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The effect of financial liberalization on economic growth

A panel data analysis of 38 countries

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Abstract

This paper empirically surveys the actual links between financial liberalization and economic growth by drawing lessons from both developed and emerging economies over 26 years. The macroeconomic indicators for economic growth are GDP per capita growth, growth volatility, and real lending interest rate. Previous researches hold differing views about whether the impact of liberalization reform on macroeconomic outcomes and financial indicators is positive theoretically, and they mainly focus on capital account liberalization. This paper uses a multidimensional database of financial liberalization and employs econometric approaches to examine the actual influences of liberalization in 38 countries, spanning the year 1980-2005. The main findings are the GDP grows faster and the growth volatility maintains more steadily in economies with more developed financial sectors; the impact of real interest rate is found to be nonlinear and depends on whether the countries are middle-income or high-income economies. These results imply the reform of liberalization increases GDP growth, maintain growth volatility, and has varying degrees of impacts in developed and emerging countries.

Keywords: Financial deepening theory, Financial liberalization, Economic growth, Panel data model

Acknowledgments

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1. Introduction

The financial deepening theory proposed by McKinnon (1973) and Shaw (1973) presents the positive effect of the "financial liberalization" on economic growth and reveals the harmfulness of "financial repression". Because of the capital utilization inefficiency caused by the distortion of the financial market, the economy of emerging economies increased sluggishly in the 1970s. Along with the development of financial deepening theory and financial globalization theory, many developing countries adopted the policy of liberalization reform by deregulating the domestic financial department during the past two decades. The financial deepening reform in general includes several internal and international financial sector policies, which in theory would stimulate economic growth theoretically. However, some developing economies suffered heavily from the financial crisis after processing the reform of financial liberalization, and many economists suggested that capital account liberalization would be related with the instability of growth and the potential risk of crisis. Thus, the realistic impact of financial liberalization is still ambiguous. However, many historical surveys about financial liberalization have some limitations. Firstly, some studies, such as Edison et al. (2004) and Stiglitz (2000), only concentrate on the influence of capital account liberalization while the financial deepening reform covers several policies such as equity market liberalization, interest rate liberalization, banking sector liberalization etc. Secondly, they asses the influences of financial liberalization reform on different economic indicators in theory without providing empirical evidence. To avoid these limitations, this paper employs econometric approaches to survey the influence of the index of financial liberalization, which contains seven dimensions of financial policies, on macroeconomic outcomes by examining the actual experiences of 38 countries, during the period 1980-2005. The macroeconomic indicators are GDP growth, growth volatility, and the real interest rate. The econometric approaches this paper employs are panel data models with fixed effects and two-way fixed effects, respectively. This study first investigates the short-run effects of liberalization index on three macroeconomic indicators and compares the short-run effects on both emerging and developed economies, and then surveys the effects of liberalization index in the long run and makes a comparison.

The remainder of this paper is organized as follows. Section 2 illustrates the financial deepening theory briefly, reviews the debate on financial liberalization, and presents some potential effects on economic and financial indicators. Section 3 discusses the models and econometric approaches. Section 4 outlines a multidimensional database of financial liberalization, introduces a way to conduct an index of liberalization, and summarizes all variables. Section 5 reports the empirical results, discusses and compares the effects of liberalization index. Finally, section 6 draws the conclusions, mentions the limitations of this paper and points out several suggestions for further research.

2. Theory and literature review

In Section 2.1, the financial deepening theory and the main approaches to achieve financial liberalization are described briefly. Section 2.2 mentions the debate about whether the financial liberalization can stimulate the economic growth and reviews the past literature.

2.1 Financial deepening theory

The term "financial liberalization," which has an opposite meaning to "financial repression," is originated in "financial deepening theory" proposed by McKinnon (1973) and Shaw (1973). Financial repression describes the fact that government intervenes the financial market by controlling interest rate, setting restrictions over capital flows and supervising financial institution, while the financial liberalization implies the opposite thing that the government loosens the administrative intervention of the financial system to maximize the efficiency of resource distribution. The financial deepening theory emphasizes the core status of the financial sector in economic development, mentions the drawbacks of over-relying on foreign capital, and proposes that developing countries should adopt the financial deepening reform. The financial deepening theory has been improved by several scholars. For example, in the research of Mathieson (1980), he confirmed the probability of success in financial reform and indicated the necessity of integrating financial liberalization with stabilization policy, which can avoid the threat of potential financial bankruptcies. What should be noticed is that the phenomenon of financial repression is more general in emerging economies so that the financial deepening reform would mean different things to developed and emerging economies. For emerging countries, the financial system should also be constructed and optimized in the process of liberalization reform.

The two main approaches to achieve full financial liberalization are internal liberalization and international liberalization. The process of liberalization reform, in general, starts with the liberalization of the domestic sector, containing the reduce of restrictions over several financial sector policies, then is followed by trade and external capital account openness, and ends with external financial liberalization (Ahmed & Islam 2009). The table below

presents four dimensions of liberalization.

Table 1. The proponents of financial sector policy

Domestic liberalization	1) Regulation of interest rate controls
	2) Removal of reserve requirements
	3) Decrease of entry barriers to the financial institution
	4) Stabilization of price level
	5) Privatization
Trade liberalization	
External capital account liberalization	
International liberalization	1) Removal restrictions over investment of assets abroad
	2) Openness of the foreign currency market

To investigate the links between the financial deepening reform and macroeconomic outcomes, such as economic growth, capital inflow, financial crisis, etc., many scholars constructed various measures of liberalization reform to document the degree of financial reform policies in different countries. Most of the financial liberalization measures are based on three main categories: capital account liberalization, equity market openness, and banking sector deregulation (Bumann et al. 2013). This paper chooses the database from Abiad et al. (2010), who used a multidimensional measure to grade the liberalization policies based on seven dimensions.

2.2. Literature review

Over the past few decades, there exist a vast majority of literature to survey the actual consequence of financial deepening reform on macroeconomic indicators. Based on the financial deepening theory, applying financial liberalization reform should stimulate economic growth and improve economic and financial efficiency. Levine (2005) confirmed that developed financial sectors did stimulate economic growth from comprehensive literature and concluded that reducing external financial restrictions on firms and industries can improve capital allocation. However, after implementing the financial reform in the 1980s, many developing countries, i.e., Mexico, Brazil, and Argentina, suffered from financial crisis heavily, thus the theory that financial liberalization would promote

economic growth is challenged. Stiglitz (2000) argued that implementing the financial and capital market liberalization policy with inefficient regulatory framework would cause the problem of instability and cannot solve the problem of incomplete information. One of the intuitions from Hellmann et al. (2000) is the profits banks can gain are reduced because of the increased competition among banks caused by financial liberalization, leading to lower franchise values; banks with lower franchise value tend to apply gambling strategy, which increases the likelihood of moral-hazard. From the above-mentioned literature, the association between financial liberalization and economic and financial development seems to be ambiguous. This paper also reviews some empirical studies focusing on the realistic effect of financial deepening reform on macroeconomic or financial indicators. Quinn and Toyoda (2008) confirmed the positive influence of capital account liberalization and the independent influence of the equity market policy on growth by using econometric approaches. The finding from Bekaert et al. (2006) is no evidence could prove that the volatility of GDP growth and consumption growth would increase after the liberalization reform. According to one of the findings from Forbes and Warnock (2012), the association between capital account restriction and capital flows is not significant based on the theory that the degree of liberalization and global factors determine the capital waves.

A very recent paper from Huang and Ji (2017) examined the influence of liberalization reform on both macroeconomic and financial indicators by using a panel data model with fixed effects, i.e., GDP growth, growth volatility, interest rate, capital flows and financial crisis in 60 middle-income economies. Huang and Ji's found that financial liberalization reform could increase GDP growth, arise the interest rate, and increase the potential risk of banking crisis. In my paper, a panel data model with fixed effects is considered which is based on the Barro-type growth equation in Huang and Ji (2017), and a multidimensional measure of liberalization is applied to analyze the effects of the constructed index of financial liberalization. The difference between previous work and this paper is that the model is appended by adding time effects and lagged economic variables to study the effects of financial liberalization. In the meanwhile, this paper also researches various influences of liberalization in high-income and middle-income nations separately.

3. Econometric approach

To analyze the realistic influence of liberalization reform on economic development for 38 specific countries over 26 years, i.e., from 1980-2005, this paper estimates several panel data models. The panel data models that are estimated by using Ordinary least squares (OLS) in this paper are similar to the main regressions used by Huang and Ji (2017). To expand the regression models, this paper employs static and dynamic panel data models with fixed effects and two-way fixed effects. Also, the influence of financial deepening reform on high-income and middle-income countries will be investigated separately.

