

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

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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 before comparing the effect of market liquidity and local market size on the decision. Our results suggest that greater market growth and trading volume have contributed indirectly to the issuance of bonds. Finally, we find that there is evidence of greater issuance for a given set of firm-specific characteristics in the ABMI period compared to the period before it.

Key words: Bond Financing, Financial Indicators, Emerging Asian Markets

JEL: F32, F34, G32, G15

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1 Introduction

Asian countries have small bond markets. At the end of 2007, 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 \$369 billion, while the corresponding figure for the US was \$2,953 billion.¹ While numbers from Eichengreen and Luengnaruemitchai (2004) suggest there is variation between countries, a comparison at the regional level with the emerging region of Latin America shows 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 Eichengreen et al. (2006)). The adverse impact of bank dependence has been recognized by governments in the light of the Asian crisis, and policy initiatives have been taken to allow bond markets to develop. Governments have co-ordinated the issue and trading of sovereign and quasi-sovereign bonds 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 the Asian Bond Market Initiative (ABMI) to create a more integrated regional market. 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. It is clearly the intention to encourage the corporate bond market to grow as the sovereign bond market has done, the question is whether it has done so.

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 a 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. 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 and size on the willingness of the firm to issue bonds. 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) and Hale and Santos (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. Second, we investigate the effect of market level developments on the probability of bond issuance. Larger markets

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

with greater liquidity are more likely to encourage firms to issue bonds. These have direct and indirect 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. Finally, we consider the impact of the Asian Bond Fund (ABF) and the Asian Bond Market Initiative (ABMI) by exploring whether the influence of these explanatory variables changed by examining the effect of financial and market variables on the decision to issue bonds in the period before the start of the ABF/ABMI initiative in 2003 compared with the period after. If the initiatives had an effect we would expect them to either influence the probability of bond issuance directly, or to act indirectly through the market size and liquidity variables interacted with firm-specific variables.

Our conclusions show that firm-level effects are very important determinants of the firm's decision to issue a bond. In addition we find there is some evidence of a direct effect of market size and liquidity on the decision to issue bonds and evidence of an indirect effect. When we split the sample into pre-ABMI and ABMI periods, we find that there is strong evidence of the effect of the ABMI through the response to market size and some weaker evidence of an effect through market liquidity.

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 Martínéz (2008). We extend their analysis in two directions that may prove useful for policy design in Latin American region. 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 the 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 a multi-country data that capture the wide regional variation in Asian markets in terms of size, liquidity and sophistication. 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 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 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 enterprises 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 become 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) and 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) and Eichengreen et al. (2006)), since all emerging Asian countries excepting Korea, and more recently China and India, have failed

²The 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.

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 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

³Previously, 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.

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 8 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 6 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 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.

First we control for the firm-level influences on the decision to issue bonds, which include

⁴The 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.

the influence of profitability, liquidity, debt to assets levels, growth prospects, collateral assets and size, 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.

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 had a greater effect after these policies were initiated than beforehand. We examine whether, after the introduction of the ABF initiatives in 2003 the influence of financial and market variables on the decision to issue bonds differs for the period before the ABF/ABMI compared with the period after. If the initiatives had an effect we would expect them to either influence the probability of bond issuance directly, or to act indirectly by increasing the market size and liquidity or influencing the response to firm-specific variables.

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 β and intercepts accounting for group effects a_i , and a normally distributed error term ϵ_{it} :

$$y_{it}^* = \mathbf{X}_{it}\beta + \epsilon_{it} \tag{3.1}$$

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

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

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

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

and we maximize the log likelihood

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

where $\Pr(y_i = 1 \mid \mathbf{X}_{it}, \beta, \alpha_i) = F(\mathbf{X}_{it}\beta + \alpha_i)$ and $\Pr(y_i = 0 \mid \mathbf{X}_{it}, \beta, \alpha_i) = 1 - F(\mathbf{X}_{it}\beta + \alpha_i)$, to obtain parameter estimates β 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 $\Pr(y_i = 1 \mid \mathbf{X}_{it}, \beta, \alpha_i)$ by calculating

