HONG KONG INSTITUTE FOR MONETARY RESEARCH

WHAT EFFECT HAS BOND MARKET DEVELOPMENT IN EMERGING ASIA HAD ON THE ISSUANCE OF CORPORATE BONDS?

Paul Mizen and Serafeim Tsoukas

HKIMR Working Paper No.18/2010

June 2010

Hong Kong Institute for Monetary Research
(a company incorporated with limited liability)

What Effect Has Bond Market Development in Emerging Asia Had on the Issuance of Corporate Bonds?

Paul Mizen

University of Nottingham

Hong Kong Institute for Monetary Research

and

Serafeim Tsoukas*

University of Nottingham

Hong Kong Institute for Monetary Research

June 2010

Abstract

This paper investigates the determinants of firms' decision to issue public debt in emerging Asian economies, using a novel database covering the period 1995 to 2007. We use comparable micro level panel of eight countries – China, Hong Kong, Indonesia, Korea, Malaysia, Philippines, Singapore and Thailand – to explore the influence of firms' characteristics and indicators of bond market depth on the decision to issue corporate bonds. Our paper demonstrates the influence of firm-specific characteristics on the decision to issue bonds, especially an indicator that the firm made previous issues of bonds. It also finds that the effect of market liquidity and local market size on the decision is small but significant. Finally our results show that co-ordinated policies by national governments to encourage bond market development have had little impact on probability of bond issuance at the firm level in Asia.

Keywords: Bond Financing, Financial Indicators, Emerging Asian Markets

JEL Classification: F32, F34, G32, G15

---

* Corresponding Author: Serafeim Tsoukas; Email: serafeim.tsoukas@nottingham.ac.uk. The authors gratefully acknowledge the support of the Hong Kong Institute for Monetary Research, Hong Kong and their generous hospitality during the period that this paper was prepared. We have received helpful comments from the BIS, Asia Office, Hong Kong, (particularly from Eli Remolona, Illock Shim and Philip Wooldridge) and also from Michael Bleaney, John D. Burger, Kevin Cowan, Anzhela Knyazeva and seminar participants at the 2009 INFINITI Conference on International Finance, the 2009 International Conference on Macroeconomic Analysis and International Finance, the 2009 Scottish Economic Society Conference, the 2008 European Economics and Finance Society, the Hong Kong Monetary Authority, and Loughborough University. We thank Kenneth Chow for excellent research assistance. Serafeim Tsoukas gratefully acknowledges support from the Economic and Social Research Council, grant PTA-026-27-1790. Any remaining errors are our own.

1. Introduction

Asian countries have small bond markets. At the end of 2008, the eight Asian economies included in this study-China, Hong Kong, Indonesia, Korea, Malaysia, Philippines, Singapore and Thailand – had domestic debt securities outstanding of almost $547.5 billion, while the corresponding figure for the US was $2,914 billion.[1] We might expect Asia to have a small market in relation to the United States, but numbers from Eichengreen and Luengnaruemitchai (2004) suggest that even compared to countries in Latin America the scale of bond markets in relation to broad money or domestic credit is small. This reflects the fact that firms in Asian countries have greater dependence on bank finance than firms in Latin America (see Burger and Warnock, 2006; Eichengreen *et al.,* 2006). Hale (2007) argues that the composition of credit between bonds and loans affects the cost of debt crises when they occur and, therefore, with the low level of debt securities outstanding, Asia is potentially more prone to the adverse effects of foreign loan dependence, which for emerging markets in general has been estimated to cause credit supply to fall by over 30 percent following an exchange rate depreciation of 10 percent (see Hale and Arteta, 2009). With this in mind, governments have started policy initiatives to allow bond markets to develop and have co-ordinated the issue and trading of sovereign and quasi-sovereign bonds since 2003 by allowing the Asian Bond Fund to purchase dollar and local currency government bond issues via the Pan Asian Bond Index Fund (PAIF) and the Fund of Bond Funds (FoBF). They have also improved the infrastructure as part of a wider Asian Bond Market Initiative (ABMI) to create a more integrated regional market. As a result the sovereign bond market has grown since 2003 by almost 50%. The purpose of this paper is to ask whether the policy initiatives undertaken have had a noticeable effect on the incentives for firms to issue corporate bonds.

We address the question by assessing whether the probability that a firm will issue a corporate bond in Asian markets has been affected by the ABMI, and if so, how. Ours is the first study to use firm-level data for a regional panel of eight Asian countries to consider the influence of bond market development initiatives on the incentive for firms to issue bonds employing multi-country data which includes firm-level panels for China, Hong Kong, Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand over the period 1995-2007.

Our approach is illustrated in Figure 1. The central question is `what influences the probability of bond issuance by firms?' We recognize that there are two influential drivers of this decision: firm-specific factors such as firm growth, profitability, leverage etc, and market-specific drivers such as market size and liquidity. These factors have direct effects on bond issuance indicated by the upper curved arrows.

Issuance on emerging securities markets is likely to be affected by a firm's characteristics such as profitability, liquidity, debt to assets levels, growth prospects, collateral assets and size because these

[1] Figures are taken from the BIS statistics, Table 12C.

variables indicate the economic justification for issuing and the creditworthiness of the issuer. Our choice of variables reflects the factors that have been found to influence bond issuance at the firm level in developed countries (see Pagano *et al.,* 1998; Datta *et al.,* 2000; Hale and Santos, 2008) as well as in emerging Latin American markets (see Aguilar *et al.,* 2008; Braun and Briones, 2008; Castellanos and Martinéz, 2008) and they measure the ability of firms to overcome hurdles of issuing by convincing investors, underwriters and rating agencies that their bond issues are viable. An important consideration is whether the firm has previously issued bonds. Having once entered the market it may be more likely to do so again.

Market factors also influence the firm's decision to issue bonds by improving the market environment in which the firm issues. Larger markets with greater liquidity are more likely to encourage firms to issue bonds. These have direct effects on the probability of bond issuance since they affect costs of entering and exiting the market for firms and investors, and they reduce uncertainty and thresholds for entry. Larger and more liquid bond markets reduce uncertainty for investors by revealing more accurately the firm's financial condition in market prices and reduce the thresholds for entry by allowing the development of local underwriting and rating agencies to facilitate lower cost bond issuance for the issuer. There is also an indirect effect from market factors to firm-specific factors, indicated by the horizontal arrow in Figure 1 because these influences do not necessarily affect all firms equally, but vary with the characteristics of the firm. Therefore we allow for the fact that firms of different sizes, with varying levels of profits, liquidity, debt and collateral might respond to the growth of the market size and liquidity disproportionately. We can be sure, however, that the direction of influence is from markets to firms rather than the other way around, because firms are relatively small compared to the market.

Finally, in Figure 1 we consider the impact of the Asian Bond Fund (ABF) and the Asian Bond Market Initiative (ABMI). These effects are illustrated by the lower curved arrows, which show the policy influence over both the market environment and the impact of firm-specific characteristics on issuance. We can be quite precise about the timing of these initiatives, since starting in June 2003 eight east Asian countries purchased dollar denominated bonds issued by Asian governments through the Asian Bond Fund (ABF1), and in June 2005 launched a new fund to purchase local currency bonds from Asian countries (ABF2). We can explore how much influence the initiative had over firm-specific and market-specific variables and whether the effect changed after 2003 compared to the period before the start of the ABF/ABMI initiative.

Our conclusions show that firm-level effects and market size and liquidity have a significant effect on the probability that a firm will issue a bond; additionally, there is evidence that market variables – size and liquidity – have a small direct and indirect effect operating via firm-specific variables on this probability. The dominating factor, however, is whether the firm has previously issued a bond, which has fifteen times more influence than the next most important factor influencing the decision to issue. When we split the sample into pre-ABMI and ABMI periods, we find that there is little evidence of any effect of the ABMI on firm's decisions to issue bonds.

Our work is directly comparable to a growing set of studies on the development of Latin American bond markets as summarized in Borensztein *et al.* (2008) and evidenced in Aguilar *et al.* (2008), Braun and Briones (2008) and Castellanos and Martinéz (2008). We extend their analysis in two directions that may prove useful for policy design both in Asian and Latin American regions. First, we are able to separate the influence of firm-specific effects on the decision to issue bonds from the influence of growth in market size and liquidity. Once we have controlled for these factors we can determine the effects of official steps taken to encourage bond market development through the ABF and ABMI, for corporate bond market development. Therefore, the collective East Asian approach can be compared with Latin America's decentralized approach. Second, our sample is longer time period, 1995-2007, (studies in Borensztein *et al.,* 2008 span 1995-2004), covering more of the ABF period, and we employ multi-country data that capture the wide regional variation in Asian markets in terms of size and liquidity. Our conclusions suggest that bond market initiatives had an indirect effect through firm-specific characteristics on the probability of a firm issuing a bond in the Asian markets. These results are important for Latin American countries as they seek to take steps to promote bond market finance.

The rest of the paper is organized as follows. Section 2 discusses the state of Asian bond markets over the last decade. Section 3 presents the empirical methodology. In Section 4 we describe our data. Section 5 reports our results and Section 6 presents the robustness of our findings. Section 7 concludes the paper.

