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Revisiting the Role of Governance and Institutions in the Impact of Financial Liberalization on Economic Growth using the PSTR Model

Summary: This paper provides a comprehensive review of the literature on the dual effect of financial liberalization over more than three decades, starting from the independent contributions of Ronald I. McKinnon and Edwards S. Shaw on this topic. In this regard, the paper revisits the effects of financial liberalization and governance on growth. Moreover, it presents a summary of current research in this area, covering the conclusions of the endogenous growth models, issues on volatility and the relationship between financial liberalization, institutions, governance and economic growth. To study data of 54 countries from 1985 to 2010 and because the nexus between financial liberalization and economic growth is nonlinear and depends on specific national factors especially institutions quality and governance, the Panel Smooth Transition Regression (PSTR) model is used. The main result of this study shows that a better contribution of financial liberalization to economic growth requires the interrelationship and the complementarity between financial liberalization and governance. Overall, regardless of the level of liberalization, output income is always higher with better governance and institutions.

Key words: Economic growth, Financial liberalisation, Institutions quality and governance, PSTR.

JEL: E44, F36, G21, G28.

Financial repression disables banks and prevents them from using their full potential (James Ang 2014). Ronald I. McKinnon (1973) and Edward S. Shaw (1973) consider financial liberalization to be the backbone of economic reforms in developing countries. Developing countries should liberalize their economies to promote their banking and financial sectors and to stimulate economic growth. In the early 90s, new approaches supporting financial liberalization were proposed to identifiy the possible relationship between financial liberalization and economic growth concluding that financial system needs to be liberalized to support economic growth (Silke Bumann, Niels Hermes, and Robert Lensink 2013). These studies indicated that developing banks and financial markets have a positive effect on economic growth because it allows allocation of more savings to investment. Indeed, financial liberalization facilitates economic integration and interdependence between economies (Essahbi Essaadi, Jamel Jouini, and Wajih Khallouli 2009; Agnieszka Gehringer 2015).

However, "*With increasing deregulation and globalization in the 1980s, banking systems have become more fragile and banking crises have proliferated, causing or aggravating economic crises*" (Aslı Demirgüç-Kunt, Enrica Detragiache, and Thierry Tressel 2008). Graciela Kaminsky and Carmen Reinhart (1999) define financial liberalization as a shock that affects financial institutions. Similarly, Joseph Joyce and Malhar Nabar (2009) argue that banking crises have a negative impact on investment and consequently on economic growth. In a similar line, Randall Kroszner, Luc Laeven, and Daniela Klingebiel (2007) confirmed that crises do indeed affect economic growth: "*It is widely accepted that financial crises have adverse consequences for the economy*". Sebastian Edwards (2007) further validates this assertion in the Latin American region: "*GDP per capita has been reduced as a consequence of the recurrence of external crises*". Moreover, Romain Ranciere, Aaron Tornell, and Frank Westermann (2006), Giovanni Dell'Ariccia, Detragiache, and Raghuram Rajan (2008) and Dimitris Kenourgios and Dimitrios Dimitriou (2014) concluded that economic growth rate is very low during periods of banking crises.

Therefore, the need to improve institutional environment to ensure sound banking practices is very well noted. In reality, this institutional change is essential but difficult to accomplish as it results from a practical implementation of an effective governance system. Carolyn Currie (2006), Lukas Menkhoff and Chodechai Suwanaporn (2007), Demirgüç-Kunt, Detragiache, and Tressel (2008), showed that financial liberalization pursued in a poorly institutional environment accelerate the proliferation of banking crises. This suggests that failure of banking governance can be one of the reasons behind worsening banking crises (Frederic Stanley Mishkin 2007; Michael Alexeev and Kim Sunghwan 2008; Pablo De Andres and Eleuterio Vallelado 2008). James Barth, Gerard Caprio, and Ross Levine (2004), Sungyoon Ahn and Wooseok Choi (2009), Apanard Angkinand (2009), Iftekhar Hasan, Paul Wachtel, and Mingming Zhou (2009), and Houssem Rachdi (2010), showed that good banking governance fosters a healthy and a sustainable economic growth and an absence of banking crises. Similarly, Caprio, Laeven, and Levine (2007) concluded that good governance guarantees efficient allocation of savings.

The main purpose of this paper is to explore the role of governance and examine its impact on financial liberalization and economic growth. To date, no attempt so far has been made to investigate this relationship by applying the PSTR approach. The remainder of this paper is structured as follows: Section 1 discusses the relationship between financial liberalization, institutions, banking regulation and economic growth; bearing in mind the previous empirical studies, the model and results are reviewed in Section 2; and lastly, policy implications and conclusions follow in Section 3.

1. Review of the Literature

1.1 Financial Liberalization and Growth

Endogenous growth models concluded that financial development has a positive impact on economic growth since it allows efficient allocation of savings for investment in emerging countries, in which financing the economy is made through the banking

sector. The government should liberalize its financial system to make profits from financial openness because financial systems of these countries are under the control of public authorities. With the access to economic growth, the ultimate goal of these countries, goes through an intermediate stage of economic openness. The recent relevant literature recommends the liberalization of the economy to achieve high savings returns and benefits for investors. Therefore, to explain this positive influence on growth, it follows that mobilizing savings, effectively diversifying risk, evaluating investment projects are all functions of the financial system.

Shandre Thangavelu and Ang (2004) corroborate this view and argue that financial development significantly determines economic growth. Saumitra Bhaduri (2005) shows that financial liberalization that reduces the role of the state in the economy changes investment patterns. Arturo José Galindo, Fabio Schiantarelli, and Andrew Murray Weis (2007) studying developing countries, concluded that there is a strong positive relationship between financial liberalization and efficient allocation of investment. For Amira Guermazi (2014), financial liberalization alleviates financial constraints on firms and thereby reduces sensitivity of investments to cash flow. Mishkin (2006) points out that financial openness stimulates domestic financial development and economic growth. Financial intermediation positively affects savings and investment through several channels. Kroszner, Laeven, and Klingebiel (2007) support the hypothesis that financial intermediaries play an important role in reducing moral hazard and adverse selection. Abdul Abiad, Nienke Oomes, and Kenichi Ueda (2008) state that financial liberalization has a "quantitative" effect, which manifests itself in an increase in savings and investment. Moreover, financial liberalization strongly correlates with the efficient allocation of savings while financial repression leads to the opposite effect.

