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The Malaysian Domestic Bond Market: Growing into its Rightful Role

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Abstract: This paper revisits Malaysia's past for a closer look into the interaction between its dominant banking sector and capital markets, encompassing both domestic bond and equity markets. Data beginning Q4, 1993 on the Malaysian domestic bond market are extracted from Bank for International Settlements (BIS). The sample period ends at Q4, 2011 due to a change in definition for categories of domestic debt securities by BIS. Nine possible determinants of bond market development are identified from the empirical literature. The ARDL modelling approach is used. In the absence of a long-run relationship, the analysis continues with an OLS distributed lag regression. Findings point to competition between the domestic bond market with the established banking sector and equity market, which could have hindered development of the bond market in its earlier years. Since interest rate volatility and exchange rate changes adversely impacted bond market development, credible monetary policy is necessary to support development of the Malaysian bond market. The benefits accruing from a better developed domestic bond market for raising long-term funds and providing financing for post-crisis recoveries can be seen in Malaysia's example as a policy lesson for other emerging economies.

Keywords: Domestic bond market, determinants, debt, banking sector.
JEL classification: H62, G10

1. Introduction

In Asia, Malaysia and other developing countries continue to pursue faster economic growth and, in tandem, greater economic prosperity. To this end, there is strong support from research that financial development, encompassing development of domestic bond markets, has a significant and positive contribution to national economic output and poverty reduction (Caprio and Honohan, 2001; Fink *et al.*, 2003; Levine, 2005). In terms of financial development, even in the 1990's, Malaysia boasted of a large banking sector and vibrant equity market. In fact, the consensus is that Malaysia's dominant and over-extended banking sector was responsible for the country being adversely affected in the 1997-98 Asian financial crisis. When the crisis erupted then, Malaysia's bank loans to GDP ratio was a hefty 145 percent (Ariff and Yap, 2001, p. 312). Exacerbating this problem, the overvaluation in the Malaysian equity market was reflected by the huge ratios of market capitalization to GDP of 375 percent in 1993 and 323 percent in 1996, respectively (Ariff and Yap, 2001, p. 309).

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The Malaysia government had made noticeable efforts in the late 1980s and much of the 1990s to develop the country's domestic bond market. Such efforts included developing the Islamic bond or "*sukuk*" segment (Bank Negara Malaysia, 1999a). To complement the government bond market and thriving equity market, the government undertook measures to spur development of the corporate debt or private debt securities (PDS) market (Bank Negara Malaysia and Securities Commission, 2009, p. 3). These efforts were in tandem with the government's privatization programme launched in 1983 and the mid-1980s policy to promote the private sector as the engine of economic growth. In 1987, PDS made up barely 1 percent of the local currency or domestic bond market. Government securities made up the balance of the bond market, most of which were conventional bonds with just 1 percent Islamic bonds or *sukuk* (Bank Negara Malaysia, 1999a, p. 338).

Nevertheless, the 1997-98 Asian financial crisis underscored Malaysia's over-reliance on its banking sector and lack of a well-diversified financial system. As such, there was an obvious need for further development of the domestic bond market. It had been relatively underdeveloped and could not meet the nation's funding requirements before the crisis. In fact, a major part of financing for Malaysia's privatization and infrastructure projects in the 1980s and even in the 1990s was met by short-term bank borrowings. This serious mismatch of long-term financing requirements with short-term bank borrowings led to a severe liquidity crunch when the Asian financial crisis erupted (Bank Negara Malaysia, 1999a). Other studies (Ariff and Yap, 2001; Eichengreen and Luengruemitchai, 2004; Kaminsky and Reinhart, 2001) also highlighted the issue of mismatch of funding between assets and liabilities, and excessive reliance on bank borrowings where covenants allow withdrawal of funding within short periods.

Herring and Chatusripitak (2000) pointed out that, in the absence of a well-diversified financial system, the banking sector could be over-extended. Indeed, this was the experience of Malaysia leading up to the Asian financial crisis (see also Eichengreen and Luengruemitchai, 2004; Kaminsky and Reinhart, 2001). Studies suggested that a better diversified financial system, with a well-developed domestic bond market, could have helped to mitigate the effects of the Asian financial crisis, including facilitating a faster recovery in the post-crisis period (*e.g.* Eichengreen and Luengruemitchai, 2004; Herring and Chatusripitak, 2000; Turner, 2012; van Rixtel *et al.*, 2015). A developed domestic bond market will reduce any over reliance on the banking sector where funding is typically short term in nature or can be rapidly withdrawn in periods of financial turbulence.

There are not many country level country-level studies that identify determinants of aggregate domestic bond market of developing countries. In view of the importance and benefits of a developed domestic bond market in a well-diversified financial system, this paper seeks to fill an existing gap by identifying the potential determinants of the Malaysian domestic aggregate bond market over a time period that spanned important developments in the bond market. The chosen sample period covers two major financial crises that struck Malaysia, namely the Asian financial crisis and global financial crisis. Analyzing this sample period adds value to the paper since the focus on Malaysia's domestic bond market then would also provide valuable insights about the role of the domestic bond market, including beyond its normal functions in an emerging economy during the post-crisis and recovery periods.

The study by Burger *et al*. (2015), though extensive, represents a descriptive comparison of different emerging bond markets, with no empirical analysis on association between variables. This country level country-level study on Malaysia will enable deeper analysis of the Malaysian aggregate bond market to complement and add greater insights to other cross country cross-country studies on domestic bond markets (*e.g.* those by Eichengreen and Luengnaruemitchai (2004 & 2006), and Burger *et al.* (2015)). Furthermore, this paper

revisits Malaysia's past for a closer look at its financial development and the interaction between its dominant banking sector and capital markets, encompassing both domestic bond and equity markets.

2. Literature Review

A well-functioning capital market, encompassing bond and equity markets, is crucial to the process of economic development of a country (Levine, 2005). For example, a well-developed domestic bond market will enable bond issuers to lock in long-term funds in local currency. Such bond issuance can thus minimize their interest rate and exchange rate risks by locking in interest rates and local currency funding (Pettis, 2000). This will be even more critical in times of financial turbulence (Bhattacharyay, 2013; Eichengreen and Luengnaruemitchai, 2004).

Domestic bond markets are also developed as a means of providing governments with a reliable and cost-effective source of financing. Various studies show that government bond markets are used to help fund budget deficits in a non-inflationary way (Turner, 2002; World Bank and International Monetary Fund [IMF], 2001). Government bond markets also help countries to sterilize large capital inflows (Mihaljek *et al.*, 2002).

Highlighting a critical function of domestic bond markets, Herring and Chatusripitak (2000) noted that Japan, Scandinavia, the US and countries affected by the Asian financial crisis tapped their bond markets to raise the much needed funds to recapitalize their banking sectors in the respective post-crisis periods. The Malaysian government also turned to the domestic government bond market to raise funds to restructure the economy and recapitalize its banks following the Asian financial crisis (Bank Negara Malaysia, 1999a; National Economic Action Council, 1998).

Without a well-developed bond market, an economy is likely to be heavily dependent on bank intermediation. This makes the economy more vulnerable to crises as banks tend to be highly leveraged (Herring and Chatusripitak, 2000). Nevertheless, the authors stressed that only well-developed bond markets could substitute for banks. According to Hawkins (2002), and Rajan and Zingales (2003), from studies on advanced countries, the general pattern observed was for banking to emerge at a much earlier stage of development than bond markets. Hence, in emerging economies, bank intermediation remained dominant with bond markets relatively underdeveloped.

