Malaysian Domestic Bond Market Experience: Lessons for Emerging Economies

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Abstract: Research Question: Are there effects of crowding-out from persistent fiscal deficits and what are the role of the banking sector on development of the government and corporate bond markets in Malaysia? **Motivation:** This paper revisits the aftermath of the 1997-98 Asian financial crisis that led to challenging years for Malaysia when its running balanced budgets switched to fiscal deficits. A policy option is to develop the domestic bond market to raise funds, but this is not without challenges. **Idea:** Raising long-term government bonds through the domestic bond market to cover the fiscal shortfall may crowd-out the corporate bond market. An already established banking sector is also likely to compete with the domestic bond market to provide financing to the economy. **Data:** To focus on the Asian financial crisis for policy lessons, this paper uses quarterly data on the Malaysian government and corporate bond markets based on the old categorization of Bank for International Settlements from Q4 1993 up to Q4 2011. The sample includes observations up to the period before the categorization was changed beginning from 2012. **Method/Tools:** Regression analyses are conducted to examine the effects of government debt and the growth of banking sector on the development of the domestic bond market. The ARDL approach is used to screen for possible long-run relationships between the variables. **Findings:** We find that a dominant banking sector complements development of the government bond market. It, however, impacts the corporate bond market negatively. Over-concentration of power in large banks does not augur well for both bond markets, but this impact disappears as the bond markets develop. Persistent fiscal deficits, resulting in the growth of the government bond market, do not result in crowding-out of the corporate bond market. **Contributions:** Our findings suggest that efforts to boost domestic bond market development must take cognizance of the possible complementary and competing roles between the two bond markets and the banking sector.
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1. Introduction

Thus far in 2020, the Covid-19 pandemic has affected many emerging and advanced economies, to the extent that the International Monetary Fund (IMF) has projected a global recession of -3% in 2020, much worse than the -1% contraction in 2009 following the global financial crisis (IMF, 2010; 2020). In the current global scenario, after various degrees of lockdown in numerous countries, many economic activities have slowed down significantly or ground to a halt. This has necessitated governments of both advanced and emerging economies to unveil substantial stimulus measures to support employment and economic activities. In line with past major global shocks, many economies will be grappling with burgeoning fiscal deficits as they deal with the fall-out from the Covid-19 pandemic. For example, past studies (Borio *et al.*, 2016; Hauner, 2009; Reinhart and Rogoff, 2013) showed that severe financial crises, where output, asset prices and currency values plummeted, have resulted in soaring public expenditure and government debt to finance economic revival and bank recapitalization. Also, the more severe the crisis, the more adversely affected is the fiscal position of the government.

During the 1997-98 Asian financial crisis and its aftermath, Malaysia faced a similarly difficult situation. The economy shrank by 7% in 1998 with its currency depreciating by some 50% and the loss of some three quarters of its stock market value during the worst of the Asian financial crisis (Ariff and Yap, 2001). To finance its recovery efforts, Malaysia raised long-term domestic government and corporate bonds to fund its fiscal deficits, revive the economy and recapitalize its banks.

To what extent was Malaysia successful in this endeavour? While the domestic government bond market can be boosted by growing fiscal deficits, can a developing corporate bond market avoid crowding-out effects from the same fiscal deficits? Importantly, can the government and corporate domestic bond markets co-exist successfully alongside an already established banking sector? Historically, the banking sector in many Asian economies, including Malaysia, was usually established much earlier than the bond market, which can only be viewed by the banking sector as an unwanted competitor. Accordingly, how well Malaysia performed in this endeavour should provide valuable insights to other emerging economies when faced with economic challenges such as burgeoning fiscal deficits while needing to boost employment and economic activities. Other events in Malaysia help to underscore the importance and relevance in studying its experience. Firstly, Malaysia was running balanced budgets for some years before increasing public expenditure, thus incurring continuous fiscal deficits as a result of the 1997-98 Asian financial crisis. Secondly, in the wake of this crisis, its central bank, Bank Negara Malaysia, moved to restructure the dominant local banking sector in 2000-01, which resulted in bigger banks and possibly greater market share concentration among the country's top banks (Bank Negara Malaysia, Annual Report, various issues).

To address issues highlighted above, this paper empirically examines the potential determinants of the government and corporate bond markets, focussing on possible crowding-out effects and the role of the banking sector in Malaysia. As Malaysia is a developing country with sizeable government and corporate bond markets, the findings shall be relevant to other emerging economies seeking to develop their domestic bond markets and diversify their financial systems. This paper comprises the following. Section 2 reviews the relevant literature on benefits of domestic bond markets as well as interaction between domestic bond markets and established banking sectors. It covers the loanable funds theory underlying the risks of crowding-out on the corporate bond market from fiscal deficits and includes anecdotal evidence on crowding-out. Section 3 covers data and methodology while Section 4 analyzes the empirical findings. Section 5 sets out important policy implications for Malaysia and other emerging economies, with Section 6 concluding.

2. Literature Review
This section reviews the loanable funds theory and empirical evidence on the benefits of bond markets as well as their interaction with banks.

2.1 Loanable Funds Theory and Anecdotal Evidence on Crowding-out
We examine the theoretical underpinnings of the crowding-out phenomenon by considering the loanable funds theory for a single financial market in an open economy (Mankiw, 2018). Households, firms and the government make up the savers and borrowers. All savers will have to deposit their saving into a lone financial market while all borrowers can only borrow from the same financial market. Only one interest rate prevails, i.e., the return to saving and the cost of borrowing.

The savings of households and the government are sources of supply of loanable funds. Hence, private and public saving constitute national saving (S). Demand for loanable funds comes from households and firms borrowing to invest domestically (I). In addition, in an open economy, the second component of demand comes from net capital outflows (NCO). NCO is the purchase of foreign assets by domestic residents (capital outflow) less purchase of domestic assets by foreigners (capital inflow). Hence, a dollar saved can be invested in either domestic or foreign assets (S=I+NCO). A higher interest rate will increase the quantity of loanable funds supplied (upward sloping supply curve). It makes borrowing more costly, which reduces the demand for domestic investment (I), and also reduces NCO as domestic assets become relatively more attractive compared with foreign assets (downward sloping demand curve).

