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MARKET DEVELOPMENT FOR FIXED INCOME SECURITIES: THE ROLE OF SOCIO-ECONOMIC AND INSTITUTIONAL FACTORS

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THE ROLE OF SOCIO-ECONOMIC AND INSTITUTIONAL FACTORS

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Abstract:

It is well understood that bond markets play an important role in the development of the overall financial sector. Bond markets also help to make efficient investment and financing decisions, to improve efficiency in the design and implementation of monetary policy, provide financial stability by mitigating rollover risk and interest rate risk for the borrowers, provide an alternative source of finance to firms and thus reduce the monopoly of the banking sector. Given the importance of this market, this paper aims to investigate the factors that may be important for developing a market for domestic bonds. First, we discuss the importance of macro- and microeconomic factors in the development of a government bond market. We focus on the role of socio-economic and institutional factors in a country's bond market development. For empirical purposes, we extend the model used by Claessens, Klingebiel, and Schmukler (2003) by including a number of socio-economic and institutional variables and see if they are important in influencing the size of the domestic bond market. For empirical estimation, we use data on macroeconomic indicators and a set of social and institutional indices for a panel of developed and emerging markets. The empirical findings of this paper suggest that socio-economic and institutional factors play an important role in determining the size of the market for local currency bonds.

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1. INTRODUCTION

It is well understood that bond markets play an important role in the development of the overall financial sector. A bond market has significant importance in any economy but more so in emerging economies where saving and investment opportunities are limited. The benefits of the development of a market for domestic bonds include both macroeconomic and microeconomic perspectives.[1] The set of macroeconomic conditions include fiscal discipline, monetary conditions, choice of exchange rate regime as well as overall financial sector development. It seems to be unrealistic to plan policies for bond market development without establishing certain norms of macroeconomic stability and financial sector reform. Within these macroeconomic conditions, fiscal discipline takes first precedence. Economic theory suggests that a high level of fiscal deficits will increase interest rates. These deficits will also increase the risk of default and the cost of government debt, thus making it difficult to develop a liquid nominal bond market. In order to reduce market uncertainty, the government must provide fiscal discipline. Monetary stability is another important pre-requisite. High fiscal deficits financed through the central bank leads to high inflation and high inflationary expectations. High inflation and large fiscal deficits discourage the long-term investment projects needed for sustainable development. Spreads between expected and realized inflation discourages investors, increases the cost of funds and thus affects market efficiency. Credible commitment on the part of the central bank to contain inflation helps to reduce such uncertainties. The third pre-requisite is exchange rate stability. Exchange rate and capital account policies impact government bond yields and increase exchange rate and default premiums. The central bank and the monetary authority should be careful in designing and implementing exchange rate and capital account policies. For instance, too many restrictions on capital accounts will be categorized as financial repression while no restrictions could expose the economy to high risks.[2]

Among microeconomic conditions, building market participants takes the first preference. Emerging economies face numerous problems in building market participants due to the lack of incentives for issuers, a strict regulatory structure, the absence of a diversified portfolio, the lack of sufficient finances for dealers, and the absence of a hedge market and instruments. The experience of some early reformers shows that a balanced regulatory structure without

[1] See Shin (2000), Kim (2001), Shah and Thomas (2002), Park and Park (2003), Jiang and McCauley (2004), and Khalid (2006) for more details.
[2] For more details see Harwood (2000), Valle (2001).

sacrificing prudential standards and removal of unnecessary information disclosure would help the development of a bond market. The second issue in the development of a domestic bond market is the lack of commitment on the part of the government. The existence of multiple regulatory authorities as well as a lack of coordination among them hinders the development of a bond market. Banking sector development also takes a central role. A weak banking system cannot support the corporate bond market. At the same time, a dominant banking system hinders the development of a corporate bond market.[3]

From the early 1980s to mid 1990s, many East Asian and Southeast Asian countries embarked on policies of financial sector reforms, liberalization, deregulation and financial market developments. By the mid 1990s, most of these countries were enjoying the benefits of a liberalized financial market and an open economy. One area where these financial markets lacked was the development of a domestic bond market, especially a secondary market for government bonds. Asia Bond Monitor (2006) reports that "Emerging East Asia's bond market deepening is less impressive than its banking sectors as well as equity market deepening, with only Malaysia showing above-average performance". In view of these recent financial sector developments in emerging economies, it is imperative to assess why the development of a bond market could not keep the same pace as other sectors of the financial market. There are also many lessons to be learnt through the experiences of these relatively more developed economies.

