Why doesn't Asia have bigger bond markets?

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Table of Contents

Introduction

The 1997-8 financial crisis highlighted the problem of bond market underdevelopment in Asia. The small size and slow growth of regional bond markets, many observers noted, left corporate borrowers excessively dependent on bank finance. Given the short tenor of bank loans, a shock to confidence left Asian economies vulnerable to a disruptive credit crunch. Since banks denominated many of their loans in foreign currency, exchange-rate depreciation could result in serious balance-sheet damage and thrust highly leveraged corporations into bankruptcy.

Analysts argued further that Asia's heavy dependence on banks increased the weight of political and economic connections in resource allocation. Banks and the companies to which they lent were linked by family control. Banks were used by the authorities to extend preferential credit to firms favored on political or developmental grounds. Financial institutions carrying out these tasks came to be seen as too big and politically important to fail, and the guarantees they consequently enjoyed weakened market discipline over their lending.

The lesson drawn was that Asian countries need better diversified financial systems and specifically deep and liquid bond markets to supplement their banking systems. Better diversified financial markets would reduce financial fragility and enhance the efficiency of capital allocation. The development of bond markets would lengthen the tenor of debt and facilitate the placement of domestic-currency bonds, limiting maturity mismatches on corporate balance sheets. Corporations would be encouraged to disclose more information and follow internationally-recognized accounting practices, strengthening corporate governance. Borrowers would be distanced from lenders, anonymous and decentralized bond markets being hard to influence, and markets would be better insulated from governments, limiting moral hazard and political interference.

The problem of Asia's underdeveloped bond markets was known to close observers, of course, even before the 1997-8 crisis. In some cases the absence of bond markets complicated efforts to finance large infrastructure projects, and enterprises with high minimum efficient scale found it hard to meet their

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financial needs.[2] In principle they could borrow from a syndicate of banks which could securitize their loans, but securitization was costly and difficult in the absence of a bond market. Banks therefore found it hard to diversify risk created by their acquisition of concentrated stakes in the large enterprises that were their leading customers. And the development of other financial instruments was limited by the absence of bond markets on which to base forwards, futures, and more exotic derivative contracts.[3] These problems were not specific to Asia, to be sure, but they seemed to manifest themselves there in particularly dramatic ways.

Coincident with the Asian crisis, contributions to the theoretical literature explained how countries benefit from well-diversified financial systems (see e.g. Boot and Thakor 1997). Equity finance encourages risk taking, since holders of equity stakes share in super-normal returns while their losses are truncated on the down side, whereas debt holders, who do not share in exceptional profits, encourage risk aversion; a well diversified financial system therefore facilitates risk management. Banks have a comparative advantage in providing external finance to smaller, younger firms which typically operate in information-impacted segments of the economy, while securities markets do the job most efficiently for large, well established companies.

Thus, as early as 1995, before the Asian crisis, the World Bank issued studies recommending that Asian countries accelerate bond market development (see e.g. Dalla et al. 1995). The crisis then directed additional attention to the problem. The 17 Asian governments participating in the Asia Cooperation Dialogue set up a Working Group on Financial Cooperation to establish guidelines for the development of Asian bond markets. APEC finance ministers agreed on a comprehensive approach to developing sound and sustainable regional bond markets, including credit guarantees and markets in a variety of new products (bonds denominated in a basket of Asian currencies being the most attractive candidate). ASEAN+3 established a Study Group on Capital Market Development and Cooperation under the leadership of Thailand, Japan, Korea and Singapore.

The most prominent of these responses was a proposal to use the international reserves of Asian central banks to encourage the development of regional bond markets. The Asian Bond Fund (ABF) was launched by EMEAP in June 2003, whose members committed to investing U.S. $1 billion of the region's international reserves in Asian sovereign and quasi-sovereign dollar bonds.[4]

The question is whether this use of central bank reserves will have the desired effect. Perhaps, but some critics of this use of central bank reserves will object that other factors – improved regulation, enhanced transparency, stronger investor protection, and stable macroeconomic policies – are more important for the development of deep and liquid bond markets.[5] In their view, these fundamentals and not the allocation of some small fraction of the reserves of regional central banks to local debt securities should be the focus of efforts to develop Asian bond markets.

This uncertainty about what initiatives are most urgently needed to promote Asian bond markets reflects our incomplete understanding of why those markets are underdeveloped in the first place.[6] This paper

[2] The difficulty of infrastructure finance was particularly a problem with the privatization of electricity supply, telecommunications, and transportation services in Asian countries. More generally, securing adequate finance might require diluting corporate control by issuing equity or giving banks representation on corporate boards. Since owners saw the dilution of control as unattractive, dynamic enterprises sometimes found it difficult to access external finance.

[3] Herring and Chatusripitak (2000) observe that it still may be possible, despite the absence of these markets, to tailor forward, futures and derivative contracts to the needs of individual customers, but doing so can be costly, limiting the use of such instruments.

[4] Some of the proposal's initiators had envisaged utilizing 1 per cent of the international reserves of Asian central banks, which would have amounted to $12 billion, purchasing domestic-currency as well as dollar bonds, and investing in corporate as well as government securities. At the time of writing, EMEAP is discussing an ABF-II that might be larger in size and would invest in high-grade domestic-currency issues.

[5] See Fernandez and Klassen (2003).

[6] While earlier studies touched on the issue, none of them, so far as we know, has analyzed it systematically. Burger and Warnock (2003, 2004) are the studies closest in spirit to our own, but they consider only long-term bonds (not also the short-term bonds considered here) and a subset of the potential determinants of local market issuance. Claessens, Klingebiel and Schmukler (2003) consider both domestic and foreign currency denominated issues, but they limit their analysis to government bonds, putting aside the determinants of corporate bond market growth. Eichengreen, Hausmann and Panizza (2002) consider corporate as well as

therefore considers the historical, structural, institutional, and macroeconomic determinants of bond market development in a cross section of developing and developed economies. Section 2 presents an overview of bond markets in Emerging Asia with comparisons to other regions. Sections 3 and 4 enumerate the hypotheses that have been described to explain bond market underdevelopment. Sections 5 and 6 present our regression analysis. Section 7 draws out the implications for the development of Asian bond markets.

The results confirm that small size and fragmentation is part of the explanation for the underdevelopment of Asia's bond markets, but it is only part. In addition, corruption, poor regulatory quality and failure to compel firms to follow internationally recognized accounting standards have slowed the development of private debt markets. Countries with competitive, well-capitalized banking systems also have larger bond markets (both public and private), suggesting the existence of complementarities between banking and bond market development.

This suggests that, in order to promote the development of bond markets, governments need to encourage adherence to internationally recognized accounting standards and enhance the reliability of regulation and contract enforcement. They should distance themselves from the lending operations of banks in order to accentuate the complementarities between banking and bond-market development. Through this combination of policies, our results suggest, Asian countries could acquire bond markets as liquid and well capitalized as those of other regions.

1. Overview

Table 1 describes the stock of external finance at the end of 2001. For emerging Asia, bond market capitalization (the sum of corporate, financial institution and public-sector issues) was 45 per cent of GDP; this was actually higher than the average for all emerging markets, at 39 per cent, if lower than for developed countries, at 139 per cent. Note that we include here only domestic-currency bonds issued by residents and targeted to local investors.[7] At this level of aggregation, Asia is not behind Latin America or Emerging Central Europe in terms of bond market development, although it is considerably behind the developed countries, and in particular the United States.[8]

These regional aggregates disguise considerable variation across countries. Corporate bond market capitalization is 50 per cent of GDP in Malaysia and 28 per cent in South Korea but only 5 per cent in Thailand.[9] Financial institutions are important for bond issuance in Hong Kong, Singapore and South Korea, but less so in China and Malaysia. They figure hardly at all in external finance in Thailand.

Table 2 compares the relative importance of bonds, bank loans, and equity markets in domestic external finance outstanding at the end of year 2001.[10] In terms of the composition of external finance, Asia relies less on bond markets than other emerging regions; the share of bonds is a bit more than half that of Latin America and Emerging Central Europe. Again, these generalizations disguise considerable variation

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government issues, but they too are concerned with currency denomination, not market capitalization. Domowitz, Glen and Madhavan (200) and Hale (2003) analyze the choice between bank and bond finance, but they analyze international bonds and bank loan syndications, not their domestic counterparts.

[7] For more discussion of our measure of bond market capitalization, see Section 4 below.

[8] The picture is not much different when we distinguish bond issues by nonfinancial corporations, financial institutions, and governments. Public issues are slightly less important in Emerging Asia than in other emerging markets, reflecting the traditionally strong fiscal position of Asian governments, while issues by corporations and financial institutions are slightly more important in Emerging Asia than elsewhere.

[9] These aggregates need to be interpreted cautiously; in some cases they may tell us less about the scale and health of the bond market than might be naively supposed. Thus, in the Korean case, a considerable fraction of bond market capitalization is in the form of asset backed securities in which the government and its agencies have absorbed the risky junior tranche that accounts for the majority of the outstanding stock.

[10] Strictly speaking, total external finance would include also credit provided by foreign sources, for which we lack information. To avoid double counting, we exclude bonds issued by financial institutions from this comparison. Including them makes little difference for the comparisons with which we are concerned in this paper. The main effect is to further increase the value of bond market capitalization in the advanced economies.

among countries. For well-known historical reasons, the banking sector is particularly important for external finance in China, South Korea, and Thailand. The stock market is important only in Hong Kong, Malaysia and Singapore, where the authorities have aggressively promoted it. The bond market is the least important of these three sources of finance in virtually every country (and exception being Thailand, where it is approximately the same size as the stock market). Bonds are least important in total external finance in Hong Kong and most important in Malaysia and South Korea.

The preceding data are for stocks; flows may offer a clearer picture of recent trends. According to Table 3, new domestic bank loans were 10 per cent of GDP in Emerging Asia in 2001 but only 4 per cent of GDP for the emerging markets as a whole. Domestic bond flotations, in contrast, amounted to 12 per cent of GDP in 2001 for emerging markets as a whole but only 8 per cent in Asia.