3.1. Static panel data analysis

This section starts with the Barro-type growth model by describing the static panel data model with fixed effects and two-way fixed effects respectively. The basic equation is given by,

$$y_{it} = \beta_0 + \beta_1 index_{it} + \beta_2 index_{it}^2 + \beta_3 index_{it} \cdot Pol_{it} + \gamma X_{it} + \alpha_i + \varepsilon_{it} \quad (1)$$

where the subscripts i indicates the country and t presents time period. Y_{it} is a vector, containing several macroeconomic indicators: GDP per capita growth, the volatility of GDP growth, and the real interest rate. The main explanatory variable $index_{it}$ represents the constructed index of financial liberalization by using the PCA approach, and the square of the liberalization index allows for a nonlinear effect. The Pol presents the political regime index in all regressions. The interaction terms of $index$ and Pol can detect the effect of political regime given the level of financial liberalization. Control variables X_{it} in the regressions contain inflation rate, population growth, the ratio of trade to GDP, the saving rate, the ratio of broad money to GDP, government size, political regime, the ratio of public debt to GDP, and the initial GDP level.

The fixed effects α_i in equation (1) capture time-invariant differences across countries. By using demeaning, α_i can be eliminated so that we can apply OLS to obtain $\hat{\beta}_{FE}$ and $\hat{\gamma}_{FE}$, which are so-called fixed effects estimators. However, the drawback of individual fixed effects is that $\hat{\beta}_{FE}$ and $\hat{\gamma}_{FE}$ cannot estimate the influences of the variables which are time-

invariant.

Essentially, the panel data model with fixed effects concentrates on differences within individuals. From a fixed effects regressions, parameters are identified through the within dimension of the data, that is through time variation (Verbeek, M. 2008). To solve the problem that the above model omits the variables that are individual invariant but time-varying, this paper introduces the time fixed effects into the model. Then the model becomes,

$$y_{it} = \beta_0 + \beta_1 index_{it} + \beta_2 index_{it}^2 + \beta_3 index_{it} \cdot Pol_{it} + \gamma X_{it} + \alpha_i + \tau_t + \varepsilon_{it} \quad (2)$$

where the time fixed effects τ_t can be considered as the specific intercept in t period, measuring the effect of "t period" on explained variable y. Since equation (2) contains both individual fixed effects α_i and time fixed effects τ_t, it can be called as a two-way fixed effects model.

3.2. Dynamic panel data analysis

Many economic phenomena suggest that current behavior of explained variables may depend upon past behavior. If the lagged terms of the dependent variable are considered to be the independent variables in the panel data model, then this kind of model would be the dynamic panel data model. Equation (1) and (2) would thus be expanded as the following forms, which are Autoregressive Distributed-lagged (ARDL) panel data model,

$$y_{it} = \beta_0 + \delta y_{i,t-1} + \beta_1 index_{it} + \beta_2 index_{i,t-1} + \beta_3 index_{it}^2 + \beta_4 index_{i,t-1}^2 + \beta_5 index \cdot Pol_{it} + \beta_6 index \cdot Pol_{i,t-1} + \beta_7 X_{it} + \beta_8 X_{i,t-1} + \alpha_i + \varepsilon_{it} \quad (3)$$

$$y_{it} = \beta_0 + \delta y_{i,t-1} + \beta_1 index_{it} + \beta_2 index_{i,t-1} + \beta_3 index_{it}^2 + \beta_4 index_{i,t-1}^2 + \beta_5 index \cdot Pol_{it} + \beta_6 index \cdot Pol_{i,t-1} + \beta_7 X_{it} + \beta_8 X_{i,t-1} + \alpha_i + \tau_t + \varepsilon_{it} \quad (4)$$

To avoid the issue of incidental parameter bias that occurs in OLS estimation when it is used to estimate dynamic panel data models and possible endogeneity (the models above are Barro-type growth equation), this paper uses the generalized method of moments (GMM) estimators. This paper first considers the difference GMM estimation by applying first difference to the above equations; then the individual α_i would be eliminated. $\Delta y_{i,t-1}$

is still correlated with $\Delta\varepsilon_{it}$ as $y_{i,t-1}$ is correlated with $\varepsilon_{i,t-1}$. Instrumental variables should be used to obtain consistent estimation. Following Arellano and Bond (1991), this paper considers all potentially lagged variables as instrumental variables. Apparently, the number of instruments would be larger than that of endogenous variables. This paper also employs system GMM estimators proposed by Blundell and Bond (1998) to avoid the potential weak instruments problem difference GMM may cause. Compared with difference GMM, system GMM has another advantage that it can estimate the coefficient of the time-invariant variable. According to Roodman (2006), one problem both difference and system GMM may cause is that the number of instruments would be too many with the increase in T, overfitting endogenous variables.

4. Data and variables description

Annual panel data of financial liberalization and macroeconomic indicators are used in this paper, covering 38 countries (27 richer countries and 11 emerging countries), over the 1980-2005 period. The choice of countries and time horizon is based on data availability. The growth rate of GDP, growth volatility and the real lending interest rate are considered as dependent variables to analyze the links between the financial deepening reform and macroeconomic indicators. The variable of interest is the constructed index of financial liberalization. Several control variables are contained in all regressions.

With regard to the macroeconomic dependent variables, all variables are available from the World Development Indicators Database (WDI). In this paper, the growth volatility is defined as the standard deviation of each GDP growth rate at 5-year overlapping periods. As to the index of financial liberalization, there exist many alternative measures of liberalization reform index constructed by recent scholars. The overall index of financial liberalization built by Bandiera et al. (2000) by using a dummy variable was based on eight financial dimensions. Kaminsky and Schmukler (2003) graded the index of financial liberalization based on the three main ingredients: capital account liberalization, domestic financial sector deregulation, and stock market openness. The database this paper used is from Abiad et al. (2010), which puts emphasis on the domestic department, and each component in the database is graded while many measures use binary value. The dataset comprises seven components of financial sector policy: (1) Credit restrictions and reserve requirements; (2) Interest rate controls; (3) Entry barriers into the financial system; (4) State ownership of banks; (5) Restrictions of capital account transaction; (6) regulations and supervision of the banking sector; and (7) Securities market policies. These seven components are graded from 0 to 3, with three corresponding to full liberalization.

Because these seven financial indicators in the database are highly correlated, this paper uses the principal component analysis (PCA) approach to construct the index to avoid potential problem caused by including all of the correlated variables in the models. PCA approach is a standard statistical tool that can reduce the variables into aggregated

dimensions and identify new underlying variables. After applying the PCA approach, uncorrelated components can be constructed and each of them is a weighted combination of all variables. The weights are given by the eigenvectors of the correlation matrix (Vyas & Kumaranayake 2006).

$$PC_1 = a_{11}X_1 + a_{12}X_2 + \cdots + a_{1n}X_n \quad (5)$$
$$\cdots$$
$$PC_m = a_{m1}X_1 + a_{m2}X_2 + \cdots + a_{mn}X_n$$

where a_{mn} indicates the weight for the mth principal component and the nth variable. The resulting index of liberalization is created based on the first principal component, as the first PC can explain the largest proportion of variation. The index values from -2.36 to 2.09, which can explain 61.34% of the variation of the seven other indices.

The source of control variables in the regressions such as the inflation rate, population growth, trade/GDP, saving/GDP, government size, which is measured as the ratio of general government expenditure to GDP, the proportion of broad money to GDP, and the log of GDP per capita is from WDI and International Monetary Fund (IMF). Data on the ratio of public debt to GDP are from Horton et al. (2010). Political regime data are from Our World in Data (OWID).

The log of GDP, which is the initial GDP level, is considered as a control variable to capture the convergence effect (Huang et al. 2014). According to Barro (1996), initial GDP level, population growth, government size, and inflation rate are expected to repress GDP growth, while the trade/GDP and saving rate would promote the GDP growth. In the perspective of the links between growth and political development, it seems to be controversial. The table below reports the summary statistics of all variables for the period of observation of the dataset.