Following the Asian financial crisis, Asian countries worked on diversifying and deepening their financial markets, including developing their bond markets (Burger *et al.*, 2015; Didier *et al.*, 2012; Gyntelberg *et al.*, 2005; Mu *et al.*, 2013; Park, 2016). The central bank, Bank Negara Malaysia, spearheaded a bank consolidation programme whereby the 54 local banks were eventually merged into 10 banking groups by 2001 (Bank Negara Malaysia, various issues). In early 2001, the country launched its Capital Market Masterplan 1, a long-term plan to boost further development of its capital market, both the conventional and Islamic markets, over the period 2001-10 (Securities Commission, various issues). Bank Negara Malaysia also launched its Financial Sector Masterplan 1 to guide the banking sector in meeting business challenges during that decade (Bank Negara Malaysia, 2002). By 2005, the Malaysian corporate bond market had overtaken the government bond market, accounting for some 52 percent of total outstanding bonds (Committee on the Global Financial System, 2007, p. 60). By the end of 2008, the Malaysian bond market had grown to RM524 billion, almost four times its size at the end of 1997 (Bank Negara Malaysia and Securities Commission, 2009, p. 1).

Many Asian economies fared relatively better during the 2007-08 global financial crisis, with the help from better diversified and deeper financial markets that provided the necessary funds for fiscal stimulus packages (Burger *et al.*, 2012; Mu *et al.*, 2013; Park,

2016). Turner (2012) also found evidence that emerging economies in both Asia and Latin America coped better during the global financial crisis due to development of their domestic bond markets in the years preceding the global crisis.

This review highlights that over-reliance on the banking sector may lead to the mismatch of long-term financing requirements with short-term bank borrowings, or the mismatch of funding between assets and liabilities. In such situations, excessive reliance on bank borrowings can lead to a credit crunch when withdrawal of funding happens within short periods in economic crises. A well-developed bond market that diversifies and deepens the financial sector can cushion such impacts, especially for an emerging economy.

3. Data and Methodology

Secondary data on the Malaysian domestic bond market are available from the Bank for International Settlements (BIS) website. Previously, such data, of quarterly frequency, were available for Malaysia beginning Q4, 1993. However, as of January 2012, the BIS has changed its definition for its categories of domestic debt securities (Gruic and Woodbridge, 2012). Arising from the global financial crisis, this revision to the BIS's debt securities statistics was made so as to facilitate comparability across different markets.

Following this change by the BIS, data on Malaysian domestic debt securities are available only from 2005 onwards. However, starting with data from 2005 will mean:

(a) This paper will not be able to cover crucial years, *i.e.* from 1993 to 1997 when Malaysia was running a balanced or surplus government budget, and from 1998 to 2004 when the government initially embarked on expansionary fiscal policies that resulted in persistent and growing fiscal deficits. That is, this paper will not cover the crucial period that captures the important switch in the trend of Malaysia's government debt and its impact on the domestic aggregate bond market (Bank Negara Malaysia, various issues).

(b) The interaction between the well-established banking sector and equity market with the developing domestic bond market in Malaysia cannot be captured by this paper for the period from Q4, 1993 to Q4, 2004. This is an important period as it includes events and developments that are of significance to the Malaysian economy such as the years leading up to the Asian financial crisis, the actual crisis years and major government initiatives in the wake of the crisis. These initiatives include the post-crisis bank consolidation programme (Bank Negara Malaysia, various issues).

(c) Omitting the earlier period when the Malaysian domestic aggregate bond market was going through a relatively active period of development, including as a result of the Asian financial crisis.

In view of the above important issues, this paper will utilize data based on the old BIS categorization. Doing so will enable this paper to have data for the Malaysian domestic aggregate bond market for the sample period from Q4, 1993 to Q4, 2011. In fact, Burger *et al.* (2015), in their extensive study on domestic bond market development in 45 emerging economies, also opted to use the old set of data from the BIS and confined their study to end 2011. They cited concerns that the "more recent data" from the BIS "may not be consistent with the historical data" (p. 4).

Additionally, using the old data set from the BIS means that findings of this paper can be compared with important studies using the old BIS data, including those by Bae (2012), and Eichengreen and Luengnaruemitchai (2004).

Other data for the paper are obtained from Bank Negara Malaysia reports, the IMF, including International Financial Statistics, and CEIC (a provider of economic data). The published data from the BIS and those on Malaysia's banking sector and government debt, which are of quarterly frequency, were deseasonalized.

Identification of independent variables for this paper has been guided by the various studies on bond market development, especially in Asian countries. Independent variables selected for this analysis are:

(a) *Year-On-Year Growth of Real GDP*. This is calculated after taking Logarithm of Real GDP. Real annual GDP growth for Malaysia will be the proxy for size or progress of the Malaysian economy (Bae, 2012; Eichengreen *et al.,* 2002; Eichengreen and Luengnaruemitchai, 2004; Garcia and Lin, 1999; La Porta *et al.,* 1997; Mihaljek *et al.,* 2002). Its relationship with the dependent variable is expected to be positive since faster economic growth should provide impetus to bond market development.

(b) *Trade over nominal GDP*. This trade ratio has been calculated based on exports plus imports to GDP and will be a measure of the openness of the Malaysian economy. Its effect on bond market development is expected to be positive as studies showed that openness to trade contributed positively to financial development (Bae, 2012; Eichengreen and Luengnaruemitchai, 2004; Essers *et al.,* 2015; Rajan and Zingales, 2003; Sachs and Warner, 1995).

(c) *Loans outstanding over nominal GDP*. Loans outstanding by commercial banks to annual nominal GDP will be the proxy for size of the Malaysian banking sector as well as the level of financial market development and financial intermediation (Bae, 2012; Burger and Warnock, 2006; Eichengreen and Luengnaruemitchai, 2004; Essers *et al.,* 2015; Garcia and Lin, 1999). Since banks in Malaysia were established way ahead of the Malaysian domestic bond market, they are seen as having "first-mover advantage" (Bentson, 1994; Burger and Warnock, 2006; Eichengreen and Luengnaruemitchai, 2004; Harwood, 2000). The large amount of loans outstanding from its commercial banks should also reflect the banking sector's dominance in the Malaysian economy and level of financial market development and financial intermediation. Various cross-country studies have found a positive relationship between domestic bond markets and banking sectors (*e.g.* Bae, 2012; Eichengreen and Luengnaruemitchai, 2004). Malaysia, one of the worst hit countries by the Asian financial crisis with its high loans outstanding over GDP ratio, could have depended heavily on its banking sector, to the detriment of its domestic bond market. If this is the case, then the relationship between Malaysia's domestic bond market and its banking sector could be negative. Also, Essers *et al.* (2015) noted a negative relationship between domestic government bond markets and bank loans in his study on African countries.

(d) *Bank concentration ratio*. This is estimated from Malayan Banking Berhad's Assets over Total Commercial Banking Assets. Share of assets held by Malayan Banking Berhad, Malaysia's largest commercial bank, is used as a proxy for concentration of the banking sector in Malaysia. While the bank concentration ratio was defined as share of assets held by the top three banks in a country by Beck *et al.* (2003) (see also Eichengreen and Luengnaruemitchai, 2004), 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). However, since Malayan Banking Berhad holds about one-fifth of total assets of the commercial banking sector in Malaysia,[1] it should be an adequate proxy for bank concentration in Malaysia. Its impact on domestic bond market development is expected to be negative. This is because large banks with big market shares tended to engage in rent-seeking behaviour and make bond issuance costly or difficult (Bentson, 1994; Eichengreen and Luengnaruemitchai, 2004; Rajan and Zingales, 2003; Schinasi and Smith, 1998).