2. Asian Bond Markets

The Asian region has long recognized that it has relatively small bond markets. Both sovereign and corporate bonds outstanding are small as a percentage of GDP in relation to loans and equities in Hong Kong, Indonesia, Malaysia, Philippines, Singapore and Thailand; only Japan and Korea are exceptions in this regard, but even here the scale of the bond markets is closer to European than US levels as a percentage of GDP. Figures reported in Eichengreen and Luengnaruemitchai (2004) suggest that there is considerable variation between countries, but by comparison with other emerging markets, notably in Latin America, the scale of bond markets in relation to broad money or domestic credit is small, which reflects the great dependence of Asian economies on bank finance (see Eichengreen *et al.,* 2006).

The vulnerability of corporations to small underdeveloped bond markets was underlined with the onset of the Asian crisis. Most corporations were heavily dependent on bank finance in domestic and foreign currency to supplement internal cash flow for investment, with smaller and medium sized enterprizes almost exclusively reliant on *domestic* bank loans. Domestic banks in turn depended on short-term dollar denominated funds to finance these domestic currency loans creating a potential currency mismatch between assets and liabilities on their balance sheets. When the crisis occurred the funding to banks and

then to corporates fell dramatically, and in the absence of local bond markets to provide a "spare tire" for firms c.f. Borensztein *et al.* (2008), the real effects of the crisis were amplified.[2]

In the post-crisis period, building deep and liquid regional bond markets has became a priority to provide the means to free Asian economies from excessive dependence on bank intermediation and to foster the development of a more diversified and efficient financial sector, and there is evidence that they are growing (see Fernandez and Klassen, 2004; Gyntelberg *et al.,* 2005). But the level of bond market capitalization is low and results from the fact that bond markets are separated by country, with low liquidity, limited investor participation, underdeveloped infrastructure and few intermediaries. They are unable to create the critical mass required for adequate liquidity, which is widely regarded as between $100-200bn (see McCauley and Remolona, 2004; Eichengreen *et al.,* 2006), since all emerging Asian countries except Korea, and more recently China and India, have failed to reach this level. Until a market reaches this critical size, trading volumes remain low, bid-ask spreads will be wider than comparable markets elsewhere (if not constrained by market regulations as many are in Asia) and both issuers and investors will remain few in number.

Large strides have since been taken to improve the bond markets at the country and regional level. Governments have issued increasing numbers of sovereign or quasi-sovereign bonds to establish a yield curve off which corporate bonds can be priced. The range of institutional investors has increased, the infrastructure improved to ensure prices and volumes are recorded more quickly, and ratings agencies are beginning to provide information on bond issues. The regional initiative to establish an Asian Bond Fund to purchase dollar and local currency government bond issues through the Pan Asian Bond Index Fund (PAIF) and the Fund of Bond Funds (FoBF) has resulted in a deeper sovereign bond market and the Asian Bond Market Initiative proposal brought by the ASEAN+3 Finance Ministers has spurred a number of moves to create a more integrated regional market.

It is widely recognized that greater securitization in the sovereign bond market provides a yield curve off which the corporate issues can be priced (Hirose *et al.,* 2004) and encourages fixed income dealers to establish themselves in the markets, which they might not otherwise do (Harwood, 2000). According to Lejot *et al.* (2008) it is reasonable to suggest that bond market depth even if it is largely confined to the public sector debt market could be a spur to corporate bond issues.

Hirose *et al.* (2004) indicate that the scale of government issues of bonds has increased over time with issues being made on a scheduled basis, which has helped to establish a benchmark yield curve off which other bond issues can be priced. In addition, the range of investors encouraged to participate in bond markets has widened to include institutional investors such as private pension funds, insurance

[2] The most severe experiences were in those countries with the most highly leveraged companies prior to the crisis – Korea, Thailand and Indonesia. Much of the corporate debt was foreign currency denominated; therefore the reversal of capital inflows with the subsequent depreciation of the exchange rate had a sharp adverse effect on investment and output.

companies, investment trusts and this has been aided by lowering the bureaucratic hurdles involved with registration and participation.[3] Besides institutional investors, governments have encouraged foreign investor participation by liberalizing the domestic financial markets allowing foreigners to invest by reducing exposure to withholding taxes on returns or reporting requirements when purchasing or selling assets, although the level of participation is very low, as documented by Burger and Warnock (2007). In some markets foreign entities have been encouraged to issue bonds themselves. Asian authorities have sought to increase participation in the markets further by improving the infrastructure for market participants by improving the settlement process to enhance the immediacy and transparency of the trading process.[4] The engagement of international rating agencies and local agencies to rate issues in local currency has reduced information asymmetry in the markets.

Perhaps the most prominent initiative has been the move towards a regional bond market, and here there have been two major developments. First, following discussions among the senior executives of the regional central banks, the Asian Bond Fund, referred to as the ABF1, was launched in 2003. Initially this was a commitment by eight East Asian and Pacific countries to set aside $1bn of reserve assets in a closed end fund to purchase dollar denominated Asian government bond issues. The ABF2 initiative, launched in 2005, extended the project to local currency government bond issues through the Pan Asian Bond Index Fund (PAIF) and the Fund of Bond Funds (FoBF). The investment was enlarged to $2bn per country in an open ended fund which was accessible to private sector investors – Eichengreen *et al.* (2006) report that the PAIF grew by 13% in its first six months of operation reflecting private sector participation. Second, an Asian Bond Market Initiative (ABMI) proposal to the ASEAN+3 Finance Ministers meeting in Manila 2003 has spurred a number of initiatives to develop regional bond markets including a) the intention to create a robust primary and secondary market for securities by large sovereign bond issues by Asian governments and quasi-government agencies to establish benchmarks, b) Asian government financial institutions' financing requirements intention to meet in Asia, and c) a series of new ventures to create asset-backed securities markets, bond issues by multilateral development banks and government agencies, and bonds to fund foreign direct investment in Asian countries. Several working groups have been established to take these forward.

To allow for the development of the bond market we consider two indicators: size of local currency bond market and the extent of trading in the secondary market relative to the amount of bonds outstanding. These indicators are allowed to influence the probability of corporate bond issue directly and indirectly through interactions with firm-specific variables.

[3] Previously, the main institutional investors had been local banks and government pension funds, which were buy-to-hold investors that did not enhance turnover in these markets. The lack of diversity among these investors tended to mean markets were dominated by participants on one side of the market i.e. buyers or sellers.

[4] The move to paperless trading in Korea, Malaysia, Singapore, Philippines and Thailand for both government and corporate bonds is almost complete, while the reporting of the price and volume of trades in Hong Kong, Korea, Malaysia, Singapore and Thailand ensures that the secondary market for bonds can utilize recent information.

3. Methodology

In order to determine whether the policy initiatives undertaken through the ABF and ABMI had a noticeable effect on the incentives for firms to undertake bond issues we evaluate the probability that a firm will issue a corporate bond using the approach outlined in Figure 1.

First we control for the firm-level influences on the decision to issue bonds, which include the influence of profitability, liquidity, debt to assets levels, growth prospects, collateral assets, size and previous market activity, which we expect to influence the willingness of the firm to issue and their ability to overcome hurdles of issuing, by convincing investors, underwriters and rating agencies that their bond issues are viable.

Second, we investigate the effect of market level developments – growth of local bond market size (MKT SIZE) and local liquidity (MKT LIQ) – by considering the local currency bond issues as a proportion of GDP and the trading volumes in the secondary markets relative to the amount of bonds outstanding. We allow for both direct influence on bond issuance and indirect influence through firm-specific effects.

Finally, we consider the impact of the Asian Bond Fund (ABF) and the Asian Bond Market Initiative (ABMI) by exploring whether the impact of market size and liquidity and firm-specific variables was greater after these policies were initiated than beforehand. If the coefficient values differ significantly for the period before the ABF/ABMI compared with the period after then we have evidence of the influence of ABMI.

3.1 Estimation Method

In this study we model the firm's decision to issue corporate bonds. The most suitable methodology for this purpose is the probit model, which can be used to provide an estimate of the probability that a firm will issue a bond based on a range of relevant variables. There is a literature on this approach to bond finance, beginning with Pagano *et al.* (1998) and Datta *et al.* (2000) who ask why firms enter the public markets.

