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Remedy or Poison? Exploring the Collateral Effect from Capital Account Liberalization

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The paper employs a 65-country dataset to address the collateral effect from capital account liberalization on economic growth. Besides directly providing foreign capital and transferring technology spillovers, capital account liberalization might foster development of other sectors, enhancing their importance to economic growth. This is coined "collateral effect". Previous researches in delving the collateral effect have focused on studying the transmitting mechanism from capital account liberalization to financial development. In this paper we test whether different status of liberalization results in varying importance of financial development to economic growth. We find debt capital flows serve as a substitute to the development of domestic financial sector, albeit more debt capital flows might directly inhibit economic growth if further reforms in the under-developed financial sectors fail to occur. On the other hand, FDI flows might not stem the economic growth, while it does not mitigate the lack of development in domestic financial sector.

JEL Codes: F30, F36 and F43

1. Introduction

Since the building-up of Washington Consensus, debates on pros and cons of capital liberalization have never been as fierce as in present days. Market liberalists suggest capital account controls might impede the optimization of social welfares, thus freeing the constraint is indispensable. On the other hand, countries and regions suffering in the financial turmoil, such as Mexico, Southeastern Asia and Chile, provide straightforward caveats to an inappropriate liberalization of capital account. For politicians, the best response might be a conditional acknowledgement to capital controls, just as reflected by Axel Weber in the Per Jacobsson Foundation Lecture, that "In circumstances of high and volatile capital flows … countries need room for maneuver to formulate their own policy … in order to enhance financial stability".[1]

Turning from the political perspective to the economists' view, neither the neoclassical "laissez-faire", that liberalization benefits, nor the Keynesian "interference", that control works better, is strong enough to overwhelm the other. Theoretically, formal discussions are far less than those in trade affairs. Empirically, studies on the impact of capital account liberalization on economic growth at best provide mixed findings. It is no shame to say that, "[Capital account liberalization] remains one of the most controversial and least understood policies of our day." (Eichengreen, 2003: p.49).

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In this paper, we plan to elucidate the collateral effect from capital account liberalization on economic growth. The term “collateral” is first proposed by Kose, et al. (2006), referring to the indirect benefit resulted from financial integration. In addition to directly influencing the economic growth by providing necessary capital as well as professional know-hows, freeing international capital flows could nurture the development of financial sector and further benefit the domestic economy.

Unlike previous work directly testing capital flows and economic growth, we indirectly evaluate the change in the importance of financial development to economic growth after liberalizing the capital account. To our best knowledge, only Braun and Raddatz (2007) had researched similar questions. While their work was based on the de jure index of capital account liberalization, we adopt the de facto index to complement their findings [2]. Quinn (2010) denoted that no consensus has been reached on which measurement of capital account liberalization (nor on the intensity of capital account controls) is superior. We defend our choice of de facto index for following reasons. First, noise embedded in the de facto index could be averaged out in the long run. Besides, by adopting the de facto index, we could distinguish different impact brought by different types of capital flows (e.g. FDI, debt flows and aggregate cross-country capital flows), which was overlooked in Braun and Raddatz’s work. Last, compared with the de jure index, the de facto one provides more objective judgment on the status of capital account.

We expect to detect either a positive effect, implying that opening capital account allows for more investment opportunity which levels up the importance of financial sector, or a negative and insignificant effect, indicating that economic agents suffer less from finance constraint after liberalizing cross country capital flows, and premature financial system no long exists as a burden to economic growth. We refer to Levine (2002) to construct the financial development index. Despite the difficulty to distinguish whether or not the index is constructed under researchers’ subjective judgment, we focus mainly on the change of status of these indices, rather than delving the transmitting mechanism. We adopt two-stage regression so as to address the issue of endogeneity. Origins of the country’s legal system and lag in financial development are adopted as an instrument variable[3].

The next section provides literature reviews on pertinent researches, while section 3 discusses the model employed in the paper. In section 4 we analyze the findings from the two stage regression model, either from the perspective of collateral effect and threshold effect. To preview the main findings, we find countries with more liberalized debt capital account behave differently in removing financing constraints and fostering economic growth, compared with countries freeing more FDI capital flows. Section 5 concludes the paper and offers several policy implications.

2. Literature Review

We first summarize the measurement of capital account liberalization, so as to recall the caveat proposed by Quinn (2010) about the measurement error. Generally speaking, two types of methods are employed in assessing the extent to which capital account has been liberalized. The de jure approach is based on legislative or policy restrictions. It often

draws on data from the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) and the OECD's Code of Liberalization of Capital Movement[4]. The de jure method provides good information about the policy framework or policy intension. However, it may not be a good indicator of the actual controls, as the observed capital flows often exceed the legal limit. Therefore, some researchers prefer the de facto approach, which is literally 'outcome based'. [5] Admittedly, the indicator also bears critiques that actual flows of international capital are often results of not only capital controls but also other factors, such as expectations of investment returns and perceptions of sovereign risks.

Since the paper is designed to delve the long term impact from capital account liberalization on the importance of financial development to economic growth, the noise brought with implementing de facto index might be averaged out. Besides, it would risk losing generality if we rely on the statute-based de jure index. Thus, we adopt the de facto index as the proxy to capital account liberalization, in contrast to the earlier work done by Braun and Raddatz (2007).

Another strand of literatures pertinent to our research focuses on studying the linkage between capital account liberalization and economic growth. Early studies employed aggregate datasets to track the impact from capital account liberalization. As one of the most cited works, Rodrik (1998) reported no significant relation between capital account liberalization and economic growth. On the other hand, Quinn (1997) employed a larger sample to indicate a significant positive correlation. Klein and Olivei (1999) further proved that in developed countries, removing capital control might facilitate growth. One explanation might be that developed countries are equipped with appropriate institutional environment to capture the positive effects.

