"The impact of stock market development on economic growth: A GMM approach"

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BUSINESS PERSPECTIVES

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THE IMPACT OF STOCK MARKET DEVELOPMENT ON ECONOMIC GROWTH: A GMM APPROACH

Abstract

This study investigated the impact of stock market development (SMD) on economic growth (EG) among emerging markets and developing economies (EMDEs) in Asia. The data sample includes eight Asian EMDEs (China, Indonesia, India, Sri Lanka, Malaysia, the Philippines, Thailand, and Vietnam) from 2008 to 2019. These countries share several similarities, so this ensures reliability of the results. Regarding the analysis, the generalized method of moments (GMM) is used for the estimation. The results show that SMD exerts a positive impact on EG. This finding confirms the importance of SMD in improving efficient capital accumulation and allocation, and also allows investors to reduce risks and increase liquidity, which will boost EG. Further, the significant influence of domestic credit (DC), control of corruption (CC), and inflation (INF) on EG is also highlighted. These findings are valuable empirical evidence that greatly contributes to reinforcing the suitability of classical economic growth theories, especially the theory of endogenous growth. They are also essential to EMDEs in Asia. Accordingly, the EMDEs should develop effective policies to improve the stock market's scale, which contributes substantially to the development of EG. Moreover, these economies need to pursue many appropriate policies in sync, such as stimulating SMD, improving governance effectiveness and implementing effective macroeconomic policies.

Keywords   economic growth, EMDEs, GMM, market capitalization, stock market development

JEL Classification   F43, G15, G23

INTRODUCTION

The impact of SMD on EG is an interesting topic that has been mentioned in some empirical studies. Generally, SMD plays a crucial role in promoting EG. Therefore, many countries have developed policies for boosting SMD to promote EG (King & Levine, 1993a, 1993b; Nguyen & Bui, 2019; Pradhan et al., 2014; Reinhart & Tokatlidis, 2003). To formulate and implement these policies effectively, it is necessary to create reliable empirical evidence on the influence of SMD on EG. However, theories of this impact are relatively vague. It is because most of them have only mentioned the impact of financial development – which is mainly the banking sector – on EG. Meanwhile, the credit market is unable to operate well without the stock market (Cho, 1986). This topic is still not commonly considered in empirical studies. Further, there exist contradictory views in the current studies. Besides, this has received little attention in empirical studies in Asia, especially among the EMDEs. The term EMDEs is used by the International Monetary Fund (IMF) to refer to the countries that are experiencing developing market economies and in transition to developed countries (Mody, 2004). Their similar features are their low or middle income but rapid economic growth, and more especially the adoption of a free-market system for boosting EG (Hoskisson et al., 2000). On the

other hand, their stock markets are quite nascent and limited. However, they are active in promoting SMD for the improvement of EG. Consequently, it is really important to reveal empirical evidence on the impact of SMD on EG in EMDEs.

1. LITERATURE REVIEW

SMD is one of the most vital indicators influencing EG (Beck & Levine, 2004; Naceur & Ghazouani, 2007). Its effect on EG can be explained by several classical theories such as the classical growth theory (Ricardo, 1817; Smith, 1776), Keynes' growth theory (Keynes, 1936), the neoclassical growth theory (Solow, 1956; Swan, 1956), and the endogenous growth theory (Barro, 1991; Lucas, 1988; Mankiw et al., 1992). Apparently, all of them affirmed the importance of capital to EG. Moreover, the neoclassical growth theory mentioned the role of labor force and technology. Besides, both Keynes' growth theory and the endogenous growth theory assumed that EG is significantly affected by government policies. In general, the endogenous growth model is superior to the previous ones. However, it has the same limitation as others in that it does not consider the role of the stock market (Pan & Mishra, 2017). This limitation has been found in several empirical studies. Specifically, Schumpeter (1911) was the first to investigate the effect of financial development on EG. Then this impact was examined by McKinnon (1973), Shaw (1973), Rousseau and Wachtel (2000), Xu (2000), Rousseau and Vuthipadadorn (2005), and Botev et al. (2019). From another perspective, Olwenyand and Kimani (2011) only analyzed the influence of the financial market on EG in Kenya. Generally, most of them reported the positive effect of financial development on EG. Nevertheless, there is still a big limitation in analyzing financial development only through the banking sector and not through the stock market. Meanwhile, through SMD, capital accumulation and allocation can be performed efficiently, thereby affecting EG. Even without the stock market, the credit market cannot operate well (Cho, 1986). Consequently, the impact of SMD on EG has received a lot of attention in a large number of empirical studies.

