average years of schooling	0.0564359*** 0.0040656	0.0566871*** 0.0042875	0.0516167*** 0.004775	0.0802338*** 0.0028563
Gross fixed capital formation to GDP	0.0130005*** 0.0069291***	0.0130584*** 0.0069982***	0.0136476*** 0.0073762***	0.0139563*** 0.0068875***
Openness	0.0001729 0.0001603	0.0002283 0.0001636	0.0001457 0.0001001	0.0002429 0.0001149
Inflation	-0.0002405*** -0.0000895***	-0.0002211*** -0.0000886***	-0.0002427*** -0.0000875***	-0.0002383*** -0.00008***
Institutional quality	0.0087196 0.0004414	0.0104778 0.0002523	-0.0122527 -0.0166752	0.0130104 0.0054011
Broad financial integration	-0.0434152*** 0.0009181	-0.0231047 -0.0022084	-0.0526571*** -0.0038293	
Chinn-Ito index				-0.0103269 0.0065296
Financial depth	-0.0001534 -9.70* 10 ⁻⁶	-0.0000446 -0.0000864	-2.96e* 10 ⁻⁶ -0.0000788	-0.0009027 -0.0000367
Banking regulation	0.0208013*** -0.00317	0.0099156* -0.0023206	0.0115965** -0.002553	0.011984** -0.0018363
Interaction with banking regulation	0.0046576 0.0009917			-0.0010449 -0.0035597
Interaction with financial depth		-0.0002967 0.0000636		
Interaction with institutional quality			0.029477 0.0169194**	

Note: the first row indicates the GMM estimation result, the second row the random effect estimation result.
*** significance at 0.01 level, ** significance at 0.05 level, * significance at 0.1 level

Table 5
 Regressions with the respective forms of financial integration

	Portfolio equity liabilities	Portfolio debt liabilities	FDI liabilities
Initial log real GDP per capita	-0.0015804 -0.0281724***	-0.0055139 -0.0253485**	-0.0127536*** -0.0274797***
Population growth	-1.738969*** -0.8473994***	-1.573366*** -0.8014351***	-1.385474*** -0.8335609***
Average years of schooling	0.058661*** 0.0042197	0.0625793*** 0.0030926	0.0581511** 0.0036734
Gross fixed capital formation to GDP	0.012954*** 0.0042197***	0.013032*** 0.0066834***	0.0144019*** 0.0070982***
Openness	-0.0000181 0.0001055	-30.41e-06 0.0002347	-0.0002218 0.0000363
Inflation	-0.0003223*** -0.0000891***	-0.0003395*** -0.0000883***	-0.0003247*** -0.0000887***
Institutional quality	0.0075712 0.000677S	-0.0099541 0.0014996	-0.0093737 0.0017871
Financial integration	0.1441747*** 0.0326889*	-0.0099615 -0.0111742*	0.0444375 0.0286835
Financial depth	-0.0000769 -0.0001221	-0.0004379 0.0000525	-0.0006179 -0.0000466
Banking regulation	0.0182462** -0.0023579	0.0148855* -0.0025279	0.014674** -0.0023051

Note: the first row indicates the GMM estimation result, the second row the random effect estimation result.
 *** significance at 0.01 level, ** significance at 0.05 level, * significance at 0.1 level

Table 6

Regressions with quadratic interaction with the threshold variables

	Interaction with banking regulation	Interaction with financial depth	Interaction with institutional quality	Interaction of the Chinn-Ito indicator with banking regulation
Initial log real GDP per capita	-0.0145713** -0.0254294***	-0.0200115*** -0.0154375*	-0.0123881* -0.0156584*	-0.0153205* -0.021926*
Population growth	-1.568841*** -0.8191934***	-1.458386*** -0.6861475***	-1.22629*** -0.686411***	-1.589773*** -0.7680853***
Average years of schooling	0.0515544*** 0.0036826	0.0597556*** 0.0066706*	0.0353399** 0.0068237*	0.0696708*** 0.0051692
Gross fixed capital formation to GDP	0.0141429*** 0.006887***	0.0133015*** 0.0067429***	0.0141604*** 0.0067878***	0.0144176*** 0.0069237***
Openness	0.0003159 0.0001489	0.0001679 0.0000678	-0.0002581 0.0000552	-0.0000681 0.0000398
Inflation	-0.0002196*** -0.0000888***	-0.0002308*** -0.0000942***	-0.0002345*** -0.0000938***	-0.0003016*** -0.0000853***
Institutional quality square	0.0026975 0.0019875	-0.0026433 -0.0159006*	-0.0269157* -0.0167619*	-0.0224735 -0.0141862
Financial integration	-0.0479651* 0.0020861	-0.0211818 0.0019197	-0.034184 -0.0010934	
Chinn-Ito index				-0.0224789 0.0060404
Financial depth square	-0.0003375 -0.0000288	-2.82* 10 ⁻⁶ -1.23* 10 ⁻⁷	-2.10* 10 ⁻⁶ -1.77* 10 ⁻⁷	-4.21* 10 ⁻⁶ -2.01* 10 ⁻⁷
Banking regulation square	0.0007008 0.0007246	0.001316 0.0005664	0.0022551 0.0005416	0.0011693 0.0005398
Interaction with squared banking regulation	0.0003407 0.0000102			-0.0001032 -0.0000267
Interaction with squared financial depth		-3.49* 10 ⁻⁷ -2.08* 10 ⁻⁸		
Interaction with squared institutional quality			0.000089 0.0006357	

Note: the first row indicates the GMM estimation result, the second row the random effect estimation result.