In sum, this overview confirms that Emerging Asia relies less on bonds and more on banks than other emerging markets, and very much less on bonds and very much more on banks than developed countries. Recent data suggest that these distinctive characteristics of Asian financial systems are not growing noticeably less pronounced; in some cases the opposite may be true.

2. Hypotheses

Five broad hypotheses have been advanced to explain the underdevelopment of Asian bond markets. One is the region's history. Banks have dominated Asian financial markets for many years. Once upon a time there may have been good reasons for their dominance. Imperfections in the information and contracting environment gave a strong comparative advantage to bank intermediation, while governments found banks to be a convenient vehicles for advancing their industrial policies. But although these circumstances have now changed, banks retain their first-mover advantage. Markets, institutions and social conventions have adapted to the dominance of bank intermediation. Examples of that adaptation include the importance of family connections and state involvement in financial relationships. As a result, bonds may face an uphill battle when seeking to acquire market share.

A second hypothesis emphasizes structural characteristics of the region's economies. Small countries presumably find it more difficult to develop bond markets insofar as liquid securities markets have a certain minimum efficient scale. Endowment theories suggest that the geographical environment shapes the long-standing institutions that influence financial development. The strength of bondholder protections may depend on a country's legal tradition (see LaPorta 1998). Not all of these structural characteristics are impervious to change, but even the most malleable of them may be difficult to change quickly.

A third hypothesis focuses on the developmental stage of the region's economies. Compared to the economies of Western Europe and North America, most Asian countries have undergone the transition to modern economic growth relatively recently. Some Asian countries are still poor. At the core of underdevelopment is the underdevelopment of market-supporting institutions, including the institutions needed to support financial markets. In this view, Asian financial markets are underdeveloped because of the unreliability of contract enforcement and uncertainty of investor rights that are characteristic of less developed economies. These are problems that economies presumably grow out of, though how quickly they do so depends on country-specific circumstances.

A fourth hypothesis focuses on the structure and management of the financial system. This explanation considers, inter alia, the intensity of competition among financial institutions, the quality of prudential supervision and regulation, the existence of a well-defined yield curve, the absence of institutional investors and rating agencies, and the adequacy of trading, settlement and clearing systems.[11]

[11] Independent agencies that rate corporate issuers provide information that should help to attract a large base of active investors into the bond market. While some Asian countries have independent rating agencies (Malaysia has two), others do not. A large population of institutional investors is important for creating a demand for domestic bonds (Schinasi and Smith 1998). Conversely, heavy regulation of mutual funds may prevent fund managers from actively participating in corporate bond markets. Finally, it has

Fifth and finally are macroeconomic policies. The currency risk created by flexible exchange rates may limit the market for domestic-currency-denominated securities. Domestic interest rate volatility may make it unattractive to hold long-term debt securities. Such instability may be a serious impediment to bond market development. Finally, controls on capital flows, such as those limiting the ability of foreigners to purchase domestic capital and money market securities or to repatriate their interest earnings and principal, may discourage foreign participation in domestic markets and rob those markets of liquidity.

3. Empirical implications

We now turn from broad hypotheses to empirical implications, illustrating our points with information for 41 countries. The data are for all countries for which the Bank for International Settlements reports estimates of bond market capitalization.[12] Hence, the sample is not limited to Asia. But neither are questions about the development of bond markets limited to Asia. In analyzing the determinants of bond market development we seek to take advantage of the information content of a wide cross section of countries. The variables that we use to operationalize our five hypotheses are shown in Table 4.[13]

Economic size. Small countries may lack the minimum efficient scale needed for deep and liquid bond markets.[14] The amount of money that can be raised by issuing on the local market may be too small to attract multinational corporations and other potential foreign issuers. The market may be too small to justify inclusion in the global bond market indices constructed by the leading investment banks, in which case there will be no demand to hold local securities in order to track the index. Markets in small issues may be characterized by price volatility as buyers and sellers enter and exit. Similarly, it may be difficult to put on and take off positions without being noticed. There being fixed costs of learning about the performance characteristics of an issue, investing in small issues may not be attractive for portfolio managers, who will consequently demand a yield premium in order to do so.[15] And if adverse selection is present, no premium may create a demand. A bivariate scatter plot of bond market development (measured as domestic bond market capitalization as a share of GDP, averaged over the 1990s) and country size (GDP at purchasing power parity, also averaged over the 1990s) shows a weakly positive relationship between the two variables (see Figure 1).[16]

Natural openness. Entrenched interests will seek to prevent their advantaged position from being undermined by market competition. Banks, for example, will attempt to prevent their dominant market share from being eroded by competition from securities markets. But entrenched interests will be less

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been argued that the absence of well developed clearing, settlement and trading systems have rendered some Asian bond markets illiquid and unattractive (Trairatvorakul 2001).

[12] The BIS collects security-level data from the Bank of England, Capital Data, Euroclear, the International Securities Market Association, and a variety of national sources, and attempts to correct its estimates of bond market capitalization for double counting. Capitalization is only one measure of bond market development, of course; turnover is another obviously relevant dimension. But only capitalization is available for a broad cross section of countries. Previous studies (e.g. MacCauley and Remolona 2000) suggest that capitalization and turnover on domestic bond markets are strongly if imperfectly correlated.

[13] Information on data sources can be found in the appendix.

[14] Eichengreen, Hausmann and Panizza (2002) provide evidence that small size is similarly the most robust determinant of the inability of emerging markets to borrow abroad in their own currencies ("original sin"). Here the obvious explanation is that countries whose debt issuance is small have trouble getting international investors to add securities denominated in "exotic" currencies to their investment portfolios. This will be the case when the increase in management costs is constant but the diversification benefits decline with each additional currency. This is probably an appropriate point at which to discuss how domestic bond market development relates to original sin. In principle, domestic bond market development is a route for solving this problem. As domestic markets gain scale and liquidity, foreign participation will be easier to attract, both because those local currency markets will become easier to enter and exit (transactions costs will decline) and because they will constitute a greater share of the global portfolio (diversification benefits may increase). In practice, however, this route to "redemption" appears to work only very slowly. Data in Burger and Warnock (2004) indicate that as of 2001 U.S. residents held only $2.5 billion bonds issued by emerging markets, whereas emerging markets had more than $1.6 trillion of local currency bonds outstanding (and more than $2.2 trillion of total bonds outstanding). While foreign participation in local bond markets has attracted much comment, in other words, as a quantitative phenomenon it remains inconsequential.

[15] This phenomenon is familiar in the context of foreign bond issues; see Eichengreen and Mody (2000).

[16] All variables are similarly measured as averages for the 1990s in the scatter plots that follow, except where expressly noted otherwise.

able to insist on policies that suppress competing sources of supply when the economy is exposed to international competition. This is Rajan and Zingales' (2001) explanation for why more open economies do less to suppress securities markets. That said, Figure 2 does not suggest a particularly strong relationship between openness, measured there as the ratio of exports to GDP, and bond market development.

Legal system. Legal traditions differ in the priority they attach to protecting minority investors. LaPorta et al. (1998) predict that common law systems in the British tradition, which offer stronger investor protection than systems in the French civil law tradition, should promote the development of financial markets. But the same legal traditions may not affect all aspects of financial development equally. Where investor rights are weak, savers may prefer investing through banks rather than bonds since politically well-connected banks are better able to enforce their claims (Sharma 2000). Systems with weak investor rights may also encourage creditors to demand assets with seniority (bonds rather than stocks).[17]

Geographical/disease endowments. Endowment theories suggest that environmental factors shape long-standing institutions influencing financial development. Authors like Beck, Demirguc-Kunt and Levine (2002) argue that countries with less favorable geographical and disease environments should have less developed financial markets. They present evidence that endowments (measured by settler mortality or distance from the equator) are correlated with financial intermediary and stock market development. Figure 3 suggests the existence of a positive relationship between distance from the equator and bond market development.

Riskiness of the investment environment. Bonds are a way for investors to limit risk. It follows that entities issuing bonds are generally of higher credit quality than those issuing equity claims (Harwood 2000). In some countries, however, there may be a dearth of high quality issuers with proven business models and records of financial probity. Consistent with this idea, Figure 4 suggests that bond market capitalization rises as investment risk declines.

Law and Order. Countries with more reliable law enforcement are more attractive to investors. Figure 5 confirms the existence of a positive relationship between the size of bond markets and International Country Risk Guide (ICRG)'s measure of law and order. To the extent that corruption undermines law enforcement, corruption and bond market development should be negatively correlated. Figure 6 is consistent with his hypothesis (since, on the ICRG scale utilized here, a higher score indicates a lower level of corruption).

Weak corporate governance and transparency. If corporate governance is weak, managers will be able enrich themselves at the expense of holders of debt and equity claims (Jensen and Meckling 1976). If banks possessing long-term relationships with borrowers have a comparative advantage in detecting and correcting insider abuses, savers may prefer to invest via banks rather than securities markets. Lenders will also prefer banks to bond markets where transparency is low, since banks have a comparative advantage in information impacted markets (Diamond 1991, Hale 2003). Consistent with the hypothesis, Figure 7 shows that the quality of accounting standards is positively associated with bond market development.

Developmental stage of the economy. There are a number of reasons why economic development and bond market development go hand in hand. Less developed countries have volatile investment environments and heavy government involvement in commercial activity. Often they have weak creditor rights, inadequate transparency, and poor corporate governance. GDP per capita can be thought of as capturing these aspects of underdevelopment insofar as they are not already absorbed by our other explanatory variables. Figure 8 is consistent with the notion that economic development and bond market development are positively associated.[18]

[17] LaPorta et al. (1998), when reporting a positive correlation between debt/GNP and common law legal tradition, define debt as the sum of corporate bonds and bank loans. Beck, Demirguc-Kunt and Levine (2000) consider financial intermediary credits to the private sector divided by GDP. Thus, neither set of authors address the impact on bond markets that is our concern here.

[18] It suggests that bond markets are less developed than levels of per capita GDP and a broader sample of national experiences would predict – in, inter alia, Hong Kong, Singapore and Japan – while they are rather better developed in Malaysia.

