

Bond Market Development and Economic Growth: An Empirical Study in Asia

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ABSTRACT

This paper investigates the impact of bond market development on economic growth in 10 Asian countries from 1990 to 2016. We examine this relationship in addition to stock market development as well as bank development. In this paper, we investigate the bond market development in four different dimensions: domestic private debt securities, domestic public debt securities, international private debt securities and international public debt securities. Applying fixed effect model, this paper confirms the positive effect of bond market development on growth. Our results imply that to promote the economy in Asian countries, policy makers should pay more attention to develop the bond market.

Keywords: Asia, bond market development, economic growth.

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INTRODUCTION

In finance literature, there has been numerous researches which covers the nexus of financial market development and economic growth. Early literature points out some key determinants of economic growth, such as human capital, productive investment, technology, fiscal and monetary policy. Inspired by the research of King and Levine (1993a, 1993b), numerous studies show the causal relationship between financial market development and economic growth (Ang, 2008a, 2008b; Levine, 2005). Prior literature shows that countries with developed financial system, i.e growing securities market,

solid banks and other active financial markets, have the potentials of growing their economy in the future (Anwar & Cooray, 2012; De Gregorio & Guidotti, 1995; Jadidia, Boujelbene & Helali, 2014; Samargandi, Fidrmuc & Ghosh, 2015; Yang & Yi, 2008).

Majority of finance researches on the relationship between financial development and economic growth focus on two components of financial market: stock market and bank. In comparison to stock market and bank, bond market receives much less attention and has been neglected in finance research (Sharma, 2001; Thumrongvit, Kim & Pyun, 2013). Thumrongvit et al. (2013) point out two reasons why bond market development studies has lower coverage in literature: (1) issuing bond is considered debt financing, which has been dominated by banks in many countries; (2) it is feasible to assess stock trading data since stocks are traded on stock exchange where data is publicly available, however, a large number of bond is traded on over-the-counter market where the information is not as transparent nor publicly available.

In this paper, we attempt to discover the effect of bond market development on economic growth in 10 Asian countries during 1990 and 2016. Though receiving less attention in comparison to stock market and bank, bond market is still integral components of financial markets. According to World Bank (2006), bond market development has an impact on economic growth in terms of size, integration, stability and efficiency. Therefore, it is necessary for the policy makers to fully understand the relationship between bond market development and economic growth as well as have solutions to develop this part of financial market (DeBond, 2002; Fink, Haiss, Kirchner & Moser, 2006). In this paper, we fill the gaps in finance research by answering the question whether the bond market development have positive effect on economic growth. We apply fixed effect model to analyze the panel dataset. Some researchers criticize that whether this relationship exists depends on the financial development measures. In our paper, we use four different measures of bond market development. We check the robustness of our results by using different proxies for stock market development and bank development.

Similar to the studies on effect of stock market or banking system on economic growth, the linkage between the bond market development and economic growth can be explained by four hypotheses: Supply – leading hypothesis (SLH), Demand-following hypothesis (DFH), Feedback Hypothesis (FBH) and Neutrality Hypothesis (NLH). SLH emphasizes the unidirectional effect of bond market development on economic growth. According to SLH, bond market development plays an important role in economic growth. In

contrast, DFH posits that the development in bond market contribute little to economic growth and it is the economic growth that leads to the development of bond market. Academics who support FBH suggest that bond market and the economy have causal relationship while NLH posits that bond market development and economic growth are interdependent.

Goldsmith (1969), King and Levine (1993a, 1993b) are researchers who initially investigate the finance growth link. Goldsmith (1969) find evidence showing the positive linkage between finance development and economic growth while King and Levine (1993a, 1993b) find a strong correlation between those two. Their studies use only one variable representing the size of banking sector to be the proxy of financial development. In addition, critics claim that the model used by King and Levine (1993a) suffers from estimation bias. After that, to reduce the estimation bias, Atje and Jovanovic (1993) introduce new financial development indicators to their model. Levine and Zervos (1998) follow suits and find that both stock market and banks plays important roles in economic growth. Beck and Levine (2004) also find evidence to confirm the roles of bank and stock market. Nonetheless, other studies show different result in terms of stock market role to the economy. Ritter (2005) find negative relationship between stock market development and economic growth. Harvey (1989) emphasizes that bond yield in US market is proven to be better prediction of economic growth than the stock market.