We assume that there is an underlying response variable, y_{it}^{*}, the decision to issue a bond as a function of the vector of determinants of issuance, X_{it}. This is defined by the regression relationship, with slope parameters given by the vector $\boldsymbol{\beta}$ and intercepts accounting for group effects a_i, and a normally distributed error term ε_{it}:

$$y_{it}^{*} = \mathbf{X}_{it}\boldsymbol{\beta} + \varepsilon_{it} \qquad (3.1)$$

In practice, y_{it}^* is unobservable, and what we observe is a dummy variable y_i defined by

$$y_i = \begin{cases} 1 & \text{if the firm issues a bond at any time in the sample period,} \\ 0 & \text{if the firm is a non-issuer.} \end{cases} \quad \begin{matrix} y_i = \mathbf{1}(y_i^* > 0) \\ y_i = \mathbf{0}(y_i^* = 0) \end{matrix} \tag{3.2}$$

The likelihood is constructed from observing the probability of observing outcomes y_i given the observed determinants, $\mathbf{X}_{it}$, hence

$$L = \prod_{i=1}^{N} \Pr(y_i = 1|\mathbf{X}_{it}, \boldsymbol{\beta}, \alpha_i)^{y_i} \Pr(y_i = 0|\mathbf{X}_{it}, \boldsymbol{\beta}, \alpha_i)^{1-y_i}$$

and we maximize the log likelihood

$$\ln L(\boldsymbol{\beta}, \alpha_i|\mathbf{X}_{it}) = \sum_{i=1}^{N} (y_i \ln \Pr(y_i = 1|\mathbf{X}_{it}, \boldsymbol{\beta}, \alpha_i) + (1 - y_i) \Pr(y_i = 0|\mathbf{X}_{it}, \boldsymbol{\beta}, \alpha_i)$$

where $\Pr(y_i = 1|\mathbf{X}_{it}, \boldsymbol{\beta}, \alpha_i) = F(\mathbf{X}_{it}\boldsymbol{\beta} + \alpha_i)$ and $\Pr(y_i = 0|\mathbf{X}_{it}, \boldsymbol{\beta}, \alpha_i) = 1 - F(\mathbf{X}_{it}\boldsymbol{\beta} + \alpha_i)$, to obtain parameter estimates $\boldsymbol{\beta}$ and α_i and thereby to establish the impact of the determinants and the group effects. The reported coefficients on the determinants can be adjusted to establish the marginal effect of a change in the element of $x_{it} \in \mathbf{X}_{it}$ on $\Pr(y_i = 1|\mathbf{X}_{it}, \boldsymbol{\beta}, \alpha_i)$ by calculating

$$\frac{\partial \Pr(y_i = 1|\mathbf{X}_{it}, \boldsymbol{\beta}, \alpha_i)}{\partial x_{it}} = F(\mathbf{X}_{it}\boldsymbol{\beta} + \alpha_i).b$$

where b is the estimated parameter on element x_{it}.

3.2 Empirical Specification

We begin our inquiry with a baseline model of the following format:

$$Pr(BOND_{it} = 1) = F(a_0 + a_1 SIZE_{i(t-1)} + a_2 GROWTH_{i(t-1)} + a_3 YEARS_{i(t-1)} + a_4 LEVER_{i(t-1)} + a_5 PROF_{i(t-1)} + a_6 LIQUID_{i(t-1)} + a_7 COLL_{i(t-1)} + a_8 PREV.ISSUE_{it} + \varepsilon_{it}) \tag{3.3}$$

where BOND is a dummy variable that equals 1 if firm *i* issued a bond in year *t*, and 0 otherwise. *F*(.) denotes the standard normal distribution function. Our specification includes regressors evaluated at time *t*-1 to mitigate potential endogeneity concerns.[5] The model evaluates the firm's probability of issuing bonds based on firm-specific variables based on size and growth opportunities, the track record acquired from the stock market and financial health e.g. LEVER, PROF, LIQUID and COLL. In addition, we add a dummy variable that takes the value one if the firm has issued a bond in period t-1 to capture the influence of presence in the bond market, which may indicate that a firm has achieved some threshold that allows it to participate in the bond market and may also convey reputation among investors. Finally, our model includes country dummies to control for institutional differences between countries, time dummies accounting for common trends and business cycle effects and industry dummies to control for fixed effects across industries.

It is widely recognized that a firm's size plays an important role in determining access to public finance, Datta *et al.* (2000), and is expected to increase the probability of a bond issue. Large firms obtain finance from equities, issue of securities and bank finance, while smaller firms with more severe information problems tend to borrow from banks and private creditors. In addition, a large and growing set of empirical findings supports the view that flotation costs make bond financing unattractive to small firms intent on raising small amounts of funding from the market: Blackwell and Kidwell (1988) and Krishnaswami *et al.* (1999) show that flotation costs of public issues make this funding source economically viable only for firms seeking large amounts of funding. To control for size (SIZE) we include the logarithm of the firm's total assets consistent with Calomiris *et al.* (1995). Growing firms are more likely to issue bonds than firms that have fewer opportunities for expansion because they have greater demand for external funding (see Pagano *et al.,* 1998; Datta *et al.,* 2000). In our data GROWTH is measured by growth in sales. Finally, reputation from other markets (stock markets) may be influential in determining access to bond markets. To control for that we include a variable measuring the number of years a firm has been listed in the stock exchange (YEARS).

The financial condition of the firm is also an important determinant of access to external finance as argued by Leland and Pyle (1977), Rajan (1992) and Bougheas *et al.* (2006). We consider four dimensions of financial health from the balance sheet, namely leverage, profitability, liquidity and collateral assets in total assets. We define leverage (LEVER) as total debt over total assets, to measure the firm's overall indebtedness. Considering the likely response of the probability of bond issue to these variables we remark that high leverage can be associated with an unhealthy balance sheet and therefore firms with higher levels of debt face greater difficulties obtaining funds on the markets, especially during recessions (see Cantor, 1990; Bougheas *et al.,* 2006). Should this effect prevail, one would observe a negative relationship between leverage and the likelihood of bonds issuance. Yet, some authors argue that the probability of raising public finance increases with firms' leverage (see Pagano *et al.,* 1998; Datta

[5] We corroborate our findings using regressors at time *t*. Both empirical models suggest a common story. These results are not reported for brevity, but are available upon request.

et al., 2000; Dennis and Mihov, 2003; Faulkender and Petersen, 2006) since a high rate of leverage can be seen as an indicator of a good credit standing and high borrowing capacity of firms. If this is the case, we would expect a positive relationship between leverage and the probability of issuing bonds.

The profitability ratio (PROF), is defined as earnings before interest and taxes relative to total assets, to measure a firm's ability to generate profits. Dennis and Mihov (2003) argue that bond financing should be more viable for firms with high profits. Therefore, the more profitable firms are more likely to issue bonds. In other words, we expect a positive relationship between profitability and the probability of issuing corporate bonds.

As an additional balance sheet indicator, we employ the liquidity ratio (LIQUID) measured by current assets over total liabilities. This variable has been used in earlier studies (Mateut *et al.,* 2006), as an indicator of the liquid assets of the firm. As with leverage this variable can have a coefficient of either sign, since liquidity indicates both the need to raise funds due to low shareholder equity, and a signal of low creditworthiness. Hale and Santos (2008) find that firms with more liquidity take longer to enter the public bond market due to the fact that they have substantial internal funds.

We include a measure of tangible assets which proxies for the firm's ability to pledge collateral for debt finance. Collateral (COLL) is defined as tangible assets over total assets. Access to collateral assets was very important in studies on debt composition (Demirguc-Kunt and Maksimovic, 1999; Booth *et al.,* 2001). Assets that are more tangible sustain more external financing because tangibility increases the value that can be recaptured by creditors in case of borrower's default. Thus we expect to find that high values of collateral increase the probability of issuing corporate bonds.

At the next stage we allow for the influence of growth in market size and liquidity over the sample. We modify Equation (3.3) to include terms ($IND_t = MKTSIZE$ or $MKTLIQ$) with variables that measure bond market development such as local market size or market liquidity, respectively (not to be confused with firm liquidity and size). These terms are allowed to influence the probability of issue directly, judged from the sign and significance of the coefficient a_{15} through the reduction in costs associated with issuing, and indirectly, judged from the sign and significance of the coefficients $a_2, a_4, a_6, a_8, a_{10}, a_{12}$ and a_{14}, where we suggest the influence is determined in conjunction with a firm's characteristics. The estimated model is specified as follows:

$$
\begin{aligned}
Pr(BOND_{it} = 1) = F(a_0 + a_1 SIZE_{i(t-1)} + a_2 SIZE_{i(t-1)} * IND_t \\
+ a_3 YEARS_{i(t-1)} + a_4 YEARS_{i(t-1)} * IND_t \\
+ a_5 GROWTH_{i(t-1)} + a_6 GROWTH_{i(t-1)} * IND_t \\
+ a_7 LEVER_{i(t-1)} + a_8 LEVER_{i(t-1)} * IND_t \\
+ a_9 PROF_{i(t-1)} + a_{10} PROF_{i(t-1)} * IND_t \\
+ a_{11} LIQUID_{i(t-1)} + a_{12} LIQUID_{i(t-1)} * IND_t \\
+ a_{13} COLL_{i(t-1)} + a_{14} COLL_{i(t-1)} * IND_t \\
+ a_{15} IND_t + a_{16} PREV.ISSUE_{it} + \varepsilon_{it})
\end{aligned} \tag{3.4}
$$

A final version of the model considers the influence of ABMI on the firm's desire to issue bonds directly and indirectly through impact on the influence of firm-specific variables, since firms may have been influenced by the ABMI initiative. To investigate the hypothesis we split the sample into pre-ABMI and ABMI periods, and compare the coefficients using equality of coefficient tests.[6]

3.3 Mechanisms

A critical issue is the mechanisms by which market size and liquidity and the policy initiatives can be thought to affect the decision to issue a bond at the firm level. We argue that larger markets with greater liquidity are more likely to encourage firms to issue bonds directly by reducing the costs of issue for firms and lowering the cost of entering and exiting the market for investors. As noted by Eichengreen *et al.* (2006), if there is a large volume of trading, it may be possible for brokers to spread their fixed costs more widely and thus reduce transactions costs. It is generally accepted that investors are willing to invest in securities only if there is enough liquidity for them to sell and exit easily when needed, which depends on the overall market size and the trading volume exchanged. If liquidity is limited and the price discovery does not function well, the investors that participate will demand a higher interest rate to compensate for the low liquidity, and this in turn may further deter firms from issuing bonds. Local market size may be beneficial for firm-level bond issuance for other reasons. Local markets provide easier access to domestic firms that typically face thresholds that bar their entry to international bond markets. Local markets are better suited to the credit needs of domestic small or medium-sized businesses compared to global investors operating in international markets. Underwriters and ratings agencies typically operate in global financial centers and therefore may show less interest in local issues which are typically smaller, but as local markets increase in size they can support local underwriters and ratings agencies, which are able to acquire and process local information more easily.