Other researchers focus on a more disaggregated facet, investigating if composition of capital flow matters. As a common belief, FDI is more stable than other cross-border capital flows[6]. Kose, et al. (2006) provided a comprehensive survey on FDI and growth, concluding that by taking a more nuanced approach, particularly after accounting for the initial conditions, FDI and economic growth exhibit a positive linkage. Researches on portfolio flows reach similar conclusion. A more interesting question might be delving the impact on growth volatility from liberalizing different types of capital flows, since lower volatility might facilitate the growth (Ramey and Ramey, 1995).

Our research also connects the financial openness, financial development and economic growth. In his sage work, Levine (1997) summarized the channel via which financial system might influence the economic growth. His claim suggested that a better-functioned financial sector would reap more benefit from capital account liberalization. Rajan and Zingales (2003) provided an "interest-group" theory to illustrate the positive link between trade openness, financial openness and development of financial sector. Balgati, et al. (2009) further elaborated on the issue, claiming that a nation only needed to accomplish one type of openness so as to attain gains in financial development.

To summarize, previous researches have drawn disproportionate attention on uncovering the direct impact from liberalization on either financial development or economic growth. In

this paper, we ask another question: could the liberalization indirectly affect economic growth by changing the role played by financial sectors?

3. Data and Methodology

We rely on two-stage least square (2SLS) panel regression so as to address the issue of endogeneity. Explicitly we would estimate the following model:

$$g_{i;t,t-\tau} = \alpha_i + \nu_t + \lambda y_{i,t-\tau} + V_{i,t-\tau}\bar{\theta} + X_{i,t,t-\tau}\bar{\delta} + \beta_1 FD_{i,t} + \beta_2 LIB_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$FD_{i,t} = \omega_i + \sigma_t + \lambda y_{i,t-\tau} + V_{i,t-\tau}\theta + X_{i,t,t-\tau}\delta + \beta LIB_{i,t} + Z_{i,t}\gamma + \eta_{i,t} \quad (2)$$

Where $g_{i;t,t-\tau}$ is the averaged growth rate of real GDP per capita in country i and time period $(t-\tau, t)$. This is a standard panel regression setup, with $V_{i,t-\tau}$ denotes variables measured at the beginning of period $(t-\tau, t)$, and $X_{i,t-\tau}$ denotes the growth determinants measured as averages over the period $(t-\tau, t)$. Considering the span of data is not sufficiently large, we define $\tau = 5$, which is long enough to eliminate short term business cycle noise and also short enough to capture the changes taking place in the economy. $y_{i,t-\tau}$ is the initial level of per-capital GDP in logarithm. $FD_{i,t}$ is the average level of financial development. Referring to Levine (2002) and taking account of the data availability, we define $FD_{i,t}$ as ratio of bank credit to private sector to GDP (*credit*) and ratio of bank deposit to GDP (*deposit*)[7]. $LIB_{i,t}$ measures the extent of capital account liberalization. As discussed in Lane and Milesi-Ferretti (2007), we adopt the stock of capital, including aggregated data (gross capital stocks) and disaggregated data (FDI stocks and debt capital stocks), as the proxy of capital account liberalization. α_i, ν_t in the model are set to control the country-specific and time-specific effect respectively.

We claim the selection of explanatory variables is based on neoclassical growth theory (see Barro, 1991) instead of ad hoc decision. X_i in equation (1) depicts a conditioning set including CPI inflation, government expenditure, gross domestic investment, volume of trade to GDP, level of democracy and primary education enrollment[8]. The government spending variable and gross investment variable might capture the net capital formation effect on economic growth. We expect the government spending would negatively correlate with the economic growth, by crowding out the more productive private investment. The gross domestic investment is positively related to the growth. According to Alesina, et al. (1994), higher trade openness would lead to higher economic growth. Institutions such as democracy and autocracy might also influence the effect from capital account liberalization and economic growth.

Table 1: Data Description

Variable	Obs.	Mean	Std. Dev.	Min	Max
Real GDP per Capita Growth	390	1.85%	3.18%	-13.07%	17.91%
Initial GDP Level (in USD)	390	11635.49	10318.5	1018.16	97126.27
Bank Credit to Private Sector (% of GDP, in Log)	359	33.59%	20.48%	1.74%	101.81%
Bank Deposit Ratio (% of GDP, in Log)	360	34.19%	18.19%	2.06%	115.24%
Gross Capital Stock to GDP	390	68.26%	41.65%	4.88%	263.83%
Gross Debt Stock to GDP	390	59.20%	39.22%	3.92%	252.81%
Gross FDI Stock to GDP	390	17.50%	17.94%	0.00%	114.74%
Inflation (in Log)	376	16.90%	35.88%	0.00%	332.93%
Government Spending (% of GDP, in Log)	352	14.20%	5.38%	3.92%	38.53%
Domestic Investment (% of GDP, in Log)	375	19.64%	4.38%	5.83%	37.84%
Trade Openness (in Log)	390	43.78%	19.76%	0.00%	113.14%
Primary Education Index	376	99.07%	15.01%	43.00%	149.00%
Democracy Index	378	5.53	4.13	0	10

Note: All the datasets employed in the paper are five-year averaged. Description of the raw data is available upon request.

With respect to the data measured at the beginning of period, we expect the initial per-capita GDP level $y_{i,t-\tau}$ is negatively associated with the following-year growth rate, which is consistent with the classical growth theory. Human capital, measured as primary education enrollment, included in $V_{i,t-\tau}$, which we expect to be found a positive sign

Equation (1), which has been fully explained above, is the second step in the 2SLS regression. At the first stage, we seek for the instrument variable $Z_{i,t-\tau}$ to provide a consistent estimation (as depicted in equation (2)). As argued in Beck and Levine (2005), the origins of the country's legal system and the lag of financial development are ideal instruments for addressing the endogeneity occurs between financial development and economic growth. We employ these datasets to finish our regression model setup.