Table 2 Summary statistics for 38 countries, 1980-2005

Variables	Observations	Mean	Std. Dev	Min	Max
Credit allocation	988	1.81	1.12	0	3

Interest rate controls	988	2.10	1.18	0	3
Capital account	988	1.78	1.08	0	3
Entry barriers	988	1.81	1.14	0	3
Banking regulations	988	0.84	0.96	0	3
Privatization	988	1.36	1.10	0	3
Security markets	988	1.58	1.03	0	3
Population growth	988	1.68	0.86	-1.48	4.81
Inflation	987	49.33	471.00	-26.30	12338.61
Trade/GDP	988	64.28	54.66	6.32	422.65
Saving/GDP	986	21.88	9.65	-2.10	87.10
Government size	986	13.35	5.20	0.91	27.69
M2/GDP	986	47.66	28.41	9.06	146.48
Public debt/GDP	968	58.42	29.48	5.04	205.25
Political regime	988	4.16	6.23	-9.00	10.00
GDP growth	987	1.82	3.72	-15.45	13.59
GDP growth volatility	909	2.62	1.83	0.141	10.18
Lending interest rate	644	7.83	12.37	-65.86	77.62
Ln(GDP)	988	7.80	0.61	5.29	11.11
Number of countries	38	38	38	38	38

Source: Author's calculation based on mentioned database.

5. Empirical results and analysis

The following sections present and analyze the effect of financial deepening on three macroeconomic indicators separately by using static and dynamic panel data models and compare the liberalization effect on richer and emerging economies. The regression results of different income level economies and the results of dynamic panel data models when GDP growth volatility and interest rate are used as dependent variables are reported in Appendix B. Coefficients in column (1) and (3) are the results when running all explanatory variables while in column (2) and (4) are the results when keeping only significant variables in the models. The control variables are eliminated one by one in regressions, starting with the least significant variable. FE and TE in all regression tables imply the individual fixed effects and time effects, and the dummy time variables are omitted to save space.

5.1. Effect of financial liberalization on GDP per capita growth

Table 3 Effect of liberalization on GDP growth using static panel data models

Variables	(1)	(2)	(3)	(4)
		GDP growth		
Index	0.794***	0.755***	1.345***	1.355***
	(0.243)	(0.135)	(0.308)	(0.245)
Index^2	0.00998		0.0501	
	(0.107)		(0.109)	
Index*Political	-0.0135		-0.0136	
	(0.0217)		(0.0211)	
Population growth	-0.402		-0.361	
	(0.347)		(0.348)	
Inflation	-0.000746***	-0.000767***	-0.000747***	-0.000799***
	(0.000241)	(0.000234)	(0.000236)	(0.000228)
Trade/GDP	0.0177**	0.0179**	0.0268***	0.0240***
	(0.00871)	(0.00845)	(0.00914)	(0.00864)
Saving/GDP	0.00874		-0.00126	
	(0.0246)		(0.0240)	
Government size	-0.225***	-0.220***	-0.203***	-0.207***
	(0.0622)	(0.0579)	(0.0627)	(0.0575)
M2/GDP	-0.0396***	-0.0391***	-0.0367***	-0.0351***
	(0.00965)	(0.00880)	(0.00980)	(0.00927)
Public debt/GDP	-0.00328		-0.00802	
	(0.00572)		(0.00620)	
Political regime	0.0741*	0.0790**	0.0833**	0.0939***
	(0.0387)	(0.0348)	(0.0385)	(0.0347)

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Ln(GDP)	-0.240		-0.0528	
	(0.445)		(0.520)	
Constant	7.873**	5.180***	6.313	5.345***
	(3.593)	(0.981)	(4.028)	(1.178)
Obs	962	983	962	983
R^2	0.104	0.098	0.192	0.186
Num of countries	38	38	38	38
FE	Yes	Yes	Yes	Yes
TE	No	No	Yes	Yes

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

What should be mentioned first is that the coefficient of inflation rate in all regressions are extremely minimal because the inflation rates of several countries in specific years are unusually large. The coefficient of the constructed index of financial liberalization is statistically significant at 1% level, while the square of liberalization, as well as interaction term, show insignificant effects. In comparison with the results in Y Huang and Y Ji (2017), the signs of the coefficient of liberalization index are both positive, meaning financial liberalization did promote the GDP growth during 1980-2005, while in this paper liberalization index has a more significant and massive impact. Compared the results in Barro, R. J. (1996), the estimated coefficients associated with most control variables are as expected: trade/GDP and political regime increase the GDP growth, while inflation rate, M2/GDP and government size decrease the GDP growth. The time specific effects are included as they can control the time variant unobserved effects, i.e., the external shocks in worldwide.

Table 4 Effect of financial liberalization on GDP growth in middle-income and high-income countries using static panel data models

	Middle-income countries				High-income countries			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Variables	GDP growth				GDP growth			
Index	0.968***	1.006***	1.683***	1.646***	1.406	1.199***	2.247**	0.975**
	(0.273)	(0.144)	(0.382)	(0.357)	(1.025)	(0.442)	(1.078)	(0.426)
Index^2	0.0856		0.0810		0.0238		0.229	
	(0.158)		(0.170)		(0.308)		(0.356)	
Index*Political	-0.00917		-0.00473		-0.157**	-0.118***	-0.227***	-0.115***
	(0.0253)		(0.0250)		(0.0674)	(0.0313)	(0.0724)	(0.0282)

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Obs	682	698	682	700	280	285	280	285
R-squared	0.096	0.089	0.180	0.165	0.306	0.284	0.435	0.406
Countries	27	27	27	27	11	11	11	11
FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
TE	No	No	Yes	Yes	No	No	Yes	Yes

Note: Results of control variables are omitted in table 4 to save space. The complete table can be found in Appendix B.
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

As to high-income economies, the coefficient of the index is higher than that in middle-income economies since the extents of financial reform in richer economies are deeper. Also, the adverse effect of government size on GDP growth is more remarkable than that in emerging countries, suggesting that the GDP growth is enhanced by smaller government size. The impact of the interaction term is significant and negative in high-income nations, which implies the improvement of financial liberalization combined with political regime may reduce the GDP growth.

Table 5 Effect of liberalization on GDP growth by using dynamic panel data models

	Difference GMM				System GMM			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Variables	GDP growth				GDP growth			
L.GDP growth	0.171***	0.214***	0.179***	0.234***	0.257***	0.292***	0.273***	0.336***
	(0.0565)	(0.0518)	(0.0626)	(0.0571)	(0.0559)	(0.0502)	(0.0605)	(0.0553)
Index	0.722*	0.776***	0.913*	0.730*	0.406	0.188	0.638*	0.383**
	(0.435)	(0.169)	(0.476)	(0.377)	(0.429)	(0.439)	(0.372)	(0.181)
L.Index	0.314		0.255		-0.348	-0.00379	-0.412	
	(0.424)		(0.370)		(0.388)	(0.433)	(0.346)	
Index^2	0.0459		-0.0372		0.156		-0.0878	
	(0.198)		(0.207)		(0.245)		(0.244)	
L.Index^2	0.0793		0.159		-0.226		-0.00877	
	(0.171)		(0.169)		(0.217)		(0.225)	
Index*Political	-0.0555		-0.0659		-0.0775		-0.104**	
	(0.0513)		(0.0479)		(0.0530)		(0.0479)	
L.Index*Pol	0.0857*		0.0898**		0.0899*		0.116**	
	(0.0448)		(0.0396)		(0.0486)		(0.0434)	
Obs	850	907	850	907	905	946	905	946
Num of countries	38	38	38	38	38	38	38	38
AR(2) test	0.685	0.392	0.501	0.156	0.365	0.195	0.195	0.215
Sargan test	0.692	0.730	0.671	0.848	0.639	0.896	0.742	0.724
Hansen test					1.000	1.000	1.000	1.000
FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
TE	No	No	Yes	Yes	No	No	Yes	Yes

Note: Results of control variables are omitted in table 5 to save space. The complete table can be found in Appendix B.
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The table above describes the results for regression when employing dynamic panel data models. All regressions pass the statistic tests, suggesting the results above are reliable. The coefficients of lagged dependent variables are all positive and significant at 1% level, which means the GDP growth does depend on its past behavior. When applying difference GMM with fixed effects and two-way fixed effects, the coefficients of the index are 0.722 and 0.913 respectively and significant at 10% level while the lagged index is insignificant. Compared to the effects of liberalization index in the short run, the effects on GDP growth in the long run, which is the effect of index and lagged term of index on GDP growth and the lagged term of itself, are more substantial. Thus, implanting the financial liberalization reform brings a positive and lasting impact on GDP growth during the period 1980-2005.