In this model, a fiscal deficit lowers public saving, thereby reducing national saving and shifting the supply curve leftward. Given the demand for loanable funds, the equilibrium interest rate rises, and this will make investments more costly. It will also reduce net capital outflows. The fall in investment is referred to as the crowding-out effect of the private sector.

The above is based on the assumption that all else remain constant or *ceteris paribus*. However, all else may not be constant. Hence, it is possible that fiscal deficits may not eventually lead to crowding-out in some situations. For example, in response to an adverse shock, the government initiates fiscal stimulus measures, resulting in a fiscal deficit and public saving declines. Private saving can rise to off-set this if households decide to do so for contingency purposes. As an example, the global financial crisis in 2008-09 led to a rise in private savings in the UK while its loans growth slumped (Begg *et al.*, 2014). Hence, the supply curve may shift less to the left, remain at the same position, or even shift to the right compared to its original position. This means that the interest rate may stay the same or even become lower. There can also be a similar effect on the interest rate from the demand side of loanable funds. A shock can result in firms reducing investment. Also, in an open economy, there can be a reduction in NCO (other than due to a change in interest rate). Both these events will cause the demand for loanable funds curve to shift leftward.

As to whether there is a trade-off between the size of government bond markets and crowding-out in corporate bond markets in the real world, McCauley and Remolona (2000) noted that in 1998, Japanese corporate bond issuance reached a record high despite the top global ranking of its government bond market in terms of size. Burger and Warnock (2006), and Eichengreen and Luengnaruemitchai (2004) reported that growth of government bond markets was propelled by an increase in budget deficits, but such deficits had no impact on private bond market development.

Malaysia's challenging years in the 1990's and 2000's – when the country switched from running balanced budgets to fiscal deficits – present this paper with a unique backdrop for analyzing any occurrence of crowding-out.

2.2 Bond Markets and Banks

Essentially, both bond markets and banks provide finance in the economy. In this respect, banks and bond markets are competitors since they serve a similar function. In fact, the Malaysian government promoted corporate bonds as a cheaper source of funding compared to Malaysian banks (National Economic Action Council, 1998). Nevertheless, there are benefits of having well-developed bond markets, such as providing a more stable source of financing to firms. In helping to develop a corporate bond market, banks also stand to gain as they are often among the most important issuers, holders, dealers, advisers, underwriters, and guarantors in this market (Harwood, 2000; World Bank and IMF, 2001).

However, there is still on-going debate about how domestic bond markets interact with the banking sector. Studies by Bentson (1994), Lee *et al.* (2019), Rajan and Zingales (2003), and Schinasi and Smith (1998) have suggested that banks would negatively affect domestic bond market development since the banking sector, in many Asian countries, has the "first-mover" advantage and is the traditional force behind the development of financial markets.

Various cross-country studies (e.g. Bhattacharyay, 2013; Eichengreen and Luengnaruemitchai, 2004), some of which included Malaysia, have found that countries with better developed banking sectors also had better developed bond markets (that is, both public and private bonds). In fact, Bae (2012) highlighted that a well-developed banking sector contributed positively to development of government bond markets and especially to corporate bond markets. Overall, their findings lent support to banks and bond markets complementing each other. However, in their studies on Malaysia, Lee *et al.* (2019) and Lee and Goh (2019) found that the local banking sector exerted a negative impact on growth of the local bond market, especially the private segment.

Nevertheless, bond markets and banks may not be purely competitive nor do they have a wholly synergistic relationship. Song and Thakor (2010) suggested that there has been no strong empirical evidence that capital markets, including bond markets, and banks always competed. By reviewing existing literature on the relationship between capital markets and banks, they found that in developed countries during the period 1960 to 2003, capital markets and banks mostly complemented each other, with the exception of "occasional spurts of competition" (p. 1022).

Besides the banking sector's size, the market share held by the top banks may also have an impact on the development of bond market. The study by Eichengreen and Luengnaruemitchai (2004) showed that countries with concentrated banking sectors tended to have bond markets that are smaller. This finding supports other studies (e.g. Bae, 2012; Bentson, 1994; Rajan and Zingales, 2003) that argued a highly concentrated banking sector could impede the development of corporate bond markets by making it more costly for firms to get financing from bond markets through manoeuvrings of loan and deposit rates.

3. Data and Methodology

This paper used secondary data from the Bank for International Settlements (BIS) website (https://www.bis.org/statistics/secstats.htm), where quarterly data on the Malaysian domestic bond market, for the government and corporate debt segments, are available. Important studies such as the ones by Bae (2012) and Eichengreen and Luengnaruemitchai (2004) also used BIS data. As discussed earlier, this paper needs to look into the years before the 1997-98 Asian financial crisis and the years after 2000-01 (when the bank merger programme was implemented) to analyze the impact and outcome on the government and corporate bond markets from fiscal deficits and bank concentration in Malaysia.

For the paper's findings to be material and meaningful in its analysis of the Malaysian domestic bond market, the sample period should ideally cover the following:
   (a)   Period of active development in the domestic bond market;

(b) Asian financial crisis of 1997-98 and post-crisis years in Malaysia; and
(c) Malaysian central bank's restructuring programme of the local banking sector after the 1997-98 crisis.

To fulfil the above criteria, this paper used data based on the old BIS categorization. This data series on Malaysian bonds provide data from Q4 1993 up to Q4 2011, which is the full sample period. Data according to the new BIS categorization for Malaysia is only available beginning from 2005. This change by BIS was undertaken as of January 2012 as a result of the 2008-09 subprime or global financial crisis (Gruic and Woodbridge, 2012).