Table 1 above offers the summary statistics of the data, while table 2 and table 3 below further discuss the sources and definition of the datasets.

Table 2: Sample Countries and Categories

Category of Nation	Number	Countries
High income nations		
OECD and Non-OECD advanced economies	**27**	Australia, Austria, Belgium, Canada, Cyprus, Denmark, Finland, France, Germany, Greece, Ireland, Israel, Italy, Japan, Korea, Kuwait, Netherlands, Norway, Portugal, Saudi Arabia, Singapore, Spain, Sweden, Switzerland, Trinidad and Tobago, United Kingdom, United States
Emerging economies		
Upper middle income countries	**16**	Argentina, Brazil, Chile, Costa Rica, India, Cote d'Ivoire, Georgia, Indonesia, Malaysia, Mauritius, Mexico, Panama, Poland, South Africa, Turkey, Venezuela
Developing countries		
Low income and lower middle income countries	**22**	Bangladesh, Bolivia, Columbia, Côte d'Ivoire, Ecuador, Egypt, El Salvador, Ghana, Guatemala, Iran, Jordan, Kenya, Morocco, Nepal, Pakistan, Paraguay, Peru, Philippines, Sri Lanka, Thailand, Tunisia, Zambia

Note: We have in total 65 countries with sample covering 1970-2004. Since there is break in education series between 1996 and 1997, the sample span for the panel regression is: 1970-1995 (averaged on five years) and 1998 – 2002 (averaged on five years)

4. Discussion of Findings

4.1. Findings from 2SLS Model

The findings of the two-stage least square (2SLS) model are summarized in table 4. For the model specification, we evaluate the strength of the IV by Anderson's CC test and the over-identification issue is addressed by Sargan's test.[9] We find that the coefficients on the initial GDP level are all significantly negative, indicating that a country with higher initial income would growth slower than those countries starting with a lower level. The coefficients of CPI inflation are significantly negative across model setups. Government spending is negatively related to the economic growth, as expected. The improvement of investment rate facilitates the economic growth significantly. At this stage, trade openness, education and democracy do not appear significantly across samples. To the author's knowledge, the puzzle of the insignificant impact from education development has long existed in the cross-country growth literature (see Pritchett 1996).

Table 3: Sources and Definition of Variable

Variable Name	Sources
Financial crisis episode	drawn *Laeven and Valencia* (2008)
Democracy index	research in *George Mason University*
Financial development	*Beck and Demirgüç-Kunt* (2009)
General government final consumption expenditure (% of GDP)	*Global Development Network Growth Database* (GDNGD), New York University
Gross capital formation (% of GDP)	*Global Development Network Growth Database* (GDNGD), New York University
Growth rate of GDP per capita	*Global Development Network Growth Database* (GDNGD), New York University
Inflation	*Global Development Network Growth Database* (GDNGD), New York University
Capital account liberalization	*Lane and Milesi-Ferretti (2007)*
Origins of the country's legal system	*Global Development Network Growth Database* (GDNGD), New York University. Classified as: *British common law; Germany civil law; French civil law; Scandinavia civil law; Socialist law*
Primary education enrollment	*Global Development Network Growth Database* (GDNGD), New York University
Real growth of GDP per capita (Laspyre)	*Global Development Network Growth Database* (GDNGD), New York University
Trade share of GDP	*Global Development Network Growth Database* (GDNGD), New York University

Capital account liberalization, as either measured by gross capital stock to GDP, debt capital stock or FDI stock, does not facilitate economic growth. We conjecture the insignificant effect from capital account liberalization might be contributed to threshold effect as depicted in Kose, et al. (2006). [10] With respect to financial development, whatever measurement we adopt, the coefficient is significantly positive. Noticeably the impact from credit scale (asset side) is larger than that from deposit scale (liability side).

Table 4: GMM-IV Two Stage Regression

Dependent Variable	Real GDP per Capita Growth (5-year period)					
Initial GDP level	-0.096***	-0.097***	-0.101***	-0.086***	-0.089***	-0.091***
	(-5.2)	(-5.14)	(-5.17)	(-4.01)	(-4.06)	(-3.99)
CPI Inflation (in Ln)	-0.014**	-0.014**	-0.01*	-0.014**	-0.015**	-0.011*
	(-1.98)	(-2.04)	(-1.48)	(-2.01)	(-2.08)	(-1.51)
Government spending (in Ln)	-0.021**	-0.021**	-0.019**	-0.02**	-0.019**	-0.019**
	(-2.26)	(-2.2)	(-2.17)	(-2.14)	(-2.09)	(-2.06)
Domestic Investment (in Ln)	0.029***	0.029***	0.031***	0.029***	0.029***	0.032***
	(2.83)	(2.77)	(3.08)	(2.86)	(2.79)	(3.13)
Primary Education Enrollment	-0.072**	-0.072**	-0.071*	-0.07*	-0.069*	-0.068*
	(-1.69)	(-1.68)	(-1.62)	(-1.61)	(-1.61)	(-1.54)
Trade Openness (in Ln)	0.012*	0.013*	0.011*	0.012*	0.013*	0.011*
	(1.47)	(1.59)	(1.41)	(1.38)	(1.51)	(1.3)
Democracy index	0.001	0.001	0.001	0.001	0.001	0.001
	(1.1)	(1.1)	(0.97)	(1.01)	(1.02)	(0.87)
Gross Capital Stock to GDP	-0.05**			-0.041*		
	(-2.13)			(-1.38)		
Debt Stock to GDP		-0.049**			-0.043*	
		(-2.23)			(-1.57)	
FDI Stock to GDP			-0.06*			-0.027
			(-1.32)			(-0.55)
Bank Credit to Private Sector to GDP	0.339***	0.323***	0.31***			
	(2.89)	(2.96)	(2.69)			
Bank Deposit Ratio to GDP				0.363**	0.362**	0.303**
				(1.92)	(2.09)	(1.76)
Constant	0.889***	0.9***	0.924***	0.786***	0.809***	0.824***
Anderson's CC Test	7.22***	7.88***	9.07***	3.67***	3.97***	5.15***
Sargan's Test	0.766	0.723	0.841	2.41	1.76	2.652
Observation	297	297	297	297	297	297

Note 1: ***, **, * signal respectively the significant level at 1%, 5% and 10% level. Numbers in parenthesis denotes t-statistics. IV variable: origin of the country's legal system and lag of financial development.