Bond market is increasingly being considered as important part of financial market. The development of bond market worldwide has been examined by several researchers. Fink, Haiss & Hristoforova (2006) use VAR model in 13 different economies from 1950 to 2003. They find that bond market development leads to economic growth in some countries including USA, UK, Switzerland, Germany, Austria, the Netherlands and Spain over the investigated period. Thumrongvit et al. (2013) use GMM method on panel dataset of 38 countries from 1989 to 2010. They conclude that both the bond market and stock market have impact on economic growth. They emphasize the positive impact of government bond market while the effect of corporate bond changes in different countries. Fabella & Madhur (2003) focus on the bond market development in Asia. According to their research, domestic bond market development is an important factor that increase the financial strength of East Asia countries. A well-established bond market also makes East Asia countries to be less vulnerable to financial crisis. Using four different proxies for bond market development, Pradhan, Zaki, Maradana, Dash, Jayakumar & Chatterjee (2015) apply vector autoregressive (VAR) model for testing Granger causality. They find the existence of both unidirectional and

bidirectional causality between bond market development and economic growth.

METHODOLOGY

Data collection

Data for bond market development and economic growth are collected from World Development Indicators (WDI) of the World Bank dataset. Among 50 independent Asian countries, we choose 10 countries including: China, Indonesia, Israel, Japan, South Korea, Malaysia, the Philippines, Russia, Thailand and Turkey. The number of selected countries depends mainly on the data availability of bond market in World Bank dataset. Other countries which World bank does not provide enough data will be omitted from the investigated sample. The final sample includes 10 countries during 27 years from 1990 to 2016.

Key variables defined

In this paper, we investigate the bond market development's impact on economic growth in 10 Asia countries. Financial development indicators are regressed on economic growth controlling for secondary school enrollment rate, trade openness, government size and inflation. Among financial development indicators, the variable of interest is bond market development. World Bank (2006) points out that the the bond market can have effect on economic growth in terms of four dimensions including size, integration, stability and efficiency. This paper focuses only on the bond market size because market size is common measure of market development worldwide. Bond market includes domestic and international bond as well as private and public bond. We follow Pradhan et al. (2015) to examine the bond market size in four different ways. These include the domestic private debt securities (DPTB), the public private debt securities (DPUB), international private debt securities (IPTB) and international public debt securities (IPTB). This paper considers the relationship of bond market development and economic growth in the existence of stock market and bank. We adopt the stock market development and bank development measures used by Beck and Leven (2004). Stock market development is proxied by the stock market turnover to GDP ratio and bank development is proxied by private credit by deposit money banks to GDP. For robustness check, we use market capitalization to be proxies of stock market development and bank development is proxied by broad money to GDP ratio. Control variables in this model include inflation, government size (government consumption as percentage of GDP), trade

openness (sum of export and import as percentage of GDP) and secondary school enrollment rate.

The following panel model is used:

$$G_{ti} = \alpha + \beta_1 * BOND_{ti} + \beta_2 * STOCK_{ti} + \beta_3 * BANK_{ti} + \beta_4 * CONTROL_{i,t} + \mu_{ti} (1)$$

Table 1: Variables in the model

Variable	Denotation in the model	Construction	Note
Economic growth	G	LOG_GDP_PER_CAPITA: Natural logarithm of per capita GDP	Dependent variable
Bond market development	BOND	DPTB: Domestic private debt securities, expressed as a percentage of GDP	Independent variable
		DPUB: Public private debt securities, expressed as a percentage of GDP	
		IPTB: International private debt securities, expressed as a percentage of GDP	
		IPTB: International public debt securities, expressed as a percentage of GDP.	
Stock market development	STOCK	TURN: Stocks traded, turnover ratio of domestic shares (%)	
		MARKET_CAP: Market capitalization of listed domestic companies (% of GDP)	
Bank development	BANK	DOS_CRE: Domestic credit to private sector (% of GDP)	
		BR_MONEY: Broad money (% of GDP)	
Inflation	CONTROL	CPI: Inflation, consumer prices (annual %)	Control variable
Government size	CONTROL	GOV_CON: General government final consumption expenditure (% of GDP)	
Trade openness	CONTROL	TRADE_OPEN: Trade openness (sum of export and import %GDP)	
Secondary enrollment rate	CONTROL	SE_SCHOOL_ERR: School enrollment, secondary (% gross)	

All variables are summarized in Table 1. The dataset contains 10 different countries in Asia. Considering the differences among those economies, this paper applies fixed effect model to analyze the data. Fixed effect model allows researchers to control for the country's differences.