With the old data series from BIS, the full sample period covers the periods in 1993 to 1997 when Malaysia ran balanced government budgets as well as 1998 to 2004 when Malaysia switched to expansionary fiscal policies, thus incurring budget deficits. Furthermore, under the old BIS categorization, government or public sector bonds comprised those issued by governments and central banks. This earlier BIS definition is the same as the definition used by Malaysia to-date (Bank Negara Malaysia and Securities Commission, 2009). In fact, BIS data as per the previous categorization was used in a major study on bond markets in 45 developing countries (Burger *et al.*, 2015). The authors expressed concerns that the "more recent data" from the BIS "may not be consistent with the historical data" (p. 4).

The sub-sample period (Q2 2001 to Q4 2011) was chosen for analysis. This is based on the consolidation of Malaysia's largest bank, Malayan Banking Berhad. The bank concentration ratio for this paper was estimated from Malayan Banking Berhad's assets over total assets of commercial banks. The consolidation of the commercial banks, which began in 1999, was spearheaded by Bank Negara Malaysia following the 1997-98 Asian financial crisis. Bank Negara Malaysia moved quickly with its merger programme in 1999 to strengthen the fragmented banking sector (Bank Negara Malaysia, Annual Report 2002). Under its merger programme, Malayan Banking Berhad was merged with two smaller banks and the new entity began its operation from Q2 2001 (Malayan Banking Berhad, 2001).

This paper used publicly available data from Bank Negara Malaysia, CEIC (a provider of economic data) and IMF. The secondary data of quarterly frequency on Malaysian bonds, banking sector and government debt were deseasonalized.

The lack of studies on bond markets that encompass both government and corporate bonds could be due to the fact that corporate bond markets in many countries including Germany and Japan "were virtually non-existent in 1980" (Schinasi and Smith, 1998, p. 15). In Japan, data from Asian Bonds Online (*asianbondsonline.adb.org*) showed that corporate bonds made up under 10% of Japan's aggregate domestic bond market as recently as 2015. In contrast, corporate bonds have become a key segment of the Malaysian domestic bond market and, in the 2000's, accounted for about half of total outstanding bonds (Bank Negara Malaysia, Annual Report, various issues).

Alluding to numerous bond market studies, especially those covering Asian economies, the Malaysian domestic government and corporate bond markets should be linked to various macroeconomic factors as follows:

(a) Economic growth, represented by the annual growth rate of real Gross Domestic Product (GDP) (Bae, 2012; Eichengreen and Luengnaruemitchai, 2004; Garcia and Lin, 1999; La Porta *et al.*, 1997; Mihaljek *et al.*, 2002). Higher economic growth should boost bond market development.

(b) Openness of the economy, measured by the ratio of total trade to nominal GDP. This trait is expected to boost bond market development (Bae, 2012; Eichengreen and Luengnaruemitchai, 2004; Essers *et al.*, 2015; Rajan and Zingales, 2003).

(c) Size of the banking sector, measured by the ratio of loans outstanding to nominal GDP. For Malaysia, the large amount of loans outstanding of the banking sector

reflected its dominance in the local economy and extent of financial market sophistication and development (Bae, 2012; Burger and Warnock, 2006; Eichengreen and Luengnaruemitchai, 2004; Essers *et al.*, 2015; Garcia and Lin, 1999). As the local banks were set up much earlier than the Malaysian domestic bond market, they likely competed with the domestic bond market to provide external financing to the public and private sectors (Bentson, 1994; Burger and Warnock, 2006; Essers *et al.*, 2015; Harwood, 2000; Herring and Chatusripitak, 2000). However, some cross-country studies also discovered a symbiotic relationship between both parties, indicating complementarity (e.g. Bae, 2012; Eichengreen and Luengnaruemitchai, 2004).

(d) Market share concentration within the banking sector, represented by the bank concentration ratio (Beck *et al.*, 2003; Eichengreen and Luengnaruemitchai, 2004). This ratio is calculated from the assets of the top Malaysian bank over total assets of commercial banks in Malaysia. Beck *et al.* (2003) used share of assets of the three largest banks in a country as a measure of bank concentration. However, Malaysia's second largest commercial bank, Bank Bumiputra Berhad, was unlisted and its balance sheet figures unavailable to the public until it was merged with another local commercial bank in 2000 (Bank Negara Malaysia, 2001). Since Malayan Banking Berhad holds about one-fifth of total assets of the commercial banking sector in Malaysia or possibly close to half of the assets of the top three banks in Malaysia, it should be an adequate proxy for bank concentration in Malaysia. The larger this ratio, the greater the market share held by top bank(s) in the country and this concentration of power in the top banks may be used by them to make bond issuance burdensome and costly for potential bond issuers (Bentson, 1994; Eichengreen and Luengnaruemitchai, 2004; Rajan and Zingales, 2003; Schinasi and Smith, 1998).

(e) Size of the equity market, measured by the ratio of equity market capitalization to nominal GDP. This is the proxy for the local equity market, which may also be competing with the domestic bond market (Bae, 2012; Burger and Warnock, 2006; Eichengreen and Luengnaruemitchai, 2004; Mihaljek *et al.*, 2002; Mohanty, 2002). In addition, the equity market proxy may reflect the overall development of the capital market (e.g. Garcia and Lin, 1999).

(f) Exchange rate, represented by the logarithm (log) and standard deviation of exchange rate of ringgit Malaysia against US dollar. Currency stability should boost domestic bond market growth in Malaysia (Bae, 2012; Eichengreen and Luengnaruemitchai, 2004; Turner, 2002).

(g) Interest rate, represented by the three-month interbank rate in Malaysia. Low and stable interest rates are conducive to development of domestic bond markets (Bae, 2012; Eichengreen and Luengnaruemitchai, 2004; Essers *et al.*, 2015).

(h) Inflation, represented by the percentage change in the Consumer Price Index. Inflation is expected to negatively affect the Malaysian bond market (Burger *et al.*, 2015; Burger and Warnock, 2006; Essers *et al.*, 2015). Nevertheless, long-term inflation in Malaysia was fairly stable. Average inflation rate for the full period of analysis (Q4 1993 – Q4 2011) was 2.7%, and 2.3% for the sub-sample period (Q2 2001 – Q4 2011) (calculated using data from Bank Negara Malaysia).