SMD can have a positive impact on EG. This is what has been frequently highlighted in the previous studies. Accordingly, SMD enables effective capital accumulation and allocation, which

in turn promotes EG. More than that, SMD allows investors to reduce their investment risks and raise liquidity (Ngare et al., 2014). It can be said that SMD is a keystone in economic activities. The positive influence of SMD on EG has been revealed by Atje and Jovanovich (1993), Korajczyk (1996), Levine and Zervos (1998), Garrestsen et al. (2004), Nieuwerburgh et al. (2006), Colombage (2009), Enisan and Olufisayo (2009), Tsouma (2009), Cooray (2010), Kolapo and Adaramola (2012), and Pradhan et al. (2014). Broadly speaking, a majority of earlier studies have concluded that SMD is positively related to EG. However, it was also stated that this impact depends on different factors. Indeed, Garrestsen et al. (2004) recognized the positive effect of SMD on economic activities, which was developed by Levine and Zervos (1998), could disappear when other legal and social factors were controlled. Furthermore, the result could vary according to dataset, variables, time, and analyses (Pan & Mishra, 2017). In Asia, few studies have considered the impact of SMD on EG. In particular, Estrada et al. (2010) and Setiawan et al. (2020) found a positive effect of SMD on EG in Asian countries. These studies agreed on the major role of SMD in boosting EG, especially in the post-financial crisis era. Also, policymakers need to give priority to appropriate policies to improve the stock market's scale, thereby stimulating EG. Recently, Setiawan et al. (2020) also announced a similar finding by analyzing the data of Association of Southeast Asian Nations (ASEAN) countries.

A limited number of studies, namely those of Demirguoc-Kunt and Levine (1996) and Pan and Mishra (2017), have reported a negative impact of SMD on EG. Specifically, SMD stimulates investment in the stock market, which leads to a decrease in savings rate, since investors have a consumption tendency rather than earning one, thereby reducing investment in the economy, as well as capital accumulation in the future (Demirguoc-Kunt & Levine, 1996). On the other hand, SMD can increase financial instability,

which will reduce EG. Further, the excessive and badly controlled capital from the stock market to the economy may hinder EG.

Broadly speaking, most of the earlier studies only investigated the impact of financial development, which is focused on the banking sector on EG. The impact of SMD on EG is still a theoretically vague topic that is not frequently empirically studied. There are also contradictory opinions on this matter. In specific, a majority of these studies reported a positive effect of SMD on EG. However, some researchers argue that SMD can negatively affect EG. On the other hand, only a limited number of empirical studies have examined the impact of SMD on EG in Asian countries, more especially in EMDEs. In modern literature, this can be seen as a big limitation. Therefore, it can be said that the impact of SMD on EG in Asian EMDEs is an interesting research topic and there are still many gaps that need to be explored.

For EMDEs in Asia, SMD is improving significantly, this makes an important contribution to the promotion of the efficient accumulation and allocation of capital, which in turn can promote EG. Based on this, the research hypothesis proposed in this study is as follows:

H_0: *SMD has a positive impact on EG in Asian EMDEs.*

2. ECONOMETRIC METHODOLOGY AND DATA

This study analyzed the impact of SMD on EG in Asian EMDEs using the following equation:

$$EG_{it} = \alpha + \lambda SMD_{it} + \beta CV_{it} + \varepsilon_{it}, \qquad (1)$$

where EG is economic growth. EG is measured by the logarithm of GDP per capita that was used by Cooray (2010) and Botev et al. (2019). SMD is the stock market development. This measure was suggested by Cooray (2010), Estrada et al. (2010), Ngare et al. (2014), Pradhan et al. (2014), Pan and Mishra (2017), Botev et al. (2019), and Setiawan et al. (2020).

To ensure stability, this study includes some control variables (CV), including domestic credit (DC), labor force (LF), control of corruption (CC), and inflation (INF). In specific, DC proxies financial development through the banking sector (Botev et al., 2019; Pradhan et al., 2014), and LF indicates the labor force (Botev et al., 2019; Cooray, 2010). CC is the control of corruption in each country (Ngare et al., 2014) that demonstrates a high level of corruption with its low value, and vice versa. INF refers to the macroeconomy previously used by Ngare et al. (2014), Pradhan et al. (2014), and Botev et al. (2019).