Before we proceed any further, it may be instructive to compare the size of the domestic bond market among the sample countries. We look into the percentage of government, financial institutions and corporate sector participation for all securities issued. It is evident from Table 1 that there are significant differences in the size of the domestic bond market between developed and emerging economies. Table 1 presents the status of domestic debt securities for the 2003-2006 (as of March) period. The table shows that within emerging markets, domestic securities are mainly issued by the government and financial institutions and the corporate sector do not participate in debt securities. On the contrary, the numbers suggest that all three agencies equally participate in the domestic security market in the sample of developed countries.

INSERT TABLE 1 AROUND HERE

[3] Further readings on this issue include Cheung and Cham (2002), Eichengreen and Luengnaruemitchai (2004), Herring and Chatusripik (2000), Mihaljek, Scatigna, and Villar (2002), and Mohanty (2002).

This paper aims to explore the reasons for the slow development of bond markets in emerging economies. We exclusively discuss the role of economic, social and institutional factors in the development of a market for government bonds. For empirical purposes, we extend the model used by Claessens, Klingebiel, and Schmukler (2003) to incorporate a number of economic, social and institutional factors and their influence on the size of the domestic bond market. We use data on macroeconomic indicators and a set of social and institutional indices for a panel of developed and developing markets. For comparison purposes, we split the sample into three: (i) the developed economies, (ii) the emerging economies and (iii) the mixed sample. We compare bond market developments across the set of three sample countries and then draw lessons for emerging bond markets in Asia. To test the robustness of the empirical model we use both two-stage least square (2SLS) and GMM techniques.

The paper is organized in the following manner. In section 2, following this introduction, we provide a review of the theoretical and empirical literature. Testable hypothesis, data and empirical methodology are discussed in Section 3 while results of the empirical findings are discussed in Section 4. Finally, concluding remarks are made in section 5.

2. Domestic Bond Market Development: Theoretical and Empirical Literature

Gyntelberg (2006) site several reasons for illiquidity of both primary and secondary market for fixed income securities in Asia. He observes that the market for corporate bonds is more illiquid than for government bonds. The primary market for fixed income securities may be developed through policies to improve disclosure rules, accounting standards and transparency. The reasons responsible for this trend include limited diversity of the investor base, lack of market microstructure, market opaqueness (transparency, and flow of timely information). He argues policy makers in emerging markets should focus on these factors to compete with developed countries to attract investment in both domestic and foreign bonds.

Min (1998) used the yield determination to identify the cross-country differences in bond spreads. Using pooled data over the period 1991-95 for a large sample of countries, he looks at the overall and regional differences and finds that debt-to-GDP ratio, the international reserve-to-GDP ratio, the debt service ratio and export and import growth rate, domestic inflation rate,

net foreign assets, terms of trade, and real exchange rate are important determinants of the bond market spread. Ferrucci (2003) in a similar paper finds that a debtor country's fundamentals and external liquidity conditions are important determinants of market spread. Hanousek, Kocenda and Zemcik (2008) compare the behavioral differences between the Serbian bond market and developed markets. Using monthly data from September 2002 to December 2006, their results suggest that the transparency and liquidity of the secondary bond market should be increased by the enforcing of existing laws and stronger reporting requirements.

Claessens, Klingebiel and Schmukler (2003) looked at the role of macroeconomic and institutional factors in the development of the government bond market for domestic and foreign bonds. Using annual data for 36 countries over the period 1993-2000 they found that better fundamentals have a positive effect on the size of the government bond markets while the stock of foreign currency debt is more sensitive to these fundamentals than the stock of local currency debt. The policy variables that play a crucial role in the size of domestic bond markets include fiscal policy stance and exchange rate regime. In a similar paper, Eichengreen and Luengnaruemitchal (2004) discuss the issue of why Asia failed to develop a bigger bond market. They use a set of socio-economic and institutional factors for empirical estimation for a sample of 41 countries using data from 1990 to 2001. The empirical findings of their paper suggest a number of factors are responsible for the slow development of bond markets in Asia including their present size, strong fiscal balances, structural characteristics and macroeconomic and financial policies. FitzGerld and Krolzig (2005) suggest that shifts in demand in debt securities by US investors is influenced by volatility in emerging markets rather than shifts in the fundamentals.