[6] Ideally, we would like to test this hypothesis taking into account a group of firms that did not participate in the ABMI initiative, the Latin American firms. The comparison between Asian and Latin American firms would constitute a natural experiment that is well worth considering. Unfortunately, due to data limitation we are not able to explore this hypothesis in the current version of the paper but it is on the agenda for future research.

Growth in market size and liquidity may not influence all firms in a proportional way. Therefore we allow for the fact that firms of different sizes, with varying levels of profits, liquidity, debt and collateral might respond to the growth of the market size and liquidity disproportionately by measuring the indirect influence of these variables. We do this through interactions with firm-specific variables to capture indirect effects. Indirect effects on the probability of bond issuance reflect the fact that the marginal influence of such changes may vary according to a firm's characteristics. If greater market size and liquidity reduce uncertainty and thresholds for entry they may do so for those firms with characteristics that suggest they are on the margin of issuing bonds. For example, to ease the interpretation on the indirect effect of market size on firm size we can consider the following simple case where issuance depends on firm size and market size:

$$Pr(BOND_{it} = 1) = F(a_0 + a_1 SIZE_{i(t-1)} + a_2 SIZE_{i(t-1)} * MKTSIZE_t + a_3 MKTSIZE_t + \varepsilon_{it})$$

Calculating marginal effects of firm size we get the following:

$$\frac{\partial \Pr(y_i = 1|\mathbf{X}_{it}, \boldsymbol{\beta}, \alpha_i)}{\partial SIZE_{i(t-1)}} = a_1 + a_2 MKTSIZE$$

Coefficient a_1 gives an estimate of the direct effect due to firm size, as illustrated in Figure 1, while a_2 gives the indirect effect of market size on firm size. A positive coefficient for a_1 shows that firm size positively influences bond issuance, while a negative estimate for a_2 implies that the influence of firm size becomes less important in determining access to bond markets as the bond market becomes larger. We can conduct this kind of test for all firm-specific variables and market variables by use of interaction terms.

The bond initiatives may increase the probability of corporate issuance because sovereign and quasi-sovereign bond issues on a scheduled basis provide a reference point off which corporate bonds can be priced (Hirose, *et al.,* 2004), and encourages fixed income dealers to participate in the market (Harwood, 2000). Policy initiatives can encourage ratings agencies and underwriters with local expertise to emerge, and this lowers the costs of issuance. Changes to administrative procedures can similarly reduce costs widening investor participation and encourage investors who intend to buy and sell in secondary markets; similarly, the reduction of taxes, the development of paperless trading, faster settlement times to improve the transparency of prices and the initiatives provide improved information provision to allow markets to function more efficiently. All these factors may encourage bond issuance and stimulate markets to grow and become more liquid. It is also possible that ABMI may alter the sensitivity of the markets to firm characteristics, causing some firms to issue bonds that would not otherwise have done so.

4. Data

4.1 Data Description

The data on bond issues are drawn from Bondware and Bloomberg, firm-specific characteristics from the balance sheet and profit and loss accounts are taken from Thomson Financial and bond market development indicators are from the Asian Development Bank and Bank for International Settlements. These are combined in a new way to cast light on the probability of corporate bond issuance in the Asian region. The data cover firms in both emerging and developed Asian economies namely China, Hong Kong, Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand and span the time period 1995 through 2007, which covers a period of major bond market development. Our sample takes into account the fact that there is a wide regional variation in Asian markets in terms of size, liquidity and sophistication.

We use Bondware to identify all corporate bonds issued in international markets to gather information about the issue dates, denomination, currency and the maturity in the bonds measured.[7] We are also able to identify the type of the coupon (i.e zero coupon, fixed and floating). For the purpose of our analysis we focus on fixed rate bonds. We use Bloomberg to identify similar data for firms that issue bonds in the domestic Asian markets. Our coverage of bond issues therefore embraces both firms with issues in hard currencies, which are almost exclusively US dollar denominated, and firms with local currency denominated bonds. Although local currency issuance first started to capture the market's attention in the late 1990s new issues in local currency now exceed new issues in dollars for most countries; therefore it is important to consider both the local and international currency issues in the Asian markets in order to avoid mis-representing the scale of corporate bond issuance.

The Thomson Financial Primark database offers balance sheet and profit and loss accounts data for firms in the East Asian region. The data set that we use in our estimations includes a total of 41,921 annual observations on 4,661 companies. We provide information on financial accounts and ratios for Asian firms operating in all sectors of the economy for the years 1995-2007. The previous section reported the exact definitions of firm-specific variables used in the empirical specification.

Bond market depth indicators are taken from the Asian Development Bank and the Bank for International Settlements. We use two indicators to assess the depth of the Asian markets: the ratio of local and currency issues relative to GDP and the extent of trading in the secondary market relative to the amount of bonds outstanding. The size of local currency bond obligations as a percentage of nominal GDP measures the size of the domestic markets compared to the output of the economy, while the trading volume is a measure of bond market liquidity. Arguably the more liquid the market is the lower its

[7] Our definition of corporate bonds is in line with recent studies on Asian bond markets (see Gyntelberg *et al.,* 2005) and includes all non-government long-term issues in a given currency.

transactions costs and the less impact trades have on market price (see Jiang and McCauley, 2004). These variables can be observed in Figure 2, where we observe the level of local currency obligations as a percentage of nominal GDP (LCY) and trading volume (TRVOL). These figures refer to the eight economies included in the present study. There is a noticeably high growth in the post crisis period, followed by a decline after 2001 and subsequent increase. LCY has maintained levels between two and a half times higher than values in 1995, and if anything the crisis has spurred local issues of bonds, not diminished it. Burger *et al.* (2009) argue that emerging economies are able to develop local currency bond markets if they are given the opportunity to do so, and this seems to be borne out by the data. The decline in LCY after 2001 may be due to the reduction in LCY in Indonesia and Malaysia. Trading volume (TRVOL) in the East Asian region has grown rapidly over the past ten years, from negligible values before 1999 to over 100 percent of the outstanding volume of bonds. This indicates that secondary markets have become more liquid, which reflects the greater diversity of investors and the relative improvement in the trading environment due to faster settlement, more rapid dissemination of information and so on.

Following normal selection criteria used in the literature, we exclude companies that did not have complete records for all explanatory variables and firm-years with negative sales. We also require the firms have at least three consecutive time-series observations. To control for the potential influence of outliers, we exclude observations in the 0.5 percent from upper and lower tails of the distribution of the regression variables. Finally, by allowing for both entry and exit, the panel has an unbalanced structure which helps mitigate potential selection and survivor bias. Our combined sample contains data for 546 firms in China, 442 in Hong Kong, 385 in Indonesia, 910 in Korea, 961 in Malaysia, 240 in the Philippines, 582 in Singapore and 595 in Thailand that operated between 1995 and 2007 in a variety of sectors including manufacturing, utilities, resources, services and financials.

4.2 Descriptive Analysis

Summary statistics for the variables used in our empirical analysis are provided in Table 1. The figures are presented for all firms (panel A), those firms that are issuers (panel B) and those that are non-issuers (panel C) reporting mean, standard deviation, minimum and maximum values and the number of observations. In a sample of 4661 firms, 100 issued continuously through the sample period, 443 began to issue at some point in the sample, and 4118 firms never issued. We observe that size and growth opportunities are very different for issuers and non-issuers and the differences are statistically significant in both cases.[8] Firms with bonds issues are always larger and have higher growth. Dennis and Mihov (2003) and Hale and Santos (2008) indicate that larger firms have more public debt and Datta *et al.* (2000) find that the likelihood of bond issues is increasing in the firm's size and need for external funding. This finding is also consistent with the literature on Latin American bond markets (see Aguilar *et al.,* 2008;

[8] The figures for size are reported as logarithms of total assets and therefore mask to some degree the extent of the scale differences.

Braun and Briones, 2008; Castellanos and Martinéz, 2008). There are many more non-issuers (88.7%) than issuers (11.3%) in our sample.