Note 2: GMM-IV regression is adopted since the instrument variables' dimension is larger than the explanatory variables'. Heteroskedasticity and autocorrelation in error terms are taken account of by implementing regression with robust standard errors.

Note 3: Anderson's CC test evaluates the strength of instrument variables, with null hypothesis implying under-identification. Sargan's test reflects the validity of instrument variables, with null hypothesis indicating exact-identification.

Table 5: GMM-IV Two Stage Regression and Crisis

Dependent Variable	Real GDP per Capita growth (5-year average)					
	Model 1			Model 2		
Initial GDP level	-0.099***	-0.1***	-0.102***	-0.09***	-0.092***	-0.092***
	(-5.36)	(-5.29)	(-5.25)	(-4.15)	(-4.19)	(-4.05)
CPI Inflation (in Ln)	-0.012**	-0.013**	-0.009*	-0.013**	-0.013**	-0.01*
	(-1.72)	(-1.75)	(-1.36)	(-1.75)	(-1.78)	(-1.38)
Government spending (in Ln)	-0.018**	-0.017**	-0.017**	-0.017**	-0.016**	-0.016**
	(-1.87)	(-1.82)	(-1.8)	(-1.75)	(-1.7)	(-1.68)
Domestic Investment (in Ln)	0.026***	0.026***	0.029***	0.027***	0.027***	0.029***
	(2.55)	(2.53)	(2.83)	(2.6)	(2.56)	(2.88)
Primary Education Enrollment	-0.072**	-0.072**	-0.068*	-0.07*	-0.07*	-0.066*
	(-1.72)	(-1.72)	(-1.57)	(-1.64)	(-1.64)	(-1.5)
Trade Openness (in Ln)	0.016**	0.017**	0.013*	0.015**	0.016**	0.012*
	(1.84)	(1.96)	(1.61)	(1.74)	(1.88)	(1.51)
Democracy index	0.001	0.001	0.001	0.001	0.001	0.001
	(1.12)	(1.17)	(1.18)	(1.1)	(1.08)	(1.08)
Gross Capital Stock to GDP	-0.052**			-0.043*		
	(-2.19)			(-1.43)		
Debt Stock to GDP		-0.05**			-0.045*	
		(-2.28)			(-1.57)	
FDI Stock to GDP			-0.058			-0.024
			(-1.27)			(-0.49)
Bank Credit to Private Sector to GDP	0.348***	0.331***	0.309***			
	(2.97)	(3.03)	(2.69)			
Bank Deposit Ratio to GDP				0.377**	0.373**	0.302**
				(1.99)	(2.15)	(1.75)
Crisis	0.026	0.023	0.012	0.026	0.023	0.013
	(1.16)	(1.07)	(0.6)	(0.92)	(0.85)	(0.6)
Crisis * FD	-0.019	-0.019	-0.024	-0.025	-0.023	-0.029
	(-0.23)	(-0.24)	(-0.31)	(-0.22)	(-0.23)	(-0.32)
Crisis * LIB	-0.051***	-0.054***	-0.142***	-0.049***	-0.052***	-0.141***
	(-3.45)	(-3.22)	(-4.56)	(-3.22)	(-3.04)	(-4.61)
Constant	0.889***	0.93***	0.934***	0.786***	0.839***	0.834***
F test on FD	8.74***	9.12***	7.15***	3.64*	4.57**	3.03*
F test on LIB	5.22**	5.72**	2.03	2.27	2.89*	0.41
Observation	297	297	297	297	297	297

Note 1: ***, **, * signal respectively the significant level at 1%, 5% and 10% level. Numbers in parenthesis denotes t-statistics. IV variable: origin of the country's legal system and lag of financial development. The rows denoted as "Crisis * FD" and "Crisis * LIB" indicate the interaction between crisis and financial development, as well as liberalization respectively.

Note 2: F test is conducted with null hypothesis that financial development (liberalization) exerts insignificant impact on economic growth, after taking account of all the interaction terms. The same tests apply to all the tables below.

We then ask what would happen in the crisis period if the nation adopts more aggressive attitude towards freeing capital flows. Two concerns motivate us to distinguish the crisis era with the tranquil period. First, as Eichengreen, et al. (2011) emphasized, regression pooling the crisis period with non-crisis period might receive mixed findings due to structural change in economic fundamental. In addition, since we measure the openness with de facto index, the abnormal capital flows taking place in crisis era would cast doubt on the power of proxy.

In the estimation, we revise equation (1) to take account of the crisis period:

$$g_{i,t,t-\tau} = \alpha_i + v_t + \lambda y_{i,t-\tau} + V_{i,t-\tau}\bar{\theta} + X_{i,t,t-\tau}\bar{\delta} + \beta_1 FD_{i,t} + \beta_2 LIB_{i,t} + \rho_1 crisis_{i,t} + \rho_2 crisis \times FD_{i,t} + \rho_3 crisis \times LIB_{i,t} + \varepsilon_{i,t} \quad (3)$$

Table 5 summarizes the findings of equation (3). Among the six models, we find initial GDP level and domestic investment are both significant and consistent with the expectation. Inflation, government spending and trade openness are not all significant, while the signs of coefficient match the prediction as well.