(e) *Equity market capitalization over nominal GDP*. This ratio has been selected as the proxy to reflect the importance of Malaysia's equity market, a possible competitor to the

[1] Calculated from figures obtained from data set for this study.

domestic bond market (Bae, 2012; Burger and Warnock, 2006; Eichengreen and Luengnaruemitchai, 2004; Mihaljek *et al.*, 2002; Mohanty, 2002). In the case of Malaysia, its equity market capitalization was as high as 375 percent of GDP in 1993 and 323 percent in 1996, during the bull runs in those years (Ariff and Yap, 2001, p. 309). Even after the Asian financial crisis, figures from Eichengreen and Luengnaruemitchai (2004; 2006) showed that as at end 2001, 36 percent of Malaysia's total external finance was from its equity market against 41 percent from its banks and the remaining 23 percent from its bond market. Overall, competition between the local equity and bond markets means the former will have a negative impact on the latter. However, the size of Malaysia's equity market can also be considered as a proxy for overall development of the capital market (*e.g.* Garcia and Lin, 1999). Hence, a positive relationship between the domestic bond and equity markets is possible.

(f) *Exchange rate*. This is based on the Logarithm of Exchange Rate, where stability of the Ringgit is expected to promote development of the domestic bond market in Malaysia (Bae, 2012; Eichengreen and Luengnaruemitchai, 2004; Pettis, 2000).

(g) *Interest rate volatility*. This is measured by the Standard Deviation of 3-month KLIBOR (Kuala Lumpur Interbank Offered Rate).[2] Its selection as the proxy for interest rate volatility is because the 3-month KLIBOR is a key interest rate that is regarded as a benchmark for interest rates in Malaysia (see *e.g.* Bank Negara Malaysia, 1998). The study by Eichengreen and Luengnaruemitchai (2004) found interest rate volatility had a negative impact on bond market development. Bae (2012) found that the standard deviation of bank lending rates was negatively linked to corporate bond market development. Essers *et al.* (2015) found interest rate volatility had a negative relationship with domestic government bond market development.

(h) *Inflation rate*. The variable, inflation rate, is calculated from Malaysia's main inflation gauge, the Consumer Price Index (year-on-year). This variable will measure the impact of inflation on the development of domestic bond market in Malaysia (Burger *et al.*, 2015; Burger and Warnock, 2006; Essers *et al.*, 2015). Burger and Warnock (2006) used inflation variance as well as mean inflation over the past 10 years to gauge the impact of long-term inflation or as a measure whether policies have been creditor friendly. The impact of inflation on the domestic bond market in Malaysia is expected to be negative, since the studies cited found that inflation was negatively linked to bond market development. However, overall, inflation in Malaysia has been well contained (Bank Negara Malaysia, various issues), unlike the situation in some other emerging economies.

(i) *Government debt over nominal GDP*. The impact from fiscal policy on development of the domestic bond market will be measured by proxies for government debt that reflects the trend in fiscal policy stance. As issuance of government bonds is often utilized to finance government development expenditure in Malaysia, the impact from government debt on domestic bond market development is expected to be positive (see, for example, Burger and Warnock, 2006; Eichengreen and Luengnaruemitchai, 2004; Harwood, 2000; Mihaljek *et al.*, 2002; Turner, 2002).

An autoregressive distributed lag (ARDL) model will initially be used to determine if a long-run relationship exists between the level variables (Pesaran and Shin, 1999; Pesaran *et al.*, 2001), as below:

[2] Preliminary regression runs were done using the standard deviations from moving averages of four, eight and 12 quarters with the best fit from the standard deviation based on the moving average of eight quarters. Hence, the standard deviation from the moving average of eight quarters is selected for all the final runs in this paper.

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

where the dependent variable *y* is total bonds over nominal GDP. The number of potential determinants (*x*) considered is $m = 9$.These include annual GDP growth rate, trade over nominal GDP, bank loans outstanding over nominal GDP, bank concentration ratio, equity market capitalization over nominal GDP, logarithm of exchange rate, interest rate volatility, inflation rate and government debt over nominal GDP. The number of lags for each variable is represented by p, p_1, …, p_m. The error term is u_t.

The ARDL F-bound test is used to check for the presence of long-run relationships. If the F-bound test does not find any long-run relationship, the distributed lag multiple regression model (in Equation 2) will be estimated. The specification is as below:

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

Studies on bond or debt markets using multivariate ordinary least squares approach include Bhattacharyay (2013) that involved identifying major determinants of development of bond markets in Asia.

4. Empirical Findings

The summary statistics of the raw data used in this study are given in Table 1. During the period of study, the economy was growing at 5.1 percent per annum on average. While the annual growth rate for government debt was 8.6 percent, the domestic bond market expanded at a faster rate of 13.1 percent per annum. The results for unit root tests are reported in Table 2. The variables in level are a mixture of I(0) and I(1) processes. This finding supports the use of ARDL approach.

Table 1: Summary statistics of the variables

Variable	Mean	Median	Maximum	Minimum	Standard deviation
Total bonds (RM million)	389150.6	269398.4	977994.9	108954.9	252589.0
Annual growth of real GDP (%)	5.10	5.77	11.63	-11.86	4.62
Trade (RM million)	222345	199598	387341	78043	88300
Loan (RM million)	505896	452313	1002683	173154	202802
Bank concentration ratio	0.2037	0.2046	0.2422	0.1760	0.0171
Equity market capitalization (RM million)	696199	663821	1342215	249129	258918
Exchange rate (RM/USD)	3.3949	3.647	4.169	2.4395	0.496
3-month KLIBOR (%)	4.26	3.27	11.07	2.08	2.07
Inflation rate (%)	2.69	2.64	8.41	-2.29	1.55
Government debt (RM million)	188888	154309	441076	86166	103027

The ARDL model in equation (1) with up to 4 lags was considered. The final model selected based on AIC is ARDL(4, 4, 0, 1, 0, 2, 2, 0, 3, 0) (see Appendix 1). However, the statistic for the ARDL bounds test (F-statistic = 2.1309) does not provide evidence to support the existence of level relationships between the dependent variable with the

explanatory variables based on the 5 percent lower and upper limit of critical bounds values of [2.43, 3.56]. The possible explanations on why no long-run relationship could be established are (i) Malaysia switched from balanced budgets between 1993-97 to fiscal deficits beginning 1997, thus affecting its bond issuance and government debts/fiscal balances ratio, (ii) the bond market remains in a developing or fairly fluid stage, and (iii) the turbulent period that included the 1997/98 Asian financial crisis as well as the 2008 global financial crisis, which impacted interest rates, and exchange rates including the imposition of the Ringgit peg for some years.