Burger and Warnock (2006) investigate the determinants of bond market development for a sample of 49 countries (year end-2001) using a set of macroeconomic and regulatory factors. Their study finds that countries with stable inflation and strong creditor rights have more developed local bond markets and rely less on foreign-currency-denominated bonds. This study also finds that the necessary conditions for bond market development are very similar to banking sector development.

These studies show that the size of the domestic bond market is influenced by multiple factors. However, the existing literature has certain limitations. One, there are only a handful of studies available on this important issue. Two, the studies are limited to the pre-2000 period. Given

the fact that the financial system in many emerging economies changed significantly during the early period of 2000 (partly due to the rapid financial reforms and liberalization such as in China and India and partly through some polices in the aftermath of the 1997 Asian financial crisis as in East Asia), these studies do not account for the recent policy changes especially leading to some initiatives for the development of the domestic bond market. The aim of this paper is to overcome these limitations. In this study we revisit this issue by employing more recent data, establishing specific testable hypothesis and using more sophisticated econometric techniques. We split the sample into three (i) the developed economies, (ii) the emerging economies and (iii) the mixed sample.

3. Data and empirical methodology

This study follows a model similar to Claessens, Klingebiel and Schmukler (2003) and Eichengreen and Luengnaruemitchai (2004). This study, however, expands the earlier model, uses a recent data set and employs a much improved empirical methodology. The aim of this study is to investigate the development of the domestic bond market. Bond market development is determined by looking at the size of domestic bond market. Therefore, the testable hypothesis is to ascertain what determines the size of the market for domestic bonds. We hypothesize that the size of the market is influenced by three factors, namely, the macroeconomic factors, the social conditions and the institutional factors.

Data descriptions

The dependent variable is the size and composition of the domestic bond market. The size is measured by the ratio of the value of outstanding local currency bonds to GDP (GB/GDP) whereas the composition is measured using outstanding government bonds and total bonds. Both variables are used in log form. These two equations are then compared between the mix sample (total) of developed and emerging economies, only developed countries and only emerging economies.

The set of macroeconomic factors included in the model are economic growth, demand for bonds and inflation. Economic growth and financial sector development are expected to be positively correlated. A more developed financial system will encourage saving and investment activities and in turn will influence the size of the bond market. We therefore, expect economic growth to be positively related to the size of the bond market. Log of per capita GDP is used as a proxy for economic growth. Size of the banking system is a good indicator of the overall

development of the financial system. Eichengreen and Luengnaruemitchai (2004) argue that a well developed banking system may deprive or enhance the domestic bond market. It may deprive as banks and bonds compete as a source of external financing. On the contrary, banks serve as dealers and market makers and may help in the development of the domestic bond market. They suggest that the second effect is stronger and a developed banking system leads to bond market development. We use log of total deposits-to-GDP ratio to capture the effect of the size of the banking system which is expect to have a positive impact on the size of the domestic bond market. Inflation is expected to have a lagged effect on bond market activities. We use one period lagged inflation (computed through CPI) to see the influence of monetary policy on the bond market.

Two social factors are used in this study - corruption perception index, economic freedom index, and civil liberty index. Ciocchini, Durbin and Ng (2002) argue that countries with high corruption perception must pay a higher risk premium when issuing bonds. This would significantly increase the cost of issuing bonds making it difficult for the private sector to issue bonds. Economic freedom and civil liberty are expected to encourage investors, enhance market competition and provide more certain investment environment. Finally, we use capital market access index (CAI) as a proxy for institutional setting. The Milken Institute Capital Access Index measures the ability of businesses to have access to financial capital. The broad index measures the breadth, depth, vitality and openness of capital markets. As such, this is a good measure to assess the institutional setting in a country that is needed to have smooth market functioning including the market for domestic bonds. We also use macroeconomic environment (ME) as alternatives to CAI and institutional environment (IE). All social and institutional proxies are used with one lag.