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

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:

$$\begin{aligned} \Pr(\text{BOND}_{it} = 1) = & F(a_0 + a_1 \text{SIZE}_{i(t-1)} + a_2 \text{GROWTH}_{i(t-1)} + a_3 \text{YEARS}_{i(t-1)} \\ & + a_4 \text{LEVER}_{i(t-1)} + a_5 \text{PROF}_{i(t-1)} + a_6 \text{LIQUID}_{i(t-1)} + a_7 \text{COLL}_{i(t-1)} + \epsilon_{it}) \end{aligned} \quad (3.3)$$

where BOND is a dummy variable that equals 1 if firm i issued a bond in year t , and 0 otherwise. $F(\cdot)$ 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 to issue bonds based on firm-specific variables e.g. SIZE, GROWTH, YEARS, LEVER, PROF, LIQUID and COLL. In addition, our model includes country dummies to control for institutional differences between countries, time

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.

dummies accounting for common trends and business cycle effects and industry dummies to control for fixed effects across industries.

The choice of explanatory variables is based on size and growth opportunities, the track record acquired from the stock market and financial health. 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 tend to issue securities, 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) and 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) and 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 for public finance increases with firms' leverage (see Pagano et al. (1998), Datta et al. (2000), Dennis and Mihov (2003) and 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 to issue 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 the more likely to issue bonds. In other words, we expect a positive relationship between profitability and the probability to issue 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) and 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 to issue 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 $MKT LIQ$) 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:

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

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. The argument here is that the bond market development may have had a more influential role once the ABMI took place. We split the sample into pre-ABMI and ABMI periods, and compare the coefficients using equality of coefficient tests.

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 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 SMEs compared to global investors operating in international markets. The global reach of underwriters and ratings agencies undermines the interest in local issues which are typically smaller, but when local markets increase in size they can support local underwriters and ratings agencies which can acquire and process more easily local information.

But 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. 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.

The bond initiatives may similarly influence the decision to issue through direct or indirect means. A direct effect would 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)). 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. All these factors may encourage bond issuance directly. The indirect effect would alter the impact of these factors on the probability of issue according to the firm's characteristics.

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 measured⁶. 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

⁶Our 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.

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 include 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.

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 transactions costs and the less impact trades have on market price (see Jiang and McCauley (2004)). These variables can be observed in Figure 1, where we observe that 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.

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. 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 3 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.

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, those firms that are issuers and those that are non-issuers, a final column reports the p-value of a test whether there is a significant difference between values for issuers and non-issuers. We observe that size and growth opportunities are very different for issuers and non-issuers and the differences are statistically significant in both cases.⁷ 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) finds 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), Braun and Briones (2008) and Castellanos and Martínéz (2008)).

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) and 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, and these differences are not negligible, and it is possible that differences in financial health are an important determinant of the decision to issue bonds in Asia.

⁷The figures for size are reported as logarithms of total assets and therefore mask to some degree the extent of the scale differences.

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 although country, industry and year dummies are included, coefficients are not reported. 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. As expected the size of the firm has a positive impact on the probability to issue 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 a 0.47 percent increase in probability to issue 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), and 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) and Castellanos and Martínéz (2008)). Growth in sales also affects the decision to issue bonds positively (the marginal effect is 0.010). 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 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 9.6 percentage points. Higher leverage can be taken as a sign of overindebtedness or a sign that firms have been able to access debt from banks or markets in the past, Braun and Briones (2008), perhaps in order to realize growth opportunities. 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) and Braun and Briones (2008)).

Profitability (PROF) is also a characteristic that has a positive influence on the decision to issue bonds. This is a clear indicator of creditworthiness. Two recent studies for Latin American countries find positive and significant coefficients (Aguilar et al. (2008) and Castellanos and Martínéz (2008)), while two others find negative or insignificant coefficients (Braun and Briones (2008) and Fernández et al. (2008)). A negative coefficient is 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.

Liquidity (LIQUID) and collateral (COLL) also have a positive influence on the probability that a firm will issue bonds but only the latter variable is quantitatively important. The positive influence on collateral is to be expected and its importance, economically, is quite high, since the marginal effect of a one percent increase in COLL increases the probability of bond issue by 6 percent. Fernández et al. (2008) show that collateral increases the probability of bond issuance in Argentina.

5.1 The growth of market size and liquidity

Having identified a significant relationship between financial health 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, they should mitigate the effects of firm-specific variables, and therefore reduce the impact of financial indicators on bond issuance.

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

The coefficients on our firm-specific variables, which are retained as control variables, remain largely unchanged in terms of sign and significance and behave as conjectured in the previous section. Larger, more leveraged and profitable firms are more likely to issue bonds

as before. Collateral has a much stronger positive impact in the equation interacted with market size (column 3) compared to the model interacted with market liquidity (column 1).