With respect to the difference between crisis era and non-crisis period, the interaction terms in table 5 reflect that further financial development does not alleviate the pain in crisis, while more-liberalized countries suffer more in the financial turmoil. To thoroughly capture the effect from liberalization and financial development, we perform a Wald test on the coefficients. Explicitly, we propose following two hypotheses:

$$H_{0,fd} : \beta_1 + \rho_2 \times \overline{crisis} = 0 \qquad H_{0,lib} : \beta_2 + \rho_3 \times \overline{crisis} = 0$$

where $\beta_1, \beta_2, \rho_2, \rho_3$ are the estimated coefficient in equation (3). $\overline{crisis}$ is the sample mean of dummy variable *crisis*. The null hypothesis is that financial development (capital account liberalization) does not significantly influence economic growth, once taking account of the crisis period.[11] The third to last row indicates that development in credit scale (asset side) facilitate the economic growth, while the development in deposit scale (liability side) appears insignificant relation. The second to last row describes the impact from liberalization. Countries with more liberalized debt capital account generally endure lower output growth rate, while freeing FDI capital does not significantly influence the economic growth.

4.2. Collateral Effect and Threshold Effect

Previous literatures often adopt the following interaction model to detect the threshold effect from capital account liberalization (Kose, et al. 2006):

$$g_{i,t,t-\tau} = \alpha_i + v_t + \lambda y_{i,t-\tau} + V_{i,t-\tau}\bar{\theta} + X_{i,t,t-\tau}\bar{\delta} + \beta_1 FD_{i,t} + \beta_2 LIB_{i,t} + \beta_3 LIB_{i,t} \times FD_{i,t} + \rho_1 crisis_{i,t} + \rho_2 crisis \times FD_{i,t} + \rho_3 crisis \times LIB_{i,t} + \varepsilon_{i,t} \quad (4)$$

The coefficient of interest is β_3. For instance, if $\beta_3 > 0$, it suggests liberalization brings more benefit once the financial sector reaches a higher level. Thus one could argue a nonlinear or *threshold effect* exists.

However, coefficient β_3 per se does not distinguish between the above *threshold effect* and a more implicit *collateral effect*. For instance, positive β_3 could also be comprehended that financial development matters more in economic growth once the openness reaches a higher level. It is nontrivial if one skirts around this second possibility.

In this subsection, we provide a simple framework to address the issue. We first run the regression referring to equation (4) to retrieve the benchmark results. In table 6 we find the coefficients of explanatory variables, financial development and liberalization are similar to the previous models. In addition, more liberalized countries suffer more in crisis and financial development does not matter in crisis period, as previous models have discussed. With respect to the interaction term, $LIB \times FD$, all the regression results, except the model we adopt deposit scale and FDI stock as explanatory variables, are significantly positive.

We next classify the sample into two subsamples referring to the observation's level of capital account liberalization[12]. The categorization of the sample could isolate the collateral effect from the threshold effect. Table 7 provides brief summary of the regression results.[13]

Similar with equation (3), we propose following two hypothesis tests to capture the full effect of the explanatory variables:

$$H_{0,\,fd} : \beta_1 + \beta_3 \times \overline{LIB} + \rho_2 \times \overline{crisis} = 0 \qquad H_{0,lib} : \beta_2 + \beta_3 \times \overline{FD} + \rho_3 \times \overline{crisis} = 0$$

where $\beta_1, \beta_2, \beta_3, \rho_2, \rho_3$ are the estimated coefficient in equation (3). $\overline{crisis}$ is the sample mean of dummy variable *crisis*. $\overline{FD}$ and $\overline{LIB}$ are the sample mean of financial development and liberalization within each subsample respectively. Referring to table 7, we conclude our findings below:

Finding 1 (Collateral effect), financial development is significantly positively related to economic growth in less liberalized countries, while no significant relations found in the more liberalized countries.

Finding 2, capital account liberalization is significantly negatively related to economic growth in less liberalized countries, while no significant relations found in the more liberalized countries.

Finding 3, the significant effect mentioned in finding 1 takes place only when measuring liberalization with the scale of gross capital stock and scale of debt capital stock. Different status of FDI liberalization does not affect the importance of financial development on economic growth.