We use a sample of 47 countries (23 developed and 24 emerging) over the period 1998-2007. The sample was selected to have maximum representation from different regions of the world. Our choice of emerging market countries was constrained by the data availability. We split the sample into three, the total sample (a mix of developed and emerging markets), developed countries and emerging market economies.

Data on outstanding bonds (government and total) is obtained from various issues of the Bank of International Settlement (BIS) annual reports. Data on macroeconomic variables (GDPPC, TD/GDP, and INF) is extracted from International Financial Statistics (IMF-IFS-CDROM).

Transparency International published data is used for corruption perception index (CPI). Economic freedom index (EFI) is published by the Heritage Foundation while the Freedom House published index for civil liberty (CLI).

Milken Institute published data is used for Capital market access index (CAI), macroeconomic environment (ME) and institutional environment (IE). The format of these indices has changed since its first publication in 1998. The range of the data for CAI is from 1 to 100, from 1 to 7 and from 1 to 10 respectively for the period from 1998-99, 2000-2004 and 2005-2007. To make it compatible, we rescaled the data to vary between 1 to 100.On the other hand ME and IE are rescaled between 1-10 as the available data for the period from 2000-2004 and 2005-2007 respectively range between 1-7 and 1-10.

Empirical methodology:

In this section, we discuss the empirical model used in this paper to investigate the effect of macroeconomic, social and institutional factors on Bond market performance (both government and government + private bonds) using a panel of 47 countries (23 developed and 24 emerging) over the period 1998-2007.

The underlying model with fixed effects takes the form

$$Ln(Bond_{it}/GDP_{it}) = b_1 LRGDPpc_{it} + b_2 Ln(TD_{it}/GDP_{it}) + b_3 INF_{it-1} + b_4 CPI_{it-1} + b_5 EFI_{it-1} + b_6 CAI_{it-1} + b_7 ME_{it-1} + b_8 CLI_{it-1} + h_i + f_t + e_{it} \quad (1)$$

where $Bond_{it}/GDP_{it}$ measures the outstanding bonds (government and total) in country i at time t. h_i is a country-specific fixed effect, f_t is a time effect and $e_{i,t}$ is a multivariate normally distributed random disturbance. A fixed effects model, rather than a random effects model is estimated, as the h_i's are likely to represent omitted country-specific characteristics which are

correlated with other explanatory variables.[4] The variables CAI and ME are interchangeably used in estimation to avoid the common correlations between them.

The system of equations described by equation (1) assumes that the random error terms are orthogonal to the country fixed effects and the time effects. Further, the errors are assumed to have positive variance and to be uncorrelated across cross-sectional units and time. To avoid the possible endogeneity problem arises from *Inf*, we estimate the parameters of equation (1) by two-stage least square procedure by letting the errors of equation (1) to satisfy the orthogonality condition $E(INF_{i,s}e_{i,t}) = 0, \quad \forall s < t-1.$ (2)

Assuming serially uncorrelated errors, the orthogonality conditions imply that the vector of instrumental variables available to identify the parameters of equation (2) has the form $Z_{i,t} = [INF_{i,t-2}, X_{i,t}]$. (3)

The variable $X_{i,t}$ comprises all other independent variables in model (1) other than *INF*.

The fixed effect model estimated above could be purely driven by time series information of the data. To overcome this problem, if we estimated the model by averaging the data and estimating the single cross-section (the between estimator) bias estimates could occur if the explanatory variables are correlated with the intercept. Hence we decided to estimate the model by taking two year averages which also reduces the measurement error. However, we find that the sign and statistical significance of the model described by (1) and the model based on two year averages remains the same. For the sake of brevity, we report the results for the full model described by (1) and the results for the two year averages can be made available from the authors upon request. The discussions of the results are reported in the next section.

[4] Hsiao (1986) shows that the generalized least squares estimator for the random effects model under an assumption of independence between the fixed effects and the explanatory variables is biased.