Rima Turk Ariss (2008) points out that financial liberalization of the banking system increases internal competition between domestic banks and allows banks to expand their offer to customers at very competitive prices. These assumptions are consistent with the earlier work of Barth, Caprio, and Levine (2001), who agreed that an economy with a government-controlled banking system has a low level of financial development and as a result a slow economic growth. Edwards (2007) conducted a study on the Latin American region over the period 1970-2004. He concluded that countries in this region have initiated a reform process without cleaning up their economy. The result of the study showed that crises induced by financial liberalization have been very costly on growth. Ang and Warwick McKibbin (2007) conducted a study on Malaysia over the period 1960-2001 and concluded that financial liberalization, which eradicates financial repression, stimulates positive financial development and economic growth. Ang (2007), prospecting Malaysia over the period 1965-2004, found that foreign direct investments streamed in as a result of capital account liberalization is an effective instrument to initiate economic growth. Michael W. Klein and Giovanni Olivei (2008) concluded that financial liberalization in general and capital account openness in particular favour economic growth. Studies by James L. Butkiewicz and Halit Yanikkaya (2008) on a panel of 114 developed and developing countries over the period ranging from 1970 to 1997 and by Matthieu Bussiere and Marcel Fratzscher (2008) on 45 countries over the period 1980-2002 reached the same conclusions.

1.2 Financial Liberalization, Governance, Banking Crises and Economic Growth

However, Betty Daniel and John Bailey Jones (2007) found that most banking crises in emerging economies have been preceded by financial liberalization. Elena Cubillas and Francisco González (2014) confirmed that financial liberalization increases bank risk taking in both developed and developing countries. Financial liberalization stimulates stronger bank competition which in turn increases risk-taking incentives in advanced countries; whereas in developing countries, it increases bank risk by offering opportunities to take risk. Kaminsky and Sergio Schmukler (2008) assert that "*The crises of the 1990s in Asia, Europe, and Latin America have reignited the debate on the effects of financial liberalization. Many argue that deregulation of financial markets was the main trigger of many of the crises observed since the 1970s*". Therefore, financial liberalization is a factor that weakens economies.

Crises of banks' balance sheets will feed contagion and a retreat to safer investments, i.e. "flight to quality", and therefore will generate capital flight. The extreme volatility of international capital markets and investors' herd behavior lead to reluctance and panic. Capital flight will mechanically result in a pressure on currency, doubling capital flight in case of a currency crisis, which in turn leads to a higher effective interest rate supported by speculative entities indebted in foreign currency and a self-reinforcing crisis process. Mariassunta Giannetti (2007) argues that liberalizing capital inflows can disrupt the stability of banks in emerging economies. Consequently, liberalization reduces the overall well-being of the economy. Banks then massively invest without assessing risk. Financial liberalization, therefore, boosts market imperfections.

Kaminsky and Schmukler (2008) found that financial liberalization leads to cycles (booms and crashes), which is very important in the short-term and stable in the long-term. If a country imposes barriers, short-term effects are not very obvious. For example, just after liberalization, booms increased by 40% in developing countries and by 55% in developed countries compared to the period of financial repression. However, crashes increased by 30% in emerging markets in the short-term. André A. Levchenko, Ranciere, and Mathias Thoenig (2008) studied 56 industrialized and emerging countries over the 1963-2003 period and concluded that financial liberalization has a dual effect: growth and crises. The effect on growth is temporary and non-permanent as some countries have been hit by crises. Kaminsky and Reinhart (1999) concluded that banking crises are preceded by financial liberalization. The authors showed that 18 of the 26 banking crises have been preceded by an adoption of financial liberalization. Demirgüç-Kunt and Detragiache (1998) argued that the liberalization of the local financial sector increases the fragility likelihood of the banking system.

The relationship between banking crises and financial liberalization can be explained by a failure to implement sound banking governance. Ilan Noy (2004) conducted an empirical investigation on a panel of 61 countries over the period 1975-1997. The author concluded that financial liberalization implemented with a lax prudential regulation has encouraged banks to take excessive risk. As for Demirgüç-Kunt, Detragiache, and Tressel (2008), they studied a panel of 39 countries and 203 banks to determine the role of banking governance and concluded that strengthening

of prudential regulation and banking supervision positively acts on the stability of the banking systems, thus, eradicates banking crises.

2. Empirical Study

2.1 Data and Model

The empirical relationship between financial liberalization and economic growth is stronger than what the theoretical literature admits. These studies make use of traditional econometric methods (ordinary least square, GMM in difference and GMM in system).

The sample consists of a set of 54 panel of OECD (20) and developing and emerging countries (34) by testing the relationship between financial liberalization and economic growth over the period 1985-2010. The sample period is too large to catch the effect of financial liberalization on economic growth. The PSTR model is defined as follows (see Appendix 1 for the procedure of estimation):

$$GDP_{it} = \mu_i + \beta GDP_{it-1} + \varphi_0 Crisis_{it} + \delta' x_{it} + \eta_0 FLIB_{it} + \eta_1 FLIB_{it} * G(z_{it}; \gamma; c) + \varepsilon_{it}, \qquad (1)$$