Summary statistics

Table 2: Summary statistics

Variables	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
LOG_GDP_PER_CAPITA	170	9.513	0.715	8.020	8.922	10.144	10.614
DPTB	170	26.039	24.393	0.002	2.814	45.114	80.216
DPUB	170	36.380	39.644	0.435	14.234	40.758	192.442
IPTB	170	5.950	3.921	0.158	2.807	8.223	19.547
IPUB	170	2.877	4.091	0.021	0.156	4.266	19.026
TURN	170	83.169	66.686	6.490	30.041	118.627	407.880
MARKET_CAP	170	62.783	44.800	7.512	35.529	82.243	320.993
DOS_CRE	170	91.231	54.174	15.941	44.070	134.901	221.289
BR_MONEY	170	100.127	58.127	25.197	52.620	131.038	237.351
SE_SCHOOL_ENRR	170	85.109	17.823	28.513	74.399	99.388	120.632
TRADE_OPEN	170	71.319	37.868	16.014	47.615	93.785	192.114
GOV_CON	170	14.294	4.544	5.694	11.087	16.770	26.847
CPI	170	6.710	14.482	-1.353	1.647	6.255	106.263

The summary statistics show that the variation in the dependent variables is due to cross country differences. The investigated sample of 10 countries contains not only the developed economies (Japan, Israel and South Korea) but developing countries (Indonesia, Malaysia, the Philippines, Thailand, Turkey, China and Russia). This classification is based on IMF's Outlook Database. Japan has the biggest GDP per capita based on purchasing power parity (which is \$40,717.32), the largest domestic public debt securities outstanding (DPUB is 192.44% of GDP in 2015 and DPTB is 80.21% of GDP in 2008) and the largest banking system (DOS_CRE is 221.28% of GDP in 1999). The Philippines has the largest international public debt securities outstanding (19.02% of GDP in 2004). Malaysia has the smallest international private debt securities outstanding in 1990 (only 0.15% of GDP), however, the size this bond market has surged to 19.54% of GDP in 2016, make Malaysia the country which has the biggest international private debt securities outstanding in this sample. Thailand has quite small domestic debt securities outstanding (DPUB is 0.43% of GDP in 1997). South Korea has the most liquid stock market (turnover is 407.88% in 1997) and Malaysia has the biggest stock market (market capitalization is 320.99% of GDP in 1993).

Table 3: Correlation matrix

	LOG_GD P_PER_C APITA	DPTB	DPUB	IPTB	IPUB	TURN	MARKET_ CAP	DOS_ CRE	BR_ MONEY	SE_ SCHOOL_ ENRR	GOV_ CON	TRADE_ OPEN	CPI
DPTB	0.645***	1											
DPUB	0.500***	0.590***	1										
IPTB	0.330***	0.321***	0.163***	1									
IPUB	- 0.393***	- 0.499***	-0.105***	0.060***	1								
TURN	0.259***	0.393***	0.051***	-0.068***	-0.334***	1							
MARKET_ CAP	0.202***	0.339***	0.243***	0.102***	-0.052***	-0.210***	1						
DOS_CRE	0.501***	0.745***	0.531***	0.242***	-0.499***	0.160***	0.392***	1					
BR_MONE Y	0.495***	0.741***	0.717***	0.201***	-0.415***	0.158***	0.343***	0.916***	1				
SE_SCHO OL_ENRR	0.776***	0.507***	0.383***	0.358***	-0.072***	0.222***	0.027***	0.282***	0.339***	1			
GOV_CON	0.730***	0.305***	0.448***	0.156***	-0.137***	-0.039***	0.176***	0.324***	0.379***	0.642***	1		
TRADE_ OPEN	- 0.269***	- 0.048***	-0.273***	0.111***	0.210***	-0.192***	0.505***	-0.036***	-0.171***	-0.319***	-0.129***	1	
CPI	- 0.262***	- 0.325***	-0.241***	-0.229***	0.058***	0.043***	-0.236***	-0.370***	-0.348***	-0.327***	-0.228***	-0.105***	1

Note: *p**p***p<0.01

Table 2 represents Pearson correlation matrix of all the variables. The correlations of all the financial market development indicators show positive signs. Three among four bond market development measures (DPTB, DPUB and IPTB) have significant positive relationship with economic growth. Stock market development and bank development also have positive impact on economic growth. Other control variables (secondary school enrollment, government consumption expenditure) have significant positive relationship with logarithm of GDP per capita while trade openness and CPI are negatively correlated.