Table 1. Summary of the variables

Variable		Definition
Economic growth	EG	Logarithm of GDP per capita
Stock market development	SMD	Market capitalization (% of GDP)
Domestic credit	DC	Domestic credit to the private sector (% of GDP)
Labor force	LF	Growth of labor force (annual %)
Control of corruption	CC	Corruption control index, which shows the effectiveness of government control
Inflation	INF	Consumer prices (annual %)

This study uses the GMM suggested by Arellano and Bond (1991) to estimate model (1). This method, which was also employed by Cooray (2010) and Botev et al. (2019), allows control of endogeneity issues as well as model robustness. Its superiority allows resolving limitations of other traditional methods.

In this study, the data sample collected from Asian EMDEs consists of countries with similar characteristics, such as their low or middle income and rapid economic growth (Hoskisson et al., 2000). According to IMF, EMDEs in Asia include 30 countries. Nevertheless, this study provided a full dataset for only eight Asian EMDEs over the 2008–2019 period, including China, Indonesia, India, Sri Lanka, Malaysia, the Philippines, Thailand, and Vietnam. During data collection, the data sample ensures that the panel is strongly balanced to improve reliability.

CC data are gathered from the Worldwide Governance Indicator (WGI), while data for the rest variables are collected from the official World Bank Database websites.

3. EMPIRICAL ANALYSIS

Table 2 presents preliminary statistics for the eight EMDEs in Asia from 2008 to 2019.

Table 2. Summary statistics

Variable	Mean	Std. Dev	Min	Max
Panel A: full sample				
EG	8.205	0.650	6.906	9.343
SMD	65.231	35.651	10.527	160.260
DC	82.391	45.229	25.516	165.390
LF	1.173	1.383	−2.585	4.559
CC	42.233	9.893	21.053	67.299
INF	4.631	4.110	−0.900	23.115
Panel B: China				
EG	8.796	0.362	8.151	9.232
SMD	56.406	12.939	38.717	74.022
DC	138.874	18.825	102.004	165.390
LF	0.135	0.196	−0.255	0.383
CC	42.308	5.174	33.333	49.038
INF	2.591	1.777	−0.728	5.925
Panel C: Indonesia				
EG	8.113	0.205	7.681	8.327
SMD	42.841	8.293	19.356	51.268
DC	34.348	4.935	27.253	39.402
LF	1.853	0.662	0.664	2.617
CC	34.668	8.464	21.053	48.077
INF	5.176	2.011	3.031	10.227
Panel D: India				
EG	7.334	0.228	6.906	7.650
SMD	74.323	14.382	53.983	97.387
DC	50.477	1.402	48.124	52.386
LF	0.707	0.336	0.173	1.458
CC	42.566	5.091	35.545	49.519
INF	7.706	2.878	2.491	11.989
Panel E: Sri Lanka				
EG	8.103	0.246	7.619	8.314
SMD	23.711	6.429	10.527	35.123
DC	37.958	8.774	25.516	49.903
LF	0.416	1.765	−2.585	3.581
CC	45.289	3.816	41.148	51.659
INF	6.474	5.418	2.135	22.564
Panel F: Malaysia				
EG	9.212	0.136	8.895	9.343
SMD	130.670	22.146	81.988	160.260
DC	115.166	7.907	96.748	123.104
LF	2.719	1.076	1.651	4.559
CC	61.566	3.677	56.796	67.299
INF	2.279	1.428	0.583	5.441
Panel G: the Philippines				
EG	7.903	0.196	7.553	8.156
SMD	72.078	17.200	28.745	88.407
DC	36.861	7.779	27.876	47.977
LF	2.045	1.494	−2.069	3.429
CC	33.397	6.908	23.333	43.602
INF	3.556	1.982	0.674	8.260
Panel H: Thailand				
EG	8.666	0.182	8.346	8.963
SMD	87.962	23.031	35.393	120.272
DC	134.433	15.568	105.760	149.373
LF	0.082	1.293	−2.104	2.875
CC	42.640	3.398	37.019	47.393
INF	1.708	1.931	−0.900	5.468
Panel I: Vietnam				
EG	7.512	0.290	7.047	7.907
SMD	33.855	14.580	12.474	57.199
DC	111.014	17.306	82.873	137.912
LF	1.430	0.631	0.458	2.478
CC	35.431	4.155	28.155	41.827
INF	7.554	6.819	0.631	23.115

Figure 1 presents GDP per capita and SMD of Asian EMDEs in 2019. Accordingly, stock market capitalization to GDP in Malaysia and Thailand is quite high while it is limited in Sri Lanka.