where, GDP is the real GDP *per capita* growth. CRISIS is systemic banking crisis (see Appendix 2). x_{it} is k-dimensional vector of growth (inflation, trade, government consumption and population). z_{it} is the transition variable. This study uses five measures: banking supervision, law and order, corruption, deposit insurance and government stability. FLIB is financial liberalization. There is also no consensus in the literature and many studies use different definitions for financial liberalization. According to Kaminsky and Schmukler (2008), financial liberalization has three dimensions: real domestic liberalization, financial markets liberalization and capital account liberalization. Rebecca M. Neumann, Penl Ron, and Tanku Altin (2009) used a similar classification: the degree of financial liberalization is measured by the index composed of the domestic financial sector, the financial markets and the capital account and which varies between 1 and 3, for each component, a value of 1 indicates no liberalization, 2 indicates partial liberalization, and 3 indicates full liberalization. *De jure* index and *de facto* index: a country is classified as either liberalized (value of 1) or restricted (value of 0). The last measure is the Financial Reform Index from the recent International Monetary Fund Financial Reforms database proposed by Abiad, Detragiache, and Tressel (2008). In this study, this measure for financial liberalization is used. A definition of all the variables and their sources is provided in Appendix 3. Table 1 provides summary statistics for all the data used in this study.

Table 1 Summary Statistics

Variables	Observation	Mean	Std.	Min	Max
Panel A. All countries					
GDP growth	1404	1.789	3.494	-16.510	15.811
Systemic banking crises	1404	0.146	0.353	0	1
Inflation	1384	5.094	0.256	4.605	6.062
Population	1404	1.416	1.008	-3.292	11.515
Government consumption (%GDP)	1390	15.663	5.756	2.90	41.476
Trade (%GDP)	1397	62.675	32.675	11.545	228.875
Financial reform index	1404	12.441	5.932	0	21
Banking supervision	1404	1.001	1.026	0	3

Law and order	1404	3.959	1.649	0	6
Corruption	1404	3.653	1.503	0	6
Deposit insurance	1404	0.833	0.372	0	1
Government stability	1404	7.547	2.046	1	11

| Panel B. OECD countries | | | | | |
Variables	Observation	Mean	Std.	Min	Max
GDP growth	520	1.688	3.068	-13.132	11.109
Systemic banking crises	520	0.108	0.310	0	1
Inflation	520	5.092	0.260	4.605	5.800
Population	520	1.316	0.824	-0.353	3.304
Government consumption (%GDP)	517	15.699	5.782	2.9	28.197
Trade (%GDP)	514	54.800	28.124	11.545	171.943
Financial reform index	520	11.466	6.376	0	21
Banking supervision	520	1.122	1.055	0	3
Law and order	520	4.227	1.745	0	6
Corruption	520	4.026	1.351	0	6
Deposit insurance	520	0.809	0.393	0	1
Government stability	520	7.679	2.087	1.800	11

| Panel C. Other: developing and emerging countries | | | | | |
Variables	Observation	Mean	Std.	Min	Max
GDP growth	884	1.854	3.741	-16.510	15.811
Systemic banking crises	855	0.170	0.376	0	1
Inflation	880	5.095	0.253	4.605	6.062
Population	884	1.479	1.105	-3.292	11.515
Government consumption (%GDP)	853	15.641	5.744	5.012	41.476
Trade (%GDP)	853	67.698	34.027	16.109	228.875
Financial reform index	884	13.062	5.546	0	18
Banking supervision	884	0.924	1.000	0	3
Law and order	884	3.788	1.562	1	6
Corruption	884	3.415	1.546	0	6
Deposit insurance	884	0.848	0.358	0	1
Government stability	884	7.463	2.017	1	11

Source: Authors' estimation.

2.2 Estimation Procedure of PSTR Model

Referring to Meriam Brahim and Rachdi (2014) and Rachdi and Feten Ben Bouheni (2016), the non-linear effect (direct effect) is represented by a continuum of parameters between two extreme regimes. The first extreme regime corresponds to $G(z_{it}; \gamma; c) = 0$ and is associated with low values of z_{it}, while the second regime corresponds to $G(z_{it}; \gamma; c) = 1$ and is associated with high values of z_{it}. Therefore, as z_{it} increases, the effect of $FLIB_{it}$ evolves from η_0 to $\eta_0 + \eta_1$ following a single monotonic transition centered around the value c of z_{it}. Between these two extreme cases, there are an infinite number of the elasticity of GDP growth to FLIB, for country i at time t, which is defined as a weighted average of the parameters η_0 and η_1:

$$\varepsilon_{it} = \frac{\partial GDP}{\partial FLIB} = \eta_0 + \eta_1 * G(z_{it}; \gamma; c). \tag{2}$$

To resolve the endogeneity bias of the variable FLIB, we use the first lag. The final model to estimate is:

$$GDP_{it} = \beta GDP_{it-1} + \varphi_0 Crisis_{it} + \delta' x_{it} + \eta_0 FLIB_{it-1} + \eta_1 FLIB_{it-1} * G(z_{it}; \gamma; c) + \varepsilon_{it}. \qquad (3)[1]$$

2.3 Econometric Results

For the linearity test, we will use in this study the Fisher LM test (Step 1).

Table 2   LM Fisher Linearity Test

Transitions variables	All countries	OECD countries	Other countries
Banking supervision	2.728 (0.0125)	0.6104 (0.0220)	3.0919 (0.0055)
Law and order	3.0893 (0.0054)	5.7642 (0.0000)	5.1033 (0.0000)
Corruption	6.537 (0.0000)	13.8263 (0.0000)	7.5835 (0.0000)
Deposit insurance	25.496 (0.0000)	8.3867 (0.0000)	25.8075 (0.0000)
Government stability	23.9236 (0.0000)	3.5447 (0.0020)	16.0539 (0.0000)

Note: H_0: linear model Vs; H_1: PSTR model with at least one threshold. The numbers in parentheses are *p*-values of *F*-statistics.

Source: Authors' estimation.