On the basis of many financial indicators we find that issuing firms are significantly different from non-issuing firms. Issuers are more leveraged and less liquid. This supports the notion put forward by a number of studies (see Pagano *et al.,* 1998; Datta *et al.,* 2000; Dennis and Mihov, 2003; Faulkender and Petersen, 2006) that highly leveraged firms are successful and have higher borrowing capacity. In addition, since issuing firms have greater debt, and less liquidity, they have greater incentive to access bond markets for additional finance. We also find that bond issuers are more profitable but the difference is at the margin of significance. There is little difference between the collateral of issuers and non-issuers, therefore having more tangible assets is not necessarily an advantage for bond issuance, unlike for bank finance where tangible assets can be pledged as collateral. We therefore note that firms' balance sheet indicators are significantly different for issuers compared to non-issuers, that these differences are not negligible, and it is possible that differences in financial health is an important determinant of the decision to issue bonds in Asia.

5. Main Results

In this section we report the estimation results for the probit models, where all firm-level variables are lagged one period to deal with endogeneity; we present coefficients and z-statistics from the probit model and marginal effects, and country, industry and year dummies are included. All firms in our panel are listed on the stock market.

Table 2 reports the estimates for the baseline model that examines the relationship between firm-specific characteristics and the probability that a firm will issue bonds. Column 1 presents the model with time and industry dummies but without country effects, while in column 3 we add country effects and in column 5 we report the model with the dummy variable that takes into account previous bond issuance. Columns 2, 4 and 6 give the marginal effects of the variables on the probability of issuance in the current period. A marginal effect of 0.500 would be interpreted as increasing the probability of issuance by the same amount. Looking at the results in all six columns, we see that even after allowing for time and country dummies in columns 1 and 3 respectively, there is a significant impact of firm-specific characteristics on the decision to issue, since almost all variables are significant at the 1 percent level or else at the 5 percent level. Introduction of country dummies reduces the impact of all variables, with the exception of the size variable, although all variables remain highly significant.

The impact of being a previous issuer of bonds has a similar effect, reducing the influence of almost all the firm specific variables, while still retaining their significance. But being an issuer in the previous period substantially influences the probability of issuing today, raising the probability by 0.45. The impact of this

variable is roughly fifteen times larger than the largest marginal effect for any other variable in column 6. Thus firms that issue in the previous period are quite likely to issue in the current period, and this dominates every other influence on their decision. This may reflect the fact that once firms gain access to bond markets by meeting certain criteria for viable participation, they continue to access it, or it may measure the benefit of reputation on firms, making future issues easier to sell to investors and as a result reducing the cost of issue. Aguilar *et al.* (2008) reached a similar conclusion for the Colombian bond markets, where previous market activity was found to facilitate subsequent participation. These results demonstrate that once a firm has accessed the market there is a high probability of the continuation of issuance in future periods. Only 100 firms (2 percent of our sample) had continuous issues, and 543 firms (12 percent) issued at some point in the sample. But over and above the influence of previous issues, we enquire what characteristics affect the decision to issue bonds at the margin. We begin our investigation by looking at the marginal effects of other variables reported in Column 6, which gives us an understanding of factors specific to the firm, before we turn in later sections to market size and liquidity and then Asian bond market initiatives.

As expected the size of the firm has a positive impact on the probability of issuing a bond, indicating that the larger is the firm the more likely it is to issue bonds. The marginal effect demonstrates that a one percent increase in real assets results in a 0.04 increase in probability of issuing bonds. This result may reflect the high fixed costs of issuing bonds that favor larger firms, or it may be a result of the information asymmetry problem that small firms face and the finding is consistent with results reported in papers that use these arguments (see Calomiris *et al.,* 1995; Johnson, 1997; Krishnaswami *et al.,* 1999; Cantillo and Wright, 2000; Dennis and Mihov, 2003); it is also found to be a key determinant of a firm's decision to issue bonds in studies of Latin American bond markets (see Aguilar *et al.,* 2008; Braun and Briones, 2008; Castellanos and Martinéz, 2008). Growth in sales also affects the decision to issue bonds positively (the marginal effect is 0.001). We conclude that there is a minimum efficient scale to overcome before bond finance is economically feasible, and the decision to access bond markets is driven by financing needs proxied by growth in sales. Finally, the probability of bond issuance marginally decreases with the number of years a firm has been listed in the stock market which implies that bonds and stocks are substitutes. This result is in line with earlier reported evidence in Latin American bond markets (see Aguilar *et al.,* 2008).

The financial health indicators of the firm show that creditworthiness has a role to play in determining the probability of bond issue. The higher firms' leverage (LEVER) the more likely they are to issue corporate bonds compared to those with lower leverage. The positive effect is economically significant since a unit increase in leverage would increase the probability of bond issuance by 0.06. Higher leverage can be taken as a sign that firms have been able to access debt from banks or markets in the past, (see Braun and Briones, 2008), perhaps in order to realize growth opportunities rather than of overindebtedness. In this case it is a characteristic that increases the probability of issuing bonds, similar findings have been reported for Latin America (see Aguilar *et al.,* 2008; Braun and Briones, 2008).

Profitability (PROF) is also a characteristic that might be expected to have a positive influence on the decision to issue bonds, but there is no significant effect in our case. Two recent studies for Latin American countries find positive and significant coefficients (Aguilar *et al.,* 2008; Castellanos and Martinéz, 2008), while two others find negative or insignificant coefficients (Braun and Briones, 2008; Fernández *et al.,* 2008). A negative coefficient would be consistent with the pecking order theory of Myers and Majluf (1984), where more profitable firms seek alternative, lower cost, forms of finance rather than bond finance. In the Latin American studies above, where the coefficient is negative, the data contain both listed and unlisted firms, and listing has a negative effect on the probability of bond issuance. In our case all firms are already listed and therefore have met the profitability threshold to obtain equity finance, and greater profitability would not necessarily alter incentives based on the pecking order theory to issue equity instead of bonds. It is to be expected that greater profitability enhances bond issuance in our case.

Liquidity (LIQUID) and collateral (COLL) have negative and positive influences respectively on the probability that a firm will issue bonds. Firms with greater liquidity may not require additional financing through the bond market, while those with greater collateral find it easier to obtain finance if they need it.

The predictive ability for bond issuance, based on the goodness of fit statistic, improves from 0.17 to 0.23 with the addition of country dummies, and this suggests that country effects are important for firms in our sample. The improvement in the same measure when we introduce the dummy allowing for the issue of bonds in the previous period raises the statistic to 0.65. This gives a strong indication that exposure to the bond market in the previous year is an important determinant of the decision to issue bonds this period.

5.1 The Growth of Market Size and Liquidity

Having identified a significant relationship between firm-specific variables and probability of bond issuance in the emerging Asian market, we now explore whether this relationship has been influenced by the development of the markets in terms of local market size and liquidity. According to our hypothesis, when markets become more liquid and larger, these characteristics should mitigate the effects of weaker firm-specific variables, and therefore reduce the impact of firm-specific indicators on bond issuance.

Results for the augmented model are reported in Table 3, and are reported in two panels, the first indicates the influence of market liquidity, measured by secondary market trading volume, and the second reports the influence of market size, measured by the scale of the local market to GDP. These variables can directly influence the probability of bond issue and influence it indirectly, through interactions with the firm-specific characteristics. The estimated marginal effects are reported in columns next to the coefficient estimates.

As with results reported in Table 2, the dominating influence is whether the firm previously issued bonds. Once again, if the firm did issue in the previous period, the probability of issuing in the current period is between 0.44 and 0.47.

The marginal effects of our firm-specific variables show some variation with the marginal effects reported in Table 2 column 6. In the first panel of Table 3, where we look at the model allowing for the impact of market liquidity, we find that the marginal effect of SIZE remains largely unchanged and behaves as conjectured in the previous section, and the marginal effects of GROWTH and YEARS are also similar to Table 2. PROF and COLL have stronger positive marginal effects than before, as the marginal effects have more than doubled, while LIQUID has a stronger negative effect.

In the second panel of Table 3, where we consider the influence of market size, we find SIZE has a larger marginal effect than in Table 2 column 6, as does GROWTH, LEVER, COLL and PROF. LIQUID has a similar negative influence. These effects are far smaller, however, than the influence of being a previous issuer.

The indirect effect of bond development, as measured by the separate coefficients on market liquidity and size, is indicated by the interaction of the coefficient on the variable with the measure of market liquidity or size, IND. The impact of this variable is roughly a hundred times less influential than the firm-specific variables that it interacts with. Therefore while some of these interactions are significant, which implies that the marginal effect of market variables on firms' decision to issue bonds is not zero, it is still quite small. The direct effect of market liquidity and size on the probability is also small and positive causing the probability of issue to rise by less than one percent.

5.2 Asian Bond Market Development

Here we examine the effects of bond market development on bond issuance and whether they have evolved over time. We focus on two sub-periods: 1995-2002 and 2003-2007. Starting in June 2003 eight east Asian countries purchased dollar denominated bonds issued by Asian governments through the Asian Bond Fund (ABF1), and in June 2005 launched a new fund to purchase local currency bonds from Asian countries (ABF2). We refer to this entire policy operation as the Asian Bond Market Initiative (ABMI). While the ABF was relatively modest in terms of size, it would have sent a positive signal to bond markets, and many market facilitating policies that supported it would have aimed to improve bond market function. Therefore our previous results on market development may have been more pronounced after this period.