*** significance at 0.01 level, ** significance at 0.05 level, * significance at 0.1 level

Table 7

Regressions for the samples split according to banking regulation restrictiveness

	Countries with restrictive banking regulation	Countries with lax banking regulation
Initial log real GDP per capita	-0.0098403 -0.020094	-0.0004662 -0.0778968***
Population growth	-1.186176*** -0.7850127***	-1.576573*** -0.9777234***
Average years of schooling	0.0171833 -0.0013037	0.0446637** 0.015194**
Gross fixed capital formation to GDP	0.0110291*** 0.0065733***	0.0117779*** 0.0095072***
Inflation	-0.0002083*** -0.0001387***	-0.0001762*** -0.0000538**
Openness	0.0003138 -0.0001126	0.0003234 0.0005755**
Institutional quality	0.0107539 -0.006409	-0.025167 0.0227646
Broad financial integration	-0.0770725** -0.0378871**	0.0007449 0.0053618
Financial depth	0.0007532 0.0004777	-0.0012845** -0.0002286
Banking regulation	0.0089 -0.014706	0.0250157** -0.010759
Interaction with banking regulation	0.0224837* 0.0176113***	0.009655 -0.0020442

Note: the first row indicates the GMM estimation result, the second row the random effect estimation result.
 *** significance at 0.01 level, ** significance at 0.05 level, * significance at 0.1 level

Table 8

Robustness checks for subsamples

	Broad financial integration	Portfolio equity liabilities	Portfolio debt liabilities	FDI liabilities
Initial log real GDP per capita	-0.0049525	-0.0070447	-0.0025413	-0.0047963
	-0.0167691*	-0.0163451	-0.0095377	-0.0127127
	0.0061021	0.0128527	0.0092213	0.0046575
Population growth	-0.6403836	-0.9667207***	-0.4347449	-0.5460441
	-1.675004	-1.518035***	-1.625768***	-1.672122***
	-1.303996***	-0.9780381*	-1.195305	-0.7490606
Average years of schooling	0.0277126**	0.0121497	0.0155809	0.0113202
	-0.0112765	-0.0190186	-0.0100312	-0.0181929
	0.0745389*	0.0373219	0.0523921	0.0619662
Gross fixed capital formation to GDP	0.0196199***	0.0189467***	0.0174334***	0.0194133
	0.0194519***	0.0179075***	0.0179475***	0.0190151***
	0.006984***	0.0078752***	0.0073421***	0.0081872***
Openness	0.0000942	0.0002526	0.0008985***	0.0007052*
	-0.0007176	-0.0007691*	-0.0004836*	-0.0009377**
	-4. * 10 ⁻⁶	-0.0000487	-0.0000257	-0.0004029
Inflation	0.0029399	0.0047929**	0.0030531	0.0012826
	-0.0001158***	-0.0001112***	-0.0001061***	-0.0001084***
	-0.0002416***	-0.0004***	-0.0003808***	-0.0003179***
Institutional quality	-0.0455452	-0.0107813	-0.022185	-0.0371993
	-0.0249765	-0.0300186	-0.0152354	-0.0187247
	0.008685	0.0385789	0.0195183	0.0342687
Financial integration	0.0193937	0.087041***	-0.0048476	0.0762429**
	-0.0135356	0.3195761**	-0.0318446	0.0394679
	-0.0335696	0.2719132		0.0116284
Financial depth			0.0128527	
	-0.000946***	-0.0005151*	-0.0008678***	-0.0005597**
	0.000775	0.0008639	0.0005423	0.0005063
Banking regulation	-0.0000639	-0.0003669	0.000313	-0.0003454
	0.0051525	0.0012269	0.0053635	0.0021347
	0.0146898***	0.0172324**	0.0082747*	0.0146092***
Interaction with banking regulation	-0.0117029	-0.0196435	-0.0116529	-0.0124918
	0.0006612	0.0004315	-0.0004964	0.0035066
	-0.0016402	-0.0123195*	-0.0123456	-0.0073267
	0.009005	0.0063912	0.0099325	0.012463

Note: the rows indicate estimates for industrialized, emerging and other developing countries respectively.