Size of the banking system. Banks and bond markets compete in providing external finance; in some circumstances well developed banking systems may succeed in depriving bonds of market share. At the same time, banks serve as dealers and market makers, whose presence is needed for the development of a liquid and well-functioning bond market.[19] Figure 9 suggests that the complementarities dominate – that on balance banking systems and bond markets develop together.

Banking concentration. Bentson (1994), Schinasi and Smith (1998), Smith (1998) and Rajan and Zingales (2003) suggest that banks with market power may attempt to stifle the development of securities markets by setting loan and deposit rates strategically or that they may use moral suasion to discourage public placements by firms with which they have relationships. That said, Figure 10, which juxtaposes banking-sector concentration against bond market development, does not show a particularly strong relationship between the two variables.

Absence of public sector funding needs. The development of a government securities market "helps promote a class of dynamic, profitable fixed-income dealers" (Harwood 2000). In addition, an active and liquid corporate bond market requires a benchmark yield curve on whose basis risky credits can be conveniently priced.[20] That yield curve is typically constructed from a suite of outstanding treasury securities, requiring governments to issue a range of maturities on a regular schedule. If a government has modest funding requirements, there may be little need to develop an active and liquid bond market and little regular issuance to maintain a well-defined yield curve.[21] Figure 11 is consistent with the existence of a positive relationship between private- and public-sector bond market capitalization.[22]

Poor regulatory enforcement. Investors will be reluctant to take positions in markets characterized by opportunistic participants and delivery risk, problems that regulation is designed to mitigate. Elements of an adequate regulatory framework include disclosure standards, penalties for accountants and auditors providing false information, and sanctions for insider trading and market manipulation. Equally important is the clear and consistent implementation of regulations. Consistent with this notion, bureaucratic quality is positively correlated with bond market development (Figure 12).[23]

Interest rate variability. Where interest rates are variable, investors will have little appetite for long-term fixed-rate notes, since there is significant risk that the purchasing power of fixed-rate long-term assets will be eroded. Investors' limited appetite for long-term bonds thus may limit the demand for securitized debt. In addition, high levels of interest-rate volatility may be an indication of inadequate market liquidity, insofar as returns are affected by the entrance or exit of a few buyers and sellers from the market. Figure 13 illustrates the negative relationship between nominal interest rate volatility and bond market development.

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[19] See Harwood (2000) and Hawkins (2002). In many countries, regulators require that bond business be done in a separately capitalized subsidiary, although such firewalls may be more apparent than real. At the same time, dealers need a diversified and active investor base with which to buy and sell; they cannot simply trade among themselves. Without such a base, dealing will not be profitable. One suspects, therefore, that dealers are not so much a precondition for bond market development as a corollary.

[20] Schinasi and Smith (1998) note other advantages of the existence of a benchmark issue: since they are liquid, benchmark assets are widely used in repo markets and are typically usable as collateral for a wide range of other financial contracts.

[21] It is in principle possible for governments without ongoing funding needs to circumvent this constraint by overfunding the fiscal deficit (issuing more debt than strictly necessary, rolling it over as it matures, and depositing the resulting cash surplus with the central bank, which allows the central bank to retire its sterilization bonds, thereby unifying the public-sector bond market). See McCauley (2003). Thus, despite not running current budget deficits, the Hong Kong Monetary Authority has been able to create a liquid market in Exchange Fund Paper, with a ten-year yield curve, even in the absence of current government budget deficits. EFP was introduced in 1990 with the issuance of 91-day bills, followed by 182 and 364 day bills in 1990 and 1991, two and three year notes in 1993, five year notes in 1994, seven year notes in 1995 and finally ten year notes in 1996. (The ostensible rationale for this debt issuance was the desire to fund some specific infrastructure projects). The outstanding stock of EFP is more than HK$100 billion, or more than 8 per cent of GDP, and more than 20 per cent of total debt instruments. It is issued through competitive tender bids, was listed on the stock exchange in 1999 to enhance liquidity, and can be used as collateral for trading stock options and future. Taiwan financed a significant part of its National Development Plan starting in 1991 through bond issuance, using a U.S. Treasury bond-type auction system (Lynch 2001). Similarly, despite limited public funding needs; the government of Singapore decided in 1998 to increase the issuance of government securities, especially longer-term bonds of benchmark size, and introduced a repo facility for primary dealers in May 2000.

[22] Note that the variable on the vertical axis, private market capitalization, is different than in the other figures.

[23] Domowitz et al. (2003) in simple tabulations similarly find that the share of domestic finance accounted for by bonds in emerging markets rises with the quality of accounting standards.

Level of interest rates. Since few firms can service debts when interest rates are high, high rates tend to have a depressing impact on issuance. It follows, in Figure 14, that countries with high interest rates show signs of having poorly capitalized bond markets.

Exchange rate regime. It is argued (by e.g. Goldstein 1998) that pegged exchange rates encourage foreign investors to underestimate the risks of lending to banks and corporations, and that the resulting foreign competition may slow the development of domestic intermediation. From this point of view, greater exchange rate flexibility should encourage the development of domestic bond markets (as argued by, inter alia, World Bank 2003). Of course, to the extent that foreign participation is valuable for the growth and development of domestic markets, discouraging the participation of international investors by introducing additional risk into the market may not produce the desired result.[24] In fact, countries with fixed exchange rate regimes do not appear to have bigger bond markets (Figure 15). Figure 16, however, is consistent with the view that stable exchange rates are conducive to bond market development.

4. Multivariate analysis

We now test the importance of these factors using multivariate regression analysis of annual data from 1990 through 2001. The dependent variable, as in the scatter plots, is bond market capitalization as a share of GDP. Recall that this measure includes only domestic-currency bonds issued by residents and targeted to local investors.[25]

All equations are estimated using panel Generalized Least Squares (GLS) with corrections for heteroskedasticity and panel-specific autocorrelation. We start in Table 5 with preliminary regressions exploring the importance of, alternatively, historical, structural, financial, developmental and macroeconomic factors. Definitive hypothesis tests of course require considering all five categories of explanation simultaneously. We do so in the final column of the table.

The first three columns show the effects of structural characteristics of countries. Consistent with earlier arguments, country size and openness are positively related to bond market development. Distance from the equator, a proxy for endowment theories, similarly enters with its expected positive sign.[26] But where previous studies have shown that English common-law legal tradition favors equity market development and bank intermediation, the same does not appear to be true of bond markets. It may be that stronger investor rights encourage investors to attach less importance to seniority and to substitute equity for debt securities.[27] Overall, these results lend support to structural explanations for bond market development.

These regressions also include a dummy variable for Asia, which we interpret as reflecting aspects of the region's history not captured by other variables. The negative coefficient on this variable supports historical explanations for the undercapitalization of the region's bond markets.[28]

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[24] There is also the possibility that the correlation reflects causality running in the other direction, from the existence of a large domestic financial market to the willing of countries to countenance additional exchange rate variability (Calvo and Reinhart 2002).

[25] Thus, a limitation of our analysis is that we do not have information on foreign-currency denominated issues or issues by nonresidents denominated in local currency targeted to resident investors. We also do not know what share of the domestic-currency issues we include are interest-rate or exchange-rate indexed. Note that our measure excludes issues denominated in foreign currency, issues by nonresidents, and issues by residents targeted to nonresidents, all of which are counted as international securities, as it presumably should.

[26] It is not possible to use settler mortality rates in an analysis of Asian bond markets, since relatively few Asian countries were colonized by the European powers, and settler mortality estimates (and logic) are based on data for and the experience of one-time colonies.

[27] However, the coefficient on this variable is significantly different from zero in only one of the two equations in which it is included. Adding dummy variables for other legal origins does not alter these findings. For example, when we add French legal origin, the new variable enters positively (and significantly), while English legal origin continues to enter negatively and significantly. Since the French civil law tradition is associated with relatively weak investor rights, the opposite signs on the two variables are consistent with the explanation in the text.

[28] Note that the coefficient predictably becomes smaller in absolute value terms, not surprisingly, the more other independent variables are included in the specification.

The specification in column 4 considers proxies for the developmental stage of the economy: the safety of the investment environment (predictability of contract enforcement, danger of expropriation), an index of the reliability of law enforcement, and per capita GDP as a summary measure of development. While per capita GDP has its expected positive coefficient, investment risk and rule of law (which are scaled so that higher values indicate a more stable investment environment) enter with negative signs. We will return to these variables below.

Columns 5 and 6 consider governance and regulation of the corporate and financial sectors. Column 5 shows that countries with better rankings on the International Country Risk Guide (ICRG)'s measure of corruption and that adhere to international accounting standards (which is likely to enhance the effectiveness of corporate governance) have larger bond markets.[29] Column 6 shows that countries ranking higher in terms of bureaucratic quality have larger bond markets, which we interpret in terms of the efficiency and reliability of regulation. Similarly, countries with better developed banking sectors have better developed bond markets – bank and bond-market intermediation appear to be complements rather than substitutes. On the other hand, countries with more concentrated banking systems appear to have smaller bond markets, consistent with arguments suggesting that banks with market power may use it to discourage bond flotations. Again, we will return to these findings below.

Column 7 considers macroeconomic factors. While the volatility of interest rates is not significant, their level, as measured by the inter-bank rate minus LIBOR, suggests that higher interest rates are associated with smaller bond markets.[30] The coefficient on the volatility of changes in exchange rates is marginally significant, although its coefficient is, surprisingly, positive. Finally, the capital controls dummy (where a value of one indicates an open capital account) suggests that controls slow bond market development.[31] As we show below, this last result is the one that turns out to be robust.

Column 8 considers the entire range of hypotheses.[32] It suggests that no single class of factors is wholly responsible for the underdevelopment of Asian bond markets; rather, the present state of affairs reflects a confluence of influences. Structure and inheritance matter: the size of the economy, its openness, its location, and the origin of its legal system all influence bond market capitalization. Factors like these may be difficult to change, although some of them, such as the handicap of small size, may be overcome through initiatives like the Asian Bond Fund. In addition, adherence to internationally-recognized accounting standards and the size and concentration of the banking sector are important for bond market capitalization. These are policy variables: our results thus suggest that countries can accelerate the development of their bond markets by improving the quality and reliability of regulation, requiring corporations to adhere to internationally-recognized accounting standards, and encouraging competition in financial intermediation. In addition there is a role for macroeconomic policy: both the level of interest rates and the presence or absence of capital controls matter in the consolidated specification.