5.2. Effect of financial liberalization on GDP growth volatility

Table 6 Effect of liberalization on growth volatility using static panel data models

Variables	(1)	(2)	(3)	(4)
		Growth vol		
Index	-0.786***	-0.734***	-0.494***	-0.465***
	(0.106)	(0.0836)	(0.137)	(0.118)
Index^2	-0.0331		-0.0329	
	(0.0479)		(0.0494)	
Index*Political	0.0102		0.0172*	0.0175**
	(0.00983)		(0.00978)	(0.00837)
Population growth	-0.277*	-0.263*	-0.338**	-0.356**
	(0.155)	(0.151)	(0.159)	(0.156)
Inflation	0.000102		7.42e-05	
	(0.000104)		(0.000104)	
Trade/GDP	0.0108***	0.0109***	0.0105**	0.0106**
	(0.00407)	(0.00405)	(0.00435)	(0.00427)
Saving/GDP	-0.0236**	-0.0222**	-0.0277**	-0.0271**
	(0.0112)	(0.0109)	(0.0111)	(0.0107)
Government size	-0.0487*	-0.0485*	-0.0864***	-0.0852***
	(0.0276)	(0.0273)	(0.0285)	(0.0272)
M2/GDP	0.0121***	0.0114***	0.0189***	0.0201***
	(0.00448)	(0.00440)	(0.00465)	(0.00450)
Public debt/GDP	-0.00495*	-0.00469*	0.00204	
	(0.00257)	(0.00251)	(0.00287)	
Political regime	-0.0469***	-0.0519***	-0.0195	
	(0.0174)	(0.0163)	(0.0177)	

Ln(GDP)	0.554***	0.575***	0.935***	0.807***
	(0.206)	(0.195)	(0.242)	(0.208)
Constant	-0.793	-0.999	-2.718	-1.795
	(1.668)	(1.590)	(1.870)	(1.626)
Obs	885	885	885	904
	0.135	0.133	0.185	0.184
Num of countries	38	38	38	38
FE	Yes	Yes	Yes	Yes
TE	No	No	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

When analyzing the effect of liberalization reform on the volatility of GDP growth, the index of liberalization shows significant and negative sign while the square of the index and the interaction term are insignificant when panel data model with fixed effects only is used. After adding time effects, the interaction term and other significant variables in former regression increase their significance. From the regression results, financial liberalization seems to have the ability to maintain economic stability.

Table 7 Effect of financial liberalization on growth volatility in middle-income and high-income countries using static panel data models

	Middle-income countries				High-income countries			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Variables	Growth vol				Growth vol			
Index	-0.868***	-0.972***	-0.728***	-0.756***	-0.170	0.0639	0.167	-0.106
	(0.120)	(0.0877)	(0.168)	(0.160)	(0.456)	(0.108)	(0.455)	(0.197)
Index^2	0.00451		-0.0245		-0.175		0.0353	
	(0.0697)		(0.0762)		(0.138)		(0.157)	
Index*Political	0.0190*	0.0234**	0.0270**	0.0238**	-0.00946		0.0416	0.0643***
	(0.0112)	(0.00989)	(0.0114)	(0.0100)	(0.0302)		(0.0310)	(0.0135)
Obs	629	643	629	643	256	256	256	256
R-squared	0.186	0.186	0.229	0.231	0.321	0.303	0.467	0.463
Countries	27	27	27	27	11	11	11	11
FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
TE	No	No	Yes	Yes	No	No	Yes	Yes

Note: Results of control variables are omitted in table 7 to save space. The complete table can be found in Appendix B.
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The coefficient of the index in middle-income countries is significant and negative when

using fixed effects and two-way fixed effects, while in high-income countries, it becomes insignificance and the value is around 0, meaning the financial reform has no influence on GDP growth fluctuations in richer economies. Also, the political regime has a negative sign in the regressions of all economies and richer countries; this implies the political regime has the ability to maintain the GDP growth stability. Evidence from Rodrik (2000) also confirms that the political regime reduces volatility, leads to a higher growth rate in the long term, and produces more stable volatility in the short term.

Table 8 Effect of financial liberalization on growth volatility by using dynamic panel data models

Variables	Difference GMM				System GMM			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
	Growth vol				Growth vol			
L.Growth vol	0.724***	0.720***	0.741***	0.750***	0.823***	0.834***	0.826***	0.835***
	(0.0298)	(0.0296)	(0.0316)	(0.0323)	(0.0291)	(0.0246)	(0.0301)	(0.0276)
Index	-0.304	-0.135*	-0.315	-0.457*	-0.252	-0.263	-0.390	-0.418
	(0.267)	(0.0706)	(0.282)	(0.250)	(0.250)	(0.237)	(0.253)	(0.265)
L.Index	0.0587		0.126	0.315	0.190	0.228	0.274	0.377
	(0.246)		(0.256)	(0.217)	(0.261)	(0.237)	(0.264)	(0.253)
Index^2	0.102		0.101		0.0747	0.122	0.0451	
	(0.123)		(0.119)		(0.124)	(0.121)	(0.118)	
L.Index^2	-0.148		-0.126		-0.111	-0.156	-0.0950	
	(0.123)		(0.122)		(0.107)	(0.112)	(0.106)	
Index*Political	-0.00905		-0.00287		0.00225		0.00994	
	(0.0229)		(0.0217)		(0.0176)		(0.0185)	
L.Index*Political	0.00807		0.00394		-0.00503		-0.0108	
	(0.0249)		(0.0247)		(0.0185)		(0.0197)	
Obs	776	797	776	776	829	868	829	868
Countries	38	38	38	38	38	38	38	38
AR(2)	0.0038	0.6758	0.0103	0.0189	0.007	0.009	0.020	0.027
Sargan test	0.0001	0.4795	0.0001	0.0000	0.002	0.009	0.000	0.000
Hansen test					1.000	1.000	1.000	1.000
FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
TE	No	No	Yes	Yes	No	No	Yes	Yes

Note: Results of control variables are omitted in table 8 to save space. The complete table can be found in Appendix B.
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The coefficients of lagged growth volatility are still positive and significant when using dynamic panel data models, while most independent variables, including the liberalization

index, are not found to be significant. Similar to the results when using static panel data, the liberalization index has an adverse impact on volatility of GDP growth. However, since the regressions do not pass the AR (2) test and Sargan test, the reliability of results decreases, suggesting that the results of these regressions might not be reliable.

5.3. Effect of financial liberalization on real lending interest rate

Table 9 Effect of liberalization on real lending rate using static panel data models

Variables	(1)	(2)	(3)	(4)
		Interest rate		
Index	0.616	0.199	2.007	2.130*
	(0.974)	(0.849)	(1.247)	(1.183)
Index^2	-1.800***	-1.856***	-1.478***	-1.413***
	(0.410)	(0.372)	(0.416)	(0.391)
Index*Political	0.210**	0.185**	0.247***	0.191**
	(0.0879)	(0.0803)	(0.0874)	(0.0794)
Population growth	-0.235		-1.183	
	(1.058)		(1.080)	
Inflation	-0.00927***	-0.00954***	-0.00931***	-0.00938***
	(0.00143)	(0.00138)	(0.00144)	(0.00141)
Trade/GDP	-0.0759***	-0.0799***	-0.0329	
	(0.0280)	(0.0265)	(0.0301)	
Saving/GDP	-0.427***	-0.432***	-0.495***	-0.496***
	(0.0848)	(0.0795)	(0.0871)	(0.0783)
Government size	-0.174		-0.0958	
	(0.260)		(0.278)	
M2/GDP	-0.0385		-0.00677	
	(0.0339)		(0.0365)	
Public debt/GDP	-0.00643		0.00121	
	(0.0216)		(0.0229)	
Political regime	-0.0966		0.0431	
	(0.148)		(0.151)	
Ln(GDP)	3.181*	3.157**	6.085***	6.376***
	(1.765)	(1.511)	(2.129)	(1.768)
Constant	5.866	1.286		
	(14.52)	(11.05)		
Obs	512	529	512	529
R^2	0.238	0.229	0.306	0.293
Num of countries	25	25	25	25
FE	Yes	Yes	Yes	Yes
TE	No	No	Yes	Yes

Robust standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

With the lending interest rate as the dependent variable, the index is not found to be significant in most fixed effects regression, but the square of the index and the interaction term seem to be significant with $index^2$ showing negative sign and the interaction term showing positive sign. Thus, there may exist a nonlinear relationship between liberalization and real lending interest rate. After removing the insignificant variables in two-way fixed effects regression, the index becomes significant at 10% level.