Referring to the LM test in Table 2, the null hypothesis is that the model is linear is rejected for transition variables for all, OECD and other countries. The relationship between financial liberalization and growth is non-linear is concluded. Therefore, a PSTR model is used to estimate that relationship, after carefully choosing between PESTR (Panel Exponential Smooth Transition Regression) and PLSTR (Panel Logistic Smooth Transition Regression) family of models. This test is presented in Table 3 (Step 2).

Table 3   Sequence Test of Fisher: Choice between PESTR and PLSTR

Non-linear variables		All countries				
		PLSTR			PESTR	
Banking supervision					*F*-stat	*p*-value
				H01	0.9618984	0.3826
				H02	3.3873560	0.0342
				H03	0.9829479	0.3746
Law and order		*F*-stat	*p*-value			
	H01	1.0718335	0.3429			
	H02	6.5122281	0.0016			
	H03	1.6599661	0.1908			
Corruption		*F*-stat	*p*-value			
	H01	5.074738	0.0064			
	H02	13.044348	0.0000			
	H03	1.332320	0.2644			
Deposit insurance		*F*-stat	*p*-value			
	H01	11.357785	0.0000			
	H02	25.747569	0.0000			
	H03	36.019539	0.0000			
Government stability		*F*-stat	*p*-value			
	H01	25.431353	0.0000			
	H02	2.857755	0.0579			
	H03	41.163615	0.0000			

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[1] See Appendix 1, Step 4.

OECD countries						
Non-linear variables		**PLSTR**			**PESTR**	
Banking supervision					*F*-stat	*p*-value
				H0	0.0923413	0.9118
				H02	1.3252308	0.0670
				H03	0.1900829	0.8270
Law and order		*F*-stat	*p*-value			
	H01	2.4233890	0.0900			
	H02	9.8240534	0.0001			
	H03	4.7183371	0.0095			
Corruption		*F*-stat	*p*-value			
	H01	11.207871	0.0000			
	H02	18.941036	0.0000			
	H03	8.860454	0.0002			
Deposit insurance		*F*-stat	*p*-value			
	H01	10.285982	0.0000			
	H02	8.958503	0.0002			
	H03	5.018084	0.0071			
Government stability		*F*-stat	*p*-value			
	H01	4.7448376	0.0092			
	H02	2.4734740	0.0856			
	H03	3.2776115	0.0388			

Other countries						
Non-linear variables		**PLSTR**			**PESTR**	
Banking supervision					*F*-stat	*p*-value
				H01	1.2102345	0.2990
				H02	5.0236528	0.0069
				H03	1.1622913	0.3136
Law and order		*F*-stat	*p*-value			
	H01	10.667567	0.0000			
	H02	18.699368	0.0000			
	H03	13.364858	0.0000			
Corruption		*F*-stat	*p*-value			
	H01	8.8063046	0.0002			
	H02	8.2488398	0.0003			
	H03	5.0491236	0.0068			
Deposit insurance		*F*-stat	*p*-value			
	H01	10.353945	0.0000			
	H02	15.204524	0.0000			
	H03	47.064315	0.0000			
Government stability		*F*-stat	*p*-value			
	H01	20.382551	0.0000			
	H02	0.071674	0.9308			
	H03	25.904555	0.0000			

Source: Authors' estimation.

Once the linearity test and the test of the choice between PESTR and PLSTR are used, the problem is to identify the number of transition functions. The methodology of sequential test *F*-statistic LM_F (Step 3) is generally used for the *no remaining nonlinearity test* (test of number of regimes). This test is presented in Table 4.

Table 4 No Remaining Nonlinearity Test: Test of Number of Regimes

All countries		
Transition variables	**H₀: 1 regime vs H₀: 2 regimes**	**H₀: 2 regimes vs H₀: 3 regimes**
Banking supervision	$F_{(2,509)}$ = 108.7617 (0.0000)	$F_{(3,507)}$ = 0.7617 (0.9753)
Law and order	$F_{(2,509)}$ = 113.5123 (0.0000)	$F_{(3,507)}$ = 0.8512 (0.9623)
Corruption	$F_{(2,509)}$ = 114.6123 (0.0000)	$F_{(3,507)}$ = 0.6521 (0.9412)
Deposit insurance	$F_{(2,509)}$ = 114.5798 (0.0000)	$F_{(3,507)}$ = 0.8134 (0.9412)
Government stability	$F_{(2,509)}$ = 102.1673 (0.0000)	$F_{(3,507)}$ = 0.9421 (0.9742)

OECD countries		
Transition variables	**H₀: 1 regime vs H₀: 2 regimes**	**H₀: 2 regimes vs H₀: 3 regimes**
Banking supervision	$F_{(2,509)}$ = 105.8412 (0.0000)	$F_{(3,507)}$ = 0.4517 (0.8312)
Law and order	$F_{(2,509)}$ = 101.6714 (0.0000)	$F_{(3,507)}$ = 1.8314 (0.7821)
Corruption	$F_{(2,509)}$ = 117.5618 (0.0000)	$F_{(3,507)}$ = 0.5123 (0.9214)

| Deposit insurance | F(2,509) = 101.2456 (0.0000) | F(3,507) = 0.1732 (0.9984) |
| Government stability | F(2,509) = 106.1612 (0.0000) | F(3,507) = 1.2345 (0.7532) |

| Other countries | | |
Transition variables	H_0: 1 regime vs H_0: 2 regimes	H_0: 2 regimes vs H_0: 3 regimes
Banking supervision	F(2,509) = 105.1342 (0.0000)	F(3,507) = 1.1763 (0.7519)
Law and order	F(2,509) = 113.1324 (0.0000)	F(3,507) = 0.9752 (0.9053)
Corruption	F(2,509) = 112.1532 (0.0000)	F(3,507) = 1.7631 (0.6315)
Deposit insurance	F(2,509) = 101.7854 (0.0000)	F(3,507) = 1.9801 (0.5428)
Government stability	F(2,509) = 117.3142 (0.0000)	F(3,507) = 1.4561 (0.7012)

Source: Authors' estimation.