(i) Government debt and fiscal balance, represented by the ratio of government debt to nominal GDP and the ratio of fiscal balance to nominal GDP respectively. As government bonds are issued to finance government development expenditure, rising government debt is likely to boost the local bond market. However, if the ratio of fiscal balance to nominal GDP is used as a proxy, it is likely to negatively

affect growth of the local bond market as fiscal surpluses will have a dampening effect on growth of domestic bond issuance and vice versa (Burger and Warnock, 2006; Eichengreen and Luengnaruemitchai, 2004; Harwood, 2000; Mihaljek *et al.*, 2002; Turner, 2002).

To examine the relationship between the government bond market and corporate bond market with the variables stated above, an autoregressive distributed lag (ARDL) model was fitted (Pesaran *et al.*, 2001) as below:

$$\Delta y_t = \beta_0 + \beta_1 y_{t-1} + \sum_{i=1}^{m} \beta_{2i} x_{i,t-1} + \sum_{i=1}^{p} \propto_i \Delta y_{t-i} + \sum_{i=0}^{p_1} \gamma_i \Delta x_{1,t-i} + \cdots$$
$$+ \sum_{i=0}^{p_m} \theta_i \Delta x_{m,t-i} + u_t \tag{1}$$

where *x* and *y* are the independent and dependent variables, respectively, *m* is the number of potential determinants, u_t is the error term, and *p*, p_1, …, p_m are number of lags. The ARDL modelling approach was used due to a small number of observations and the estimation involves a mixture of *I*(0) and *I*(1) variables (see Section 4).

The ARDL F-bounds test was conducted to examine if long-run relationships between the variables in level are present. In the absence of long-run relationship, the following multivariate regression model was estimated:

$$\Delta y_t = \beta_0 + \sum_{i=1}^{p} \propto_i \Delta y_{t-i} + \sum_{i=0}^{p_1} \gamma_i \Delta x_{1,t-i} + \cdots + \sum_{i=0}^{p_m} \theta_i \Delta x_{m,t-i} + u_t \tag{2}$$

Studies on bond or debt markets using the multivariate ordinary least squares approach include Bhattacharyay (2013) that involved identifying major determinants of the development of bond markets in Asia. Using a similar approach, La Porta *et al.* (1997) looked at the legal determinants of capital markets to study equity and debt markets, the latter comprising bonds and bank loans.

4. Empirical Findings

The ARDL model (Equation (1)) was estimated for both government and corporate bond markets for the full sample period (Q4 1993 to Q4 2011). In the government bond market, the dependent variable is the ratio of government bond to nominal GDP (GB_t) while in the corporate bond market, the dependent variable is the ratio of corporate bond to nominal GDP (CB_t). The explanatory variables include annual GDP growth rate, ratio of trade to nominal GDP, ratio of bank loans to nominal GDP, bank concentration ratio, ratio of equity market capitalization to nominal GDP, interest rate, inflation, exchange rate, and ratio of government debt or fiscal balance to nominal GDP, as listed in (a) to (i) in Section 3. Before the estimation, the stationarity properties of all these variables were established using the ADF test. Economic growth and inflation are stationary. A breakpoint test was considered for the size of the equity market (ratio of equity market capitalization to nominal GDP) that displayed a break following the Asian financial crisis. The series is found to be stationary. All the other variables are integrated of order one and they are stationary at first difference. It should be noted that both the dependent variables of interest, GB_t and CB_t, are *I*(1). Together with this, the mixture of *I*(0) and *I*(1) variables in the model justifies the use of the ARDL modelling approach.

The ARDL F-bounds test was conducted, and it failed to establish level relationships between the government bond market (F = 2.3447) and corporate bond market (F = 2.3803) with the other variables. The outcome of no long-run relationship could be attributed to the following:

(a) The Malaysian government reduced its borrowings significantly between 1988 and 1997;

(b) Malaysia switched from running balanced budgets for the period 1993 to 1997 to expansionary fiscal policies with fiscal deficits beginning 1998 onwards;

(c) The severity of the 1997-98 Asian financial crisis;

(d) The Malaysian government and private sector raised funding from its domestic bond market (Bank Negara Malaysia, Annual Report, various issues) especially after the Asian financial crisis; and

(e) The conduct of monetary policy in the low interest rate environment in the post-crisis period meant that interest rates, in their traditional role as policy instruments, became less effective (Goh and Yong, 2007).

Since the results do not support the existence of any long-run relationship, the variables in level were dropped. Equation (2) was then estimated for both the government and corporate bond markets. The variables, which are $I(0)$ in level, were included directly in Equation 2 while first differences were taken for the variables which are $I(1)$ in level. All the variables were firstly entered into the model. The final estimated models reported below retain only the variables that are significant.

Table 1 lists all dependent and independent variables, and their abbreviations. 'D' in front of a variable indicates first difference while 'DV' indicates a dummy. As the period of this study covered various events and developments that need to be taken into consideration, four dummy variables were introduced to account for them. These are (i) DVBPGD (1 for Q1 1998, and 0 otherwise), the dummy variable for breakpoint in government debt when fiscal surpluses first changed to fiscal deficits; (ii) DVAFC (1 from Q3 1997 to Q3 1999, and 0 otherwise), the dummy variable for the Asian financial crisis; (iii) DVPEG (1 from Q3 1998 to Q3 2005, and 0 otherwise), the dummy variable for Malaysia's currency peg and partial capital controls; and (iv) DVGFC (1 from Q1 2008 to Q2 2008, and 0 otherwise), the dummy variable for the global financial crisis. The dummy variables for breakpoint in government debt and global financial crisis are significant and the other two are not.