The direct effect of bond development, as measured by the separate coefficients on market liquidity and size, is indicated by the coefficient on the variable IND. For market size, the coefficient is positive and significant, which implies that the marginal effect of increasing LCY by one unit would increase the probability of bond issuance by 0.9 percentage points. Although this coefficient is small, the effect of greater market size on bond issuance is the same as additional firm growth of 0.066 percent, or an increase in firm size by 0.02 percent.

The levels of our firm-specific variables retain their signs and remain highly significant and quantitatively important in determining bond issuance. We are particularly interested, however, on their interactions with the bond development indicators to gauge the indirect effects of bond market development on the probability of bond issuance. We expect firms to be affected in a disproportionate way by size and liquidity in accordance with their balance sheet characteristics.

As already noted, a negative sign on the interaction term for a variable with a positive coefficient shows the reduction of the estimated impact of our financial indicators on bond issuance. Examples of this scenario are found for SIZE, YEARS, PROF, LIQUID and COLL. Interactive terms on liquidity are negative and are highly significant indicating that its effects have become less important over time when as markets have increased in size and liquidity (trading volume). If greater market size reduces the uncertainty for investors because deeper more liquid markets are better able to discover the true price of debt securities then the importance of firm-specific information on the decision to issue would diminish. Firms would not need to overcome such high hurdles in order to issue because their securities could be traded and re-sold more easily on the markets reducing the cost to the investor of holding undesirable paper.

5.2 Asian bond market development

We examine whether the direct and indirect effects of bond market development on bond issuance have evolved over time. We focus on two sub-periods: 1995-2002 and 2003-2007 because 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 the entire policy 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 for market liquidity and local market size in Table 4. If we first compare columns 1 and 3, for the model that has interactions with market liquidity, we observe that significant firm-specific variables retain their signs but have larger marginal effects during the ABF period (columns 2 and 4). LEVER has approaching double the coefficient in the second period compared to the first period. The coefficient on PROF increases by 20 percent and COLL becomes much more important. Only GROWTH has less effect as it becomes insignificant in the second sample, while the other variables were not significant to begin with. Interactions are only significant for PROF and LIQ, and only PROF has a noticeably different effect across sample periods (p-value is 0.05). This does not give the impression that the ABMI had a strong indirect effect through market liquidity. the direct effect on the firm specific variables seems to be the main factor increasing the probability of bond issuance for a given magnitude of the firm's characteristics.

The economic impact is given in columns 6 and 8. When we compare columns 5 and 7, for the model that has interactions with market size, firm SIZE and GROWTH have some of the largest coefficients and have positive increases in the magnitude of these coefficient. GROWTH has a significant impact in the second period, which it did not have in the first period. Once again LEVER nearly doubles the size of coefficient in the second period. COLL has a very large impact in both periods, but few other variables have any effect on the decision to issue. The effect of the interactions with market size are negative and significant in the second period for SIZE and GROWTH. These differences are statistically significant from each other (p-values are 0.01 and 0.00, respectively). However, none of these effects is particularly indicative of a strong indirect effect of ABMI on the decision to issue bonds. Again the magnitude of the coefficients in the second period is a more important effect. Also the greater effect of market size through the IND variable in the second sample by comparison with the first sample indicates that there was a positive influence in the ABMI period.

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 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 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 indirectly to the issuance of bonds. 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. Larger trading volumes may make it possible for brokers to spread their fixed costs more widely and thus reduce transactions costs. Investors too may find that market size and liquidity make it easier for them to sell and exit easily when needed.

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 can 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 may alter the impact of these factors on the probability of issue according to the firm's characteristics. We find that there is evidence of greater issuance for a given set of firm-specific characteristics in the ABMI period compared to the period before it. The effects are mostly direct rather than indirect through market liquidity and size.