We find that the model with one threshold (two regimes) adequately captures the non-linear relationship. Thus, a PSTR model with one transition function seems to be appropriate in this paper.

2.4 Empirical Findings

Table 5 presents PSTR estimates using the Nonlinear Least Squares (NLS) method for the all, OECD and developing and emerging countries (Step 4).

Table 5 Financial Liberalization on Economic Growth: The Role of Banking Supervision and Institutions: PSTR Model Estimation with Two Regimes

Panel A: Entire countries				
	Banking supervision	Law and order	Corruption	Deposit insurance	Government stability
Government consumption	-0.0631	-0.0662	-0.0743	-0.1127	-1.7028
	(3.438)***	(3.568)***	(3.970)***	(4.771)***	(2.070)**
Inflation	-0.9573	-0.8057	-0.8454	-0.7663	-2.0775
	(2.740)***	(2.371)***	(2.469)***	(2.043)***	(2.077)**
Trade	0.0103	8.6402	0.0098	0.0089	0.5462
	(3.049)***	(2.567)**	(2.867)**	(2.576)**	(1.660)*
Population	0.0485	0.0363	0.0347	0.0247	-0.4939
	(1.593)*	(1.632)*	(1.164)*	(0.797)	(2.066)**
φ_0	-1.2723	-1.2299	-1.2936	-1.3549	-0.4054
	(5.320)***	(5.179)***	(5.370)***	(5.390)***	(5.332)***
β	-0.4066	-0.1233	-0.8064	-0.1940	-1.4277
	(7.140)***	(1.679)*	(2.189)**	(5.592)***	(2.569)**
η_0	0.1814	-0.4185	1.3970	0.0371	0.0027
	(0.508)	(1.188)	(0.008)	(1.930)**	(2.632)**
η_1	-0.3583	0.4097	1.0068	0.3580	-0.0008
	(3.823)***	(4.829)***	(0.080)	(1.997)**	(1.731)*
γ	0.4613	41.9573	0.6555	8.1436	1.1472
	(1.668)*	(2.685)**	(2.439)**	(2.287)**	(1.595)*
c	0.7844	1.7271	2.7203	0.1662	7.5712
	(1.620)*	(2.028)**	(2.060)**	(3.293)***	(2.472)**
Constant	-2.754	-1.440	-1.415	-1.073	-1.409
	(1.585)*	(1.836)**	(2.008)**	(3.571)***	(2.073)**

Panel B: OECD countries				
	Banking supervision	Law and order	Corruption	Deposit insurance	Government stability
Government consumption	-0.0923	-0.0739	-0.077	-1.109	-0.7250
	(3.354)***	(3.151)***	(2.443)**	(4.195)***	(2.702)**
Inflation	-0.3687	-0.1252	-0.690	-5.137	-1.6784
	(0.451)	(0.138)	(0.394)	(4.196)***	(2.746)**
Trade	0.0150	0.0107	0.015	0.154	1.6513
	(3.329)***	(3.292)***	(2.448)**	(4.194)***	(3.776)***
Population	0.0239	-0.0239	0.052	0.411	1.7060
	(0.278)	(1.620)*	(1.631)*	(3.693)***	(2.266)**

φ_0	-0.5981	-0.5388	-0.215	-5.080	-2.2992
	(2.426)**	(2.204)**	(2.410)**	(1.990)**	(2.255)**
β	-0.3774	-1.4197	-1.423	-3.254	-1.1171
	(7.847)***	(1.744)*	(2.022)**	(3.431)***	(2.786)***
η_0	0.4712	2.9612	2.7433	0.397	0.0671
	(5.744)***	(1.164)*	(1.880)*	(3.914)***	(2.474)**
η_1	1.3276	1.4237	-2.3354	0.722	0.0443
	(1.960)**	(4.440)***	(1.992)*	(7.276)***	(2.627)***
γ	0.3570	19.5449	0.012	8.003	0.3425
	(2.435)**	(1.826)*	(3.616)***	(5.348)***	(2.171)**
c	0.9999	0.6849	3.613	0.8153	6.6643
	(3.334)**	(2.680)**	(2.253)	(8.325)***	(2.377)**
Constant	-2.934	-2.846	-1.423	-2.910	-2.189
	(2.004)**	(1.689)*	(2.022)**	(3.693)***	(2.174)**

	Panel C: Developing and emerging countries				
	Banking supervision	Law and order	Corruption	Deposit insurance	Government stability
Government consumption	-0.0886	-0.1126	-0.1073	-0.1641	-1. 1192
	(2.886)***	(3.707)***	(3.590)***	(3.857)***	(1.942)**
Inflation	-1.2584	-0.8399	-0.7556	-1.3060	-1.3777
	(2.002)**	(1.406)	(1.292)	(2.047)**	(1.909)**
Trade	0.0084	0.0074	0.0073	0.0068	0.1690
	(1.666)*	(1.455)	(1.459)	(1.314)	(1.928)**
Population	0.0253	-0.0132	-0.0086	0.0015	-0.6427
	(0.503)	(0.256)	(0.179)	(0.031)	(0.761)
φ_0	-1.3595	-1.2712	-1.4215	-1.4095	-0.5738
	(3.818)***	(3.532)***	(4.015)***	(3.750)***	(1.935)**
β	-4.4926	0.1840	-0.1618	-0.1780	-0.4676
	(4.003)***	(4.509)***	(3.939)***	(3.999)***	(1.911)**
η_0	0.1637	-13.0056	2.5178	0.4164	0.0070
	(2.700)**	(2.491)**	(2.226)**	(3.6731)***	(1.753)*
η_1	-0.4217	1.6394	-0.4850	0.0822	-0.0033
	(3.516)***	(2.493)**	(0.009)	(1.928)**	(2.510)**
γ	0.4927	14.3838	0.6839	8.9177	0.5460
	(2.482)**	(2.027)**	(3.703)***	(2.345)**	(5608)***
c	0.1260	0.1289	2.3384	0.2371	8.2450
	(2.354)**	(9.236)***	(9.337)***	(2.462)**	(1.755)*
Constant	-4.492	-1.135	-1.173	-2.994	-1.678
	(2.464)**	(2.175)**	(2.403)**	(1.957)**	(1.701)*