Table 1: List of Variables

Variables	Abbreviations
Dependent Variables	
Ratio of Government Bonds to Nominal GDP	DGB
Ratio of Corporate Bonds to Nominal GDP	DCB
Independent Variables	
Bank Concentration Ratio	DBANCON
Ratio of Loans Outstanding to Nominal GDP	DLOAN
Ratio of Government Debt to Nominal GDP	DGDEBT
Ratio of Fiscal Balance to Nominal GDP	DFISC
Logarithm of Exchange Rate	DLEXR
Interest Rate	DIBR
Ratio of Equity Market Capitalization to Nominal GDP	EQMKT
Dummy Variables	
Dummy Variable for Global Financial Crisis	DVGFC
Dummy Variable for Breakpoint in Government Debt	DVBPGD

Notes: 'D' in front of a variable indicates that first difference is used to achieve stationarity while 'DV' indicates a dummy variable.

The two proxies for government debt are $DGDEBT_t$ and $DFISC_t$. These proxies were used alternatively in four pairs of models, shown in Tables 2 to 5. Tables 2 and 3 show the results for the estimated regression models for government bonds for the full and sub-sample periods respectively. Tables 4 and 5 show the results for corporate bonds in the full and sub-sample periods. For these models, diagnostic tests included serial correlation LM test, variance inflation factor, recursive residuals, CUSUM test, and CUSUM of squares test. Except for the serial correlation LM test, the results for the other tests are not reported to conserve space (they are available on request). The tests do not indicate any estimation problems.

4.1 Domestic Government Bond Market (Full Sample Period)

In Table 2, we have Models 1A and 1B. Here, the dependent variable is first difference of the ratio of government bond to nominal GDP (DGB_t). In Model 1A, in addition to the proxy for government debt ($DGDEBT_t$), six other explanatory variables are significant. Both the bank concentration ratio ($DBANCON_t$) and dummy variable for the global financial crisis (DVGFC) negatively affected the dependent variable i.e. domestic government bond market (DGB_t). The proxy for the banking sector ($DLOAN_{t-1}$) affected the domestic government bond market positively. Likewise, both the proxy for government debt ($DGDEBT_t$) and the dummy variable for the break in government debt (DVBPGD) also positively affected the domestic government bond market. The proxies for exchange rate stability ($DLEXR_t$) and equity market ($EQMKT_{t-1}$) negatively affected the domestic government bond market (DGB_t).

Since exchange rate stability is conducive to domestic bond market development, the negative impact of its proxy ($DLEXR_t$) on government bond market development is expected. The negative impact of the size of the equity market on government bond market development suggests that both markets may have competed to provide financing for the Malaysian government. Burger and Warnock (2006) found a negative relationship between domestic bond and equity markets. The Malaysian equity market was well-established, and the more popular avenue for raising funds within the capital market (Bank Negara Malaysia, Annual Report, various issues).

In Model 1B, the proxy used for government debt is first difference of the ratio of fiscal balance to nominal GDP ($DFISC_t$). It is significantly negative, that is, a rise in fiscal balance negatively affects the growth of the government bond market. The remaining significant variables in Model 1B are the same as in Model 1A, namely bank concentration ratio ($DBANCON_t$), dummy variable for the global financial crisis (DVGFC), banking sector ($DLOAN_{t-1}$), dummy variable for the break in government debt (DVBPGD), exchange rate stability ($DLEXR_t$), and equity market ($EQMKT_{t-1}$).

The impact of the bank concentration ratio ($DBANCON_t$) is significant and negative on the government bond market over the full sample period. The power exercised by the big banks in Malaysia negatively impacted the government bond market. These big banks may have made bond issuance difficult or costly, thereby discouraging potential bond issuers, including from the government sector (e.g. Bentson, 1994; Rajan and Zingales, 2003; Schinasi and Smith, 1998). However, it appears that the banking sector proxy (DLOAN), contributed positively to the development of the government bond market. This suggests that a growth in the banking sector in Malaysia has boosted development of the government bond market.

Table 2: The Results for Estimated Regression Models for Government Bonds (Full Sample Period)

Variable	Model 1A	Model 1B
Constant	0.0155**	0.0241***
	(0.0071)	(0.0045)
Bank Concentration Ratio, DBANCON$_t$	-1.0365***	-1.1307***
	(0.3726)	(0.3763)
Dummy Variable for Global Financial Crisis, DVGFC$_t$	-0.0238***	-0.0286***
	(0.0057)	(0.0053)
Ratio of Loans Outstanding to Nominal GDP, DLOAN$_{t-1}$	0.2231**	0.1310*
	(0.0842)	(0.0727)
Ratio of Government Debt to Nominal GDP, DGDEBT$_t$	0.4304*	-
	(0.2214)	
Ratio of Fiscal Balance to Nominal GDP, DFISC$_t$	-	-1.1526*
		(0.5892)
Dummy Variable for Breakpoint in Government Debt, DVBPGD	0.0604***	0.0521***
	(0.0082)	(0.0067)
Logarithm of Exchange Rate, DLEXR$_t$	-0.1596**	-0.1647**
	(0.0626)	(0.0621)
Ratio of Equity Market Capitalization to Nominal GDP, EQMKT$_{t-1}$	-0.0084**	-0.0136***
	(0.0039)	(0.0023)
R-squared	0.5570	0.5490
Adjusted R-squared	0.5078	0.4989
Number of observations	71	71
Breusch-Godfrey Serial Correlation LM Test – Chi-squared statistic	4.8419[0.3039]	6.8892[0.1419]

Notes: Dependent variable for both models is first difference of the ratio of government bonds to nominal GDP; figures in parentheses are White heteroscedasticity-consistent standard errors; ***, **, * indicate significance at 1%, 5% and 10% level, respectively. 'D' in front of a variable indicates first difference while 'DV' indicates a dummy variable.