Table 2: Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests

Variable	Test	p-value (level)	Order of integration	p-value (first difference)	Order of Integration
TB	ADF	1.0000	I(1)	0.0001	I(0)
	PP	1.0000	I(1)	0.0001	I(0)
GROWR	ADF	0.0003	I(0)	-	-
	PP	0.0139	I(0)		
TRADE	ADF	0.9434	I(1)	0.0170	I(0)
	PP	0.9796	I(1)	0.0092	I(0)
LOAN	ADF	0.9948	I(1)	0.0189	I(0)
	PP	0.9998	I(1)	0.0189	I(0)
BANCON	ADF	0.5891	I(1)	0.0000	I(0)
	PP	0.4892	I(1)	0.0000	I(0)
EQMKT[a]	ADF	0.0000	I(0)	-	-
LEXR	ADF	0.3683	I(1)	0.0000	I(0)
	PP	0.3142	I(1)	0.0000	I(0)
SDIBR	ADF	0.0419	I(0)	-	-
	PP	0.0700	I(0)		
INFL	ADF	0.0259	I(0)	-	-
	PP	0.0178	I(0)		
GDEBT	ADF	0.9999	I(1)	0.0000	I(0)
	PP	1.0000	I(1)	0.0001	I(0)

Notes: TB is total bonds over nominal GDP, GROWR is annual growth of real GDP, TRADE is trade over nominal GDP, LOAN is loans outstanding over nominal GDP, BANCON is bank concentration ratio, EQMKT is equity market capitalization over nominal GDP, LEXR is log of exchange rate, SDIBR is standard deviation of interest rate, INFL is inflation, and GDEBT is government debt over nominal GDP. [a]The ADF test with a breakpoint is used to take account of the sharp decline in stock market capitalization in Q1, 1997.

4.1 Baseline Model

In view of the ARDL results, the long-run relationship is not included for further analysis. Prior to the regression analysis, scatter plots of the dependent variable versus the independent variables are done (see Appendix 2). They indicate a possible negative relationship between bonds over nominal GDP with loans over nominal GDP, interest rate volatility and bank concentration ratio, while being positively related to government debt over nominal GDP and economic growth.

Equation 2 is estimated. The variables that are I(0) in level are entered directly into the model while variables that are I(1) in level are transformed to first differences. The chosen variables for the baseline model are proxies for the main drivers (government debt) or possible competitors (equity market and banking sector) to the domestic bond market. The dependent variable is the first difference of total bonds over nominal GDP (DTB_t). Initially, the contemporaneous term as well as the lags from one up to four quarters of the independent variables are considered. Subsequently, the variables that are not significant are dropped. With persistent fiscal deficits since 1998, the dummy variable ($DVBPGD_t$) for

breakpoint in government debt, has been created to denote the break in the trend in Q1, 1998 when Malaysia went from balanced budgets to fiscal deficits. Diagnostic checks are performed including serial correlation LM test, recursive residuals, CUSUM test, and CUSUM of squares test.[3] The tests do not indicate any problems.

Table 3: Regression results for the baseline model

Variable	Estimates
Constant	0.0359*** (0.0121)
First difference of loans outstanding over nominal GDP, $DLOAN_{t-3}$	-0.2521** (0.1103)
First difference of bank concentration ratio, $DBANCON_t$	-2.7195** (1.0691)
Equity market capitalization over nominal GDP, $EQMKT_{t-3}$	-0.0204*** (0.0073)
First difference of government debt over nominal GDP, $DGDEBT_{t-2}$	1.0538* (0.5311)
Breakpoint in government debt, $DVBPGD_t$	0.1596*** (0.0169)
R-squared	0.3320
Adjusted R-squared	0.2790
Breusch-Godfrey serial correlation LM test [p-value]	3.3459 [0.5017]

Notes: Dependent variable is first difference of total bonds over nominal GDP. Figures in parentheses are White heteroscedasticity-consistent standard errors. ***, **, * indicate significance at 1 percent, 5 percent and 10 percent level, respectively.

In the baseline model, only the banking sector, equity market and government debt as well as the dummy variable for break in the trend in government debt are variables that are significant. Three of them have a negative impact on the dependent variable (DTBt). These three are first difference of loans outstanding over nominal GDP (DLOANt-3), first difference of bank concentration ratio (DBANCONt) and equity market capitalization over nominal GDP (EQMKTt-3). The negative impact from these three variables likely reflect the competition between the domestic aggregate bond market with the local banking sector and equity market. The variable, first difference of government debt over nominal GDP (DGDEBTt 2), positively impacted the dependent variable. Since the Malaysian government often issued government bonds to finance its expenditure, the fiscal deficits, beginning 1998, would have resulted in greater issuance of government bonds, which make up part of the domestic aggregate bond market. Meanwhile, the dummy variable, DVBPGD, has a positive coefficient and will shift the curve upwards. This is due to the persistent fiscal debt since 1998 which caused an increase in government bond issuance.

4.2 Robustness of Results

During the sample period, exogenous events, shocks to the system, and institutional changes occurred. These events allow for a sensitivity analysis to check the robustness of results of the baseline model. Details of the events are listed in Table 4. Four dummy variables are created in relation to these events. In addition, the volatility of interest rate is added in the analysis as the interest rate had undergone structural changes as a policy response to the Asian financial crisis (Goh and Yong, 2007). Certainly there was greater volatility in interest rates as the Asian financial crisis panned out in the Malaysian economy (Bank Negara Malaysia, 1999c, Table V.3). Similarly, the exchange rate variable is also included since the Ringgit has been similarly affected by the crisis.

Three specifications are considered here (shown in Table 5 as Models A, B and C). For Model A, the effects from the two financial crises and any possible impact via interest rates are included. Subsequently, the next specification, which also includes the impact from exchange rates and the currency peg, including partial capital controls, is given in Model B.

[3] Except for the first, the results for the remaining tests are not reported to conserve space. They are available on request.

In the final specification, the dummy variable for the second rating agency, DVCRA2, is included in the estimation of Model C.

Table 4: List of events

Event and breakpoint change	Dummy variable
Asian financial crisis that affected the financial sector (Bank Negara Malaysia, 1998; 1999a; 1999b).	$DVAFC_t$ = 1 from Q3, 1997 to Q3, 1999, and 0 otherwise.
Malaysia's currency peg and partial capital controls as responses to the Asian financial crisis (Bank Negara Malaysia, 1999a; 1999b; 2006).	$DVPEG_t$ = 1 from Q3, 1998 to Q3, 2005, and 0 otherwise.
Global financial crisis that impacted the financial markets in Malaysia (see *e.g.* Bank Negara Malaysia, 2009; 2010).	$DVGFC_t$ = 1 from Q1, 2008 to Q3, 2009, and 0 otherwise.
Malaysia's second credit rating agency, Malaysian Rating Corporation Berhad (MARC), which began operations in June 1996 (Bank Negara Malaysia, 2000).	$DVCRA2_t$ = 1 from Q2, 1996 to Q4, 2011, and 0 otherwise.