Note: OECD countries are Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom and United States. Developing and emerging countries are: Bangladesh, India, Indonesia, Korea, Rep, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand, Argentina, Brazil, Chile, Costa Rica, Colombia, Dominican Republic, Ecuador, El Salvador, Jamaica, Mexico, Paraguay, Peru, Uruguay, Venezuela, Algeria, Egypt, Jordon, Morocco, Tunisia, Turkey, Burkina-Faso, Cote d'Ivoire, Kenya, Nigeria and South Africa. c: the threshold parameter and γ the slope parameter. Standard errors are corrected for heteroskedasticity. The numbers in parentheses are absolute value of t-statistics. *, **, and *** indicate statistical significance at the 1%, 5%, and 10% level.

Source: Authors' estimation.

It was found out that the shift between the two extreme regimes occurs around the location parameter c (for all regressions, the 5 location parameters seem far from their respective mean values reported in Table 1). It is concluded that countries with good governance and institutions can exploit the advantages of financial liberalization on growth. The slope γ appears to be low for banking supervision, corruption, deposit insurance and government stability (when the threshold variable is deposit insurance, the highest value is 8.1436 for the full sample, 8.003 for OECD countries and 8.9177 for developing and emerging countries). It is concluded that a smooth

transition and consequently the PSTR is well adapted. It means that in condition to those variables, the relationship between financial liberalization and growth cannot be reduced to a limited number of regimes. For law and order, the slope appears to be sharp (41.9573 for all countries, 19.5449 for OECD countries and 14.3838 for developing and emerging countries). The transition is rather rough and the PTR framework is indicated to assess financial liberalization-growth nexus the slope parameter tends towards the infinity.

It is concluded that the signs of most controlled variables are overall consistent with previous literature. The negative and significant coefficient for lagged GDP both at the global and sub-groups of countries confirm the use of the dynamic framework. The coefficient on banking crisis φ_0 is negative and statistically significant across all regressions for total group of countries or the sub-group of countries. This result suggests that, financial and banking crises negatively affect the performance of banks and consequently the rate of economic growth. Earlier empirical studies provide strong evidence supporting the hypothesis that financial liberalization increases the likelihood of banking crises. Better governance of banking institutions to reduce the probability of occurrence of banking crises was made by reducing problems following financial liberalization.

Similar to expectation, in all groups (entire panel of 54 countries; OECD of 20 countries; developing and emerging group of 34 countries), an instable direct impact of financial liberalization on growth, measured by η_0, significant in many regressions is found. This outcome depends largely on the level of governance and institutions in each country. This result is consistent with some of the studies mentioned in Section 1. The weak and inefficient institutions and governance in developing countries increase the likelihood of financial and banking crises. Newly liberalized country is more likely to experience a banking crisis. Demirgüç-Kunt, Detragiache, and Tressel (2008) confirm that the establishment of financial liberalization for some countries leads to more fragile banking sector and aggravates economic growth. Edwards (2007) approves this conclusion in Latin American countries: GDP *per capita* has been reduced due the recurrence of external crises. Thus, in the absence of an efficient supervisory structure, financial liberalization is more likely to have adverse effects on economic growth.

The direction of the effects of liberalization and its interaction with banking governance and institutional quality depend on the sample and model used. All transition variables found in this study are: FLIB-economic growth coefficient η_1 is negative and statistically insignificant for some transition variables with values ranging between -0.0008 and 1.0068 for total group of countries, between -2.3354 and 0.722 for OECD group and between -0.4850 and 1.6394 for developing emerging countries. This implies that an increase of the transition variables entails an increase of FLIB-growth coefficient. In countries with high level of institutions, there is positive effect of FLIB on economic growth. This empirical result suggests that better banking supervision, law and order, lower corruption and better bureaucracy and government stability help increase the rate of economic growth. Adequate banking supervision incites healthy and sustainable economic growth. Caprio, Laeven, and Levine (2007) concluded that good governance guarantees efficient allocation of savings.

Prudential banking regulation is positively linked to stability and healthy and durable economic performance (Barth, Caprio, and Levine 2004; Ahn and Choi 2009; Angkinand 2009; Hasan, Wachtel, and Zhou 2009). Noy (2004) and Menkhoff and Suwanaporn (2007) note a process of financial liberalization concomitantly followed by a reinforcement of prudential regulation making it possible to reduce banking crises probability.

This result, so far, confirms the idea that good banking governance and institutions (respect of rules of law and banking supervision, low level of corruption and political stability) is considered one of the main factors for outcome maximization for all countries. It is pointed out that high quality of institutions influences financial liberalization and consequently growth. When institutions are strong, the legal system works effectively. This result is quite consistent with Abdullahi Ahmed (2013) that finds the legal institutions and protection of property rights are important in explaining growth and financial development when investigating the role of financial liberalization in promoting financial deepening and economic growth in 21 countries in Sub-Saharan Africa over the period 1981-2009.

Overall, financial liberalization, governance and institutions go hand in hand and economic growth is fostered by the effectiveness of institutions. For all economies (high-income; middle-income and low-income countries), an improvement of rules of governance and good institutions lead to a greater increase in the outcome growth. Developing and emerging countries need to achieve a minimum level of institutional quality in order to benefit from the advantages offered by financial liberalization. Over all, the main result of this study shows that a better contribution of financial liberalization to economic growth requires the interrelationship and the complementarily between financial liberalization and governance.