4.2 Domestic Government Bond Market (Sub-Sample Period)

Table 3 shows Models 2A and 2B for the sub-sample period, where the dependent variable is still DGB$_t$. In Model 2A, the proxy for government debt is first difference of the ratio of government debt to nominal GDP (DGDEBT$_t$) and it is significant. Besides DGDEBT$_t$, there are four other significant explanatory variables. Even though the proxy for the banking sector (DLOAN$_{t-1}$) is still significantly positive, the other banking-related variable (DBANCON$_t$) is no longer significant and has been dropped from Model 2A.

The proxy for government debt in Model 2B is first difference of the ratio of fiscal balance to nominal GDP (DFISC$_t$). In this model, DFISC$_t$, and four other explanatory variables are significant. These four were also significant in Model 2A.

The sub-sample period begins after the bank consolidation programme implemented by Bank Negara Malaysia. Here, the findings show that DBANCON$_t$ and EQMKT$_{t-1}$ are no longer significant in affecting growth of the government bond market. There is a possibility the government bond market has grown sufficiently such that it is now able to compete with the big banks and equity market on a more equal footing. According to Song and Thakor (2010), over the longer term, banks and capital markets, encompassing bond and equity markets, mostly complemented each other.

We find that increased interest rates will impact the growth of the government bond market negatively, as shown by its proxy being first difference in interest rate (DIBR). In view of the expansionary fiscal budgets beginning 1998, this negative relationship between interest rates and growth of the government bond market is not unexpected despite the accommodating monetary policy stance. That is, interest rate hikes may adversely influence

the timing and size of government bond issuance as the impact of interest rate differentials grows in tandem with the size of fiscal deficits and cost of servicing government bonds.

Table 3: The Results for Estimated Regression Models for Government Bonds (Sub-Sample Period)

Variable	Model 2A	Model 2B
Constant	0.0026	0.0044**
	(0.0023)	(0.0020)
Dummy Variable for Global Financial Crisis, DVGFC	-0.0168***	-0.0222***
	(0.0052)	(0.0042)
Ratio of Loans Outstanding to Nominal GDP, $DLOAN_{t-1}$	0.5071***	0.3997***
	(0.0986)	(0.0959)
Ratio of Government Debt to Nominal GDP, $DGDEBT_t$	0.4354**	-
	(0.1817)	
Ratio of Fiscal Balance to Nominal GDP, $DFISC_t$	-	-1.7125**
		(0.7121)
Logarithm of Exchange Rate, $DLEXR_t$	-0.6050***	-0.6301***
	(0.0750)	(0.0684)
Interest Rate, $DIBR_t$	-0.0149**	-0.0160***
	(0.0059)	(0.0042)
R-squared	0.6507	0.6559
Adjusted R-squared	0.6022	0.6081
Number of observations	42	42
Breusch-Godfrey Serial Correlation LM Test – Chi-squared statistic	3.9161[0.4175]	4.8151[0.3068]

Notes: Dependent variable for both models is first difference of the ratio of government bonds to nominal GDP; figures in parentheses are White heteroscedasticity-consistent standard errors; ***, **, * indicate significance at 1%, 5% and 10% level, respectively. 'D' in front of a variable indicates first difference while 'DV' indicates a dummy variable.

4.3 Domestic Corporate Bond Market (Full Sample Period)

As corporate bonds in Malaysia are issued by corporations from many different industries or sectors, their determinants may be more diverse when compared with government bonds. Accordingly, the adjusted R-squared values for the selected models of corporate bonds are noticeably lower than those for the final models of government bonds for both full and sub-sample periods.

In Table 4, for Models 3A and 3B, the dependent variable is the first difference of the ratio of corporate bonds to nominal GDP (DCB_t). For Model 3A, with first difference of the ratio of government debt to nominal GDP ($DGDEBT_t$) as the proxy for government debt, a total of six explanatory variables are significant.

In Model 3A, with the exception of $DGDEBT_t$ and DVBPGD, the other four explanatory variables impacted the dependent variable, DCB_t, negatively. That is, increases in $DBANCON_t$, $DLOAN_{t-3}$ and $DLEXR_t$ will result in falls in the domestic corporate bond market (DCB_t) expansion rate. The dummy variable (DVGFC) results in a downward shift of the curve. The impact from global financial crisis has negatively affected corporate bond market capitalization.

For Model 3B, the proxy for government debt is first difference of the ratio of fiscal balance to nominal GDP ($DFISC_t$). However, the variable, $DFISC_t$, is not significant. The other explanatory variables remain significant in Model 3B.

Both proxies for bank concentration ratio ($DBANCON_t$) and banking sector ($DLOAN_{t-3}$) negatively affect corporate bond market growth over the full sample period. This suggests the banking sector and corporate bond market in Malaysia were competitors. This negative relationship is not unexpected, especially as its government actively encouraged the conglomerates to issue corporate bonds as a cheaper way to raise funds after the country's

first rating agency was set up in 1990 and, again, in the aftermath of the 1997-98 Asian financial crisis (Bank Negara Malaysia and Securities Commission, 2009; National Economic Action Council, 1998).

We find that $DGDEBT_t$ as a proxy for government debt is significantly positive in Model 3A while fiscal deficits as the alternative proxy for government debt ($DFISC_t$) is not significant in Model 3B. That is, unlike fiscal balances, government debt is a suitable proxy for capturing the effect of the government bond market serving as the necessary pre-requisite for corporate bond market development in the country. This is in line with an earlier study by Bae (2012). In addition, the results suggest that growth of the Malaysian government bond market has not caused crowding-out in the country's corporate bond market (see also Lee and Goh, 2019).

4.4 Domestic Corporate Bond Market (Sub-Sample Period)
Table 5 shows the results for corporate bonds in the sub-sample period. All four explanatory variables in Model 4A are significant, including the proxy for government debt, $DGDEBT_t$. In Model 4B, First Difference of the ratio of Fiscal Balance to Nominal GDP ($DFISC_t$) is used as the proxy for government debt. However, unlike $DGDEBT_t$ in Model 4A, it is not significant. The three explanatory variables i.e. $DLOAN_{t-3}$, $DLEXR_t$ and $DIBR_{t-4}$ remain significantly negative.