FINDINGS

Table 4: Fixed effect results

	<i>Dependent variable:</i>			
	LOG_GDP_PER_CAPITA			
	(1)	(2)	(3)	(4)
DPTB	0.013*** (0.001)			
DPUB		0.007*** (0.001)		
IPTB			0.026*** (0.006)	
IPUB				0.005 (0.008)
TURN	0.001*** (0.0003)	0.001* (0.0004)	0.001*** (0.0004)	0.001*** (0.0004)
DOS_CRE	0.004*** (0.001)	0.007*** (0.001)	0.003*** (0.001)	0.005*** (0.001)
SE_SCHOOL_ENRR	0.011*** (0.001)	0.018*** (0.002)	0.014*** (0.002)	0.015*** (0.002)
GOV_CON	0.023** (0.010)	-0.015 (0.014)	0.050*** (0.011)	0.045*** (0.012)
TRADE_OPEN	-0.004*** (0.001)	-0.002* (0.001)	-0.001 (0.001)	-0.001 (0.001)
CPI	-0.005*** (0.001)	-0.002 (0.001)	-0.004** (0.001)	-0.003* (0.001)
Observations	170	170	170	170

Note: *p**p***p<0.01

Four different fixed effect models are implemented to discover the impact of bond market development on economic growth. As shown in Table 4, in regression (1) (where the domestic private debt securities outstanding to GDP ratio is used as proxy of bond market development), bond market development does boost economic growth. The coefficient of bond market

development in regression (1) is positively statistically significant. Stock market development and bank development also promote economic growth. Among control variables, when the secondary school enrollment and government consumption expenditure increase, the logarithm of GDP per capita grows as well. On the contrary, when inflation goes up or the economy becomes more open, it effects negatively on the economic growth.

We find the same results when using different measures of bond market development. Regression (2), (3) shows that the domestic public debt outstanding as well as international private debt outstanding have significant effect on economic growth. The outstanding international public debt securities as percentage of GDP does have positive impact on economic growth, however, its coefficient in regression (4) is not statistically significant.

This paper find evidence that the bond market development does have significant positive impact on economic growth when taking into account the existence and effect of stock market and banking system.

Empirical studies on finance growth link reveal that the existence of that relationship depends on measures of financial development. To strengthen our result, we use different measures of financial development. We use stock market capitalization as percentage of GDP and broad money as percentage of GDP as proxies of stock market development and bank development, respectively.

Table 5 shows that bond market development has significant positive impact on economic growth when the financial development indicators change. The size of domestic debt securities and domestic public debt securities remain promote the economy. The coefficients of DPTB and DPUB are statistically significant. The coefficients of IPTB and IPUB stays positive, however, the effect of IPTB is no longer statistically significant. The bank development still influences on economic growth while the effect of stock market development proxied by market capitalization is trivial.

Table 5: Robustness check

	<i>Dependent variable:</i>			
	LOG_GDP_PER_CAPITA			
	(5)	(6)	(7)	(8)
DPTB	0.010*** (0.001)			
DPUB		0.003*** (0.001)		
IPTB			0.007 (0.007)	
IPUB				0.016*** (0.005)

	<i>Dependent variable:</i>			
	LOG GDP_PER_CAPITA			
MARKET_CAP	0.0002 (0.0004)	0.0005 (0.0005)	0.0005 (0.0005)	0.001* (0.0005)
BR_MONEY	0.007*** (0.001)	0.009*** (0.001)	0.009*** (0.001)	0.007*** (0.001)
SE_SCHOOL_ENRR	0.013*** (0.001)	0.017*** (0.001)	0.016*** (0.001)	0.015*** (0.001)
GOV_CON	-0.001 (0.009)	-0.016 (0.012)	0.009 (0.011)	0.018 (0.011)
TRADE_OPEN	-0.001 (0.009)	-0.016 (0.012)	0.009 (0.011)	0.018 (0.011)
CPI	-0.005*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)
OBSERVATIONS	170	170	170	170

Note: *p**p***p<0.01

DISCUSSION AND CONCLUSION

Although there is large body of finance literature investigating the finance growth nexus, the researchers have not agreed whether financial development contributes to growth. Empirical researches have been criticized when handling pooled dataset of different countries inappropriately. Moreover, previous studies point out that the results change when different financial development indicators are used. Therefore, this research is set to study the effect of bond market development, one integral part of financial market, on economic growth. The dataset used in this study consists of 10 Asian countries with different economies and financial markets.

Different from previous studies, this paper considers the impact of bond market development on economic growth in addition to bank development and stock market development. We handle the country's unobserved heterogeneity by using the fixed effect model. Results show that this paper find the evidence to confirm that bond market development does promote economic growth. Our results remain the same when we change the financial development indicators. This paper confirms the Supply – leading hypothesis, which emphasizes the leading role of bond market development to economic growth.

This paper suggests that in order to boost the economy, policy makers should pay more attention to the bond market. Specifically, efficient capital allocation is required in sync with guaranteed bond market development (Felman, Gray, Goswami, Jobst, Pradhan, Peiris, & Seneviratne, 2014). A sound financial market, including well-functioning financial institutions, in connection with developed bond market, stimulates and facilitates the fund raising in the economy, therefore supporting economy activities.

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