At first blush, a number of the results are anomalous or at least counterintuitive. Thus, we appear to find that interest rate volatility is good for bond market development. At the same time, there is little evidence of a relationship between exchange rate volatility and bond market development. We will have more to say about these counterintuitive results below.

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[29] This is consistent with results in Burger and Warnock (2004) suggesting that countries with stronger institutions have larger domestic bond markets.

[30] Domowitz et al. (2003) similarly provide evidence that countries with higher rates of inflation issue less domestic debt and more equity.

[31] A variety of alternative measures of capital controls point in the same direction. Thus, in addition to the binary ("IMF-style") open-or-closed measure, we experimented with Brune and Garrett's measure, which ranges from 0 to 9 depending on how many of the nine categories of capital account restrictions a country had in place. We looked separately at capital account openness for inflows and outflows. We looked separately at controls on inflows and outflows pertaining to capital and money market securities. In virtually all cases we obtained the same positive and statistically significant coefficient on controls when using the specification in column 7.

[32] Adding all of the explanatory variables substantially reduces the number of observations (from 475 observations in the full sample to 284 observations in column 8). However, the observations from countries in Asia remain well represented. Whereas they accounted for 22 per cent of the observations in the full sample, they account for 25 per cent of the observations in column 8.

Note also that when we add direct measures of institutions – such as bureaucratic quality, corruption, law and order, the investment profile – the effect of per capita GDP washes out. This is not inconsistent with explanations for bond market growth emphasizing the developmental stage of the economy, but it suggests that the effects of economic development and underdevelopment operate through the aforementioned institutional channels.

We looked further at the robustness of the positive association of bank and bond market development, which runs contrary to some popular arguments, which is likely to be controversial. We also regressed nonpublic bond market capitalization on bank credit to the private sector as a share of GDP, adding the entire vector of controls.[33] Excluding public-sector bonds and considering only bank credit to the private sector avoids the possibility that the positive association between the two variables is simply picking up liquidity requirements and other policies forcing the banking sector to hold government bonds – and the greater ability of the government to compel such behavior in countries where the banking system is relatively large. In this alternative specification the coefficient on bank credit continues to enter with a positive coefficient and differs from zero at the 99 per cent confidence level.

Finally, note that the dummy variable for Asia continues to matter statistically and economically. Its effect is large: the coefficient of -17 suggests that Asian bond markets are 17 per cent smaller as a share of GDP than in countries with comparable characteristics in other parts of the world. An interpretation is that the development of bond markets continues to be held back by Asia's history and current circumstances in ways that are not fully captured by the other explanatory variables. We will want to revisit this finding below, as well.

An eclectic set of policy implications would seem to flow from these findings. The Asian Bond Fund and the removal of capital account restrictions may help for domestic bond market development by relaxing the constraint of small market size, although such policies may be a mixed blessing insofar as capital account liberalization prior to domestic market development poses risks as well as promising rewards. But market size is far from the entire problem. In addition, governments seeking to promote domestic bond markets must require adherence to international accounting standards by security issuing firms and encourage growth and competition in banking so as to maximize the complementarities between banking-system and bond-market development. They should to follow stable macroeconomic policies to make it attractive to hold domestic-currency-denominated debt instruments.

Even if they take these steps, the results of this section suggest, Asian governments still should not expect to succeed in developing bond markets with the depth and liquidity characteristic of Continental Europe and the Anglo-Saxon economies, reflecting the extent to which markets, institutions and social convention have adapted to the dominance of bank intermediation. This is undoubtedly the most controversial conclusion seeming to emerge from the present section. It is important, therefore, to subject it to further analysis.

5. Adding fiscal policy

We consequently subjected these results to a variety of robustness checks. We dropped influential observations. The results were robust to these changes. We limited the sample to the period before the Asian crisis to test for structural breaks. The results were again very similar.[34]

The one sensitivity test that did make an important difference was adding fiscal policy.[35] We measured fiscal policy in three ways: as the public debt/GDP ratio, as the past year's budget balance as a

[33] In further regressions not reported here.
[34] The main differences were that the corruption and law and order variables became significant (lower levels of corruption and more reliable law enforcement were associated with larger bond markets), while distance from the equator and domestic credit provided by the banking sector lost their's.
[35] Asian governments have tended to run surpluses, with a few prominent exceptions, and this otherwise admirable behavior may have stymied the development of bond markets (for reasons explained above).

percentage of GDP, and as a three year moving average of past budget balances. The last of these alternatives is probably preferable, since the budget balance in a single year will tend to be dominated by transient factors, while public indebtedness is likely to have a spuriously strong coefficient given that the public debt is itself a major component of bond market capitalization.

The results in the first three columns of Table 6 confirm that fiscal policy is important for overall bond market development.[36] Stronger fiscal balances are negatively associated with bond market capitalization. The coefficient in the third column reinforces our trepidation about using the public debt ratio in that the coefficient is almost exactly unity. We do not consider this measure further in what follows.

Adding past budget balances has a number of other effects. We now obtain a significantly negative coefficient on exchange rate volatility. Higher interest rates continue to be obstacles to more rapid bond market development. An earlier anomaly, that greater interest rate volatility is associated with faster bond market development, is now evident in only one of the three specifications.[37]

Adding past budget deficits also eliminates previously significant coefficients on the investment profile, accounting standards, and bureaucratic quality, while strengthening at least in some cases the effects of corruption and rule of law.[38] In the case of the investment profile, this is reassuring, since the previous result anomalously suggested that safer investment environments are associated with less well developed bond markets.[39] The now greater importance of corruption and rule of law is also reassuring. The loss of significance of bureaucratic quality and accounting standards is less reassuring; at face value this suggests that financial transparency and the quality and reliability of regulation are not so important after all. At a minimum, it suggests that it is hard to distinguish the effects of transparency, regulation, and fiscal policy.

But when one distinguishes public debt from private debt (debt issued by both nonfinancial corporations and financial institutions), one finds that budget deficits are a significant determinant of public debt market capitalization (columns 6 and 7) but not private debt market capitalization (columns 4 and 5). In other words, while governments that run deficits have significantly more public debt (as a matter of definition), public-sector deficits do not appear to encourage private debt issuance. That there is no net effect is unsurprising given arguments that a history of strong fiscal policies is both good and bad for private debt markets. (It creates a more stable investment environment, but it complicates the creation of a well-defined yield curve and slows the development of a class of dynamic fixed-income dealers.[40])

Note, further, that in the regressions for private debt the coefficients on accounting standards regain their significance even through fiscal policy is still included.[41] In contrast, they are insignificant in the equations for public debt. The same is true for corruption and bureaucratic quality. Thus, whereas institutional characteristics and regulatory practices like accounting standards, corruption and bureaucratic quality matter for private debt market capitalization, they evidently matter less for public debt market capitalization.[42]

[36] The observations here are only about half the number in the full sample. However, Asian countries are still well represented: they account for 21 per cent of the reduced sample.
[37] As we will see momentarily, disaggregating public and private debt makes it disappear entirely.
[38] To be precise, accounting standards were significant in column 1, where the three-year average of the fiscal balance is included, but not in column 2, where an alternative measure of fiscal policy is used.
[39] Table 4 shows that there is a positive correlation between the strength of fiscal policy and the quality/safety of the investment environment, which may explain this result.
[40] Or, to put the point the other way, chronic deficits create an ample supply of sovereign securities from which to construct a benchmark yield curve but at the same time crowd out private debt issues (MacCauley and Remolona 2000). Our results suggest that these two effects roughly cancel out.
[41] Corruption and bureaucratic quality are not significant in the regression for public debt, except in one case where the coefficient on bureaucratic quality is marginally significant at the 90 per cent level, and there it counterintuitively enters with a negative sign.
[42] This explains the unstable pattern of coefficients when total debt is considered and measures of fiscal policy are added or dropped.

Another difference introduced by disaggregating between public and private debt has to do with the relationship between banking systems and bond markets. Earlier, when considering total debt, we found evidence that both the size and concentration of the banking sector mattered (positively and negatively respectively).[43] Disaggregating reveals that the size of the banking system matters mainly for the capitalization of private debt markets – in other words, there is evidence of complementarities between the development of banking and the development of private debt markets. In contrast, banking system concentration is negative associated with public debt. Readers familiar with Asia's economic and financial history will conjecture that in countries with concentrated banking systems the government was able to use the banks as agents for its industrial policy, channeling private savings toward favored industries and activities, whereas in countries with atomistic banking systems less subject to manipulation direct government expenditures were required for these purposes.

We also find, upon disaggregating between public and private debt, that the earlier evidence of a positive relationship between interest rate volatility and bond market development disappears. In contrast, the level of interest rates and the stability of the exchange rate continue to matter, as before, for both private and public debt.

Finally, analyzing public and private debt separately reveals that the significance of capital controls derives from their impact on the volume of public debt. Evidently, governments that open the capital account are better able to fund themselves whether by selling debt to foreigners or owing to credibility effects. Of course, we know from the Asian crisis that it can be risky to fund government deficits in this way before putting the other prerequisites for capital account liberalization in place can be risky business. And the insignificance of both capital account openness and past deficits for private bond market capitalization suggests that any benefits of this development for corporate bond markets development are at best indirect.