*** significance at 0.01 level, ** significance at 0.05 level, * significance at 0.1 level

Table 9
Fixed effects for countries

Country	Fixed effect	Country	Fixed effect
Algeria	-0.5266499***	Korea	-0.7931664***
Argentina	-0.3877925***	Lesotho	-0.3331349***
Australia	-0.1960762***	Malaysia	-10.186456***
Austria	-0.269872***	Mali	-0.5341325***
Bangladesh	-0.7935679***	Mauritius	-0.8469311***
Belgium	-0.3060058***	Mexico	-0.5585473***
Benin	-0.7256773***	Mozambique	-0.3204398***
Bolivia	-0.581025***	Netherlands	n.a.
Botswana	-0.3436845***	New Zealand	-0.2617978***
Brazil	-0.3225425***	Nicaragua	-0.3413112***
Cameroon	-0.6467622***	Niger	-0.8460277***
Canada	-0.2593986***	Norway	-0.9286368***
Colombia	-0.4083004***	Pakistan	-0.1804126***
Congo	-0.7819898***	Panama	-0.5816475***
Costa Rica	-0.3760548***	Papua New Guinea	-0.5516514***
Denmark	n.a.	Peru	-0.6868464***
Dominican Republic	-0.2665787***	Philippines	-0.5173871***
Egypt	-0.3882016***	Portugal	-0.7859833***
Finland	-0.495069***	Salvador	-0.5199574***
France	-0.2656439***	Senegal	-0.3042348***
Germany	-0.2184521***	South Africa	-0.8051326***
Ghana	-0.2741175***	Spain	-0.6095419***
Greece	-0.8746683***	Sweden	-0.1515445***
Guatemala	-0.2630757***	Switzerland	n.a.
Honduras	-0.4051***	Syria	-0.2587798***
India	-0.6567864***	Thailand	-0.8970621***
Indonesia	-0.6782741***	Togo	-0.6038183***
Ireland	-0.6115054***	Trinidad and Tobago	-0.9430209***
Israel	-0.2556217***	Uganda	-0.4783629***
Italy	-0.2754988***	UK	-0.1334901***
Ivory Coast	n.a.	USA	-10.098448***
Jamaica	-0.2026536***	Uruguay	n.a.
Japan	-0.5314757***	Venezuela	-0.4558087***
Jordan	-0.3160887***	Zimbabwe	-0.4270551***
Kenya	-0.6284558***		

*** significance at 0.01 level, ** significance at 0.05 level, * significance at 0.1 level

Table 10

Data sources

Data	Source
Real GDP per capita growth – log difference	PWT 7.0
Population growth – log difference	PWT 7.0
Openness at current prices	PWT 7.0
Chinn-Ito Index	Chinn, Ito (2007)
Stock of foreign liabilities to GDP	Lane, Milesi-Ferretti (2007)
FDI liabilities to GDP	Lane, Milesi-Ferretti (2007)
Portfolio equity liabilities to GDP	Lane, Milesi-Ferretti (2007)
Portfolio debt liabilities	Lane, Milesi-Ferretti (2007)
Gross fixed capital formation to GDP	World Bank
Inflation (CPI)	World Bank
Average years of schooling	Barro, Lee (1997); www.cid.harvard.edu/ciddata/ciddata.html
Banking regulation indicator	Barth, Caprio, Levine (2004); the World Bank banking regulatory database
Financial depth – private credit to GDP	World Bank
Institutional quality	Kaufmann et al. (2010); www.govindicators.org

Figure 1

Broad financial integration and GDP growth in sample countries over the years 1975–2007

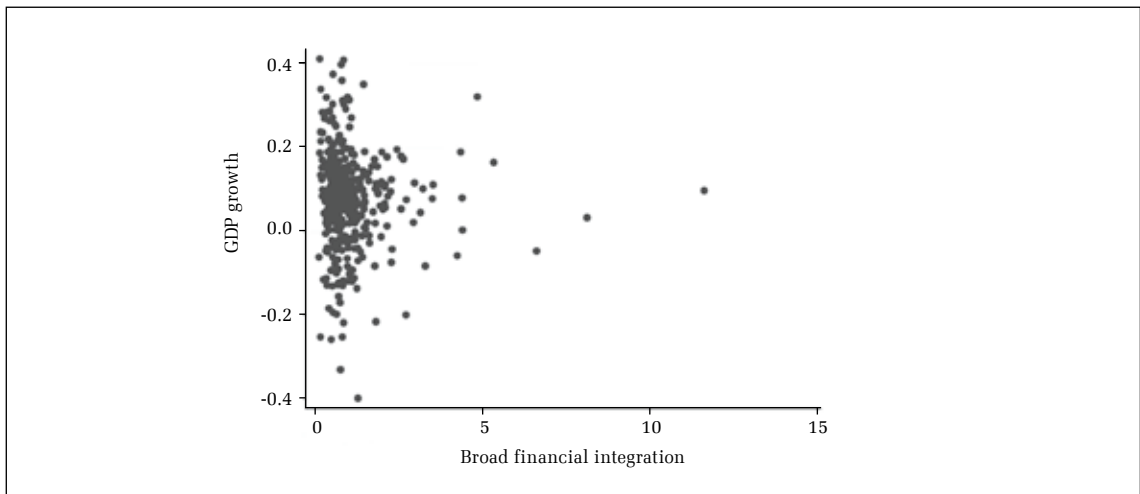


Figure 2

The threshold of banking regulation and GDP growth in sample countries over the years 1975–2007