We report results in Table 4. The first panel refers to the possibility that ABMI influence bond markets through market liquidity and firm-specific characteristics while the second panel refers to the influence through market size and firm characteristics. The sign and overall significance of variables determines whether there is any influence in each period, and the comparison of coefficient values and the marginal

effects for each sub-period tells us whether the policy initiative made any difference to the probability to issue bonds. We can test whether the coefficients in columns 1 and 3 for each panel are statistically different from each other and the p-values of the tests are reported at the foot of the Table 4.

If we first consider marginal effects in the model that has interactions with market liquidity (panel 1), we observe that significant firm-specific variables have the same signs and significance as in the first panel of Table 3. This shows us that our model captures the same mechanisms described in the previous section. But comparison across the sample splits reveals that the aparently larger coefficients and marginal effects during the ABF period (2003-2007) are not significantly different from the coefficients in the pre-ABMI period (1995-2002) . The marginal effects are not significantly larger in the post 2003 period with the exception of LIQUID. There is no significant difference in the coefficient values, according the p-values at the foot of the table. The major influence on probability of issue is PREV.ISSUE, which is significantly larger in the second sub-period in panel 1, but there are no other cases where the coefficients are significantly different.

When we consider the marginal effects of the model that has interactions with market size (second panel Table 4), with marginal effects in (second panel Table 3), we find close similarity between the two tables, again confirming our model captures the same essential mechanisms as described in the previous section. But there is no evidence that the coefficients differ between pre-ABMI and ABMI periods according to the p-values reported at the foot of Table 4. The PREV.ISSUE variable is not significantly different in the second sub-period based on p-values that test for significant differences in this panel.

We conclude that ABMI has made little difference to decisions made at the firm level to issue bonds. Its influence on the market through direct and indirect effects is greatly dominated by the influence of firm characteristics and even more so by the influence of the previous decision to issue bonds. Continuity in bond issuance, once a threshold has been met to enable access or reputation has been acquired, seems to be more important than the efforts of governments to promote bond markets. Thus our model that allows for the influence of the Asian initiatives does not alter any of our findings reported in earlier tables above and shows that the ABMI had little impact on decisions to issue at the firm level.[9]

6. Conclusion

Financial integration in Asia varies across capital markets and the development of regional bond markets is high on the priority list for policy makers, see BIS (2005) and IMF (2005). This paper examines the

[9] It is possible that our results showing greater impact of firm-specific variables, and in some cases stronger direct or indirect effects of market-specific variables, is due to a third influence. A natural candidate is the influence of GDP growth on firms and markets, causing greater numbers of expanding firms to issue bonds to finance their expansion, and also encouraging markets to grow. When we test the hypothesis that GDP growth has an impact on the probability of issuing bonds (we allow GDP growth to have a direct effect and an indirect effect through interactions with firm-specific variables) we find few significant coefficients. We conclude that differences between sub-samples are unlikely to be caused by stronger GDP growth in the latter period.

determinants of bonds issuance using a novel dataset for eight emerging Asian economies – China, Hong Kong, Indonesia, Korea, Malaysia, the Philippines Singapore and Thailand. We ask whether bond market initiatives have contributed to the probability that a firm will issue bonds via direct and indirect effects on firm-specific and market-specific variables.

Our paper demonstrates the influence of firm-specific characteristics on the decision to issue bonds before comparing the effect of market liquidity (trading volume) and local market size on the decision. Our results suggest that greater market growth and trading volume have contributed marginally through direct and indirect effects on the issuance of bonds. We expected to find that larger markets with greater liquidity were more likely to encourage firms to issue bonds directly by reducing the costs of issue for firms and lowering the cost of entering and exiting the market for investors. Larger trading volumes would also have made it possible for brokers to spread their fixed costs more widely and thus reduce transactions costs, while investors find that market size and liquidity make it easier for them to sell and exit easily when needed. However, our results show that these effects are quite small in relation to other influences – particularly firm characteristics, and whether the firm has issued before.

The question whether bond market initiatives make a difference to corporate bond issues is addressed by splitting the sample into the pre-Asian Bond Market Initiative period and the period of its operation. The direct effect was expected to increase the probability of corporate issuance because sovereign and quasi-sovereign bond issues on a scheduled basis provide a reference point off which corporate bonds can be priced, which then encourages fixed income dealers to participate in the market. In local markets, ratings agencies and underwriters with local expertise may emerge. Lowering of the administrative requirements to invest may widen participation and encourage investors who intend to buy and sell in secondary markets; similarly, the reduction of taxes, the development of paperless trading, faster settlement times to improve the transparency of prices and the initiatives provide improved information provision to allow markets to function more efficiently. The indirect effect could also raise the probability of issue through the firm's characteristics. However, what we found was little evidence of greater issuance for a given set of firm-specific characteristics in the ABMI period compared to the period before it.

These results will undoubtedly be useful for other emerging markets such as Latin America where bond market initiatives may be on the agenda. Further research on the influence of bond market development is warranted since the results reported here pool international and local currency corporate bond issues and do not distinguish between investment and speculative grade bonds. It is possible that certain segments of the corporate bond market may have responded more favorably than others to the increase in market size and liquidity in recent years.

References

Aguilar, C., M. Cárdenas, M. Meléndez and N. Salazar (2008), "Development of Colombian Bond Markets," in E. Borensztein, K. Cowan, B. Eichengreen and U. Panizza, eds, *Bond Markets in Latin America. On the Verge of a Big Bang?*, MIT Press.

BIS (2005), "Developing Corporate Bond Markets in Asia," Working Paper No.26, Bank for International Settlements.

Blackwell, D. and D. Kidwell (1988), "An Investigation of the Cost Differences between Public Sales and Private Placements of Debt," *Journal of Financial Economics*, 22: 253-78.

Booth, L., V. Aivazian, A. Demirguc-Kunt and V. Maksimovic (2001), "Capital Structures in Developing Countries," *Journal of Finance*, 56: 87-130.

Borensztein, E., K. Cowan, B. Eichengreen and U. Panizza (2008), *Bond Markets in Latin America. On the Verge of a Big Bang?*, MIT Press.

Bougheas, S., P. Mizen and C. Yalcin (2006), "Access to External Finance: Theory and Evidence on the Impact of Firm-Specific Characteristics," *Journal of Banking and Finance*, 30: 199-227.

Braun, M. and I. Briones (2008), "Development of the Chilean Corporate Bond Market," in E. Borensztein, K. Cowan, B. Eichengreen and U. Panizza, eds, *Bond Markets in Latin America. On the Verge of a Big Bang?*, MIT Press.

Burger, J. and F. Warnock (2006), "Local Currency Bond Markets," Staff Papers 53, International Monetary Fund.

Burger, J. and F. Warnock (2007), "Foreign Participation in Local Currency Bond Markets," *Review of Financial Economics*, 16: 291-304.

Burger, J., F. Warnock and V. Warnock (2009), "Global Financial Stability and Local Currency Bond Markets," *Mimeo*, Darden Business School, University of Virginia.

Calomiris, C., C. Himmelberg and P. Wachtel (1995), "Commercial Paper, Corporate Finance, and the Business Cycle: A Microeconomic Perspective," *Canergie-Rochester Conference Series on Public Policy* , 42: 203-50.

Cantillo, M. and J. Wright (2000), "How Do Firms Choose their Lenders? An Empirical Investigation," *Review of Financial Studies*, 13: 155-89.

Cantor, R. (1990), "Effects of Leverage on Corporate Investment and Hiring Decisions," *Quarterly Review*, 15, Federal Reserve Bank of New York.

Castellanos, S. and L. Martinéz (2008), "Development of the Mexican Bond Market," in E. Borensztein, K. Cowan, B. Eichengreen and U. Panizza, eds, *Bond Markets in Latin America. On the Verge of a Big Bang?*, MIT Press.

Datta, S., M. Iskandar-Datta and A. Patel (2000), "Some Evidence on the Uniqueness of Initial Public Debt Offerings," *Journal of Finance*, 55: 715-43.

Demirguc-Kunt, A. and V. Maksimovic (1999), "Institutions, Financial Markets and Firm Debt Maturity," *Journal of Financial Economics*, 54: 295-336.

Dennis, D. and V. Mihov (2003), "The Choice among Bank Debt, Non-bank Private Debt: Evidence from New Corporate Borrowings," *Journal of Financial Economics*, 70: 3-28.

Eichengreen, B., E. Borensztein and U. Panizza (2006), "A Tale of Two Markets: Bond Market Development in East Asia and Latin America," HKIMR Occasional Paper No.3, Hong Kong Institute for Monetary Research.

Eichengreen, B. and P. Luengnaruemitchai (2004), "Why Doesn't Asia Have Bigger Bond Markets?" HKIMR Working Paper No.24/2004, Hong Kong Institute for Monetary Research.

Faulkender, M. and M. Petersen (2006), "Does the Source of Capital Affect Capital Structure?" *Review of Financial Studies*, 19: 45-79.

Fernandez, D. and S. Klassen (2004), "Choice of Currency by East Asia Bond Issuers," BIS Working Paper No.30, Bank for International Settlements.