Note that adding a measure of past fiscal policies eliminates the previously negative coefficient on the dummy variable for Asia in the equations for total debt. This is true whether fiscal policy is measured as the past year's deficit or as a moving average of past deficits. Moreover, the coefficient on Asia is now positive, not negative, including in column 3 where past fiscal policy is measured by the public debt and the coefficient is significantly different from zero (columns 1-3). Once we control for the traditionally strong fiscal stance of Asian countries, in other words, there is no longer support for the notion that their bond markets are smaller than can be explained by their economic characteristics and policies.[44]

6. Conclusions

Asia's underdeveloped bond markets and dependence on bank finance attracted concern since before the crisis of 1997-8. The result has been a host of official responses, from reports by the multilateral financial institutions on the importance of reliable contract enforcement, strengthened prudential regulation and improved market infrastructure to the Asian Bond Fund funded by EMEAP central banks. But it remains uncertain whether these initiatives will succeed in surmounting the fundamental obstacles to bond market development, since there has been little systematic analysis of the nature of those obstacles. This is a gap that the present paper seeks to fill.

We find that the slow development of local bond markets is a phenomenon with multiple dimensions. To some extent the problem is one of minimum efficient scale: larger countries have better capitalized bond

[43] Although the evidence that the size of the banking system is important was much weaker when we included measures of fiscal policy.

[44] Indeed, when we limit our attention to private debt (columns 4 and 5), both estimates of the Asia dummy are significantly greater than zero. For public debt, the sign of the coefficient on the Asia dummy is sensitive to how fiscal policy is measured, and it is never significant at the 95 per cent confidence level.

markets when capitalization is measured relative to GDP.[45] But market size is not the entire problem. In addition, the failure of countries to follow internationally recognized accounting standards has slowed the development of private debt markets. Corruption and low bureaucratic quality, which are signs of unreliable securities market regulation, work in the same direction. Countries with competitive, well-capitalized banking systems, on the other hand, have larger bond markets.

Macroeconomic policy appears to have played both a supporting and impeding role. On the one hand, Asia's strong fiscal balances, while admirable on other grounds, have not been conducive to the growth of government bond markets. Fortunately, there is little evidence that the small size of public debt markets is an insurmountable obstacle to corporate bond market development. On the other hand, the stability of exchange rates in the region appears, if anything, to have encouraged bond market development.

Over time, markets, institutions, and social convention have adapted to the status quo, which in the case of Asia is the dominance of bank finance. Some may worry that, as a result of this inheritance, Asian countries will not be able to develop bond markets as efficient and well capitalized as those of the advanced industrial countries. In this respect our results are reassuring: they suggest that the region's structural characteristics and macroeconomic and financial policies account fully for differences in bond market development between Asia and the rest of the world. Once one controls for these characteristics and policies, in other words, there is no residual "Asia effect."

One obstacle that countries in the region must overcome in order to accelerate this process is the legacy of capital controls. The evidence is strong that capital controls discourage foreign participation in domestic bond markets and that they discourage bond market development more generally. But we also know, not least from the Asian crisis, that capital account liberalization is only prudent when domestic financial markets are already deep, liquid and robust. Here obviously is a dilemma. Capital account liberalization makes sense only when domestic market development is sufficiently advanced, but developing domestic financial markets is harder when the capital account remains fully or partly closed. There is no easy way of finessing this problem.[46] The only solution is to work harder at strengthening market regulation, market infrastructure and the other domestic preconditions for the development of local bond markets before giving that process a further push by finally opening the capital account.

7. Data appendix

The dataset covers the period 1990-2001 at an annual frequency. Sample countries are Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Czech Republic, Denmark, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, India, Ireland, Italy, Japan, Malaysia, Mexico, Netherlands, New Zealand, Norway, Peru, Philippines, Poland, Portugal, Russia, Singapore, South Africa, South Korea, Spain, Sweden, Switzerland, Thailand, Turkey, United Kingdom, and United States.

Domestic Debt Securities
Domestic debt securities are from Table 16A of BIS domestic and international securities statistics, which are regularly published in the annex tables of the *BIS Quarterly Review.* The series are accessible at http://www.bis.org/statistics/secstats.htm.
Inter-Bank Interest Rates
Inter-bank rates are from *Global Financial Data*. 12-month inter-bank rates are used wherever they are available. When 12-month rates are not available, shorter rates are used. Where shorter rates are not available, we use monthly average of daily overnight inter-bank rates.

[45] In addition to being supported by our empirical results, this fact is evident in Europe's experience, where the advent of the euro has relaxed the constraint of market size at the national level and greatly enhanced the liquidity of the bond market, the corporate bond market in particular.
[46] In particular, harmonizing market regulations and withholding tax regimes or creating a pan-Asian payment and settlement system, with the goal of encouraging more cross-border investment in the region and thereby producing deeper and more liquid markets, would be tantamount to encouraging more capital flows and thus equivalent to early capital account liberalization. In other words, doing so would promote market development but also heighten crisis risk, which is very dilemma referred to in the text (Eichengreen 2004).

Exchange Rates
Exchange rates are end-of-month (local currency per US$) from line AE in *International Financial Statistics*.

Institutions Variables
Measures of government stability, Investment profile, law and order, corruption and bureaucracy quality are from ICRG:

Investment Profile is an assessment of factors affecting the risk to investment. The risk rating assigned is the sum of three subcomponents, each with a maximum score of four points and a minimum score of 0 points. A score of 4 points equates to Very Low Risk and a score of 0 points to Very High Risk. The subcomponents are:

- Contract Viability/Expropriation
- Profits Repatriation
- Payment Delays

Law and Order indexes are assessed separately, with each sub-component comprising zero to three points. The Law sub-component is an assessment of the strength and impartiality of the legal system, while the Order sub-component is an assessment of popular observance of the law. A higher score indicates better law and order.

Corruption index is an assessment of corruption within the political system. The index ranges from 0 to 6, where a higher score means a lower degree of corruption.

Bureaucratic Quality is the measure of institutional strength and quality of the bureaucracy. High points are given to countries where the bureaucracy has the strength and expertise to govern without drastic changes in policy or interruptions in government services. In the low-risk countries, the bureaucracy tends to be somewhat autonomous from political pressure and to have an established mechanism for recruitment and training.

Capital Control Variable
Coded from IMF's *Annual Report on Exchange Arrangement and Exchange Restrictions* by Nancy Brune and Geoffrey Garrett; see Brune (2003)

Other variables
The following series are from World Bank's *World Development Indicators*:
GDP (constant 1995 US$)
GDP (current US$)
GDP per capita (constant 1995 US$)
GDP per capita, PPP (current international $)
GDP, PPP (current international $)
Interest rate spread (lending rate minus deposit rate)
Interest rate spread (lending rate minus LIBOR)
Lending interest rate (%)
Credit to private sector (% of GDP)
Deposit interest rate (%)
Domestic credit provided by banking sector (% of GDP)
Market capitalization of listed companies (% of GDP)
Market capitalization of listed companies (current US$)
Overall budget deficit, including grants (% of GDP)
Real effective exchange rate index (1995 = 100)
S&P/IFC investable index (annual % change)
Stocks traded, total value (% of GDP)
Stocks traded, turnover ratio (%)

Table 1
Total Outstanding External Finance
(in Percentages of GDP)

	Domestic Credit Provided by Banking Sector	Stock Market Capitalization	Outstanding Domestic Debt Securities		
			Issued by Corporate Issuers	Issued by Public Sector	Issued by Financial Institutions
Emerging Markets	**90.21**	**56.87**	**5.76**	**24.96**	**8.28**
Asia	**131.91**	**75.56**	**9.27**	**23.52**	**12.00**
China	140.59	45.21	0.90	25.04	8.80
Hong Kong	141.98	310.81	3.07	11.78	11.90
Malaysia	156.23	135.92	50.40	36.57	7.54
Singapore	102.95	138.25	6.71	34.16	20.61
South Korea	110.37	54.97	27.84	18.32	23.20
Thailand	112.03	31.67	4.96	26.17	0.35
Latin America	**41.21**	**38.70**	**1.73**	**26.12**	**4.53**
Argentina	37.13	71.62	2.71	9.11	2.04
Brazil	59.19	37.06	0.56	51.99	9.40
Chile	76.74	89.28	8.82	29.76	13.86
Mexico	24.69	20.49	1.52	12.10	0.68
Central Europe	**42.48**	**16.04**	**1.23**	**29.32**	**0.92**
Czech Republic	51.84	16.22	4.79	36.35	4.61
Hungary	49.54	19.80	1.53	35.31	0.00
Poland	37.34	14.85	0.00	25.26	0.00
Developed Countries	**194.13**	**122.92**	**20.55**	**85.18**	**33.64**
Australia	93.99	101.55	12.25	17.13	16.75
Canada	93.18	90.86	10.50	59.60	14.33
Japan	308.67	92.10	16.48	104.45	15.94
New Zealand	120.00	36.82	0.00	28.36	0.00
United States	160.56	137.48	23.90	83.53	43.32
Europe	121.30	156.25	8.05	44.12	28.44

Source: WDI and BIS

Table 2
Composition of External Finance
(in Percentages of Total)

	Domestic credit provided by banking sector	Stock Market Capitalization	Outstanding Domestic Debt Securities by Corporate Issuers and Public Sector
Emerging Markets	**50.74**	**31.98**	**17.28**
Asia	**54.90**	**31.45**	**13.65**
China	66.40	21.35	12.25
Hong Kong	30.36	66.46	3.17
Malaysia	41.21	35.85	22.94
Singapore	36.50	49.01	14.49
South Korea	52.18	25.99	21.82
Thailand	64.08	18.11	17.81
Latin America	**38.24**	**35.91**	**25.85**
Argentina	30.79	59.40	9.80
Brazil	39.78	24.91	35.31
Chile	37.51	43.64	18.86
Mexico	41.99	34.85	23.17
Central Europe	**47.69**	**18.01**	**34.30**
Czech Republic	47.48	14.85	37.67
Hungary	46.66	18.65	34.69
Poland	48.21	19.18	32.61
Developed Countries	**45.92**	**29.08**	**25.01**
Australia	41.79	45.15	13.06
Canada	36.66	35.75	27.58
Japan	59.17	17.65	23.18
New Zealand	64.80	19.88	15.32
United States	39.60	33.91	26.50
Europe	42.32	38.72	18.96

Source: See Table 1

Table 3
New External Finance in Emerging Markets
(as percentages of GDP)