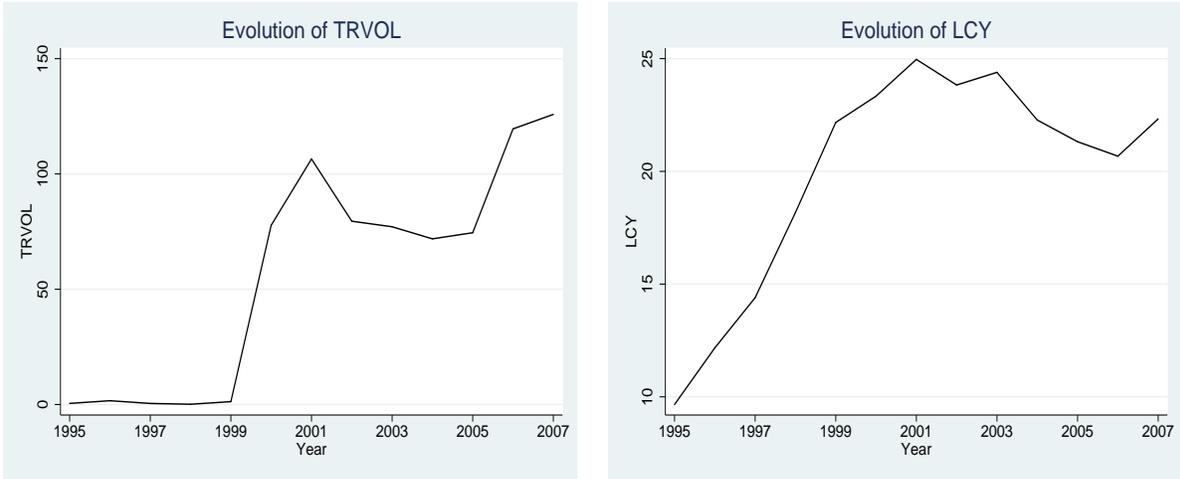
Further research on the influence of bond market development is warranted since the results reported here pool international and local currency corporate bond issues and do not distinguish between investment and speculative grade bonds. It is possible that certain segments of the corporate bond market may have responded more favorably than others to the increase in market size and liquidity in recent years. These distinctions are on the agenda for future research.

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Figure 1: 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.

TABLE 1
DESCRIPTIVE STATISTICS

	All Firms (1)	Issuers (2)	Non-Issuers (3)	Diff. (4)
<i>SIZE</i>	15.32 (3.20)	17.58 (3.30)	14.99 (3.06)	0.00
<i>GROWTH</i>	0.08 (0.35)	0.11 (0.31)	0.08 (0.36)	0.00
<i>LEVER</i>	0.26 (0.22)	0.33 (0.22)	0.25 (0.21)	0.00
<i>PROF</i>	0.038 (0.11)	0.039 (0.11)	0.034 (0.09)	0.06
<i>LIQUID</i>	0.46 (0.22)	0.40 (0.21)	0.47 (0.22)	0.00
<i>COLL</i>	0.23 (0.05)	0.23 (0.04)	0.23 (0.05)	0.86
<i>Observations</i>	32124	3582	28542	

Notes: The Table presents sample means. Standard deviations are reported in parentheses. Column 4 reports the p-value of a test of the equality of means is reported under the null that the means of issuers and non-issuers are equal. The subscript i indexes firms, and the subscript t , time, where $t = 1995-2007$. *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. Currency units are US\$.

TABLE 2
THE BASELINE MODEL

	Coefficients	M.E
	(1)	(2)
SIZE	0.363*** (37.6)	0.047
GROWTH	0.076** (2.38)	0.010
YEARS	-0.005** (-1.96)	-0.001
LEVER	0.752*** (13.3)	0.096
PROF	0.386*** (3.18)	0.049
LIQUID	0.092 (1.38)	0.012
COLL	0.469** (2.24)	0.060
Observations	26074	
R^2	0.22	
Log Likelihood	-7,102	

Notes: The Table reports the effects of the variables listed on the probability to issue bonds by a probit model. Column 2 reports 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. The standard errors are corrected for clustering. All firm-specific variables are lagged one period. Country dummies, time-dummies and industry dummies were included in the model. 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. The following countries were included in the regressions: China, Indonesia, Hong Kong, Malaysia, Korea, Philippines, Singapore and Thailand.