Table 4: The Results for Estimated Regression Models for Corporate Bonds (Full Sample Period)

Variable	Model 3A	Model 3B
Constant	0.0028**	0.0027**
	(0.0014)	(0.0013)
Bank Concentration Ratio, $DBANCON_t$	-0.7548***	-0.8269***
	(0.2341)	(0.2314)
Dummy Variable for Global Financial Crisis, DVGFC	-0.0117**	-0.0150***
	(0.0053)	(0.0052)
Ratio of Loans Outstanding to Nominal GDP, $DLOAN_{t-3}$	-0.0676***	-0.0730***
	(0.0217)	(0.0237)
Ratio of Government Debt to Nominal GDP, $DGDEBT_{t-1}$	0.4447**	
	(0.1927)	-
Ratio of Fiscal Balance to Nominal GDP, $DFISC_t$	-	-0.8260
		(0.6987)
Dummy Variable for Breakpoint in Government Debt, DVBPGD	0.0248***	0.0277***
	(0.0037)	(0.0034)
Logarithm of Exchange Rate, $DLEXR_t$	-0.1119***	-0.0995***
	(0.0277)	(0.0277)
R-squared	0.3626	0.3589
Adjusted R-squared	0.3009	0.2968
Number of observations	69	69
Breusch-Godfrey Serial Correlation LM Test – Chi-squared statistic	0.9141[0.9225]	0.9161[0.9222]

Notes: Dependent variable for both models is first difference of the ratio of corporate bonds to nominal GDP; figures in parentheses are White heteroscedasticity-consistent standard errors; ***, **, * indicate significance at 1%, 5% and 10% level, respectively. 'D' in front of a variable indicates first difference while 'DV' indicates a dummy variable.

Table 5: The Results for Estimated Regression Models for Corporate Bonds (Sub-Sample Period)

Variable	Model 4A	Model 4B
Constant	0.0004	0.0002
	(0.0016)	(0.0016)
Ratio of Loans Outstanding to Nominal GDP, $DLOAN_{t-3}$	-0.0634***	-0.0645***
	(0.0224)	(0.0224)
Ratio of Government Debt to Nominal GDP, $DGDEBT_{t-1}$	0.5035***	-
	(0.1806)	
Ratio of Fiscal Balance to Nominal GDP, $DFISC_t$	-	-0.2003
		(0.5586)
Logarithm of Exchange Rate, $DLEXR_t$	-0.3498***	-0.3464***
	(0.0809)	(0.0791)
Interest Rate, $DIBR_{t-4}$	-0.0012***	-0.0014**
	(0.0004)	(0.0005)
R-squared	0.5136	0.4680
Adjusted R-squared	0.4563	0.4055
Number of observations	39	39
Breusch-Godfrey Serial Correlation LM Test – Chi-squared statistic	2.2491[0.6900]	3.6621[0.4537]

Notes: Dependent variable for both models is first difference of corporate bonds of the ratio of nominal GDP; figures in parentheses are White heteroscedasticity-consistent standard errors; ***, **, * indicate significance at 1%, 5% and 10% level, respectively. 'D' in front of a variable indicates first difference.

As was the case with the government bond market in the sub-sample period, the proxy for interest rate movements ($DIBR_{t-4}$) is significant here too, with higher interest rates negatively affecting corporate bond market expansion. The difference in lags between government and corporate bonds for DIBR may stem from the shorter time needed for the government to issue bonds while corporates require a longer time period, including time needed to obtain approvals from the relevant authorities. With interest rates mostly accommodating in the years following the Asian financial crisis, potential bond issuers in the domestic bond market would very likely view any interest rate hikes as a deterrent in their consideration to issue bonds.

Findings for the sub-sample period are in line with the theoretical underpinnings as discussed in Section 2. That is, even with fiscal deficits reducing the country's total savings, crowding-out will not happen to the corporate bond market if national investments fall and the equilibrium interest rate is lower (which would be so with Malaysia's easy monetary policy in the years after the Asian financial crisis). For this reason, interest rate hikes in the sub-sample period are now influential in adversely affecting the issuance of corporate bonds.

5. Policy Implications for Malaysia and Other Emerging Economies
The findings of this paper on potential determinants of Malaysian domestic bond market development can provide insights and serve as input for future policies to add greater depth and breadth to financial markets in Malaysia and other emerging economies.

Findings for the full sample period show that the relationship between the government bond market and banks is positive. This positive relationship may reflect the benefits a well-established banking sector can provide in developing the government bond market (Bae, 2012; Eichengreen and Luengnaruemitchai, 2004). Also, the sizeable Malaysian government bond market may be able to interact with the dominant banking sector on a more equal footing (Song and Thakor, 2010). In contrast, results show that the local banking sector has a dampening effect on the corporate bond market in both sample periods. This negative relationship may result from the tussle between the former and latter to be the

preferred source of financing for Malaysian corporates (Bentson, 1994; Rajan and Zingales, 2003; Schinasi and Smith, 1998).

For the period after the bank merger programme (sub-sample period), findings show that the equity market no longer has a negative impact on development of the government bond market. Also, the bank concentration ratio is no longer significant in negatively affecting the government or corporate bond markets in the sub-sample period. Sahay *et al.* (2015) said in their assessment of the Malaysian banking sector for the period 1980 to 2013 that it was large and concentrated. Furthermore, the bank concentration ratio used in this paper did not exhibit any declining trend in the sample period in this study (which is unlikely given the 2001 merger exercise). As such, it is possible that the government and corporate bond markets (both of which were growing robustly in the full sample period) are able to interact with the local banking sector on a more equal footing in the sub-sample period. In fact, the diminished role of the banking sector in providing external financing to large corporates was noted by Goh and Hooy (2008) in the years following the Asian financial crisis as the Malaysian capital market expanded.