Table 5: Sensitivity analysis for potential determinants of bond market

Variable	Model A	Model B	Model C
Constant	0.0446***	0.0305***	0.0177
	(0.0123)	(0.0110)	(0.0162)
First difference of loans outstanding over nominal GDP, $DLOAN_{t-3}$	-0.2655**	-0.2068**	-0.2101***
	(0.1021)	(0.0784)	(0.0781)
First difference of bank concentration ratio, $DBANCON_t$	-3.0268***	-2.3595**	-2.3391**
	(0.9827)	(0.8954)	(0.8933)
Equity market capitalization over nominal GDP, $EQMKT_{t-3}$	-0.0214***	-0.0096*	-0.0073
	(0.0073)	(0.0050)	(0.0058)
First difference of log of exchange rate, $DLEXR_t$	-	-0.4402***	-0.4541***
		(0.1017)	(0.1019)
Standard deviation of interest rate, $SDIBR_t$	-0.0071*	-0.0093**	-0.0089**
	(0.0040)	(0.0044)	(0.0044)
First difference of government debt over nominal GDP, $DGDEBT_{t-2}$	1.1119*	1.1403**	1.1594**
	(0.5609)	(0.4872)	(0.4946)
Breakpoint in government debt, $DVBPGD_t$	0.1624***	0.0896***	0.0857***
	(0.0375)	(0.0269)	(0.0271)
Asian financial crisis, $DVAFC_t$	0.0034	0.0265	0.0253
	(0.0314)	(0.0246)	(0.0246)
Ringgit peg, $DVPEG_t$	-	-0.0074	-0.0080
		(0.0079)	(0.0080)
Global financial crisis, $DVGFC_t$	-0.0403***	-0.0411***	-0.0418***
	(0.0101)	(0.0071)	(0.0072)
Second rating agency, $DVCRA2_t$	-	-	0.0098
			(0.0084)
R-squared	0.4077	0.6181	0.6210
Adjusted R-squared	0.3287	0.5523	0.5479
Breusch-Godfrey Serial Correlation LM Test [p-value]	2.7422 [0.6018]	3.0394 [0.5513]	3.8730 [0.4235]

Notes: Dependent variable is first difference of total bonds over nominal GDP.
Figures in parentheses are White heteroscedasticity-consistent standard errors.
***, **, * indicate significance at 1 percent, 5 percent and 10 percent level, respectively.

By and large, all the significant variables in the baseline model remain significant in this sensitivity analysis. The inclusion of the exogenous shocks and institutional changes did not alter the qualitative results. In model A, of the three new variables, the standard deviation of interest rate (SDIBRt) and the dummy variable for the global financial crisis (DVGFCt) are

significant and negatively affect bond market development. However, the dummy variable for the Asian financial crisis (DVAFC) is not significant. It is possible that its effect has been picked up by interest rate volatility. Accordingly, the volatility in interest rate had a dampening effect on the domestic aggregate bond market.

In Model B, two explanatory variables, namely first difference of logarithm of exchange rate (DLEXRt) and the dummy variable for the currency peg and partial capital controls (DVPEG), are included. The variable, DLEXRt, measures change in the growth in the exchange rate for the Ringgit. Both variables are postulated to have negative signs (Eichengreen and Luengnaruemitchai, 2004). Only DLEXRt is significant and negatively impacts the dependent variable, DTBt. This shows that exchange rate stability would help promote development of the domestic bond market. However, results here suggest that imposition of the currency peg and partial exchange controls by the Malaysian authorities did not have the predicted negative effects on the domestic bond market (e.g. Eichengreen and Luengnaruemitchai, 2004). Explanatory variables that are significant in the baseline model have the same sign in Model B, and significance of these variables is not affected by inclusion of the exogenous events.

Finally, the dummy variable, DVCRA2, is added in Model C.[4] It is not significant. Bae (2012) commented that there was no consensus on the role of credit rating agencies in emerging economies in aiding bond market development. With the exception of $EQMKT_{t-3}$, all other significant explanatory variables in the baseline model have the same sign and remain significant in Model C.

4.3 Discussion of Findings

The ARDL modelling in this paper shows no evidence of long-run relationships between domestic aggregate bond market capitalization and selected macroeconomic variables. This outcome may have been influenced by various developments and events. Firstly, the Malaysian government was able to sharply reduce its borrowings for the period 1988 to 1997. As such, redemption of Malaysian Government Securities for this period totalled RM22.2 billion, which was about three times the redemptions for the period 1978-87 (Bank Negara Malaysia, 1999a, p. 341). As a result, outstanding amounts of Malaysian Government Securities actually fell for the years 1993, 1994, 1995 and 1997. These developments would have affected the proxies for government debt and domestic aggregate bonds.

Secondly, the Asian financial crisis impacted variables including Malaysia's economic growth, interest rates, inflation rates, exchange rates as well as necessitated the imposition of selective exchange controls and the Ringgit peg by the Malaysian government (see *e.g.* Bank Negara Malaysia, 1999a; 1999b; 2000). Subsequently, as the Malaysian government turned to the domestic bond market to raise funds for economic recovery and bank recapitalization, issuance of domestic government bonds increased sharply in certain years (see *e.g.* Bank Negara Malaysia 1999a; 1999b; 2000). In turn, this would have increased domestic aggregate bond issuance. Finally, after the crisis, especially for the period July 1998 to September 2005, the conduct of easy monetary policy with low interest rates meant that the interest rate was less effective as a monetary policy instrument (Goh and Yong, 2007).

Findings in this paper show that potential determinants that positively impact the Malaysian domestic aggregate bond market are government debt and the dummy variable

[4] As a further test to the robustness of the results, we identified the exact structural breakpoint after accounting for the stochastic trend in the dependent variable using the endogenously determined breakpoint method. The breakpoint occurred in 2006. A dummy variable is added (1 for all quarters of 2006, 0 otherwise) to Model C. Its inclusion did not affect the regression results, as the structural breakpoint variable is not significant.

for breakpoint in the trend in government debt or growing trend in the country's government debt. This positive association is to be expected as the Malaysian government has traditionally favoured domestic borrowings to finance government development expenditure (Ministry of Finance, various issues). Furthermore, this finding that Malaysia's growing government debt would be positively related to the size of the country's domestic aggregate bond market is in line with various bond studies, including those by Bae (2012), Burger and Warnock (2006), Claessens *et al.* (2007), Eichengreen and Luengnaruemitchai (2004), and Mihaljek *et al.* (2002).

From the findings, potential determinants that negatively impact development of the domestic aggregate bond market in Malaysia include competition from the country's banking sector and equity market, both of which were established way ahead of the domestic bond market. The competition between Malaysia's domestic aggregate bond market and the dominant local banking sector for the full sample period of Q4, 1993 to Q4, 2011 can be expected. This is because in attempts to further develop the domestic bond market, the Malaysian government often promoted it as a cheaper alternative avenue of raising funds to the private sector, especially the large corporates, (*e.g.* Bank Negara Malaysia, 1999a). In fact, this government stance was further emphasized in the subsequent years by the National Economic Action Council, after the Asian financial crisis (National Economic Action Council, 1998). As a measure of the effectiveness of such government efforts, corporate debt securities accounted for almost 60 percent of total corporate financing as at end 2010, up from some 46 percent in 2001 (Bank Negara Malaysia, 2011, p. 56). This was also noted by Goh and Hooy (2008), who attributed the banking sector's reduced role in providing capital to the large corporates to greater development of the Malaysian capital market arising from the Asian financial crisis. This local trend was in line with regional developments with corporate bonds playing an increasingly important role in corporate financing (Park, 2016).

Herring and Chatusripitak (2000), who studied Thailand in the wake of the Asian financial crisis, highlighted that the country's excessive dependence on its local banking sector for private sector financing would have been at the expense of development of its domestic bond market. Likewise in Malaysia, the years of robust loans growth of the local banking sector, at a hefty 19.2 percent annually between 1988 and 1997, would have had a dampening effect on development of the Malaysian domestic aggregate bond market (Bank Negara Malaysia, 1999a, p. 405). In fact, loans growth was even higher for the period 1995-97, averaging 29 percent *per annum* (National Economic Action Council, 1998, p. 13).

In addition to the size of the Malaysian banking sector, its concentration of market share and, accordingly, market power, as measured by the bank concentration ratio, also has a significant and negative impact on the development of the domestic aggregate bond market. This dampening effect due to concentration of market power in the large banks is in line with the findings of Eichengreen and Luengnaruemitchai (2004). As the Malaysian banking sector was established much earlier than the domestic bond market, the former would have used its dominant position in the Malaysian economy when competing with the bond market. The banking sector would have set interest rates and other bank charges strategically, thereby dissuading corporates and the government from bond issuance (Bae, 2012; Bentson, 1994; Schinasi and Smith, 1998).