Table 10 Effect of financial liberalization on real interest rate in middle-income and high-income countries using static panel data models

Variables	Middle-income countries				High-income countries			
	(1) Interest rate	(2) Interest rate	(3) Interest rate	(4) Interest rate	(1) Interest rate	(2) Interest rate	(3) Interest rate	(4) Interest rate
Index	2.091*	1.894**	2.882	3.330**	0.0205	-0.671	-0.266	-0.483
	(1.210)	(0.923)	(1.751)	(1.551)	(1.700)	(1.463)	(1.758)	(1.416)
Index^2	-2.173***	-1.904***	-0.910	-1.320*	3.196**	2.093	4.589**	4.966***
	(0.706)	(0.598)	(0.786)	(0.676)	(1.534)	(1.426)	(1.842)	(1.772)
Index*Political	0.171		0.232*	0.207*	-0.519***	-0.480***	-0.331*	-0.402***
	(0.117)		(0.121)	(0.108)	(0.172)	(0.148)	(0.176)	(0.126)
Obs	339	354	339	354	134	134	134	134
R-squared	0.251	0.240	0.321	0.304	0.477	0.459	0.696	0.688
Countries	17	17	17	17	6	6	6	6
FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
TE	No	No	Yes	Yes	No	No	Yes	Yes

Note: Results of control variables are omitted in table 10 to save space. The complete table can be found in Appendix B.
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

It is interesting that the liberalization index and $index^2$ have the opposite effect on interest rate in developed and emerging nations. While the financial index has positive sign and is significant in middle-income economies, it seems to be insignificant in high-income economies. However, the nonlinear effect of financial liberalization in middle-income regressions decrease the interest rate, and it increases the interest rate in high-income regressions.

Table 11 Effect of financial liberalization on real interest rate by using dynamic panel data models

Difference GMM	System GMM

Variables	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
		Interest rate				Interest rate		
L.Interest rate	0.395***	0.392***	0.383***	0.382***	0.621***	0.619***	0.628***	0.635***
	(0.0930)	(0.110)	(0.0903)	(0.0974)	(0.109)	(0.0972)	(0.110)	(0.0986)
Index	1.004	1.500*	2.867	4.282**	-0.245	1.189	0.154	1.895
	(1.998)	(0.909)	(2.263)	(1.708)	(1.994)	(1.825)	(2.160)	(1.972)
L.Index	0.755		0.861		0.0984	-1.180	-0.284	-1.864
	(1.605)		(1.458)		(1.940)	(1.733)	(2.239)	(1.969)
Index2	-1.967*	-1.742	-2.200**	-1.829*	-2.495**	-2.057*	-2.814**	-2.245**
	(1.172)	(1.250)	(1.032)	(0.940)	(1.163)	(1.087)	(1.155)	(1.076)
L.index2	1.709*	1.645	2.284***	2.131**	1.880	1.509	2.256*	1.759
	(0.979)	(1.279)	(0.843)	(1.018)	(1.151)	(1.054)	(1.143)	(1.033)
Index*Political	0.330		0.246		0.229		0.206	
	(0.256)		(0.244)		(0.214)		(0.240)	
L.Index*Political	-0.258		-0.154		-0.238		-0.211	
	(0.169)		(0.172)		(0.204)		(0.231)	
Obs	435	471	435	470	473	498	473	499
Countries	25	25	25	25	25	25	25	25
AR(2)	0.3942	0.3486	0.2999	0.2895	0.361	0.547	0.317	0.360
Sargan test	0.0203	0.0041	0.0693	0.0258	0.016	0.025	0.001	0.003
Hansen Test					1.000	1.000	1.000	1.000
FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
TE	No	No	Yes	Yes	No	No	Yes	Yes

Note: Results of control variables are omitted in table 11 to save space. The complete table can be found in Appendix B.

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Similar to the results when employing static panel data models, the coefficients of the liberalization index and the lagged index are positive but not significant by using dynamic panel data models with difference GMM, however, the coefficients of $index^2$ and its lagged term are significant, suggesting the financial liberalization has a nonlinear adverse effect and its lagged term has a positive effect. Although the coefficients of $index^2$ are around -2, the long run effect of $index^2$ is less negative than short-run effect, which implies the financial liberalization would bring nonlinear but less negative effect on the real interest rate. When using dynamic panel data models with system GMM, the coefficients of index and its lagged term are not found to be significant, while the index seems to have a nonlinear effect on interest rate.

All of the coefficients of the lagged terms of dependent variables are significant, meaning

the current macroeconomic indicators partly depend on their past behavior. Thus, it is necessary to employ dynamic panel data models to analysis whether the economic development would be affected by both current and lagged term of financial liberalization. Also, the degree of the effect of liberalization reform on middle-income and high-income economies are different; this fact echoes one of the conclusions from Levine (2005) draws that the economy of countries with more developed financial sectors grows faster.

6. Conclusion

According to the financial deepening theory, the fact that the economic growth of emerging economies was stagnant in the 1970s is due to the financial repression policy. Thus, many emerging economies processed the financial deepening reform, which theoretically can stimulate the growth of the economy and improve the efficiency of the financial market. However, the actual experiences of some developing countries imply that the reform of financial liberalization may bring more costs to economic and financial growth. Many studies and evidence doubt the positive influence of financial deepening reform and suggest that it may cause the instability of growth and arise the potential risk of financial and economic crisis. Thus, this paper is interested in investing the actual impact of liberalization reform on macroeconomic outcomes. Also, the measures of financial liberalization in historical studies did not cover enough financial reform policies. Thus, a multidimensional database of liberalization seems to be necessary when investigating the influence of financial liberalization.

The purpose of this study is examining the realistic influence of financial liberalization on three macroeconomics indicators in developed and developing economies by using a composite index of liberalization. Both static and dynamic estimations are used to see the effects in short term and long term. The empirical results can be summarized based on three aspects. Firstly, the GDP growth increases under financial liberalization reform in both richer and emerging countries, and the extent of increase in advanced economies is more obvious. Secondly, financial liberalization contributes to the stability of growth overall, especially in emerging countries, while it does not affect the volatility of GDP growth in developed countries. Thirdly, liberalization seems to have both linear and nonlinear effects on interest rate in middle-income countries while it only has a nonlinear and positive effect in high-income economies. Finally, the long-run and short-run effects of liberalization reform on macroeconomic indicators are different: the long-run effect of liberalization improves the GDP growth more obviously and decrease the interest rate more slightly.

The reliability of some results using dynamic estimations is doubtful according to several

statistic tests, and the main reason to explain this condition is that too many instruments are included in the regression. Another limitation is although most empirical results in this study prove that the financial liberalization does stimulate the economic growth, this study does not investigate the potential risk of financial crisis liberalization may bring. Worldwide, the raging trend of financial liberalization is irresistible, and most developing economies are implanting the financial liberalization reform gradually. As deregulating the financial sector may bring potential risk, governments have to reconsider the implementation of financial deepening reform. How to balance the benefits and risks of financial liberalization will be the assignable issue. Thus, further research would focus on the potential economic and financial crisis caused by financial liberalization reform by using more accurate econometric approaches. Also, how to regulate and optimize the financial system is another valuable research orientation.

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Appendix A. The list of 38 countries

According to the World Bank, the middle-income economies are classified as those with a GNI per capita between $996 and $12,055; high-income economies are those with a GNI per capita of $12,056 or more in 2017.

The middle-income countries included are: Bangladesh, Bolivia, Brazil, Cameroon, Colombia, Costa Rica, Dominican Rep, Ecuador, Egypt, El Salvador, Ghana, Guatemala, India, Indonesia, Jamaica, Kenya, Malaysia, Mexico, Morocco, Nigeria, Peru, Senegal, South Africa, Sri Lanka, Thailand, Tunisia, Turkey.

The high-income countries include are: Britain, Canada, Chile, Denmark, Korea, Norway Singapore, Sweden, Switzerland, United States, Uruguay.

Appendix B1.