Fernández, R., S. Pernice and J. Streb (2008), "Corporate Bond Markets in Argentina," in E. Borensztein, K. Cowan, B. Eichengreen and U. Panizza, eds, *Bond Markets in Latin America. On the Verge of a Big Bang?*, MIT Press.

Gyntelberg, J., G. Ma and E. Remolona (2005), "Corporate Bond Markets in Asia," *Quarterly* R*eview*, Bank for International Settlements.

Hale, G. (2007), "Bonds or Loans? The Effect of Macroeconomic Fundamentals," *Economic Journal*, 117: 196-205.

Hale, G. and C. Arteta (2009), "Currency Crises and Foreign Credit in Emerging Markets: Credit Crunch or Demand Effect?" *European Economic Review*, 53: 758-74.

Hale, G. and J. Santos (2008), "The Decision to First Enter the Public Bond Market: The Role of Reputation, Funding Choices, and Bank Relationships," *Journal of Banking and Finance*, 32: 1928-40.

Harwood, A. (2000), "Building Local Bond Markets: Some Issues and Actions," in A. Harwood, ed., *Building Local Bond Markets: An Asian Perspective*, Washington, D.C.: World Bank: 1-37.

Hirose, M., T. Mukarami and Y. Oku (2004), "Development of the Asian Bond Markets and Business Opportunities," Working Paper 82, Nomura Research Institute.

IMF (2005), "Development of Corporate Bond Markets in Emerging Market Countries," *Global Financial Stability Report September*, International Monetary Fund.

Jiang, G. and R. McCauley (2004), "Asian Local Currency Bond Markets," *Quarterly Review*, Bank of International Settlements.

Johnson, S. (1997), "An Empirical Analysis of the Determinants of the Corporate Debt Ownership Structure," *Journal of Financial and Quantitative Analysis*, 32: 47-69.

Krishnaswami, S., P. Spindt and V. Subramaniam (1999), "Information Asymmetry, Monitoring and the Placement Structure of Corporate Debt," *Journal of Financial Economics*, 51: 407-34.

Lejot, P., D. Arner and L. Schou-Zibell (2008), "Securitazation in East Asia," Working Paper No.12, Asian Development Bank.

Leland, H. and D. Pyle (1977), "Informational Asymmetries, Financial Structure, and Financial Intermediation," *Journal of Finance*, 32: 371-87.

Maddala, G. (1983), *Limited-Dependent and Qualitative Variables in Econometrics*, Vol. 3, Econometric Society Monographs, Cambridge University Press.

Mateut, S., S. Bougheas and P. Mizen (2006), "Trade Credit, Bank Lending and Monetary Policy Transmission," *European Economic Review*, 50: 603-29.

McCauley, R. and E. Remolona (2004), "Size and Liquidity of Government Bond Markets," *Quarterly* R*eview*, Bank for International Settlements.

Myers, S. and N. Majluf (1984), "Corporate Financing and Investment Decisions When Firms Have Information Investors Do Not Have," *Journal of Financial Economics*, 131: 187-221.

Pagano, M., F. Panetta and L. Zingales (1998), "Why Do Companies Go Public? An Empirical Analysis," *Journal of Finance*, 53: 27-64.

Rajan, R. (1992), "Insiders and Outsiders: The Choice between Informed and Arms Length Debt," *Journal of Finance*, 47: 1367-400.

Rivers, D. and H. Vuong (1988), "Limited Information Estimators and Exogeneity Tests of Simultaneous Probit Models," *Journal of Econometrics*, 39: 347-66.

Table 1A. Descriptive Statistics-All Firms

Variable	Mean	Std. Dev.	Min.	Max.	N
$SIZE$	14.676	2.974	8.970	24.26	26074
$GROWTH$	0.068	0.424	-2.883	2.417	26074
$LEVER$	0.272	0.231	0	2.258	26074
$PROF$	0.035	0.14	-1.041	1.223	26074
$LIQUID$	0.473	0.215	0.011	0.98	26074
$COLL$	0.027	0.061	-0.021	0.587	26074

Notes: $SIZE$: Logarithm of total assets. $GROWTH$: Growth in sales. $LEVER$: Total debt to total assets. $PROF$: Earnings before interest and taxes relative to total assets. $LIQUID$: Current assets over total liabilities. $COLL$: Tangible assets relative to total assets. N refers to the number of observations. Currency units are US$.

Table 1B. Descriptive Statistics-Issuers

Variable	Mean	Std. Dev.	Min.	Max.	N
$SIZE$	17.23	3.493	9.038	24.26	2941
$GROWTH$	0.105	0.354	-2.47	2.408	2941
$LEVER$	0.369	0.208	0	1.806	2941
$PROF$	0.036	0.12	-1.035	0.889	2941
$LIQUID$	0.411	0.195	0.014	0.972	2941
$COLL$	0.03	0.061	-0.021	0.587	2941

Notes: $SIZE$: Logarithm of total assets. $GROWTH$: Growth in sales. $LEVER$: Total debt to total assets. $PROF$: Earnings before interest and taxes relative to total assets. $LIQUID$: Current assets over total liabilities. $COLL$: Tangible assets relative to total assets. N refers to the number of observations. Currency units are US$.

Table 1C. Descriptive Statistics-Non-Issuers

Variable	Mean	Std. Dev.	Min.	Max.	N
$SIZE$	14.351	2.736	8.970	23.78	23133
$GROWTH$	0.064	0.432	-2.883	2.417	23133
$LEVER$	0.26	0.23	0	2.258	23133
$PROF$	0.034	0.142	-1.041	1.223	23133
$LIQUID$	0.481	0.216	0.011	0.98	23133
$COLL$	0.026	0.061	-0.021	0.583	23133

Notes: $SIZE$: Logarithm of total assets. $GROWTH$: Growth in sales. $LEVER$: Total debt to total assets. $PROF$: Earnings before interest and taxes relative to total assets. $LIQUID$: Current assets over total liabilities. $COLL$: Tangible assets relative to total assets. N refers to the number of observations. Currency units are US$.

Table 2. The Baseline Model

	(1)	(2)	(3)	(4)	(5)	(6)
1995-2007	Coef.	M.E	Coef.	M.E	Coef.	M.E
SIZE	0.168***	0.024	0.364***	0.047	0.287***	0.004
	(39.34)		(37.57)		(21.14)	
GROWTH	0.106***	0.015	0.077**	0.010	0.088*	0.001
	(3.79)		(2.41)		(1.82)	
YEARS	0.015***	0.002	-0.005**	-0.001	-0.030***	-0.0001
	(5.92)		(-1.99)		(-7.56)	
LEVER	0.875***	0.126	0.749***	0.096	0.431***	0.006
	(17.40)		(13.26)		(4.45)	
PROF	0.554***	0.080	0.380***	0.049	0.147	0.002
	(5.59)		(3.15)		(0.89)	
LIQUID	-0.164***	-0.024	0.091	0.012	-0.490***	-0.007
	(-2.72)		(1.37)		(-4.71)	
COLL	0.717***	0.103	0.459**	0.059	1.874***	0.027
	(3.98)		(2.19)		(5.65)	
PREV.ISSUE					3.040***	0.447
					(49.55)	
Observations	26074		26074		26074	
R^2	0.17		0.23		0.65	
Log Likelihood	-7574		-7103		-3143	
Time dummies	Yes		Yes		Yes	
Industry dummies	Yes		Yes		Yes	
Country dummies	No		Yes		Yes	

Notes: The Table reports the effects of the variables listed on the probability to issue bonds by a probit model. Columns 2, 4 and 6 report the marginal effects evaluated at covariate means. The dependent variable is a dummy equal to one if the firm is a bond issuer, and zero otherwise. Robust z-statistics in parentheses. All firm-specific variables are lagged one period. SIZE denotes the logarithm of total assets. GROWTH is the growth in sales. YEARS shows the number of years a firm has been listed in the stock exchange. LEVER is the ratio of total debt over total assets. PROF is the ratio of earnings before interests and taxes to total assets. LIQUID is measured as current assets to total liabilities. COLL is the ratio of tangible assets to total assets. PREV.ISSUE is a dummy variable that takes the value one if the firm has issued a bond in period t-1. The following countries were included in the regressions: China, Indonesia, Hong Kong, Malaysia, Korea, Philippines, Singapore and Thailand.