	1997	1998	1999	2000	2001
Emerging markets	**22.47**	**27.03**	**18.69**	**23.20**	**20.28**
Domestic	**18.05**	**24.47**	**15.77**	**19.56**	**17.33**
Equities	1.00	0.92	1.26	0.67	0.54
Bonds					
Private	0.30	0.33	0.30	2.59	3.25
Public	10.45	17.73	11.50	10.25	9.09
Bank loans					
Private	4.55	4.49	2.25	5.29	2.72
Public	1.74	1.00	0.46	0.76	1.72
International	**4.42**	**2.56**	**2.93**	**3.64**	**2.95**
Equities	0.50	0.16	0.46	0.84	0.25
Bonds					
Private	1.12	0.56	0.64	0.58	0.88
Public	1.12	0.81	1.01	0.86	0.83
Bank loans					
Private	1.14	0.61	0.65	1.04	0.79
Public	0.54	0.42	0.18	0.32	0.20
Asia	**12.63**	**15.88**	**16.77**	**19.72**	**22.20**
Domestic	**8.46**	**14.38**	**14.57**	**16.21**	**19.03**
Equities	1.49	0.99	1.93	1.03	0.60
Bonds					
Private	0.00	0.00	0.05	2.12	3.00
Public	0.36	2.52	2.49	2.78	5.28
Bank loans					
Private	6.70	7.56	8.54	9.08	7.53
Public	-0.09	3.31	1.56	1.21	2.61
International	**4.16**	**1.50**	**2.20**	**3.51**	**3.16**
Equities	0.55	0.24	0.76	1.32	0.43
Bonds					
Private	1.04	0.20	0.45	0.62	1.21
Public	0.74	0.35	0.54	0.39	0.57
Bank loans					
Private	1.18	0.27	0.26	0.81	0.80
Public	0.65	0.43	0.21	0.37	0.16
Central Europe	**20.88**	**30.19**	**24.52**	**24.30**	**33.47**
Domestic	**17.52**	**26.81**	**21.49**	**21.67**	**31.08**
Equities	0.54	2.52	1.30	0.51	0.34
Bonds					
Private	0.21	0.11	0.13	0.07	0.11
Public	17.69	18.03	23.07	22.35	22.85
Bank loans					
Private	1.46	4.50	-1.48	0.45	4.24
Public	-2.38	1.66	-1.53	-1.71	3.54
International	**3.36**	**3.38**	**3.03**	**2.63**	**2.39**
Equities	1.07	0.56	0.45	0.15	0.00

Bonds					
Private	0.52	0.82	0.69	0.33	0.66
Public	0.52	0.96	1.05	0.50	0.78
Bank loans					
Private	0.73	0.55	0.49	1.49	0.43
Public	0.52	0.50	0.35	0.17	0.52
Latin America	**34.52**	**38.45**	**20.20**	**27.59**	**15.35**
Domestic	**29.63**	**34.89**	**16.31**	**23.60**	**12.55**
Equities	0.50	0.60	0.33	0.23	0.50
Bonds					
Private	0.67	0.72	0.68	3.61	4.17
Public	21.44	33.98	21.50	18.05	11.08
Bank loans					
Private	2.46	1.19	-5.56	1.12	-3.47
Public	4.56	-1.59	-0.65	0.59	0.27
International	**4.89**	**3.55**	**3.89**	**3.99**	**2.80**
Equities	0.34	0.00	0.05	0.33	0.08
Bonds					
Private	1.32	0.91	0.89	0.56	0.52
Public	1.67	1.27	1.64	1.54	1.17
Bank loans					
Private	1.15	0.98	1.21	1.27	0.84
Public	0.41	0.39	0.11	0.28	0.19

Notes:
- Dollar amounts are from Tables 4.2 and 4.3 in IMF's Global Financial Stability Report: Market Developments and Issues (March 2003) GDP are from Worldbank's World Development Indicators.
- Emerging markets include China, Hong Kong SAR, Korea, Malaysia, Singapore, Thailand, Argentina, Brazil, Chile, Mexico, Czech Republic, Hungary, and Poland.

Table 4
Correlations of Explanatory Variables

	GDP, PPP	Exports to GDP (%)	Dummy for Asia	Dummy for English Legal Origin	Distance from Equator	Investment Profile	Law and Order	GDP per capita, PPP	Corruption	Accounting Standards	Bank Credits	Concentration in Banking Sector	Bureaucracy Quality	Interest Rate Volatility	Interest Rate Spread	Exchange Rate Volatility	Budget Balance (% of GDP) 3-Year Moving Average
GDP, PPP	1																
Exports to GDP (%)	-0.2511	1															
Dummy for Asia	-0.1045	0.517	1														
Dummy for English Legal Origin	0.2960	0.3069	0.2452	1													
Distance from Equator	0.0131	-0.4452	-0.6842	-0.3749	1												
Investment Profile	0.1807	0.1415	-0.1082	0.0953	-0.0496	1											
Law and Order	0.1658	0.0917	-0.3004	0.2509	0.5557	0.0247	1										
GDP per capita, PPP	0.4217	-0.0032	-0.4491	0.1586	0.6141	0.171	0.7602	1									
Corruption	-0.0273	-0.0552	-0.3841	-0.0111	0.6711	-0.0405	0.6468	0.6298	1								
Accounting Standards	0.1402	0.3326	0.1509	0.4985	0.1489	-0.0344	0.4411	0.4720	0.4028	1							
Bank Credit	0.3339	0.0322	0.1145	0.1976	0.1700	-0.0498	0.4414	0.4301	0.2420	0.3269	1						
Concentration in Banking Sector	-0.5322	0.2670	-0.1784	-0.1083	0.2408	-0.0719	0.1574	0.1041	0.4159	0.2559	-0.1242	1					
Bureaucracy Quality	0.2337	0.0745	-0.3017	0.2666	0.5625	0.1557	0.7582	0.8176	0.7016	0.5669	0.4373	0.1927	1				
Interest Rate Volatility	-0.1436	-0.1417	0.0729	-0.2013	-0.3703	-0.0713	-0.6644	-0.5824	-0.4733	-0.3767	-0.3942	-0.0222	-0.5799	1			
Interest Rate Spread	-0.1516	-0.2699	-0.0111	-0.2893	-0.2219	-0.2787	-0.6057	-0.5791	-0.295	-0.3633	-0.389	-0.0602	-0.5275	0.7165	1		
Exchange Rate Volatility	-0.2516	-0.0326	-0.0347	-0.2457	0.1406	-0.2046	-0.0866	-0.0696	0.0998	0.0258	0.1191	0.1883	-0.0383	0.1795	0.2693	1	
Budget Balance 3-Year Moving Average	-0.0459	0.5713	0.4628	0.3817	-0.549	0.3514	-0.087	-0.1121	-0.2364	0.1223	-0.0909	-0.0481	-0.0294	0.0907	-0.1719	-0.1969	1

Table 5
Multivariate Analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP, PPP (current international billion $)	0.010	0.012	0.012					0.012
	(7.97)***	(11.72)***	(11.98)***					(19.04)***
Exports to GDP (%)	0.209	0.237	0.351					0.265
	(3.53)***	(4.19)***	(8.25)***					(5.02)***
Dummy for Asia	-32.702	-29.669	-10.674					-16.899
	(6.33)***	(7.23)***	(3.81)***					(4.85)***
Dummy for English Legal Origin		-9.492	-3.587					-18.426
		(4.96)***	(1.17)					(3.74)***
Distance from Equator			110.339					65.177
			(11.79)***					(4.10)***
Investment Profile				-0.371				-0.542
				(1.97)**				(1.71)*
Law and Order				-0.674				0.808
				(1.47)				(0.82)
GDP per capita, PPP (current international thousand $)				3.179				-0.291
				(30.53)***				(1.26)
Corruption					3.383			0.023
					(4.90)***			(0.03)
Accounting Standards (La Porta et al (1998))					0.630			0.775
					(6.66)***			(3.47)***
Domestic credit provided by banking sector (% of GDP)						0.213		0.090
						(9.17)***		(2.84)***
Concentration in Banking Sector						-9.031		-18.909
						(3.47)***		(4.60)***
Bureaucracy Quality						12.327		1.554
						(11.10)***		(1.17)
Standard deviation of inter-bank interest rates							-0.222	0.605
							(0.83)	(2.19)**
Interest Rate Spread (Inter-bank rate minus LIBOR)							-0.713	-0.484
							(5.65)***	(3.47)***
Standard deviation of change in log of exchange rates							39.393	-5.936
							(1.87)*	(0.34)
IMF Capital Controls Dummy Variable							3.226	2.641
							(2.87)***	(1.85)*
Constant	45.368	46.363	-3.903	13.413	7.538	2.535	52.352	-25.739
	(23.25)***	(26.75)***	(0.86)	(5.24)***	(1.26)	(0.63)	(42.46)***	(2.75)***
Observations	475	475	421	469	395	405	400	284
Number of id	41	41	36	41	34	41	38	30

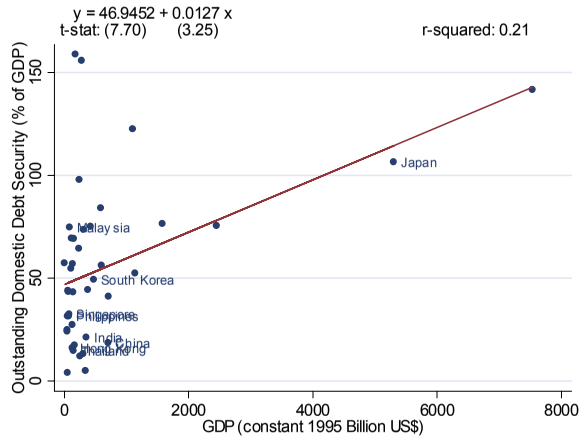
Absolute value of z statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 6.
Sensitivity Analysis