Table 12 Effect of financial liberalization on GDP growth in middle-income and high-income countries using static panel data models

Variables	Middle-income countries				High-income countries			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
	GDP growth				GDP growth			
Index	0.968***	1.006***	1.683***	1.646***	1.406	1.199***	2.247**	0.975**
	(0.273)	(0.144)	(0.382)	(0.357)	(1.025)	(0.442)	(1.078)	(0.426)
Index^2	0.0856		0.0810		0.0238		0.229	
	(0.158)		(0.170)		(0.308)		(0.356)	
Index*Political	-0.00917		-0.00473		-0.157**	-0.118***	-0.227***	-0.115***
	(0.0253)		(0.0250)		(0.0674)	(0.0313)	(0.0724)	(0.0282)
Population growth	-0.0904		-0.603		-0.729*	-0.646*	-0.294	
	(0.732)		(0.771)		(0.372)	(0.354)	(0.388)	
Inflation	-0.000679***	-0.000689***	-0.000705***	-0.000702***	0.0173		0.0172	
	(0.000257)	(0.000245)	(0.000256)	(0.000242)	(0.0174)		(0.0177)	
Trade/GDP	0.0101		0.0232**	0.0228**	0.0326**	0.0321**	0.0322*	0.0471***
	(0.0110)		(0.0117)	(0.0110)	(0.0143)	(0.0133)	(0.0170)	(0.0142)
Saving/GDP	0.00728		0.000831		-0.0199		-0.0574	
	(0.0291)		(0.0288)		(0.0628)		(0.0679)	
Government size	-0.123*	-0.120*	-0.0973		-1.111***	-1.034***	-0.963***	-0.853***
	(0.0729)	(0.0652)	(0.0731)		(0.165)	(0.140)	(0.174)	(0.142)
M2/GDP	-0.0458***	-0.0377***	-0.0500***	-0.0485***	-0.0347***	-0.0330***	-0.0270**	-0.0262**
	(0.0156)	(0.0134)	(0.0156)	(0.0140)	(0.0106)	(0.0104)	(0.0117)	(0.0109)
Public debt/GDP	-0.00221		-0.00758		0.00254		-0.0228*	
	(0.00800)		(0.00820)		(0.00916)		(0.0122)	
Political regime	0.0372		0.0602		-0.0556		-0.147	
	(0.0467)		(0.0472)		(0.0940)		(0.108)	
Ln(GDP)	-0.0207		-0.119		-0.749	-1.001*	-2.409*	
	(0.668)		(0.686)		(0.692)	(0.590)	(1.320)	
Constant	4.385	4.486***	6.630	3.216***	29.36***	29.67***	42.52***	14.48***
	(5.619)	(0.874)	(5.602)	(0.953)	(8.525)	(6.423)	(14.34)	(3.234)
Obs	682	698	682	700	280	285	280	285
R-squared	0.096	0.089	0.180	0.165	0.306	0.284	0.435	0.406
Countries	27	27	27	27	11	11	11	11
FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
TE	No	No	Yes	Yes	No	No	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 13 Effect of financial liberalization on growth volatility in middle-income and high-income countries using static panel data models

Variables	Middle-income countries				High-income countries			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
	Growth vol				Growth vol			
Index	-0.868***	-0.972***	-0.728***	-0.756***	-0.170	0.0639	0.167	-0.106
	(0.120)	(0.0877)	(0.168)	(0.160)	(0.456)	(0.108)	(0.455)	(0.197)
Index^2	0.00451		-0.0245		-0.175		0.0353	
	(0.0697)		(0.0762)		(0.138)		(0.157)	
Index*Political	0.0190*	0.0234**	0.0270**	0.0238**	-0.00946		0.0416	0.0643***
	(0.0112)	(0.00989)	(0.0114)	(0.0100)	(0.0302)		(0.0310)	(0.0135)
Population growth	0.393		0.185		-0.263*	-0.237*	-0.274*	-0.296**
	(0.335)		(0.361)		(0.155)	(0.142)	(0.159)	(0.149)
Inflation	4.71e-05		4.06e-05		-0.00102		0.00515	
	(0.000108)		(0.000110)		(0.00768)		(0.00776)	
Trade/GDP	0.0105**	0.0103**	0.00936*	0.00994*	0.00134		-0.00319	
	(0.00488)	(0.00474)	(0.00533)	(0.00518)	(0.00718)		(0.00803)	
Saving/GDP	-0.0320**	-0.0313**	-0.0363***	-0.0330***	-0.0381		-0.0277	
	(0.0129)	(0.0122)	(0.0130)	(0.0122)	(0.0280)		(0.0286)	
Government size	-0.143***	-0.145***	-0.170***	-0.161***	0.270***	0.307***	0.204***	0.243***
	(0.0315)	(0.0302)	(0.0325)	(0.0305)	(0.0731)	(0.0602)	(0.0760)	(0.0648)
M2/GDP	0.0320***	0.0321***	0.0391***	0.0401***	-0.00188		-0.00291	
	(0.00673)	(0.00631)	(0.00689)	(0.00654)	(0.00491)		(0.00536)	
Public debt/GDP	-0.00189		0.00241		-0.00886**	-0.00946**	0.0122**	0.0148***
	(0.00353)		(0.00371)		(0.00410)	(0.00367)	(0.00541)	(0.00422)
Political regime	0.00497		0.0212		-0.168***	-0.147***	-0.0261	
	(0.0209)		(0.0216)		(0.0390)	(0.0231)	(0.0446)	
Ln(GDP)	1.085***	1.102***	1.182***	1.066***	0.388		2.423***	2.570***
	(0.299)	(0.242)	(0.310)	(0.253)	(0.328)		(0.581)	(0.411)
Constant	-5.161**	-4.555***	-4.406*	-3.388*	-2.729	-0.889	-20.58***	-23.86***
	(2.516)	(1.671)	(2.535)	(1.759)	(4.289)	(1.132)	(6.399)	(3.825)
Obs	629	643	629	643	256	256	256	256
R-squared	0.186	0.186	0.229	0.231	0.321	0.303	0.467	0.463
Countries	27	27	27	27	11	11	11	11
FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
TE	No	No	Yes	Yes	No	No	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 14 Effect of financial liberalization on real interest rate in middle-income and high-income countries using static panel data models

Variables	Middle-income countries				High-income countries			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
	Interest rate				Interest rate			
Index	2.091*	1.894**	2.882	3.330**	0.0205	-0.671	-0.266	-0.483
	(1.210)	(0.923)	(1.751)	(1.551)	(1.700)	(1.463)	(1.758)	(1.416)
Index^2	-2.173***	-1.904***	-0.910	-1.320*	3.196**	2.093	4.589**	4.966***
	(0.706)	(0.598)	(0.786)	(0.676)	(1.534)	(1.426)	(1.842)	(1.772)
Index∗Political	0.171		0.232*	0.207*	-0.519***	-0.480***	-0.331*	-0.402***
	(0.117)		(0.121)	(0.108)	(0.172)	(0.148)	(0.176)	(0.126)
Population growth	2.218		-2.480		0.643		-0.323	
	(3.428)		(3.795)		(0.451)		(0.450)	
Inflation	-0.00946***	-0.00959***	-0.00886***	-0.00947***	-0.597***	-0.570***	-0.679***	-0.672***
	(0.00173)	(0.00167)	(0.00181)	(0.00173)	(0.0933)	(0.0914)	(0.121)	(0.114)
Trade/GDP	-0.0765*	-0.0814**	-0.0468		-0.0315	-0.0329*	-0.0130	
	(0.0445)	(0.0391)	(0.0507)		(0.0192)	(0.0175)	(0.0205)	
Saving/GDP	-0.506***	-0.485***	-0.562***	-0.599***	0.120		0.162	0.210**
	(0.112)	(0.102)	(0.119)	(0.104)	(0.122)		(0.134)	(0.104)
Government size	-0.173		0.176		-0.345	-0.584***	-0.252	
	(0.372)		(0.415)		(0.270)	(0.221)	(0.294)	
M2/GDP	-0.0392		-0.0643		-0.0110		-0.0108	
	(0.0730)		(0.0793)		(0.0141)		(0.0174)	
Public debt/GDP	0.0252		0.0359		0.0949***	0.0873***	0.109***	0.0925***
	(0.0391)		(0.0410)		(0.0217)	(0.0206)	(0.0273)	(0.0214)
Political regime	-0.281	-0.313*	-0.159		0.619**	0.601**	0.577**	0.466**
	(0.196)	(0.181)	(0.207)		(0.249)	(0.248)	(0.272)	(0.233)
Ln(GDP)	7.353**	6.440***	9.605***	8.583***	-3.686***	-3.374***	2.267	
	(3.414)	(2.373)	(3.582)	(2.588)	(1.085)	(0.996)	(2.428)	
Constant	-25.61	-16.83	-40.72	-38.56**	39.47***	44.04***	-17.37	-4.170
	(27.92)	(15.74)	(28.87)	(17.32)	(14.49)	(12.57)	(23.85)	(3.811)
Obs	339	354	339	354	134	134	134	134
R-squared	0.251	0.240	0.321	0.304	0.477	0.459	0.696	0.688
Countries	17	17	17	17	6	6	6	6
FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
TE	No	No	Yes	Yes	No	No	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix B2.