Table 3. Correlation matrix

Variable	EG	SMD	DC	LF	CC	INF
EG	1.000					
SMD	0.545***	1.000				
	[0.000]					
DC	0.587***	0.386***	1.000			
	[0.000]	[0.000]				
LF	0.025	0.203**	−0.210**	1.000		
	[0.806]	[0.048]	[0.040]			
CC	0.620***	0.567***	0.341***	0.110	1.000	
	[0.000]	[0.000]	[0.001]	[0.285]		
INF	−0.601***	−0.447***	−0.373***	0.068	−0.273***	1.000
	[0.000]	[0.000]	[0.000]	[0.512]	[0.007]	

Note: *** – significant at 1%, ** – significant at 5%.

The results indicate that EG is negatively related to INF. Meanwhile, the other variables are positively associated with EG (Table 3). In addition, there is no serious multicollinearity in the model due to a low correlation between independent and control variables.

Table 4. Estimated results

Variable	Pooled OLS	FEM	REM
α	6.949***	6.754***	6.899***
	[0.000]	[0.000]	[0.000]
SMD	0.001	0.001	0.001
	[0.813]	[0.628]	[0.433]
DC	0.005***	0.013***	0.008***
	[0.000]	[0.000]	[0.000]
LF	0.034	0.012	0.012
	[0.282]	[0.411]	[0.507]
CC	0.026***	0.012***	0.015***
	[0.000]	[0.000]	[0.000]
INF	−0.059***	−0.014***	−0.019***
	[0.000]	[0.006]	[0.001]
R-squared	66.65%	67.41%	64.08%
Significance level	35.98***	34.34***	142.04***
	[0.000]	[0.000]	[0.000]
F test		84.57***	
		[0.000]	
Hausman test		14.89**	
		[0.011]	

Note: ** – significant at 5%, *** – significant at 1%.

As can be seen, the FEM is superior to the others when the F (F(7, 83) = 84.57) and Hausman (chi2(5) = 14.89) tests are statistically significant (Table 4).
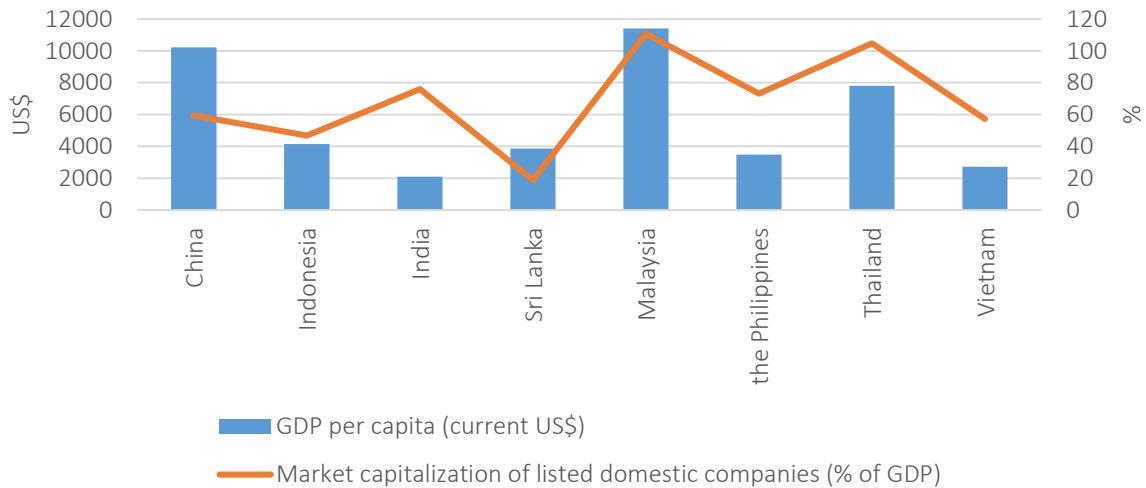
Figure 1. GDP per capita and SMD of Asian EMDEs in 2019

Table 5. Model testing results

Multicollinearity test			Modified Wald test	Wooldridge test
Variable	VIF	Tolerance		
SMD	1.89	0.530	46.57***	81.536***
DC	1.40	0.714		
LF	1.18	0.848		
CC	1.52	0.660	[0.000]	[0.000]
INF	1.34	0.744		
Mean VIF = 1.47				

Note: *** – significant at 1%.

As can be seen from Table 5, the model is free of multicollinearity issues. However, autocorrelation and heteroscedasticity issues are statistically significant. As a result, the GMM suggested by Arellano and Bond (1991) was used to estimate the most reliable results.