	(1)	(2)	(3)	(4)	(5)	(7)	(8)
		Total			Private		Public
GDP, PPP (current international billion $)	0.011	0.011	0.005	0.006	0.005	0.006	0.010
	(13.78)***	(12.75)***	(3.95)***	(13.00)***	(13.43)***	(5.99)***	(9.09)***
Exports to GDP (%)	0.176	0.159	0.113	0.130	0.106	0.131	0.236
	(2.45)**	(1.87)*	(3.58)***	(3.59)***	(3.10)***	(3.03)***	(6.05)***
Dummy for Asia	7.484	5.217	13.259	8.805	7.743	8.673	-8.124
	(1.26)	(0.80)	(4.94)***	(3.90)***	(3.07)***	(1.57)	(1.71)*
Dummy for English Legal Origin	-4.718	-7.270	-20.759	-15.939	-14.394	9.714	4.957
	(1.16)	(1.54)	(8.35)***	(7.59)***	(7.20)***	(2.77)***	(1.55)
Distance from Equator	111.762	79.264	69.202	58.224	48.715	73.631	63.661
	(6.02)***	(4.08)***	(8.02)***	(6.91)***	(6.18)***	(6.03)***	(6.03)***
Investment Profile	0.357	0.111	0.187	-0.149	-0.087	0.260	-0.028
	(1.06)	(0.33)	(1.31)	(0.97)	(0.59)	(1.14)	(0.11)
Law and Order	2.066	-0.097	-0.387	0.217	0.288	1.452	1.021
	(2.08)**	(0.09)	(1.07)	(0.49)	(0.65)	(1.87)*	(1.18)
GDP per capita, PPP (current international thousand $)	-0.035	0.662	-0.372	-0.143	-0.203	-0.712	-0.745
	(0.09)	(1.65)*	(2.21)**	(0.70)	(1.09)	(2.58)***	(2.95)***
Corruption	2.500	2.552	0.201	1.208	1.353	0.456	0.978
	(2.99)***	(2.73)***	(0.57)	(3.03)***	(3.58)***	(0.72)	(1.34)
Accounting Standards (La Porta et al (1998))	0.330	-0.095	0.351	0.480	0.446	-0.134	0.102
	(1.72)*	(0.32)	(4.01)***	(5.83)***	(5.56)***	(0.69)	(0.60)
Domestic credit provided by banking sector (% of GDP)	0.039	0.004	0.071	0.070	0.103	0.040	0.092
	(0.89)	(0.08)	(4.25)***	(3.52)***	(4.89)***	(1.29)	(3.05)***
Concentration in Banking Sector	-11.878	-20.028	-4.101	-2.739	-1.279	-11.415	-11.823
	(2.63)***	(3.87)***	(1.68)*	(1.12)	(0.51)	(3.30)***	(3.35)***
Bureaucracy Quality	-1.397	-0.554	1.114	1.544	1.754	-1.665	-1.571
	(1.06)	(0.32)	(2.04)**	(2.68)***	(3.17)***	(1.67)*	(1.28)
Standard deviation of inter-bank interest rates	0.509	0.295	0.159	0.084	0.110	0.218	0.191
	(2.02)**	(0.87)	(1.55)	(0.78)	(1.07)	(1.00)	(0.81)
Interest Rate Spread (Inter-bank rate minus LIBOR)	-0.391	-0.289	-0.104	-0.116	-0.166	-0.285	-0.295
	(3.25)***	(1.85)*	(1.80)*	(1.91)*	(2.81)***	(2.81)***	(2.69)***
Standard deviation of change in log of exchange rates	-57.932	-95.382	-17.051	-21.608	-25.153	-31.280	-38.613
	(3.07)***	(4.21)***	(2.14)**	(2.24)**	(2.51)**	(2.23)**	(2.63)***
IMF Capital Controls Dummy Variable. (1= if capital account is open)	5.740	4.859	-0.218	1.336	1.056	4.385	5.667
	(3.24)***	(2.81)***	(0.29)	(1.44)	(1.20)	(3.00)***	(4.07)***
Fiscal Balance (% of GDP) 3-Year Moving Average	-1.357			0.165		-1.204	
	(5.91)***			(1.58)		(6.83)***	
Lagged Overall Budget Balance (% of GDP)		-0.871			0.078		-0.348
		(5.09)***			(1.21)		(2.52)**
Outstanding Domestic Debt Security issued by Public Sector (% of GDP)			1.094				
			(45.88)***				
Constant	-41.317	9.632	-36.844	-49.076	-45.686	7.940	-8.686
	(3.93)***	(0.63)	(7.52)***	(9.93)***	(9.84)***	(0.71)	(0.91)
Observations	231	235	284	231	235	231	235
Number of id	28	29	30	28	29	28	29

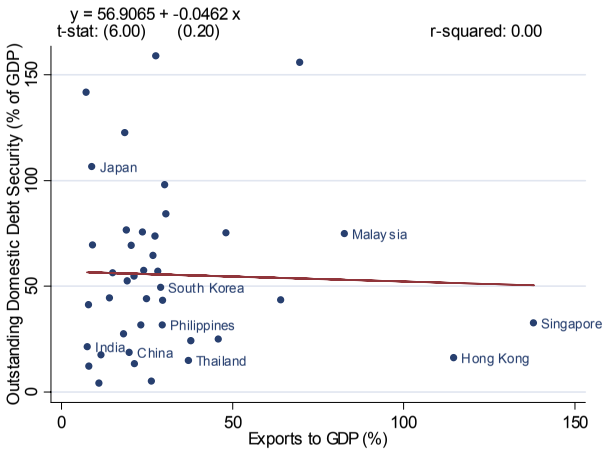
Absolute value of z statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Figure 1. Bond Markets and Country Size



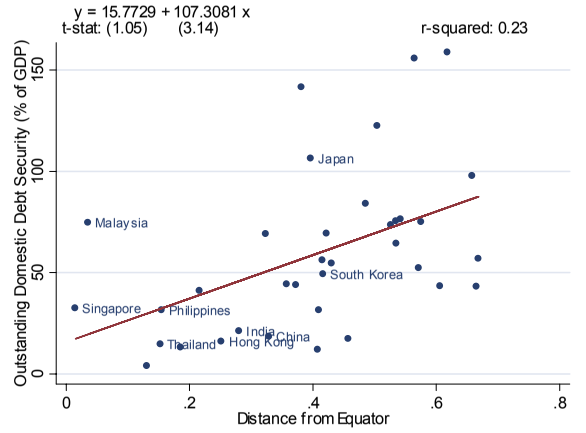
Source: WDI

Figure 2. Bond Markets and Exports to GDP



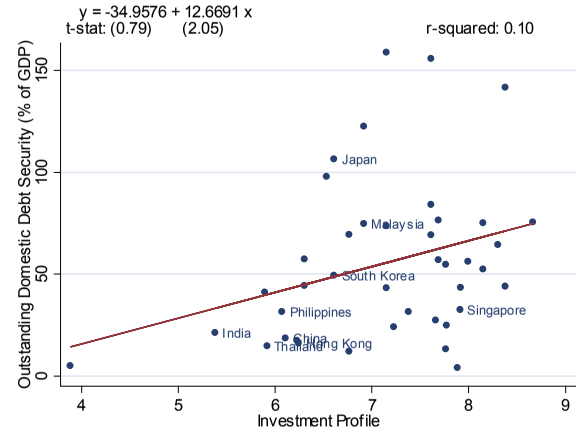
Source: WDI

Figure 3. Bond Markets and Distance from Equator



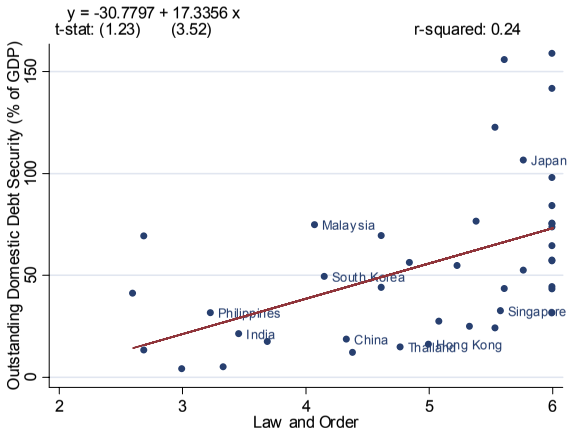
Source: La Porta et.al. (1999)
Note: Measured by absolute value of the latitude of a country, scaled between zero and one.