Unlike Beck *et al.* (2003), and Eichengreen and Luengnaruemitchai (2004), who based their bank concentration ratios on a country's top three banks' share of assets, the bank concentration ratio in this paper has been calculated based on the share of Malaysia's largest commercial bank, Malayan Banking Berhad. Malaysia's second largest commercial bank up to the post-Asian financial crisis banking consolidation programme was Bank Bumiputra

Malaysia Berhad, which was state-owned and not public listed.[5] Hence, its financial results were not published. However, after the bank merger exercise, a bank concentration ratio based on Malaysia's three largest banks, which are all public-listed entities – Malayan Banking Berhad, Public Bank Berhad and CIMB Bank Berhad – was 52.8 percent as at end Q4, 2011.[6] This figure was about two-and-half times the asset share of Malayan Banking Berhad (18.9 percent). Hence, the negative impact on the Malaysian domestic aggregate bond market during the sample period from a much higher bank concentration ratio of 52.8 percent may be correspondingly larger.

Similarly, the well-established Malaysian equity market was also, to some extent, competing with the domestic aggregate bond market during the sample period. The negative relationship between the equity and domestic aggregate bond markets is in line with findings from bond studies such as Bae (2012), Burger and Warnock (2006), Eichengreen and Luengnaruemitchai (2004), Mihaljek *et al.* (2002), and Mohanty (2002). Just as the over-extended local banking sector likely grew at the expense of the domestic bond market, the local equity market would have had a dampening effect on the domestic bond market. In fact, Sahay *et al.* (2015) noted that equity markets in emerging economies averaged about 40 percent of GDP for the years between 2000 and 2013. This figure was significantly lower than Malaysia's 1993 and 1996 ratios of 375 percent and 323 percent of GDP respectively. Even more telling, the corresponding figure for the group of advanced economies in the same study was only about 70 percent of GDP (p. 6).

Additionally, volatility in domestic interest rates and changes in exchange rate are found to have a significant and negative impact on growth of the Malaysian domestic aggregate bond market. Similarly, Eichengreen and Luengnaruemitchai (2004) found that interest rate volatility had a negative impact on bond markets. Regarding the impact of financial crises, the global financial crisis (represented by a dummy variable between Q1, 2008 to Q1, 2009 in this study) also had a negative impact on the growth of the Malaysian domestic aggregate bond market.

5. Conclusion

This paper finds a negative relationship between Malaysia's domestic bond market with both the local banking sector and equity market. However, it is possible that the sample period covered earlier years when there was presumably greater competition between the various sectors in the Malaysian financial system. In contrast, Song and Thakor (2010), in their analysis of banks and capital markets (comprising bond and equity markets) in advanced economies for the period 1960-2003, suggested banks and the capital markets complemented each other for much of the period with "occasional spurts of competition" (p. 1022). Hence, over time in Malaysia, the interaction between the domestic bond market with banks and the equity market could evolve to a more complementary and synergistic relationship, as postulated by Song and Thakor.

The benefits accruing from a better developed domestic bond market for raising long-term funds and providing financing for post-crisis recoveries can be seen in Malaysia's example. In the wake of the Asian financial crisis, Malaysia turned to its domestic bond market to fund its post-crisis recovery efforts and recapitalize its banks. Its economy rebounded from a sharp recession in 1998 (-7.4 percent) to grow by 6.1 percent in 1999 (Bank Negara Malaysia, various issues).

[5] Bank Bumiputra Malaysia Berhad was eventually merged with another bank, which subsequently became CIMB Bank Berhad (see *e.g.* Bank Negara Malaysia, 2000; 2001).

[6] Figures for Malayan Banking Berhad are obtained from the data set for this study and the other two top Malaysian banks from their published financial statements (CIMB Bank Berhad, 2011; Public Bank Berhad, 2011).

Furthermore, in the aftermath of the Asian financial crisis, the Malaysian government made a concentrated effort to develop the domestic bond market, including the corporate or private segment. These measures to promote corporate bond or debt issuance resulted in a shift in the composition of the Malaysian bond market. The share of private bonds in total bonds rose from about 48 percent as at end of 1998 to 50 percent and above since 1999. According to the World Bank and IMF (2001, p. 364), this percentage was a remarkable achievement for Malaysia. As at end 2006, this share was about 51 percent (Bank Negara Malaysia, 2007 p. 92). Furthermore, by 2006, over half of the total PDS had maturities exceeding five years, which underlined the importance of the Malaysian domestic bond market in reducing the maturity mismatch that contributed to the onset of the Asian financial crisis in Malaysia.

Between end 2001 to 2010, the Malaysian domestic bond market, including the Islamic bond segment, grew from RM273 billion to RM759 billion, recording an annual growth rate of 10.8 percent *per annum*. During this same period, the share of corporate financing from the domestic bond market rose from 46 percent to almost 60 percent ((Bank Negara Malaysia, 2011). Accordingly, the banks shifted their business focus to households in Malaysia. Earlier, Goh and Hooy (2008) noted that the proportion of bank lending for residential property and consumption credit had doubled from 1996 to 2006. Such trends are in line with studies that show bond markets can take away good customers from banks (Das, 2003; Harwood, 2000; Hawkins, 2002). In view of this, the Malaysian government should ensure that future policies and measures to develop and reform its financial system need to provide growth opportunities for the banking sector as well as the domestic bond market.

Since volatility in interest rates and changes in exchange rates adversely impacted Malaysian bond market development, credible government policies, including monetary policy, are necessary to ensure stability in interest rates and exchange rates in order to support bond market development. Also, financial crises or turmoil was found to have a significant and adverse impact on the Malaysian domestic bond market. As such, measures and policies need to be put in place by the relevant authorities to support financial markets and increase their resilience in times of economic and financial turmoil.

Underscoring the remarkable progress since the Asian financial crisis, the Malaysian capital market has grown to RM3.1 trillion as at end of 2018 (Securities Commission, Annual Report 2019). The Malaysian bond market, inclusive of *sukuk*, has reached RM1.4 trillion in size. Challenges remain in the development of the Malaysian domestic bond market. However, more embracive future policies and measures aimed at continued diversification of the Malaysian financial system should augur progress for the domestic bond market and possibly greater synergies with the local banking sector and equity market. To this end, future research can be greatly facilitated by the provision of monthly data on Malaysian bonds and other relevant variables. In addition, more research on the determinants of the various segments of the domestic bond market, especially corporate and government bonds, would complement the findings of this paper (*e.g.* Lee and Goh, 2019). Together, such research would represent valuable input for policy makers in Malaysia as well as in other emerging economies in future bond market development.

References

Ariff, M., & Yap, M. M. C. (2001). Financial crisis in Malaysia. In T.S. Yu & D.Q. Xu (Eds.), *From crisis to recovery: East Asia rising again?* (pp. 305-345). Singapore, SG: World Scientific.

Bae, K. H. (2012). *Determinants of local currency bonds and foreign holdings: Implications for bond market development in the People's Republic of China* (ADB Working Paper No. 97). Retrieved from Asian Development Bank website: https://www.adb.org/publications/determinants-local-currency-bonds-and-foreign-holdings-implications-bond-market

Bank Negara Malaysia. (1998). *Annual report 1997*. Retrieved from http://www.bnm.gov.my/index.php?ch=en_publication&pg=en_ar&ac=1&lang=en&uc=2

Bank Negara Malaysia (1999a). *The central bank and the financial system in Malaysia: A decade of change, 1989-99.* Kuala Lumpur, MY: Bank Negara Malaysia.