Table 6: Capital Account Liberalization, Crisis and Interaction Effect

Dependent Variable	Real GDP per Capita growth (5-year average)					
	Model 1			Model 2		
Initial GDP level	-0.096***	-0.097***	-0.102***	-0.087***	-0.089***	-0.091***
	(-4.22)	(-4.14)	(-4.16)	(-3.34)	(-3.33)	(-3.26)
CPI Inflation (in Ln)	-0.012***	-0.012***	-0.01**	-0.012***	-0.012***	-0.01**
	(-2.49)	(-2.39)	(-1.92)	(-2.47)	(-2.39)	(-1.87)
Government spending (in Ln)	-0.017	-0.017	-0.016	-0.016	-0.016	-0.015
	(-0.78)	(-0.77)	(-0.74)	(-0.74)	(-0.73)	(-0.71)
Domestic Investment (in Ln)	0.028*	0.027*	0.029*	0.029*	0.028*	0.03*
	(1.51)	(1.49)	(1.57)	(1.55)	(1.53)	(1.59)
Primary Education Enrollment	-0.066*	-0.065*	-0.069*	-0.064*	-0.063*	-0.066*
	(-1.5)	(-1.46)	(-1.57)	(-1.43)	(-1.4)	(-1.5)
Trade Openness (in Ln)	0.019**	0.021**	0.013	0.019**	0.02**	0.012
	(1.86)	(2.01)	(1.24)	(1.75)	(1.89)	(1.16)
Democracy index	0.001**	0.001**	0.001*	0.001**	0.001**	0.001*
	(1.89)	(1.83)	(1.56)	(1.83)	(1.78)	(1.44)
Gross Capital Stock to GDP	-0.081***			-0.076**		
	(-3)			(-2.33)		
Debt Stock to GDP		-0.084**			-0.083***	
		(-2.28)			(-2.57)	
FDI Stock to GDP			-0.077*			-0.038
			(-1.38)			(-0.65)
Bank Credit to Private Sector to GDP	0.308***	0.289***	0.308***			
	(2.5)	(2.49)	(2.57)			
Bank Deposit Ratio to GDP				0.322**	0.315**	0.301**
				(1.69)	(1.8)	(1.74)
Crisis	0.022*	0.02*	0.01	0.022	0.02	0.012
	(1.55)	(1.36)	(1.04)	(0.92)	(1.17)	(0.94)
Crisis * FD	-0.015	-0.018	-0.021	-0.019	-0.022	-0.027
	(-0.5)	(-0.55)	(-0.62)	(-0.43)	(-0.48)	(-0.66)
Crisis * LIB	-0.048***	-0.05***	-0.139***	-0.046***	-0.048***	-0.138***
	(-3.17)	(-2.9)	(-4.29)	(-3)	(-2,76)	(-4.31)
FD * LIB	0.049**	0.056**	0.029	0.061**	0.071**	0.022
	(1.85)	(2.07)	(0.49)	(1.8)	(2.02)	(0.29)
Constant	0.914***	0.922***	0.938***	0.812***	0.831***	0.836***
F test on FD	8.26***	8.16***	6.95***	3.29*	3.6*	2.69
F test on LIB	8.25***	8.97***	1.59	3.76*	4.68**	1.1
Observation	297	297	297	297	297	297

Note: ***, **, * signal respectively the significant level at 1%, 5% and 10% level. Numbers in parenthesis denotes t-statistics. IV variable: origin of the country's legal system and lag of financial development. The rows denoted as "Crisis * FD", "Crisis * LIB" and "FD * LIB" indicate the interaction between crisis and financial development, crisis and liberalization as well as financial development and liberalization respectively.

Table 7: Collateral Effect from Liberalization

Group		Measurement on Financial Development					
		Gross Capital		Debt Capital		FDI Capital	
		Credit	*Deposit*	*Credit*	*Deposit*	*Credit*	*Deposit*
Full Sample Countries	FD	0.308***	0.322**	0.289***	0.315**	0.308***	0.301**
		(2.5)	(1.69)	(2.49)	(1.8)	(2.57)	(1.74)
	LIB	-0.081***	-0.076**	-0.084**	-0.083***	-0.077*	-0.038
		(-3)	(-2.33)	(-2.28)	(-2.57)	(-1.38)	(-0.65)
	FD*LIB	0.049**	0.061**	0.056**	0.071**	0.029	0.022
		(1.85)	(1.8)	(2.07)	(2.02)	(0.49)	(0.29)
	F test on FD	8.26***	3.29*	8.16***	3.6*	6.95***	2.69
	F test on LIB	8.25***	3.76*	8.97***	4.68**	1.59	1.1
	Observation	297	297	297	297	297	297
Less Open Economy	FD	0.409***	0.603***	0.259**	0.381**	0.346**	0.309**
		(2.79)	(2.42)	(2.01)	(2.34)	(1.88)	(1.77)
	LIB	-0.113***	-0.126**	-0.129***	-0.16**	0.093	0.189
		(-2.49)	(-2.03)	(-2.51)	(-2.01)	(0.33)	(0.46)
	FD*LIB	0.046	0.032	0.269**	0.214	0.113	-0.026
		(0.28)	(0.11)	(2.01)	(1.05)	(0.12)	(-0.02)
	F test on FD	4.08**	6.63**	5.97**	4.31**	3.97**	2.62
	F test on LIB	4.81**	3.42*	4.23**	2.97*	1.19	0.83
	Observation	143	143	143	143	143	143
More Open Economy	FD	0.197	0.064	0.052	-0.14	0.253**	0.062
		(0.43)	(0.06)	(-0.09)	(-0.32)	(2.11)	(0.22)
	LIB	-0.066	-0.088	-0.118**	-0.09	-0.044	0.05
		(-0.91)	(-0.53)	(-1.92)	(-1.06)	(-0.55)	(0.44)
	FD*LIB	0.114**	0.138*	0.148**	0.188**	0.036	0.014
		(1.73)	(1.62)	(2.38)	(2.38)	(0.74)	(0.45)
	F test on FD	2.76*	0.44	1.02	0.01	3.88**	0.11
	F test on LIB	2.12	0.52	2.14	0.31	1.48	1.81
	Observation	154	154	154	154	154	154

Note 1: ***, **, * signal respectively the significant level at 1%, 5% and 10% level. Due to the space limit we do not report the t-statistics. *Gross, Debt, FDI* defines the logarithm form of gross capital stocks to GDP, debt stocks to GDP and FDI stock to GDP respectively. *Credit and Deposit* denotes the measurement of financial development as *bank credit to private sector to GDP* and ratio of *bank deposit to GDP* respectively. The model refers to equation (4).

Note 2: The null hypothesis for *F test on FD* is that financial development does not influence economic growth after considering all the level effect and interaction effect. Due to words limit, we have not reported the interaction coefficient between *crisis and FD*, and *crisis and LIB*. We choose the sample mean of liberalization and crisis to conduct the F test. The same technique applies to *F test on LIB* which tests the effect from capital account liberalization. We report the Wald statistic from F test in the table with asterisks denotes the significant level aforementioned.