3. Concluding Remarks and Policy Implications

Motivated by the important role of financial liberalization on economic growth, this paper has shed new light in understanding this relationship by focusing on the role played by the governance and institutional quality. Using a panel of 54 countries (20 OECD countries and 34 developing and emerging countries) for the period 1985-2010, this paper highlights the impact of financial liberalization on economic growth based on the governance and institutional quality. The PSTR is adopted for five measures of governance and institutions quality (banking supervision, law and order, corruption, deposit insurance and government stability). The empirical evidence captured by the PSTR framework confirms that the effectiveness of governance and institutions promotes economic growth.

The findings in this paper were interpreted with caution because the estimation results appear to be sensitive to the smoothness of transition. It also provides a hint for the sequence of reform in developing and emerging countries. While it is an ultimate goal, strengthening governance and institution, nonetheless, should not be an urgent concern when the economy is still stranded by multiple banking and financial crises. It is more urgent for all countries to strengthen governance. In this context, the gains will be much larger on economic growth.

The results may have some practical implications for econometric modelling as well as for policy makers in stimulating economic growth. Generally, the analysis shows that the process of financial liberalization must concomitantly followed by a reinforcement of prudential regulation and the legal system to reduce banking crises and to sustain economic growth.

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Appendix 1 Procedure of Testing PSTR Models

The basic PSTR model with two extreme regimes (Andres González, Timo Teräsvirta, and Dick Van Dijk 2005) is defined:

$$y_{it} = \mu_i + \beta_1' x_{it} + \beta_2' x_{it} * G(z_{it}; \gamma; c) + \varepsilon_{it},$$ (A1)

where $i = 1,...,N$ and $t = 1,...,T$. N and T denote the cross-section and time dimensions of the panel, respectively. y_{it} is a dependent variable, x_{it} is a k-dimensional vector of time-varying exogenous variables, μ_i represents the fixed individual effect, ε_{it} are the errors terms. The transition function $G(z_{it}; \gamma; c)$ is a continous function of the observable variable z_{it} and is normalized to be bounded between 0 and 1. More generally, the value of z_{it} determines the values of $G(z_{it}; \gamma; c)$ for individual i at time t. γ is the slope parameter, describing the slope of the transition function. c is the threshold or location parameter. γ and c are endogenously estimated.

The empirical specification procedure for PSTR models consists of the following steps (González, Teräsvirta, and Van Dijk 2005):

1. Test the null hypothesis of linearity (homogeneity) against the alternative of PSTR-type nonlinearity.
2. If linearity is rejected, choose between PLSTR and PESTR models using a sequence of tests of nested hypothesis.
3. Determining the number of regimes.
4. Estimate the parameters in the selected PSTR model.

STEP 1

For the linearity test, the null hypothesis can be written as: $\{H_0 : \gamma = 0$. This test is non-standard, since the PSTR model contains unidentified nuisance parameters under the null hypothesis. We use the Fisher LM test $LM_F = [(SSR_0 - SSR_1)/K]/[SSR_0/(NT - N - K)]$: where SSR_0 is the panel sum of squared residuals under H_0 (i.e., linear panel model with individual effects) and SSR_1 is the panel sum of squared residuals under H_1 (i.e., PSTR model). K is the number of explanatory variables, and it has an approximate $F_{(K, NT-N-K)}$ distribution.

STEP 2 (Choosing between PLSTR and PESTR models)

Teräsvirta (1994) proposes a short sequence of ordinary Fisher test to decide between PESTR (Panel Exponential Smooth Transition Regression) and PLSTR (Panel Logistic Smooth Transition Regression) family of models. Luukkonen Ritva, Pentti Saikkonen, and Teräsvirta (1988) test homogeneity using the null hypothesis $H_0 : \gamma = 0$. To circumvent the identification problem we replace $G(z_{it}; \gamma; c)$ in (A1)

by its third-order Taylor expansion around $\gamma = 0$. After reparameterization, this leads to the auxiliary regression:

$$y_{it} = \mu_i + \beta_1^{*'} x_{it} + \beta_2^{*'} x_{it} z_{it} + \beta_3^{*'} x_{it} z_{it}^2 + \beta_2^{*'} x_{it} z_{it}^3 + \varepsilon_{it}^*. \qquad (A2)$$

To choose between PLSTR and PESTR models by a sequence of nested tests within (A2) as followed:

$$H_{01} : \beta_4 = 0;$$
$$H_{02} : \beta_3 = 0 \setminus \beta_4 = 0;$$
$$H_{03} : \beta_2 = 0 \setminus \beta_4 = \beta_3 = 0.$$

The decision rules of choosing between PLSTR and PESTR models are suggested by Teräsvirta (1994): First, we may check directly the test of H_{01}, if the null hypothesis is rejected, this may be interpreted as a favor of the PLSTR model. If we are not able to reject H_{02}, this can be supportive for the PLSTR model, which will be supported by rejecting H_{03} of after accepting H_{02} as well. Then the rules will be the other way around for picking the PESTR model. We can also choose by comparing the significance level of the three F-tests, if the p value of the test of H_{02} is the smallest among the three, select an PESTR model; if not, then choose a PLSTR model.

Logistic function : $G(z_{it};\gamma,\gamma;) = \left[1 + exp\left(-\gamma \prod_{j=1}^{m} (z_{it} - c_j) \right) \right]^{-1}.$

Exponential function : $G(z_{it};\gamma,\gamma;) = 1 - exp\left[-\gamma \prod_{j=1}^{m} (z_{it} - c_j)^2 \right].$

With $\gamma \succ 0$ and $c_1 \leq c_2 \leq ... \leq c_m$. Where $c = (c_1,...,c_m)'$ is an m-dimensional vector of location parameters and the slope parameter γ determines the smoothness of the transitions[2].

STEP 3

The logic is similar when it comes to testing the number of transition functions (r) in the model or equivalently order of extreme regimes ($r + 1$). González, Teräsvirta, and Van Dijk (2005) propose a sequential approach by testing the null hypothesis of no remaining nonlinearity in the transition function. In the PSTR framework, we assume that the linearity hypothesis is rejected. The issue is then to test whether there is one transition function ($H_0 : r = 1$) or whether there are at least two transition functions ($H_0 : r = 2$). The methodology of sequential tests is generally used. In general, a

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[2] The restrictions $\gamma > 0$ and $c_1 \leq c_2 \leq ... \leq c_m$ are imposed for identification purposes.