The robustness of our results also examined by including lagged dependent variable as an independent variable in the model and estimating the model using GMM technique.

The modified model with fixed effects takes the form

$$Ln(Bond_{it}/GDP_{it}) = b_0 Ln(Bond_{it-1}/GDP_{it-1}) + b_1 LRGDPpc_{it} + b_2 Ln(TD_{it}/GDP_{it}) + b_3 INF_{it-1} + b_4 CPI_{it-1} + b_5 EFI_{it-1} + b_6 CAI_{it-1} + b_7 ME_{it-1} + b_8 CLI_{it-1} + h_i + f_t + e_{it} \quad (4)$$

Due to the possible correlation between lagged endogenous variables and the errors in equation (4), the least squares dummy variable estimator produces biased parameter estimates when it is used to estimate equations with lagged values of the dependent variable and fixed effects in a data set with a small dimension (see Nickell, 1981; Kiviet, 1995 and Judson and Owen, 1999).

Accordingly, we remove the fixed effects by differencing. Equation (4) can therefore be written as

$$\Delta Ln(Bond_{it}/GDP_{it}) = b_0 \Delta Ln(Bond_{it-1}/GDP_{it-1}) + b_1 \Delta LRGDPpc_{it} + b_2 \Delta Ln(TD_{it}/GDP_{it}) + b_3 \Delta INF_{it-1} + b_4 \Delta CPI_{it-1} + b_5 \Delta EFI_{it-1} + b_6 \Delta CAI_{it-1} + b_7 \Delta ME_{it-1} + b_8 \Delta CLI_{it-1} + \Delta h_i + \Delta f_t + \Delta e_{it} \quad (5)$$

We estimate the parameters of equation (5) by the generalized methods of moments (GMM) technique proposed by Arellano and Bond (1991). This technique uses the pre-determined lags of the system variables as instruments to exploit a potentially large set of over-identifying restrictions and provides consistent coefficient estimates.

The errors of equation (6) satisfy the following orthogonality conditions

$$E(\Delta Ln(Bond_{is}/GDP_{is})\Delta e_{i,t}) = E(\Delta X_{i,s}\Delta e_{i,t}) = 0, \quad \forall s < t-1. \quad (6)$$

Assuming serially uncorrelated errors, the orthogonality conditions imply that the vector of instrumental variables available to identify the parameters of equation (6) has the form

$$Z_{i,t} = [Ln(Bond_{it-2}/GDP_{it-2}),...,Ln(Bond_{i1}/GDP_{i1}); X_{i,t-2},...,X_{i,1}]. \quad (7)$$

Letting Z_i^* be a block diagonal matrix whose m^{th} block is given by equation (7), for $m = 1,...,T-2$, the matrix of instrumental variables is $Z = (Z_1^*,...,Z_N^*)'$.

The one-step GMM estimator for the $K \times 1$ coefficient vector in equation (4) is given by[5]

$$\hat{d} = \left(\tilde{X}^{*\prime} Z A_N Z' \tilde{X}^*\right)^{-1} \tilde{X}^{*\prime} Z A_N Z' Ln(\text{Bond}_{\text{it}}/\text{GDP}_{\text{it}}), \qquad (8)$$

$A_N = \left(\frac{1}{N}\sum_i^N Z_i^{*\prime} H Z_i^*\right)^{-1}$, with H a $T-2$ square matrix with 2's in the main diagonal, -1's in the first sub-diagonal and 0's elsewhere, and $\tilde{X}^*$ is the $N(T-1) \times K$ design matrix stacked by cross-sectional units with typical row

$$\tilde{X}_{i,t}^* = [LRGDPpc_{it}, Ln(TD_{it}/GDP_{it}), INF_{it-1}, CPI_{it-1}, EFI_{it-1}, CAI_{it-1}, ME_{it-1}, CLI_{it-1}, h_i, f_t]$$

(9)

Finally, the asymptotic variance-covariance matrix of the GMM coefficient vector is given by

$$a\,\text{var}(\hat{d}) = N\left(\tilde{X}^{*\prime} Z A_N Z' \tilde{X}^*\right)^{-1} \tilde{X}^{*\prime} Z A_N V_N A_N Z' \tilde{X}^* \left(\tilde{X}^{*\prime} Z A_N Z' \tilde{X}^*\right)^{-1}, \quad (10)$$

where $V_N = N^{-1}\sum_i^N Z_i' e_i e_i' Z_i$ and the e_i's are the GMM residuals.