Table 3. Bond Indicators

1995-2007	MARKET LIQUIDITY		MARKET SIZE	
	Coefficients	M.E	Coefficients	M.E
	(1)	(2)	(1)	(2)
SIZE	0.261***	0.005	0.389***	0.005
	(16.81)		(17.47)	
SIZE*IND	0.000	0.000	-0.004***	-0.0003
	(0.49)		(-5.24)	
GROWTH	0.052	0.001	0.197*	0.002
	(0.81)		(1.89)	
GROWTH*IND	0.000	0.000	-0.004	-0.0002
	(0.32)		(-1.05)	
YEARS	-0.011*	-0.0001	0.005	0.0003
	(-1.82)		(0.62)	
YEARS*IND	-0.000***	-0.000	-0.001***	-0.0001
	(-4.62)		(-4.59)	
LEVER	0.180	0.004	0.843***	0.010
	(1.40)		(4.55)	
LEVER*IND	0.001	0.00001	-0.015**	-0.0002
	(1.48)		(-2.53)	
PROF	0.273	0.006	0.516	0.006
	(1.13)		(1.41)	
PROF*IND	-0.003*	-0.0002	-0.015	-0.0001
	(-1.66)		(-1.28)	
LIQUID	-0.491***	-0.010	-0.470***	-0.006
	(-3.68)		(-2.65)	
LIQUID*IND	-0.002**	-0.0001	-0.002	-0.0002
	(-2.15)		(-0.43)	
COLL	2.277***	0.047	4.080***	0.050
	(5.22)		(7.02)	
COLL*IND	-0.007*	-0.0004	-0.087***	-0.001
	(-1.91)		(-4.65)	
IND	0.002***	0.0003	0.088***	0.001
	(3.29)		(6.33)	
PREV.ISSUE	2.997***	0.468	3.085***	0.438
	(48.11)		(48.97)	
Observations	19534		26041	
R^2	0.65		0.66	

Notes: The Table reports the effects of the variables listed on the probability to issue bonds by a probit model. IND is a variable measuring MARKET LIQUIDITY in columns 1 and 2 and MARKET SIZE in columns 3 and 4. Market Liquidity shows the extent of trading in the secondary market relative to the amount of bonds outstanding. Market Size shows the size of local currency bond obligations as a percentage of nominal GDP. Time dummies, industry dummies and country dummies are included in the models. Also see notes to Table 2.

Table 4. Sample Splits

	MARKET LIQUIDITY				MARKET SIZE			
	1995-2002 Coefficients (1)	M.E (2)	2003-2007 Coefficients (3)	M.E (4)	1995-2002 Coefficients (1)	M.E (2)	2003-2007 Coefficients (3)	M.E (4)
SIZE	0.247***	0.007	0.297***	0.004	0.417***	0.005	0.378***	0.004
	(10.2)		(13.8)		(7.74)		(5.94)	
SIZE*IND	0.0001	0.000	-0.000	-0.000	-0.004***	-0.0003	-0.003	-0.0002
	(0.21)		(-0.51)		(-3.48)		(-1.44)	
GROWTH	0.047	0.001	0.090	0.001	0.178*	0.002	0.226	0.003
	(0.54)		(0.97)		(1.71)		(1.32)	
GROWTH*IND	0.0001	0.000	-0.000	-0.000	-0.004	-0.0002	-0.005	-0.0003
	(0.19)		(-0.048)		(-0.89)		(-0.85)	
YEARS	-0.020**	-0.001	0.003	0.000	0.015	0.0001	-0.011	-0.0001
	(-2.45)		(0.35)		(0.68)		(-0.52)	
YEARS*IND	-0.0002***	-0.0001	-0.0001***	-0.0001	-0.002**	-0.0001	-0.001	-0.0002
	(-2.98)		(-4.32)		(-2.36)		(-0.92)	
LEVER	0.076	0.002	0.351	0.005	0.602*	0.007	1.125**	0.013
	(0.48)		(1.64)		(1.72)		(2.27)	
LEVER*IND	0.001	0.0002	0.002	0.0002	-0.015	-0.0001	-0.014	-0.0001
	(0.59)		(1.51)		(-1.52)		(-0.90)	
PROF	0.360	0.010	0.075	0.001	0.883	0.010	-0.129	-0.001
	(1.29)		(0.16)		(1.47)		(-0.15)	
PROF*IND	-0.001	-0.0005	-0.003	-0.0002	-0.023	-0.0003	-0.002	-0.0001
	(-0.57)		(-1.20)		(-1.34)		(-0.066)	
LIQUID	-0.201	-0.005	-0.834***	-0.012	-0.132	-0.002	-0.801*	-0.009
	(-1.13)		(-4.00)		(-0.31)		(-1.68)	
LIQUID*IND	-0.001	-0.0001	-0.001	-0.0001	-0.004	-0.0003	0.000	0.000
	(-0.99)		(-0.79)		(-0.33)		(0.030)	
COLL	1.962***	0.053	2.889***	0.041	4.493***	0.052	3.377*	0.038
	(3.19)		(4.33)		(2.89)		(1.93)	
COLL*IND	-0.007	-0.0003	-0.010*	-0.0001	-0.101**	-0.001	-0.055	-0.001
	(-1.16)		(-1.91)		(-2.22)		(-1.04)	
IND	0.002*	0.0001	0.003***	0.0002	0.096***	0.001	0.074**	0.001
	(1.81)		(2.74)		(3.70)		(2.03)	
PREV.ISSUE	2.986***	0.495	3.070***	0.443	3.080***	0.443	3.142***	0.426
	(32.1)		(36.0)		(17.6)		(16.4)	
Observations	8810		10724		12434		13607	
R-squared	0.64		0.65		0.67		0.66	
Log Likelihood	-1245		-1336		-1487		-1571	
Tests of equality		p-value				p-value		
SIZE		0.28				0.31		
LEVER		0.14				0.19		
LIQUID		0.00				0.09		
COLL		0.09				0.31		
IND		0.23				0.26		
PREV.ISSUE		0.05				0.40		

Notes: The Table reports the effects of the variables listed on the probability to issue bonds by a probit model. IND is a variable measuring MARKET LIQUIDITY in columns 1 to 4 and MARKET SIZE in columns 5 and 8. Market Liquidity shows the extent of trading in the secondary market relative to the amount of bonds outstanding. Market Size shows the size of local currency bond obligations as a percentage of nominal GDP. Time dummies, industry dummies and country dummies are included in the models. Also see notes to Table 2.

Figure 1. Sequence of Events

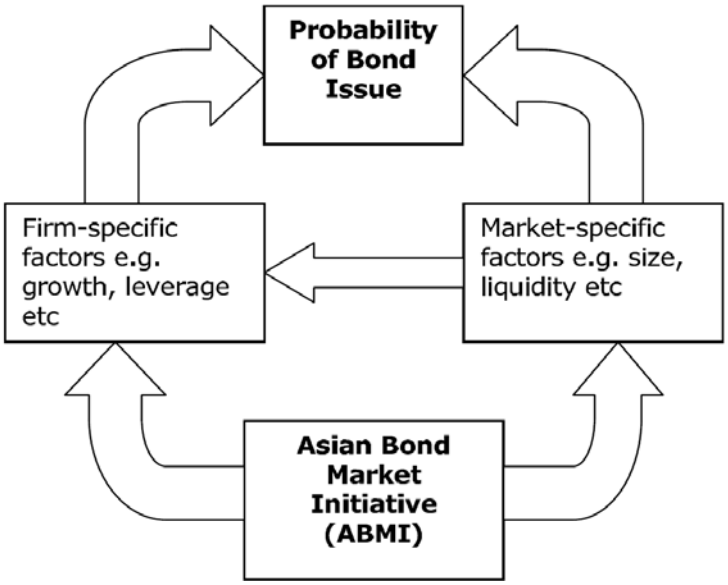
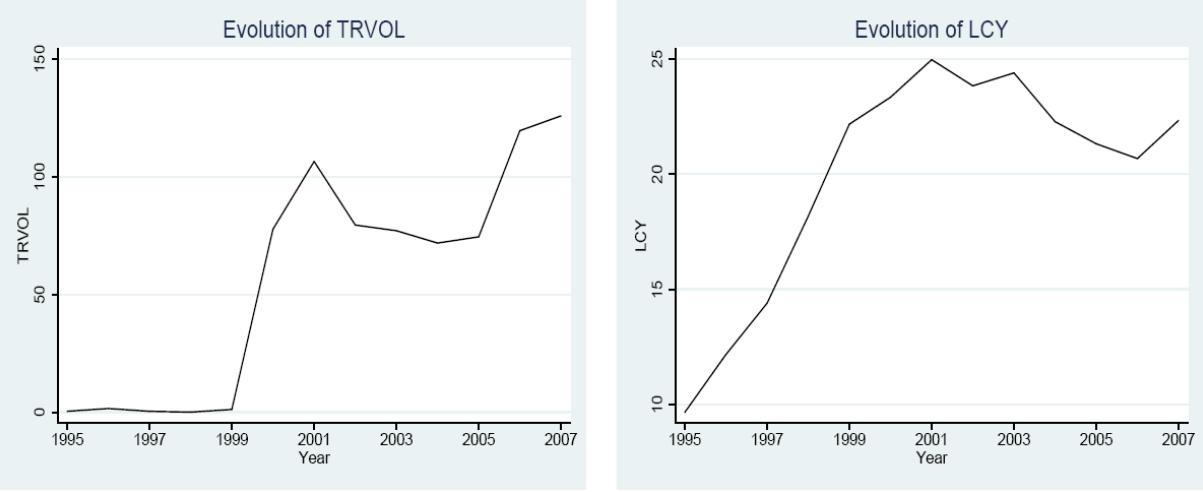


Figure 2. Evolution of Bond Market Development



Notes: TRVOL measures the extent of trading in the secondary market relative to the amount of bonds outstanding. LCY shows the size of local currency bond obligations as a percentage of nominal GDP.