Table 15 Effect of financial liberalization on GDP growth by using dynamic panel data models

	Difference GMM				System GMM			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Variables	GDP growth				GDP growth			
L.GDP growth	0.171***	0.214***	0.179***	0.234***	0.257***	0.292***	0.273***	0.336***
	(0.0565)	(0.0518)	(0.0626)	(0.0571)	(0.0559)	(0.0502)	(0.0605)	(0.0553)
Index	0.722*	0.776***	0.913*	0.730*	0.406	0.188	0.638*	0.383**
	(0.435)	(0.169)	(0.476)	(0.377)	(0.429)	(0.439)	(0.372)	(0.181)
L.Index	0.314		0.255		-0.348	-0.00379	-0.412	
	(0.424)		(0.370)		(0.388)	(0.433)	(0.346)	
Index^2	0.0459		-0.0372		0.156		-0.0878	
	(0.198)		(0.207)		(0.245)		(0.244)	
L.Index^2	0.0793		0.159		-0.226		-0.00877	
	(0.171)		(0.169)		(0.217)		(0.225)	
Index*Political	-0.0555		-0.0659		-0.0775		-0.104**	
	(0.0513)		(0.0479)		(0.0530)		(0.0479)	
L.Index*Pol	0.0857*		0.0898**		0.0899*		0.116**	
	(0.0448)		(0.0396)		(0.0486)		(0.0434)	
Population growth	-0.554***		-0.636***	-0.480**	-1.121***	-0.676***	-0.831***	-1.001***
	(0.182)		(0.188)	(0.194)	(0.379)	(0.247)	(0.246)	(0.331)
L.Pop growth	0.200		0.377*	0.357**	0.377		0.271	0.489***
	(0.198)		(0.216)	(0.181)	(0.286)		(0.204)	(0.161)
Inflation	-0.000309		-0.000339		-0.000383		-0.000401	-0.000575*
	(0.000366)		(0.000331)		(0.000403)		(0.000367)	(0.000290)
L.Inflation	-0.000190**		-0.000191*		-0.000167*		-0.000162	-0.000126**
	(8.76e-05)		(0.000105)		(9.62e-05)		(9.92e-05)	(5.84e-05)
Trade/GDP	0.0673***	0.0610***	0.0717***	0.0609***	0.0781***	0.0789***	0.0812***	
	(0.0234)	(0.0198)	(0.0224)	(0.0187)	(0.0247)	(0.0229)	(0.0233)	
L.Trade/GDP	-0.0695***	-0.0692***	-0.0606***	-0.0687***	-0.0704***	-0.0711***	-0.0749***	
	(0.0227)	(0.0198)	(0.0230)	(0.0196)	(0.0250)	(0.0227)	(0.0237)	
Saving/GDP	0.0771		0.0722		0.0726		0.0943	
	(0.0485)		(0.0484)		(0.0554)		(0.0590)	
L.Saving/GDP	-0.0570		-0.0576		-0.0396		-0.0559	
	(0.0479)		(0.0443)		(0.0426)		(0.0460)	
Government size	-0.343**	-0.497***	-0.356**	-0.495***	-0.417**	-0.474**	-0.423**	-0.561***
	(0.170)	(0.176)	(0.173)	(0.176)	(0.187)	(0.194)	(0.177)	(0.197)
L.Gov size	0.357**	0.493***	0.408***	0.487***	0.421**	0.455**	0.432**	0.525***
	(0.142)	(0.162)	(0.138)	(0.155)	(0.182)	(0.184)	(0.173)	(0.184)
M2/GDP	-0.0229		-0.0147		-0.00220		0.00331	
	(0.0154)		(0.0159)		(0.0141)		(0.0140)	
L.M2/GDP	-0.0110		-0.0138		0.000434		-0.00332	
	(0.0149)		(0.0161)		(0.0145)		(0.0146)	
Public debt/GDP	-0.0277		-0.0356*		-0.0236		-0.0318*	
	(0.0193)		(0.0197)		(0.0178)		(0.0178)	
L.Public debt/GDP	0.0319*		0.0381**		0.0208		0.0286	
	(0.0190)		(0.0188)		(0.0171)		(0.0177)	

Political	-0.103		-0.0722		-0.0318		-0.0130	
	(0.0740)		(0.0711)		(0.0768)		(0.0774)	
L.Political	0.0899		0.0891		0.0390		0.0364	
	(0.0842)		(0.0760)		(0.0790)		(0.0792)	
Ln(GDP)	11.87***	12.88***	12.01***	13.42***	13.03***	14.13***	13.19***	11.72***
	(1.332)	(1.421)	(1.324)	(1.540)	(1.472)	(1.603)	(1.421)	(1.475)
L.Ln(GDP)	-13.16***	-14.30***	-12.80***	-14.61***	-13.51***	-14.55***	-13.70***	-12.06***
	(1.324)	(1.356)	(1.280)	(1.449)	(1.446)	(1.575)	(1.392)	(1.422)
Constant	12.33***	12.57***	6.696	11.41	4.839***	4.968***	5.346***	6.020***
	(4.093)	(3.677)	(5.698)	(7.477)	(1.440)	(1.155)	(1.682)	(1.452)
Obs	850	907	850	907	905	946	905	946
Num of countries	38	38	38	38	38	38	38	38
AR(2) test	0.685	0.392	0.501	0.156	0.365	0.195	0.195	0.215
Sargan test	0.692	0.730	0.671	0.848	0.639	0.896	0.742	0.724
Hansen test					1.000	1.000	1.000	1.000
FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
TE	No	No	Yes	Yes	No	No	Yes	Yes

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 16 Effect of financial liberalization on growth volatility by using dynamic panel data models

Variables	Difference GMM				System GMM			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
	Growth vol				Growth vol			
L.Growth vol	0.724***	0.720***	0.741***	0.750***	0.823***	0.834***	0.826***	0.835***
	(0.0298)	(0.0296)	(0.0316)	(0.0323)	(0.0291)	(0.0246)	(0.0301)	(0.0276)
Index	-0.304	-0.135*	-0.315	-0.457*	-0.252	-0.263	-0.390	-0.418
	(0.267)	(0.0706)	(0.282)	(0.250)	(0.250)	(0.237)	(0.253)	(0.265)
L.Index	0.0587		0.126	0.315	0.190	0.228	0.274	0.377
	(0.246)		(0.256)	(0.217)	(0.261)	(0.237)	(0.264)	(0.253)
Index^2	0.102		0.101		0.0747	0.122	0.0451	
	(0.123)		(0.119)		(0.124)	(0.121)	(0.118)	
L.Index^2	-0.148		-0.126		-0.111	-0.156	-0.0950	
	(0.123)		(0.122)		(0.107)	(0.112)	(0.106)	
Index*Political	-0.00905		-0.00287		0.00225		0.00994	
	(0.0229)		(0.0217)		(0.0176)		(0.0185)	
L.Index*Political	0.00807		0.00394		-0.00503		-0.0108	
	(0.0249)		(0.0247)		(0.0185)		(0.0197)	
Inflation	-8.57e-06		-1.34e-05	-1.17e-05	-2.11e-06		-4.33e-06	
	(7.58e-05)		(7.42e-05)	(9.00e-05)	(7.22e-05)		(7.71e-05)	
L.Inflation	4.36e-05		6.16e-05	0.000100***	6.39e-05		7.60e-05	
	(3.23e-05)		(4.07e-05)	(3.88e-05)	(5.08e-05)		(5.16e-05)	
Population growth	-0.0264		-0.0361		-0.00360		-0.00948	
	(0.195)		(0.189)		(0.161)		(0.153)	
L.Pop growth	0.0105		0.0251		0.0107		0.0112	
	(0.113)		(0.118)		(0.152)		(0.145)	
Trade/GDP	-0.00384		-0.00626	-0.00484	-0.00448		-0.00776	
	(0.00620)		(0.00612)	(0.00454)	(0.00599)		(0.00678)	
L.Trade/GDP	0.00858		0.00998	0.00771	0.00501		0.00827	
	(0.00630)		(0.00675)	(0.00686)	(0.00582)		(0.00663)	
Saving/GDP	0.00448		0.00691	0.0102	0.00290		0.00571	
	(0.00624)		(0.00674)	(0.00722)	(0.00670)		(0.00775)	
L.Saving/GDP	-0.00308		-0.00369	-0.00194	0.00455		0.00182	0.00807***
	(0.00794)		(0.00841)	(0.00826)	(0.00662)		(0.00713)	(0.00291)
Government size	-0.108**	-0.113**	-0.114**	-0.102**	-0.103**	-0.0973**	-0.111**	
	(0.0493)	(0.0516)	(0.0471)	(0.0511)	(0.0438)	(0.0439)	(0.0448)	
L.Govs ize	0.0793**	0.0606*	0.0812**	0.0700**	0.0971**	0.0899**	0.105**	
	(0.0349)	(0.0360)	(0.0333)	(0.0350)	(0.0416)	(0.0424)	(0.0417)	
M2/GDP	-0.00443		-0.00216	-0.00376	-0.00321		-0.000913	
	(0.00496)		(0.00511)	(0.00519)	(0.00410)		(0.00466)	
L.M2/GDP	0.00241		0.00195	0.00150	0.00248		0.000479	
	(0.00383)		(0.00403)	(0.00431)	(0.00402)		(0.00439)	
Public debt/GDP	0.00232		0.00318	0.00512	0.00375		0.00379	
	(0.00579)		(0.00543)	(0.00603)	(0.00588)		(0.00564)	
L.Public	-0.00662	-	-0.00683	-0.0114*	-0.00537		-0.00541	