4. Results:

The research question and testable hypothesis under study in this paper is what role do economic, social and institutional factors play in determining the size of the domestic bond market. We first estimate the model using 2SLS technique. We use four different variants of the model discussed in section 3 above. All four variants include TD/GDP, INF, CPI, EF, and CLI as explanatory variables. The CIA and ME are used alternatively as a proxy for institutional development. We first use this model to see the impact on the domestic market for government bonds. The results for the fixed effect model described in equation (1) are reported

[5] Arellano and Bond (1991) and Judson and Owen (1999) provide more detail about one-step and two-step GMM estimators. Bond (2002) highlights that many applied work using these GMM estimators has focused on results for the one-step estimators rather than two-step estimator. The simulation study by Arellano and Bond (1991) shows that very modest gain in efficiency is observed using two-step procedure even in the presence of heteroskedasticity.

in Table 2. Columns 2 and 3 of Table 2 report the results of the combined sample (developed and emerging), columns 4 and 5 of Table 2 for developed countries and columns 6 and 7 report the results for emerging economies.

The results suggest that size of the economy proxied by per capital GDP is an important factor and have a significantly positive impact on the local currency outstanding bonds across all different specifications of the model. The same result holds for size of the banking system (TD/GDP) where banking system development has a significant and positive impact on the size of the domestic bond market. Inflation, as expected discourages investment in fixed income securities as returns in real term lose their value overtime. Although, the sign for INF is negative but the variable is statistically insignificant. As stated in section 3 above, a higher value for CPI means lower degree of corruption. As such, the results of our empirical model are consistent with the theoretical expectations and suggest a positive and statistically significant relationship between CPI and GB/GDP indicating that as a country develops and corruption declines, the investors' sentiment towards the domestic bond market changes, increasing the size of the market. However, the impact of the same variable diminishes when it is used with ME (macroeconomic environment index) and CLI (civil liberty). This may be due to the fact that an improvement in the macroeconomic environment and civil liberty helps to reduce corruption and the influence of CPI is minimized if both are used simultaneously.

Economic freedom (EFI) has a positive and significant influence on the domestic bond market and this result is consistent across all four variants of the model. We get a similar result when a measure of civil liberty (CLI) is included in the model. These results suggest that social conditions have an important and significant impact on the behavior of investors, operations of the market, and transactions in the market for domestic bonds.

The effect of institutional proxy CAI on the size of the domestic bond market is positive and significant. This suggests that as market breadth and depth improves, more transactions take place in the domestic bond market, making domestic bonds an alternate to the banking system's credit extension. Macroeconomic environment (ME), however, is not statistically significant even though it has a positive sign. Again, this may be due to some correlation between EFI, ME and CLI.

In general, the results are very much consistent across the three samples. One major difference is that the proxy for institutional setting (CAI and ME) becomes statistically insignificant when used for developed and emerging economies separately. This may be due to the small sample. Another major change in results is the statistical insignificance of CPI, a proxy for corruption perception for the sample of developed countries. This may be due to the fact that the countries included in the developed country sample have a much better track record of low corruption indicating not much change in this variable over the period analyzed.

INSERT TABLE 2 AROUND HERE

The next step is to test the same model for total domestic currency bonds and compare across the three samples. The results of this are reported in Table 3. We highlight the main differences between the two estimated models. It is interesting to note that inflation has a significant influence when included in the combined sample. The results suggest that higher inflation reduces the real value of returns and distorts investment including that in the domestic bond market. This result is consistent when the same model is regressed using emerging economies sample. Inflation (INF) is, however, statistically insignificant for the developed countries sample. It is true that emerging economies match the conditions of a small open economy where monetary policy is dictated by external shocks and to combat imported inflation. The results thus reflect the significant variation in inflation among emerging economies that create economic uncertainty and makes investors more sensitive to changes in real returns especially in the market for private debt securities where risk premium may not be enough to compensate underlying risks. The situation is different in developed markets where inflation is more stable as a result of underlying monetary policy and returns offered by issuers of private securities do reflect the realistic returns making it easy for investors to make investment decisions.