Interestingly, similar to the benchmark model, the collateral effect does not hold when measuring financial development with *deposit* ratio. We left the explanation in the discussion subsection. Moreover, the qualitative features of coefficients of other explanatory variables, financial development per se (*FD*), liberalization per se (*LIB*), and their interaction term with crisis have not changed.

Table 8: Threshold Effect from Liberalization

Group		Measurement on Financial Development					
		Gross Capital		Debt Capital		FDI Capital	
		Credit	*Deposit*	*Credit*	*Deposit*	*Credit*	*Deposit*
Full Sample Countries	FD	0.308***	0.322**	0.289***	0.315**	0.308***	0.301**
		(2.5)	(1.69)	(2.49)	(1.8)	(2.57)	(1.74)
	LIB	-0.081***	-0.076**	-0.084**	-0.083***	-0.077*	-0.038
		(-3)	(-2.33)	(-2.28)	(-2.57)	(-1.38)	(-0.65)
	FD*LIB	0.049**	0.061**	0.056**	0.071**	0.029	0.022
		(1.85)	(1.8)	(2.07)	(2.02)	(0.49)	(0.29)
	F test on FD	8.26***	3.29*	8.16***	3.6*	6.95***	2.69
	F test on LIB	8.25***	3.76*	8.97***	4.68**	1.59	1.1
	Observation	297	297	297	297	297	297
Low Financial Development	FD	0.602***	0.875***	0.485**	0.638***	0.425**	0.548***
		(3.9)	(3.42)	(2.07)	(2.81)	(2.12)	(2.6)
	LIB	-0.056	0.001	-0.058*	-0.018	0.069	0.166
		(-0.41)	(0.05)	(-1.47)	(-0.38)	(0.39)	(0.94)
	FD*LIB	-0.37**	-0.6***	-0.297**	-0.436**	-0.87**	-1.151**
		(-2.33)	(-2.73)	(-1.92)	(-1.95)	(-1.83)	(-1.92)
	F test on FD	3.84**	5.94**	6.16**	4.28**	5.16**	3.87**
	F test on LIB	10.44***	8.21***	7.14***	5.76**	1.43	1.39
	Observation	139	139	139	139	139	139
High Financial Development	FD	0.221	0.085	0.225*	0.043	0.148	0.015
		(1.09)	(0.27)	(1.64)	(0.31)	(1.12)	(0.3)
	LIB	-0.052	-0.033	-0.039	-0.008	-0.001	0.087
		(-0.78)	(-0.25)	(1.09)	(-0.06)	(0.58)	(1.05)
	FD*LIB	0.049	0.07	0.037	0.05	0.033	-0.011
		(0.44)	(0.57)	(1.02)	(0.3)	(0.63)	(-0.89)
	F test on FD	1.57	0.27	2.08	0.07	1.34	0.39
	F test on LIB	0.48	0.02	0.46	0.16	0.55	0.95
	Observation	158	158	158	158	158	158

Note 1: ***, **, * signal respectively the significant level at 1%, 5% and 10% level. Due to the space limit we do not report the t-statistics. *Gross, Debt, FDI* defines the logarithm form of gross capital stocks to GDP, debt stocks to GDP and FDI stock to GDP respectively. *Credit and Deposit* denotes the measurement of financial development as *bank credit to private sector to GDP* and ratio of *bank deposit to GDP* respectively. The model refers to equation (4).

Note 2: The null hypothesis for *F test on FD* is that financial development does not influence economic growth after considering all the level effect and interaction effect. Due to words limit, we have not reported the interaction coefficient between *crisis and FD*, and *crisis and LIB*. We choose the sample mean of liberalization and crisis to conduct the F test. The same technique applies to *F test on LIB* which tests the effect from capital account liberalization. We report the Wald statistic from F test in the table with asterisks denotes the significant level aforementioned.

Noticeably, capital account liberalization exhibits a negative relation with economic growth. We test if different level of financial development matters when evaluating the effect from capital account liberalization. Different from table 7, table 8 above reports the impact from financial development and liberalization in countries with different level of financial development. We conclude the findings as below:

Finding 4, the positive impact from financial development on economic growth diminishes as the development reaches a high enough level.

Finding 5 (Threshold effect), the impact from capital account liberalization depends on the level of the financial development. Once the financial sector has developed beyond the threshold level, freeing international flows would not stem economic growth.

Finding 6, the threshold effect mentioned in finding 5 does not hold when considering the FDI liberalization. In the case of freeing FDI, it would not cause negative impact regardless of the level of financial development.

4.3. Discussion

The implications of the results are not straightforward. First, the finding that financial development fosters growth is consistent with previous researches (Levine, 1997). One noticeable phenomenon is the different role played by the assets (credit) scale and liability (deposit) scale as mentioned above. We find changes in assets scale bring a more significant impact on economic growth, compared with the changes in liability scale. Besides casting doubts on the reliability of datasets, we conjecture this might be contributed to the fact that the transforming from deposit to credit requires banking efficiency. Thus, in contrast of deposits, the scale of bank assets is more directly related to production and output.

With respect to liberalization, no significant impact has been found. The finding that more liberalized countries suffer more in crisis complements several previous researches (such as Eichengreen and Leblang, 2002). What draws our attention is the negative impact from liberalization, which is contrary to the neoclassical “laissez-faire”. We conjecture a threshold effect from liberalization exists, implying the results from liberalization are conditional on the level of financial development. By categorizing countries referring to their financial sector development, we confirm our idea.

The most interesting yet unsolved question from previous literatures is the collateral effect from liberalization. Besides directly affect economic growth through providing more capital and technology spillovers, liberalization might change the function of other infrastructures. We suggest countries which are less liberalized in their debt capital account benefit more than their liberalized neighbors, once the development of domestic financial sector taking place. On the other hand, different status of FDI liberalization does not affect the importance of financial development. That is to say, debt capital flows could serve as a substitute to the financial development, while the relationship between FDI and domestic financing sources is ambiguous.