Figure 4. Bond Markets and Investment Profile



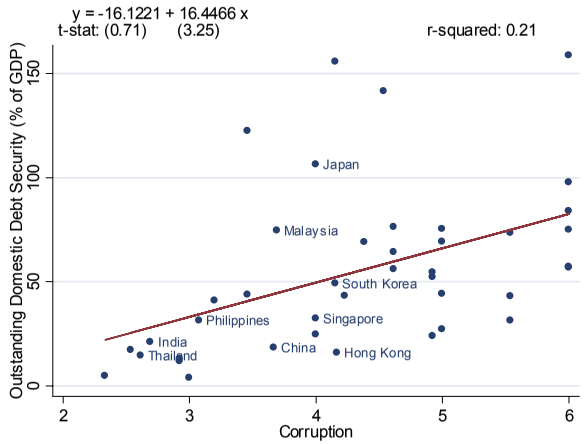
Source: ICRG
Note: See Data Appendix

Figure 5. Bond Markets and Law and Order



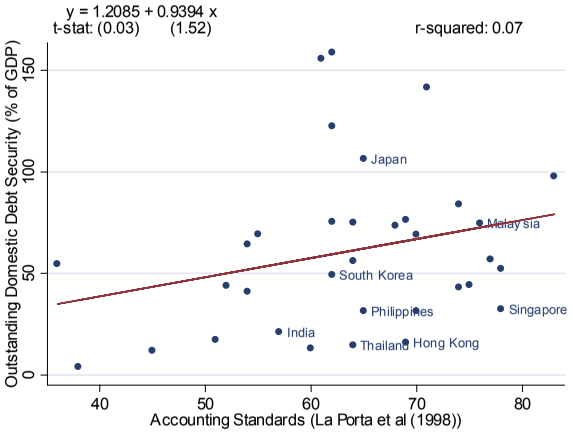
Source: ICRG
Note: See Data Appendix

Figure 6. Bond Markets and Corruption



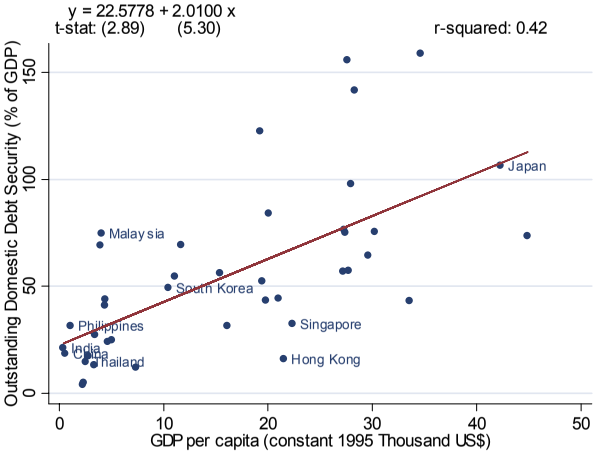
Source: ICRG
Note: See Data Appendix

Figure 7. Bond Markets and Accounting Standards



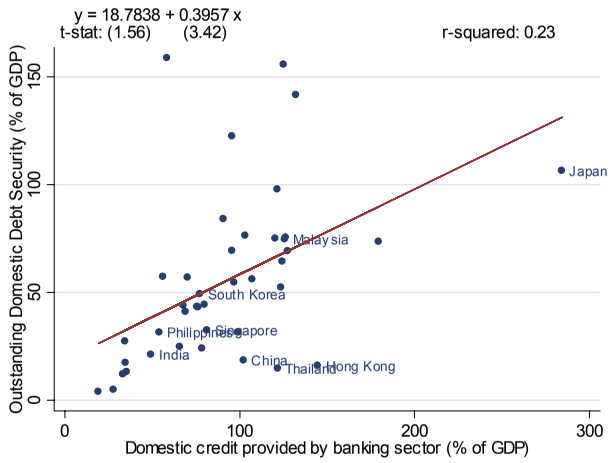
Source: Le Porta et. al. (1998)
Note: A higher score means a better accounting standard.

Figure 8. Bond Markets and GDP Per Capita



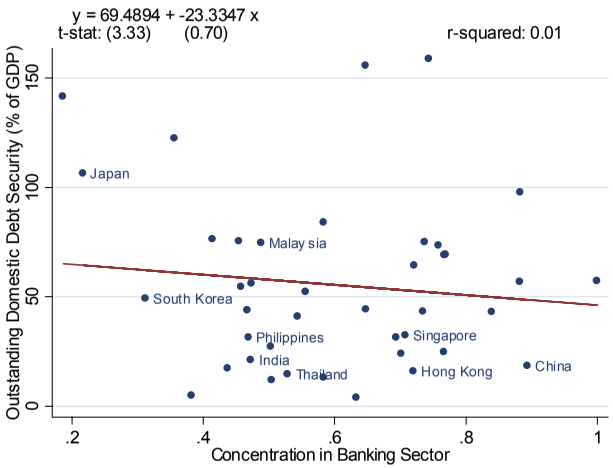
Source: WDI

Figure 9. Bond Markets and Banking Sector Development



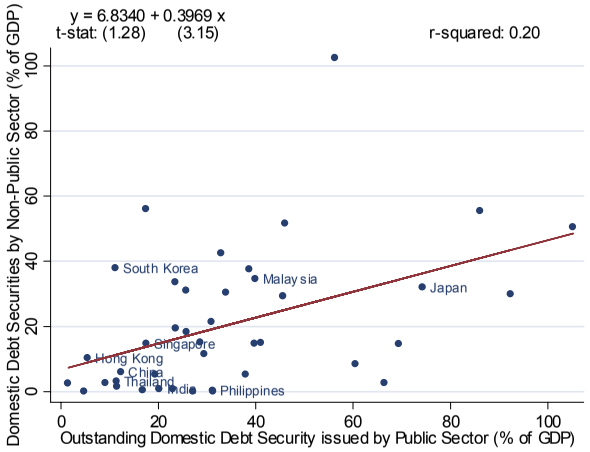
Source: WDI

Figure 10. Bond Markets and Bank Concentration



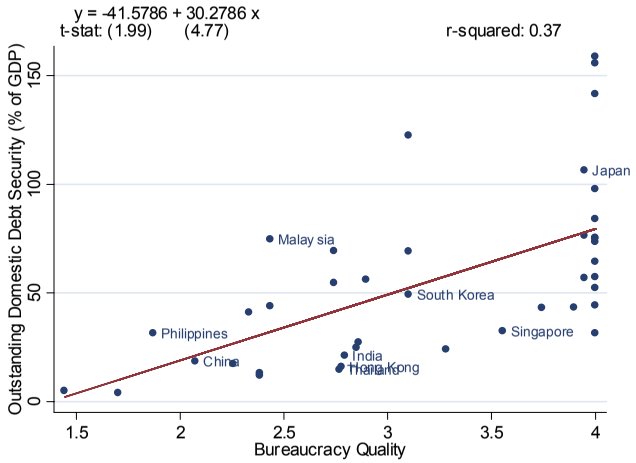
Source: Beck, Demirgüç-Kunt, and Levine (1999)

Figure 11. Public and Private Sector Bond Market Development



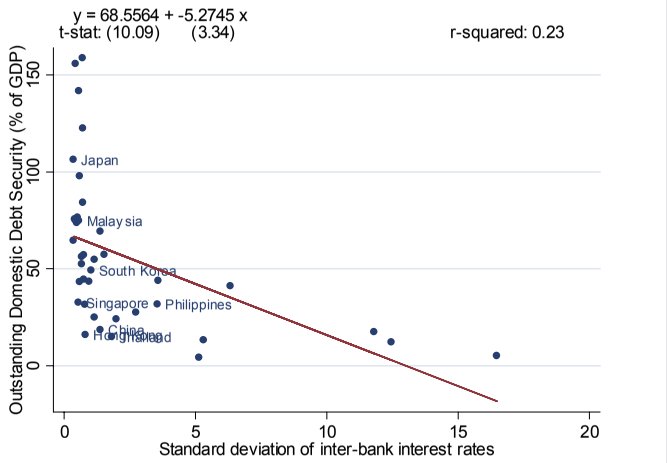
Source: BIS

Figure 12. Bond Markets and Bureaucratic Quality



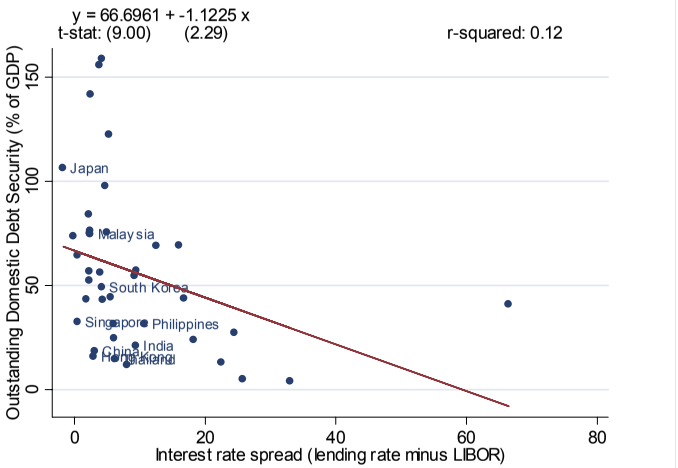
Source: ICRG
Note: See Data Appendix

Figure 13. Bond Markets and Interest Rate Volatility



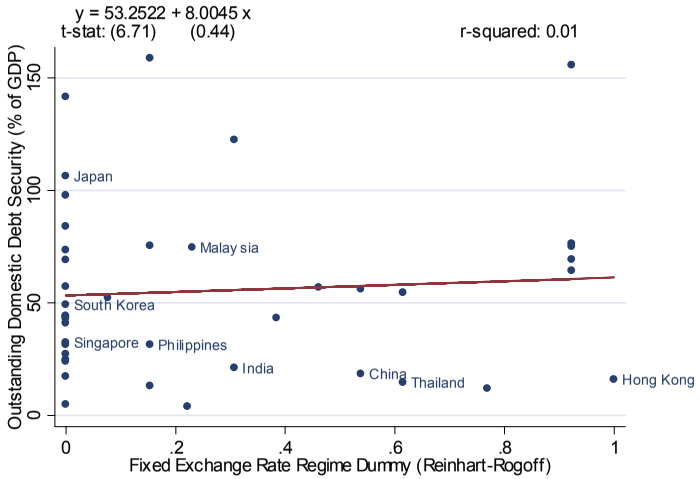
Source: Global Financial Database (GFD) and authors' calculation

Figure 14. Bond Markets and the Level of Interest Rates



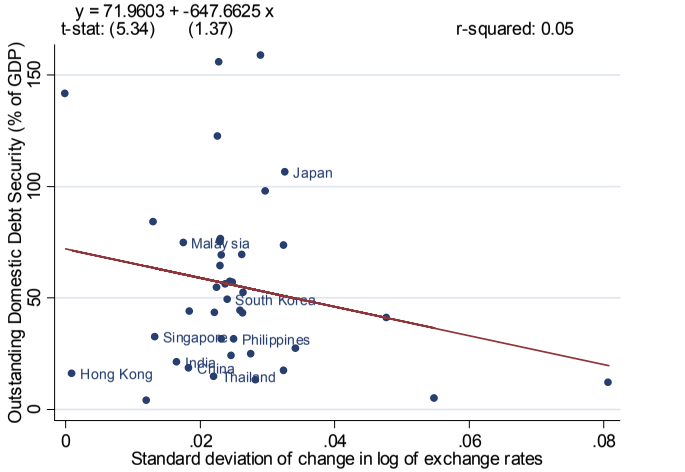
Source: GFD and WDI

Figure 15. Bond Markets and Fixed Exchange Rate Regime



Source: Reinhart-Rogoff (2002)

Figure 16. Bond Markets and Exchange Rate Volatility



Source: IFS and authors' calculation

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