After running budget surpluses from 1993 to 1997, Malaysia switched to an expansionary fiscal policy stance beginning 1998. As a result, there were fiscal deficits amounting to an average of RM24 billion or 4.6% of GDP a year between 1998 and 2011 (Ministry of Finance, various issues). Notwithstanding concerns about possible crowding-out effects on private investments, fiscal stimulus measures by the Malaysian government helped the economy to rebound quickly from the 1997-98 Asian financial crisis. This policy switch helped to revive the economy, which expanded a robust 6.1% in 1999 after a sharp contraction of -7.4% in 1998 (Bank Negara Malaysia, Annual Report, various issues).

Findings here show that Malaysia was able to avoid any crowding-out on its corporate bond market. This may be due to a confluence of factors. Firstly, even though its fiscal deficits reduced national savings (as public savings fell), private savings in Malaysia rose in the years after the Asian financial crisis. Secondly, Malaysia's Savings-Investment gap was positive for the years 1998-2011, reflecting higher private savings and lower private investments (Ministry of Finance, various issues). Further working in Malaysia's favour, its banking system had sufficient liquidity beginning 1999, after a brief period of tight liquidity in 1998. Coupled with low interest rates, the private sector was ensured of adequate access to affordable credit (Bank Negara Malaysia, Annual Report, various issues).

For other emerging economies seeking to reduce any risks of crowding-out when expansionary fiscal policies are conducted, such fiscal policies should be accompanied by accommodating monetary policies to ensure sufficient liquidity and affordable credit for the private sector. Ample liquidity and low interest rates will help mitigate the effects of higher government debt and / or bond issuance on the private sector. The negative impact of higher interest rates on the domestic bond market in such a situation is underscored by findings for the sub-sample period (when there were larger fiscal deficits), which show that interest rate hikes in that period adversely affected growth of the government and corporate bond markets.

Not only was there no evidence of crowding-out in Malaysia, findings in this paper show that growth in Malaysia's government debt and, accordingly, growth in its government bond market, has a positive impact on development of the corporate bond market. Even though Malaysia conducted expansionary fiscal policies between 1998 to 2011 (within the full sample period), findings for the full and sub-sample periods show a positive relationship between the corporate bond market and government debt (but not when government debt was proxied by fiscal balances). This parallels the finding by Bae (2012) in a study on domestic bond markets in 43 economies, which included Malaysia. That is, development of

corporate bond markets benefits significantly from well-functioning government bond markets.

In line with recommendations by multi-lateral organizations (e.g. World Bank and IMF, 2001), findings in this paper strongly indicate that emerging economies seeking to promote domestic bond markets should first develop their government bond markets to catalyze the development of their corporate bond markets subsequently.

Since weakening in the local currency negatively impacted both the government and corporate bond markets in Malaysia, emerging economies need to adopt fiscal and monetary policies that will contribute to exchange rate stability to boost domestic bond market development.

Finally, given the sizeable Malaysian corporate bond market, the government can look into measures to further develop the corporate bond market to better meet the needs of various corporate bond issuers. For example, the World Bank and IMF (2001, p. 365) suggested that governments of developing countries should differentiate between large and frequent versus small and infrequent corporate bond issuers so as to cater to the different needs or requirements of such issuers.

6. Conclusion

While this paper did not establish long-term relationships within Malaysian government and corporate bond markets, the full sample period for this study represents an important epoch for the Malaysian domestic bond market and analyzing this period has provided valuable insights to domestic bond market development that can benefit other emerging economies.

The size of government debt and the break in the trend in Malaysia's government debt positively impacted both the government and corporate bond markets. While both proxies, the ratio of government debt to nominal GDP and the ratio of fiscal balance to nominal GDP, were significant in the results for government bonds, this was not so for corporate bonds. The proxy, the ratio of fiscal balance to nominal GDP, was not significant in the results for corporate bonds. This suggests that the proxy, the ratio of government debt to nominal GDP, which is highly correlated to the size of government bond market, captures the impact of the well-developed Malaysian government bond market in supporting development of the Malaysian corporate bond market, in line with the findings by Bae (2012).

Accordingly, Malaysia's persistent fiscal deficits, which resulted in the growth of its government bond market, did not result in crowding-out of the private sector, including the corporate bond market. It should be stressed that Malaysia avoided any possible negative effects to the corporate bond segment due to it pursuing an accommodating monetary policy to complement its expansionary fiscal policy, further aided by an increase in private savings and reduction in private investments (Bank Negara Malaysia, Annual Report, various issues).

The bank concentration ratio, reflecting the power that big banks derive from their large market shares, negatively affected both government and corporate bond markets in the full sample period. However, this ratio was not significant at all in the sub-sample period. Together, these findings suggest that top banks in Malaysia use their power to compete with the domestic bond market to be the preferred avenue of external financing of the Malaysian government and corporates. However, as the domestic bond market grew in size, both the government and corporate segments, the power of the big banks waned. In fact, by 2010, corporate bonds accounted for 58.5% of total corporate financing, noticeably higher than its 46.4% in 2001 (Bank Negara Malaysia, 2011, p. 56).

Size of the banking sector has a significantly positive impact on government bond market development in both sample periods. However, the size of the banking sector

negatively affected the corporate bond market in both sample periods. The contrasting findings suggest that different factors may be at work here. The positive association between the former may be an indication that the size of the dominant banking sector reflects the greater development and sophistication of the financial system (Garcia and Lin, 1999) and/or the ability of the sizeable government bond market to interact with the local banking sector on a more equal footing (Song & Thakor, 2010). The negative relationship between the size of the banking sector and corporate bond market likely stems from the competition between the two (Lee *et al.*, 2019).

Findings of this paper on Malaysia's experience in developing its government and corporate bond markets provide useful insights to other emerging economies seeking to develop their domestic bond markets as an avenue for long-term financing, contributing to faster economic growth. Malaysia has been able to navigate the challenging path of running fiscal deficits without crowding out its local bond market, especially the corporate segment. This represents crucial information to emerging economies struggling to develop their nascent bond markets while needing to finance or boost government spending especially during post-crisis periods.

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