TABLE 3
BOND INDICATORS

	Market Liquidity		Local Market Size	
	Coefficients (1)	M.E (2)	Coefficients (3)	M.E (4)
SIZE	0.337*** (11.84)	0.048	0.456*** (26.61)	0.057
SIZE*IND	0.00001 (0.39)	0.000	-0.003*** (-6.86)	-0.0004
GROWTH	0.094** (2.34)	0.013	0.112 (1.54)	0.014
GROWTH*IND	-0.0001 (-0.32)	-0.00001	-0.001 (-0.47)	-0.00001
YEARS	-0.007 (-0.75)	-0.001	0.007 (1.28)	0.001
YEARS*IND	0.00002 (0.43)	0.000	-0.0004** (-2.25)	-0.00005
LEVER	0.653*** (4.21)	0.094	0.734*** (6.54)	0.091
LEVER*IND	0.001 (1.33)	0.00001	0.0004 (0.13)	0.00005
PROF	0.601** (2.30)	0.086	0.624** (2.28)	0.078
PROF*IND	-0.003** (-2.08)	-0.0002	-0.008 (-1.03)	-0.001
LIQUID	0.201 (1.00)	0.029	0.262** (2.28)	0.033
LIQUID*IND	-0.002** (-2.15)	-0.0003	-0.008** (-2.04)	-0.001
COLL	0.017 (0.03)	0.002	1.299*** (3.22)	0.161
COLL*IND	0.006 (1.41)	0.001	-0.031** (-2.23)	-0.004
IND	0.0001 (0.22)	0.00001	0.074*** (7.25)	0.009
R^2	0.22		0.21	
Log Likelihood	-5747		-7067	

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. Local Market Size shows the size of local currency bond obligations as a percentage of nominal GDP. Also see notes to Table 2.

TABLE 4
SAMPLE SPLITS

	MARKET 1995-2002		LIQUIDITY 2003-2007		MARKET 1995-2002		SIZE 2003-2007	
	Coefficients	M.E	Coefficients	M.E	Coefficients	M.E	Coefficients	M.E
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SIZE	0.314*** (9.15)	0.049	0.363*** (23.54)	0.048	0.452*** (18.69)	0.057	0.514*** (17.98)	0.060
SIZE*IND	0.00001 (0.38)	0.000	0.00004 (1.00)	0.000	-0.004*** (-5.49)	-0.0003	-0.005*** (-5.39)	-0.001
GROWTH	0.162*** (3.31)	0.025	0.026 (0.39)	0.003	0.102 (1.18)	0.013	0.259* (1.82)	0.030
GROWTH*IND	0.0001 (0.29)	0.00002	-0.0002 (-0.62)	-0.0001	0.001 (0.32)	0.0002	-0.009* (-1.92)	-0.001
YEARS	-0.003 (-0.32)	-0.001	-0.011* (-1.92)	-0.001	0.011 (1.34)	0.001	-0.004 (-0.44)	-0.00002
YEARS*IND	-0.00001 (-0.38)	-0.000	0.0003 (1.75)	0.0002	-0.0002* (-1.91)	-0.0002	-0.00001 (-0.22)	-0.000
LEVER	0.471*** (2.75)	0.073	0.896*** (7.92)	0.118	0.485*** (3.28)	0.061	0.814*** (4.66)	0.096
LEVER*IND	0.001 (1.26)	0.00002	0.001 (1.13)	0.00001	0.001 (0.20)	0.00003	0.007 (1.14)	0.001
PROF	0.513* (1.82)	0.080	0.603** (2.02)	0.079	0.885*** (2.80)	0.112	-0.038 (-0.08)	-0.004
PROF*IND	-0.001 (-0.88)	-0.0002	-0.004** (-2.29)	-0.001	-0.013 (-1.39)	-0.002	0.006 (0.42)	0.001
LIQUID	0.322 (1.51)	0.050	0.048 (0.38)	0.006	0.530*** (3.63)	0.067	-0.113 (-0.59)	-0.013
LIQUID*IND	-0.002** (-2.19)	-0.0003	-0.002** (-2.02)	-0.0003	-0.011** (-2.31)	-0.001	0.001 (0.18)	0.0002
COLL	-0.615 (-0.80)	-0.096	0.743* (1.75)	0.098	1.183* (1.88)	0.150	0.932* (1.72)	0.109
COLL*IND	0.005 (0.88)	0.001	0.004 (1.26)	0.0001	-0.044** (-2.01)	-0.006	-0.002 (-0.11)	-0.0002
IND	0.00003 (0.07)	0.000	0.001 (0.94)	0.00002	0.069*** (5.11)	0.009	0.094*** (5.05)	0.011
Observations	8810		10724		12434		13607	
R^2	0.22		0.22		0.21		0.21	
Log Likelihood	-2718		-2970		-3417		-3581	

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. Local Market Size shows the size of local currency bond obligations as a percentage of nominal GDP. Also see notes to Table 2.