Bank Negara Malaysia. (1999b). *Annual report 1998*. Retrieved from http://www.bnm.gov.my/index.php?ch=en_publication&pg=en_ar&ac=2&lang=en&uc=2

Bank Negara Malaysia. (1999c). *Monthly statistical bulletin April 1999.* Retrieved from http://www.bnm.gov.my/index.php?ch=en_publication&pg=en_msb&ac=207&lang=en&uc=2

Bank Negara Malaysia. (2000). *Annual report 1999.* Retrieved from http://www.bnm.gov.my/index.php?ch=en_publication&pg=en_ar&ac=3&lang=en&uc=2

Bank Negara Malaysia. (2001). *Annual report 2000.* Retrieved from http://www.bnm.gov.my/index.php?ch=en_publication&pg=en_ar&ac=4&lang=en&uc=2

Bank Negara Malaysia. (2002). *Annual report 2001.* Retrieved from http://www.bnm.gov.my/index.php?ch=en_publication&pg=en_ar&ac=5&lang=en&uc=2

Bank Negara Malaysia. (2006). *Annual report 2005.* Retrieved from http://www.bnm.gov.my/index.php?ch=en_publication&pg=en_ar&ac=11&lang=en&uc=2

Bank Negara Malaysia. (2007). *Financial stability and payment systems report 2006.* Retrieved from http://www.bnm.gov.my/index.php?ch=en_publication&pg=en_fspr&ac=1

Bank Negara Malaysia. (2009). *Annual report 2008.* Retrieved from http://www.bnm.gov.my/index.php?ch=en_publication&pg=en_ar&ac=14&lang=en&uc=2

Bank Negara Malaysia. (2010). *Annual report 2009.* Retrieved from http://www.bnm.gov.my/index.php?ch=en_publication&pg=en_ar&ac=15&lang=en&uc=2

Bank Negara Malaysia. (2011). *Financial sector blueprint 2011-2020.* Retrieved from http*://www.bnm.gov.my/index.php?ch=en_publication&pg=en_fsmp&ac=8&en*

Bank Negara Malaysia. (various issues). *Annual report*. Retrieved from http://www.bnm.gov.my/index.php?csrf=e3a7ed14e63641b47c0609de9edd126f2c5ac976&ch=en_publication&pg=&pub=ararc&yearfr=1998

Bank Negara Malaysia & Securities Commission (2009). *Malaysian debt securities and sukuk market: A guide for issuers and investors.* Kuala Lumpur, MY: Bank Negara Malaysia and Securities Commission Malaysia.

Beck, T., Demirguc-Kunt, A., & Levine, R. (2003). *Bank Concentration and Crisis* (NBER Working Paper No. 9921). Retrieved from National Bureau of Economic Research website: https://www.nber.org/papers/w9921

Bentson, G. J. (1994). Universal banking. *Journal of Economic Perspectives*, *8*(3), 121-143.

Bhattacharyay, B. N. (2013). Determinants of bond market development in Asia. *Journal of Asian Economics*, *24*(C), 124-137.

Burger, J. D., & Warnock, F. E. (2006). Local currency bond markets. *IMF Staff Papers*, *53*(Special Issue), 133-146.

Burger, J. D., Warnock, F. E., & Warnock, V. C. (2012). Emerging local currency bond markets. *Financial Analysis Journal*, *68*(4), 73-93.

Burger, J. D., Warnock, F. E., & Warnock, V. C. (2015). *Bond market development in developing Asia* (ADB Economics Working Paper No. 448). Retrieved from Asian Development Bank website: https://www.adb.org/sites/default/files/publication/173190/ewp-448.pdf

Caprio, G., & Honohan, P. (2001). *Finance for growth: Policy choices in a volatile world* (World Bank Policy Research Report No. 22239). Retrieved from The World Bank website: http://documents.worldbank.org/curated/en/341151468762914798/Finance-for-growth-policy-choices-in-a-volatile-world

CIMB Bank Berhad. (2011). *Annual Report 2011*. Retrieved from https://www.cimb.com/en/investor-relations/financial-information/cimb-group.html

Claessens, S., Klingebiel, D., & Schmukler, S. L. (2007). Government bonds in domestic and foreign currency: The role of institutional and macroeconomic factors. *Review of International Economics*, *15*(2), 370-413.

Committee on the Global Financial System. (2007). *Financial stability and local currency bond markets* (CGFS Papers No. 28). Retrieved from Bank for International Settlements website: https*://www.bis.org/publ/cgfs28.htm*

Das, D. K. (2003). Evolving financial market structure in the emerging market economies. *Journal of Asset Management*, *4*(2), 131-144.

Didier, T., Hevia, C., & Schmukler, S. L. (2012). How resilient and countercyclical were emerging economies during the global financial crisis? *Journal of International Money and Finance*, *31*(8), 2052-2077.

Eichengreen, B. J., Hausmann, R., & Panizza, U. (2002). *Original sin: The pain, the mystery and the road to redemption*. Paper presented at the 2002 Inter-American Development Bank Conference, Washington, DC. Retrieved from http://www.financialpolicy.org/financedev/hausmann2002.pdf

Eichengreen, B., & Luengnaruemitchai, P. (2004). *Why doesn't Asia have bigger bond markets?* (NBER Working Paper No. 10576). Retrieved from National Bureau of Economic Research website: https://www.nber.org/papers/w10576

Eichengreen, B., & Luengnaruemitchai, P. (2006). *Bond markets as conduits for capital flows: How does Asia compare?* (NBER Working Paper No. 12408). Retrieved from National Bureau of Economic Research website: https://www.nber.org/papers/w12408

Essers, D., Blommestein, H. J., Cassimon, D., & Flores, P. I. (2015). *Local currency bond market development in Sub-Saharan Africa: A stock-taking exercise and analysis of key drivers* (MPRA Paper No. 65320). Retrieved from Munich Personal RePEc Archive website: https://mpra.ub.uni-muenchen.de/65320/

Fink, G., Haiss, P., & Hristoforova, S. (2003). *Bond markets and economic growth* (IEF Working Paper No. 49). Retrieved from CORE website: https://core.ac.uk/download/pdf/11007252.pdf

Garcia, V. F., & Lin, L. (1999). Macroeconomic determinants of stock market development. *Journal of Applied Economics*, *2*(1), 29-59.

Goh, K. L., & Hooy C. W. (2008). Bank lending and monetary policy in Malaysia: Issues and challenges. In K. N. Betrowe (Ed.), *Bank lending, banking and financial developments* (pp. 51-68). New York, NY: Nova Science Publishers.

Goh, K. L., & Yong, S. L. (2007). Bank lending and monetary policy: The effects of structural shift in interest rates. *Economics Bulletin*, *5*(5), 1-14.

Gruic, B., & Wooldridge, P. (2012). Enhancements to the BIS debt securities statistics. *BIS Quarterly Review*, December, 63-76.

Gyntelberg, J., Ma, G., & Remolona, E. M. (2005). Corporate bond markets in Asia. *BIS Quarterly Review*, December, 83-93.

Harwood, A. (2000). *Building local currency bond markets: An Asian perspective.* Washington, DC: International Finance Corporation.