How could one explain the above collateral effect? To our best knowledge, no paper has provided explanation to the question. Braun and Raddatz (2007) reached the conclusion that liberalizing gross capital flows might substitute the financial development. They argue that freeing cross-country capital flows could foster the export-oriented sectors, mitigating

the financing constraints they face. We have not performed an inter-industry regression. Instead we disaggregate the capital flows to see if the composition matters. We conjecture the debt capital flow needs to be channeled through the financial intermediaries, while the FDI flows straightforward into the real sector. In this respect, debt capital, such as bank loans, would supplement the local capital formation. FDI, if not to crowd out, would not directly influence the financing demands and supplies of the local financial system[14]. We believe a dynamic two-sector model is helpful for further analyzing the interrelation between financial development and economic growth (such as Wang, 2000). We leave the study on the mechanism of collateral effect in future studies.

To wrap up our ideas, we have confirmed the importance of financial development on economic growth. Liberalizing debt capital flows might mitigate the under-development of domestic financial sector, serving as the substitute of domestic financing sources. However, countries with a more liberalized debt capital account suffer more if their financial sector has not developed enough (we call it as "*inhibition effect*" in contrast the *financing effect* aforementioned). With respect to FDI, despite it does not serve as the substitute of domestic financing sources, countries with more FDI flows are not subject to a lower economic growth regardless of their financial development, compared with less open economies. Table 9 provides a clear summary of the findings.

Table 9: Summary of Findings

	Financing Effect	Inhibition Effect	
		Low Financial Development	High Financial Development
Debt Capital	YES	YES	NO
FDI	NO	NO	NO

Note 1: Debt capital liberalization might help less developed countries mitigate their financing constraints. However, on condition that financial development is low, open to debt capital might cast risks on the economic stability and growth.

Note 2: FDI capital liberalization could not serve as the substitute of financial development. On the other hand they are more stable and would not inhibit economic growth

5. Concluding Remark

For quite a long time, capital account liberalization remains a contentious topic. Researchers employing macro- and micro-level datasets find ambiguous effect of liberalization on the economic growth. However, most previous literatures focus directly testing the relationship between capital account liberalization and economic growth. The collateral effect from liberalization has long been overlooked.

In this paper, we adopt two-stage regression to investigate if different status of liberalization would affect the importance of financial development. We have illustrated the tradeoff between freeing debt capital and FDI. At the early stage of development, debt

capital flows are ideal funding sources to support domestic investment. However, without further development and reform in domestic financial sectors, more debt capital flows might inhibit the domestic economic growth. On the other hand, FDI provides direct funding to the individual firms. It might not change the function of financial sector. At the same time it does not cause negative impact on economic growth.

We contend the policy makers should be cautious before pushing forward the reform on capital account liberalization. Surely countries whose financial sector performs poorly would benefit from liberalizing the capital account, especially the debt capital flows, to access the international capital. This is also the key point emphasized in the Washington Consensus. Nevertheless, without development of the immature financial sector, debt capital might stem the economic growth in the long run. Recent turmoil prevailing in Chile, Mexico and ASEAN countries has witnessed the consequence of too much exposure to debt capital flows. Another option is to liberalize the FDI flows. Despite its inability to substitute the development of financial sectors at first stage, it would not inhibit the economic growth in the long run. Thus, a carefully-planned liberalization regime is of great importance to the policy makers.

Endnotes

[1] http://www.imf.org/external/np/speeches/2011/092511.htm
[2] Generally, de jure index is based on the government statutes, which subject to the enforcement of laws. De facto index is based on economic variables, such as scale of capital flows, which might be influenced by the economic fundamental instead of capital account policies.
[3] See Beck and Levine (2005) for the discussion of validity of regarding the variable as reliable instrument variable in the financial development literature
[4] Epstein and Schor (1992) was the first to employ information provided by AREAER. Quinn (1997) took one step further to distinguish different degrees of the controls. Gou, et al. (2012) constructed a detailed de jure index to measure restrictions on capital flows in China.
[5] Such as the ratio of gross capital flows to GDP employed by Lane and Milesi-Ferretti (2007).
[6] See Sula and Willett (2009). However, Claessens, et al. (1995) believed the two types of capital flows are in essence identical.
[7] Other alternatives to depict the level of financial development are *total value traded to GDP* and *market capitalization ratio* (Levine, 2002). However, since developing countries count for 2/3 of the sample, these datasets are not retrievable.
[8] Upon regression, we have substituted the original setting with secondary education enrollment (vis-à-vis primary education enrollment), private investment (vis-à-vis gross domestic investment), black market premium and level of autocracy (vis-à-vis level of democracy). There appears no material change.
[9] In the last three columns we observe the IVs are strong; and the over-identification does not matter in the regression. The exclusion restriction implies lag of financial development and origin of legal system are independent of current economic growth, which is argued in Beck and Levine (2005)
[10] Another explanation might be that, in essence FDI and other types of capital flows do not facilitate growth of the local economy. For instance, Carkovic and Levine (2005) reported FDI does not exert a robust, independent influence on growth. Hale and Long (2011) also found China, one of world's largest FDI recipients, did not enjoy the spillover effect brought by multinational corporations.
[11] Since it is a two-way test, we look at both the estimated coefficients and Wald statistics to determine the net effect of explanatory variables.
[12] For instance, when we detect the FDI liberalization and change of importance of financial development to economic growth, we classify the sample with respect to their level of FDI to GDP ratio. The same applies to debt and gross capital stock.
[13] For full reports of the regression results, readers could reach the author by email.
[14] For instance, Harrison and McMillan (2003) investigated the case of the Ivory Coast, finding that the presence of foreign firms crowds local firms out of domestic capital markets

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