PSTR with $r*$ transition functions, we test the null hypothesis ($H_0 : r = r*$ against $H_1 : r = r*+1$). If H_0 is not rejected, the procedure ends. Otherwise, $H_0 : r = r*+1$ is tested against $H_1 : r = r*+2$. The testing procedure continues until the first acceptance of the null hypothesis. The issue is to test whether there is one transition function $(H_0 : r = 1)$, or whether there are at least two transition functions $(H_1 : r = 2)$. The testing procedure continues until the first acceptance of H_0.

STEP 4

Once the transition variable and form of the transition function are selected, estimation of parameters of the PSTR model (A1) is a relatively straightforward application of the fixed effect estimator and nonlinear least squares [NLLS]. One has to eliminate the individual μ_i by removing individual-specific means and to apply NLLS to the transformed model to estimate the remaining parameters. This estimating procedure can be seen as maximum likelihood where first the likelihood function is concentrated with respect to the fixed effects.

The optimization algorithm can be disburdened by using good starting values. For fixed values of the parameters in the transition function, γ and c, the PSTR model is linear in parameters β_1' and β_2', and therefore can be estimated by using OLS. Hence, a convenient way to obtain reasonable starting values for the NLLS is to perform a two-dimensional grid search over γ and c, and select those estimates that minimize the panel sum of squared residuals.

Appendix 2 Episodes of Banking Crises (1985-2010)

Algeria	1990-1992	Jordon	1989
Argentina	(1989-1990), 1995, (2001-2003)	Kenya	(1985-1989), (1992-1995)
Austria	2008-2010	Korea, Rep	1997-2002
Bangladesh	Late 1980s-1996	Malaysia	1997-2002
Belgium	2008-2010	Mexico	(1991), (1994-1997)
Brazil	1990, (1994-1999)	Morocco	Early 1980s
Burkina-Faso	1990-1994	Netherlands	2008-2010
Canada		New Zealand	
Chile	1976, (1981-1985)	Nigeria	1991-1995
Colombia	1987	Norway	1987-1993
Costa Rica	1994-1996	Pakistan	
Cote d'Ivoire	1988-1992	Paraguay	1995-2000
Denmark	2009-2010	Peru	1990
Dominican Republic	1991-1993	Philippines	(1987), (1998-2002)
Ecuador	1996-2001	Portugal	
Egypt	Early 1980s	South Africa	
El Salvador	1989	Spain	1985
Finland	1991-1994	Sri Lanka	1989-1993
France	2008-2010	Sweden	1991-1994
Germany	2009-2010	Switzerland	
Greece	2009-2010	Thailand	(1985-1987), (1997-2002)
India	1993	Tunisia	
Indonesia	1997-2002	Turkey	(1985), (2000-2002)
Ireland	2009-2010	United Kingdom	2008-2010
Italy	2008-2010	United States	1988, 2008-2010
Jamaica	1996-2000	Uruguay	2002
Japan	1991-2002	Venezuela	1994-1995

Source: Caprio et al. (2005), Laeven and Fabián Valencia (2012).

Appendix 3 List of Data Sources and Definitions

Variables	Definition	Source
Economic growth	Real GDP *per capita* growth.	World Bank's (2014) World Development Indicators (WDI) database[3]
Inflation	Log (100+auunual percent change in consumer price index).	Author's calculations using data from WDI
Trade	Terms of trade divided to GDP.	WDI
Government consumption	Ratio of government consumption to GDP.	WDI
Population	Growth rate of total population.	WDI
Systemic banking crises	Dummy variable: 1 if there is a crisis and 0 otherwise.	Caprio et al. (2005), Laeven and Valencia (2012)
Financial liberalisation	Financial Reform Index: includes 7 dimensions of financial liberalization. Each one takes values between 0 and 3, from fully repressed to fully liberalized. The aggregate Financial Reform Index takes values between 1 and 21.	Abiad, Detragiache, and Tressel (2008)
Banking supervision	This index is composed by 4 components: (a) Has a country adopted a capital adequacy ratio based on the Basle standard? (0/1); (b) Is the banking supervisory agency independent from executives' influence? (0/1/2); (c) Does a banking supervisory agency conduct effective supervisions through on-site and off-site examinations? (0/1/2); (d) Does a country's banking supervisory agency cover all financial institutions without exception? (0/1). Banking supervision is coded by summing up these four dimensions, which are assigned a degree of reform as follows. Highly regulated = (6), Largely regulated = (4-5), Less regulated = (2-3), Not regulated = (0-1).	Abiad, Detragiache, and Tressel (2008)
Law and order	Measure of the law and order tradition of a country. It ranges from 6, strong law and order tradition, to 1, weak law and order tradition.	The PRS Group's (2014) International Country Risk Guide (ICRG)[4]
Corruption	The level of corruption ranges from 0 (high level of corruption) to 6 (low level).	ICRG
Deposit insurance	This index takes the value of 1 if there is explicit insurance and 0 for implicit insurance.	Demirgüc-Kunt, Baybars Karacovali, and Laeven (2005)
Government Stability	This is an assessment both of the government's ability to carry out its declared program(s), and its ability to stay in office. The risk rating assigned is the sum of three subcomponents, each with a maximum score of four points and a minimum score of 0 points. A score of 4 points equates to Very Low Risk and a score of 0 points to Very High Risk.	ICRG

Source: Authors' compilation.

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[3] **World Bank.** 2014. World Development Indicators. www.worldbank.org (accessed July 31, 2014).
[4] **The PRS Group.** 2014. International Country Risk Guide. www.prsgroup.com (accessed July 31, 2014).