Hawkins, J. (2002). *Bond markets and banks in emerging economies* (BIS Papers No. 11). Retrieved from Bank for International Settlements website: https://www.bis.org/publ/bppdf/bispap11.htm

Herring, R. J., & Chatusripitak, N. (2000). *The case of the missing market: The bond market and why it matters for financial development* (ADBI Working Paper No. 11). Retrieved from Asian Development Bank website: https://www.adb.org/publications/case-missing-market-bond-market-and-why-it-matters-financial-development

Kaminsky, G. L., & Reinhart, C. M. (2001). Bank lending and contagion: Evidence from the Asian crisis. In T. Ito & A. Krueger (Eds.), *Regional and global capital flows: Macroeconomic causes and consequences* (pp. 73-99). Chicago, Illinois: University of Chicago Press.

La Porta, R., Lopez-de-Silances, F., Shleifer, A., & Vishny, R. (1997). Legal determinants of external finance. *The Journal of Finance*, *52*(3), 1131-1150.

Lee, M. W., & Goh, K. L. (2019). Bond market development in Malaysia: Possible crowding-out from persistent fiscal deficits? *Economics Bulletin*, *39*(3), 1798-1807.

Levine, R. (2005). Finance and growth: Theory and evidence. In P. Aghion & S. N. Durlauf (Eds.), *Handbook of economic growth* (Vol. 1A). Amsterdam, Netherlands: Elsevier.

Mihaljek, D., Scatigna, M., & Villar, A. (2002). *Recent trends in bond markets* (BIS Papers No. 11). Retrieved from Bank for International Settlements website: https://www.bis.org/publ/bppdf/bispap11.htm

Ministry of Finance. (various issues). *Economic report*. Kuala Lumpur, MY: Ministry of Finance.

Mohanty, M. S. (2002). *Improving liquidity in government bond markets: What can be done?* (BIS Papers No. 11). Retrieved from Bank for International Settlements website: https://www.bis.org/publ/bppdf/bispap11.htm

Mu, Y., Phelps, P., & Stotsky, J. G. (2013). Bond markets in Africa. *Review of Development Finance*, *3*(3), 121-135.

National Economic Action Council (1998). *National economic recovery plan: Agenda for action.* Kuala Lumpur, MY: Prime Minister's Department.

Park, C. Y. (2016). *Developing local currency bond markets in Asia* (ADB Economics Working Paper No. 495). Retrieved from Asian Development Bank website: https://www.adb.org/sites/default/files/publication/190289/ewp-495.pdf

Pesaran, M. H., & Shin, Y. (1999). An autoregressive distributed lag modelling approach to cointegration analysis. In S. Strom (Ed.), *Econometrics and economic theory in the 20th Century: The Ragnar Frisch Centennial Symposium.* Cambridge, MA: Cambridge University Press.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, *16*(3), 289-326.

Pettis, M. (2000). The risk management benefits of bonds. In A. Harwood (Ed.), *Building local currency bond markets: An Asian perspective* (pp. 47-58). Washington, DC: International Finance Corporation.

Public Bank Berhad. (2011). *2011 Public Bank Annual Report*. Retrieved from https*://www.publicbankgroup.com/Investor-Relations/Financial-Information.*

Rajan, R. G., & Zingales, L. (2003). The great reversals: The politics of financial development in the twentieth century. *Journal of Financial Economics*, *69*(1), 5-50.

Sachs, J. D., & Warner, A. (1995). Economic reform and the process of global integration. *Brookings Papers on Economic Activity*, *26*(1), 1-118.

Sahay, R., Cihak, M., N'Diaye, P., Barajas, A., Bi, R., Ayala, D., … Yousefi, S.R. (2015). *Rethinking financial deepening: Stability and growth in emerging markets* (IMF Staff Discussion Note SDN/15/08). Retrieved from International Monetary Fund website: https://www.imf.org/external/pubs/ft/sdn/2015/sdn1508.pdf

Schinasi, G. J., & Smith, R. T. (1998). *Fixed income markets in the United States, Europe and Japan: Some lessons for emerging markets* (IMF Working Paper No. 98/173). Retrieved from International Monetary Fund website: https://www.imf.org/external/pubs/ft/wp/wp98173.pdf

Securities Commission. (various issues). *Annual report.* Kuala Lumpur, MY: Securities Commission.

Song, F., & Thakor, A. V. (2010). Financial system architecture and the co-evolution of banks and capital markets. *The Economic Journal*, *120*(547), September, 1021-1055.

Turner, P. (2002), *Bond markets in emerging economies: An overview of policy issues.* (BIS Papers No. 11). Retrieved from Bank for International Settlements website: https://www.bis.org/publ/bppdf/bispap11.htm

Turner, P. (2012). *Weathering financial crisis: Domestic bond markets in EMEs* (BIS Papers No. 63. Weathering financial crises: Bond markets in Asia and the Pacific). Retrieved from Bank for International Settlements website: https://www.bis.org/publ/bppdf/bispap63.htm

Van Rixtel, A., Gonzalez, L. R., & Yang, J. (2015). *The determinants of long-term debt issuance by European banks: Evidence of two crises* (BIS Working Paper No. 513). Retrieved from Bank for International Settlements website: https://www.bis.org/publ/work513.htm

World Bank & International Monetary Fund. (2001). *Developing government bond markets: A handbook.* Washington, DC: The International Bank for Reconstruction and Development.

Appendix 1: Estimated ARDL model

Variable	Coefficient	Standard error
TB_{t-1}	0.9627***	0.1036
TB_{t-2}	-0.0350	0.1126
TB_{t-3}	0.1450	0.0991
TB_{t-4}	-0.2669***	0.0932
$GROWR_t$	-0.7534***	0.2099
$GROWR_{t-1}$	0.2812	0.2133
$GROWR_{t-2}$	0.1056	0.2098
$GROWR_{t-3}$	0.2126	0.1945
$GROWR_{t-4}$	-0.4904***	0.1577
$TRADE_t$	0.1610***	0.0467
$LOAN_t$	-0.3334	0.2621
$LOAN_{t-1}$	0.3160	0.2507
$BANCON_t$	-1.8831***	0.4054
$EQMKT_t$	-0.0139	0.0179
$EQMKT_{t-1}$	0.0302	0.0184
$EQMKT_{t-2}$	-0.0300*	0.0171
$LEXR_t$	-0.5907***	0.0856
$LEXR_{t-1}$	0.7951***	0.1168
$LEXR_{t-2}$	-0.4973***	0.1010
$SDIBR_t$	-0.0373***	0.0082
$INFL_t$	-0.0108***	0.0036
$INFL_{t-1}$	-0.0013	0.0046
$INFL_{t-2}$	0.0034	0.0046
$INFL_{t-3}$	0.0067	0.0041
$GDEBT_t$	0.3613***	0.1063
Constant	0.5357**	0.2274
R-squared	0.9884	
Adjusted R-squared	0.9817	
Breusch-Godfrey Serial Correlation LM Test (Chi squared statistic)	10.5206 [0.0325]	

Notes: TB is total bonds over nominal GDP, GROWR is annual growth of real GDP, TRADE is trade over nominal GDP, LOAN is loans outstanding over nominal GDP, BANCON is bank concentration ratio, EQMKT is equity market capitalization over nominal GDP, LEXR is log of exchange rate, SDIBR is standard deviation of interest rate, INFL is inflation, and GDEBT is government debt over nominal GDP. ***, **, * indicate significance at 1%, 5% and 10% level, respectively.

Appendix 2: Scatter plots