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
debt/GDP		0.00890***						
	(0.00573)	(0.00292)	(0.00575)	(0.00664)	(0.00572)		(0.00561)	
Political	0.0214		0.0213	0.0160	0.0228		0.0200	
	(0.0221)		(0.0212)	(0.0231)	(0.0243)		(0.0224)	
L.Political	-0.0211		-0.0228	-0.0308	-0.0273		-0.0256	
	(0.0342)		(0.0322)	(0.0320)	(0.0274)		(0.0264)	
Ln(GDP)	-0.0836		-0.221		-0.0599		-0.176	
	(0.368)		(0.317)		(0.339)		(0.317)	
L.Ln(GDP)	0.464*		0.530**		0.124		0.262	
	(0.244)		(0.256)		(0.341)		(0.324)	
Constant	-1.779	1.876***	-1.183	1.189	-0.00423	0.536***	-0.0956	0.397**
	(1.909)	(0.667)	(1.842)	(0.785)	(0.308)	(0.131)	(0.426)	(0.184)
Obs	776	797	776	776	829	868	829	868
Countries	38	38	38	38	38	38	38	38
AR(2)	0.0038	0.6758	0.0103	0.0189	0.007	0.009	0.020	0.027
Sargan test	0.0001	0.4795	0.0001	0.0000	0.002	0.009	0.000	0.000
Hansen test					1.000	1.000	1.000	1.000
FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
TE	No	No	Yes	Yes	No	No	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 17 Effect of financial liberalization on real interest rate by using dynamic panel data models

	Difference GMM				System GMM			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Variables	Interest rate				Interest rate			
L.Interest rate	0.395***	0.392***	0.383***	0.382***	0.621***	0.619***	0.628***	0.635***
	(0.0930)	(0.110)	(0.0903)	(0.0974)	(0.109)	(0.0972)	(0.110)	(0.0986)
Index	1.004	1.500*	2.867	4.282**	-0.245	1.189	0.154	1.895
	(1.998)	(0.909)	(2.263)	(1.708)	(1.994)	(1.825)	(2.160)	(1.972)
L.Index	0.755		0.861		0.0984	-1.180	-0.284	-1.864
	(1.605)		(1.458)		(1.940)	(1.733)	(2.239)	(1.969)
Index2	-1.967*	-1.742	-2.200**	-1.829*	-2.495**	-2.057*	-2.814**	-2.245**
	(1.172)	(1.250)	(1.032)	(0.940)	(1.163)	(1.087)	(1.155)	(1.076)
L.index2	1.709*	1.645	2.284***	2.131**	1.880	1.509	2.256*	1.759
	(0.979)	(1.279)	(0.843)	(1.018)	(1.151)	(1.054)	(1.143)	(1.033)
Index*Political	0.330		0.246		0.229		0.206	
	(0.256)		(0.244)		(0.214)		(0.240)	
L.Index*Political	-0.258		-0.154		-0.238		-0.211	
	(0.169)		(0.172)		(0.204)		(0.231)	
Inflation	-0.00900***	-0.00905***	-0.00936***	-0.00901***	-0.00764***	-0.00705***	-0.00819***	-0.00544**
	(0.00193)	(0.00159)	(0.00196)	(0.00152)	(0.00137)	(0.00109)	(0.00157)	(0.00211)
L.Inflation	0.0133***	0.0133***	0.0135***	0.0139***	0.0141***	0.0145***	0.0146***	0.0135***
	(0.000456)	(0.000350)	(0.000551)	(0.000415)	(0.000866)	(0.000775)	(0.000981)	(0.00120)
Population growth	0.337		-0.188	-0.940*	0.238		0.134	
	(0.558)		(0.570)	(0.518)	(0.337)		(0.364)	
L.Oop growth	-0.635*		-0.775*		0.0967		0.246	
	(0.336)		(0.456)		(0.393)		(0.402)	
Trade/GDP	-0.0246		-0.00251		0.0414		0.0577	
	(0.0554)		(0.0535)		(0.0672)		(0.0684)	
L.Trade/GDP	-0.0311		-0.0465		-0.0411		-0.0586	
	(0.0531)		(0.0632)		(0.0668)		(0.0689)	
Saving/GDP	-0.0857		-0.101		-0.210		-0.200	
	(0.122)		(0.107)		(0.169)		(0.164)	
L.Saving/GDP	0.163*		0.0881		0.159		0.153	
	(0.0943)		(0.0736)		(0.155)		(0.150)	
Government size	3.073***	3.038***	2.769***	2.619***	3.062***	3.039***	2.819***	2.868***
	(0.816)	(0.641)	(0.696)	(0.607)	(0.767)	(0.636)	(0.760)	(0.678)
L.Gov size	-3.299***	-3.202***	-3.047***	-2.824***	-2.966***	-2.897***	-2.730***	-2.737***
	(0.721)	(0.570)	(0.627)	(0.550)	(0.772)	(0.643)	(0.785)	(0.695)
M2/GDP	0.0540		0.0745	0.0646*	0.112**	0.0691*	0.0955*	
	(0.0485)		(0.0460)	(0.0357)	(0.0527)	(0.0377)	(0.0552)	
L.M2/GDP	-0.152***	-0.106***	-0.113**	-0.115***	-0.141**	-	-0.121**	-0.0262***

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	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
						0.0977**		
	(0.0525)	(0.0237)	(0.0476)	(0.0384)	(0.0512)	(0.0355)	(0.0542)	(0.00674)
Public debt/GDP	0.0762**		0.0915**		0.0530		0.0651	
	(0.0351)		(0.0414)		(0.0357)		(0.0472)	
L.Public debt/GDP	-0.0786		-0.0677		-0.0438		-0.0522	
	(0.0530)		(0.0579)		(0.0469)		(0.0590)	
Political	0.0206		0.0767		0.183		0.184	
	(0.278)		(0.270)		(0.229)		(0.240)	
L.Political	-0.168		-0.0397		-0.164		-0.156	
	(0.169)		(0.192)		(0.240)		(0.273)	
Ln(GDP)	7.788		12.32**	4.379**	7.897		10.37	
	(4.837)		(6.018)	(1.928)	(5.640)		(6.752)	
L.Ln(GDP)	-6.917		-8.380		-7.596		-10.11	
	(4.788)		(5.176)		(5.604)		(6.668)	
Constant	9.006	12.49***	-13.12	-19.37	1.506	3.516**	1.487	1.949
	(13.21)	(3.064)	(19.19)	(13.26)	(5.837)	(1.319)	(8.914)	(3.185)
Obs	435	471	435	470	473	498	473	499
Countries	25	25	25	25	25	25	25	25
AR(2)	0.3942	0.3486	0.2999	0.2895	0.361	0.547	0.317	0.360
Sargan test	0.0203	0.0041	0.0693	0.0258	0.016	0.025	0.001	0.003
Hansen Test					1.000	1.000	1.000	1.000
FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
TE	No	No	Yes	Yes	No	No	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1