Table 6. Results using the GMM

Variable	EG
α	6.975***
	[0.000]
SMD	0.002**
	[0.045]
DC	0.005***
	[0.000]
LF	0.048
	[0.298]
CC	0.019***
	[0.000]
INF	−0.044***
	[0.000]
Significance level	1530.29***
	[0.000]

Variable		EG
Arellano-Bond test	AR(1)	−1.70*
		[0.090]
	AR(2)	−0.79
		[0.432]
Sargan test		2.59
		[0.108]

Note: *** – significant at 1%, ** – significant at 5%, and * – significant at 10%.

The result using the GMM is statistically significant. Also, both Sargan and Arellano-Bond tests are appropriate (Table 6). This result is thus eligible to be used. Accordingly, the estimation result (1) takes the following form:

$$EG_{it} = 6.975 + 0.002 SMD_{it} + \\ + 0.005 DC_{it} + 0.019 CC_{it} - \\ - 0.044 INF_{it} + \varepsilon_{it}.$$ (2)

This study reveals a positive influence (0.002) of SMD on EG in Asian EMDEs. This confirms the importance of SMD in improving efficient capital accumulation and allocation, and also allows investors to reduce risks and increase liquidity, thereby promoting EG. The finding is consistent with what was highlighted by Atje and Jovanovich (1993), Korajczyk (1996), Levine and Zervos (1998), Garrestsen et al. (2004), Nieuwerburgh et al. (2006), Colombage (2009), Enisan and Olufisayo (2009), Tsouma (2009), Cooray (2010), Estrada et al. (2010), Kolapo and Adaramola (2012), Ngare et al. (2014), Pradhan et al. (2014), and Setiawan et al. (2020).

Table 6 also reports that EG is positively affected by DC (0.005) and CC (0.019). Further, INF has a negative influence on EG. This result is also in line with those of Ngare et al. (2014), Pradhan et al. (2014), and Botev et al. (2019). Accordingly, EG can increase if DC and CC are improved. This shows that credit and SMD play an important role in improving the ability to mobilize and allocate capital in the economy, which will boost EG. Not only that, the effective implementation of CC often brings many benefits to activities in the economy, which will also boost EG. However, if INF is too high, it can create many difficulties for the economy, which will hinder EG. Thus, besides the significant impact of SMD, EG is also substantially affected by economic growth through the banking sector, the effectiveness of the government's control of corruption, and inflation rate. These findings confirm that the impact of SMD on EG is suitable to classical economic growth models, especially the endogenous growth model. In addition, this study highlights the specific impact of SMD on EG in Asian EMDEs, greatly contributing to filling the current literature gap.

CONCLUSION

This study examines the impact of SMD on EG in Asian EMDEs over the period 2008–2019. It analyzes the complete data sample of eight Asian EMDEs, including China, Indonesia, India, Sri Lanka, Malaysia, the Philippines, Thailand, and Vietnam. To reach this objective, the GMM has been adopted. The result reports that SMD has a positive influence on EG in Asian EMDEs. This is consistent with classical economic growth theories, especially the endogenous growth theory. However, mainly investigating the explicit impact, the study resolves the existing limitation in the classical economic growth theories and previous studies by restricting financial development through the banking sector operation. In addition, this study finds a significant impact of DC, CC, and INF on EG. This suggests that the significant influence of DC, CC, and INF on EG is also highlighted. Generally, these findings are important for EMDEs in Asia. Based on them, EMDEs in Asia must develop effective policies to improve the stock market's scale, which contributes substantially to the development of EG. Moreover, EMDEs typically have low or middle income, so it is important to have a synchronous combination of various policies to stimulate SMD, improve governance effectiveness, implement effective macroeconomic policies, especially to proceed to promote comprehensive EG.

In general, this study is very successful in achieving its objective. More importantly, the study reports some interesting findings and fills the existing gap in the literature. Based on them, researchers can develop new proposals by expanding data in more countries or measuring SMD using different proxies.

AUTHOR CONTRIBUTIONS

Conceptualization: Toan Ngoc Bui.
Data curation: Thu-Trang Thi Doan.
Formal analysis: Toan Ngoc Bui, Thu-Trang Thi Doan.
Investigation: Thu-Trang Thi Doan.
Methodology: Toan Ngoc Bui.
Software: Toan Ngoc Bui.
Validation: Toan Ngoc Bui, Thu-Trang Thi Doan.
Visualization: Toan Ngoc Bui, Thu-Trang Thi Doan.
Writing-original draft: Thu-Trang Thi Doan.
Writing – review and editing: Toan Ngoc Bui, Thu-Trang Thi Doan.

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