Secondly, the measure of economic openness (EFI) is statistically not significant for the developed countries sample. But the most striking results are that the measure of civil liberty (CLI) becomes statistically insignificant across the three samples when total outstanding bonds are used instead of government bonds. This may be due to the major involvement of financial institutions and the private sector in the domestic bond market in developed and early reformers in Asia. Under this scenario, civil liberty may not have much influence in determining the size of the domestic bond market.

Finally, an interesting change in this set of results is the statistical insignificance of CAI in all samples. However, ME (which is used as an alternate to CAI) is statistically significant with the correct sign. This result suggests that the state of the macroeconomic environment becomes an important factor in domestic bond market transactions when private security is added to government securities. Since ME is derived from a broad index of CAI, it can only reflect the major impact of the macroeconomic environment on the domestic bond market leaving other measures included in the construction of CAI irrelevant.

INSERT TABLE 3 AROUND HERE

The next task is to test the robustness of these empirical results by using GMM technique as an alternative. The main difference here is the inclusion of a lagged dependent variable. The GMM estimates are reported in tables 4 and 5. When $T > 3$, the model is over-identified and the validity of the assumptions used to obtain equation (5) can be tested using the standard GMM test of over-identifying restrictions or a Sargan test. We can conclude from the Sargan test statistics and the p-values reported in tables 3 and 4 that the moment conditions (equation (6)) are valid. In this context, the key identifying assumption that there is no serial correlation in the e_{it} disturbances can be tested by testing for no *second*-order serial correlation in the first-differenced residuals (see Arellano and Bond, 1991).[6] The results generally show the absence of serial correlation and that the estimated model satisfies the standard assumptions. Table 4 reports the results of the determinants of domestic government bonds. The lagged dependent variable is statistically significant across all three samples and suggests the importance of gradual market development. Most of the results of Table 4 are very much consistent with the results of Table 2 which shows the robustness of the model. We just highlight some differences here. The GMM estimation shows that the CPI variable is statistically significant in all three samples. The same trend is observed in other variables such as EFI and CLI. The results of the GMM estimation on the combined market (both government and private) are reported in Table 5. Again, we have very similar results as

[6] Negative first-order serial correlation is expected in the first-differenced residuals if e_{it} is serially uncorrelated.

reported in Table 3. The lagged dependent variable is consistently significant. The only difference is the significance of INF.

INSERT TABLE 4 AROUND HERE

INSERT TABLE 5 AROUND HERE

In summary, the results of the two different approaches are consistent. These results are also consistent with earlier studies on this issue. These results are summarized in Table 6. The empirical results of this paper found that macroeconomic factors such as size of the economy and banking system depth play a crucial role in determining the size of the domestic bond market. We cannot reject the role of socio-economic environment in the development of the bond market. These conditions especially play a significant role in the development of the domestic bond market in emerging economies. Finally, the institutional factors are equally important although the importance changes as we switch from developed to emerging economies.

INSERT TABLE 6 AROUND HERE

5. Concluding Remarks

This paper investigates the role of economic, social and institutional factors in the development of domestic bond markets with a focus on emerging economies. The empirical data suggest that until recently, even the countries categorized as newly developed East Asian economies with a history of stable economic growth and reasonably established money and capital markets had difficulty in setting up a market for domestic bonds. The relatively more developed markets in Asia have recently made some progress in developing a market for domestic government bonds. However, we observe that the pace of bond market development did not follow the pace of overall financial market development in many early reformers. This paper uses a variety of economic, social and institutional factors to determine the size of the domestic bond market for a sample of developed and emerging economies. The model is estimated

using 2SLS technique. To ensure the robustness of empirical tests, this paper uses GMM as an alternative method.

Using a moderate sample of 47 developed and emerging economies over a period of 10 years (1998-2007) and using 2SLs, this paper finds that most of the macroeconomic, social and institutional factors have significant importance in the determination of the size and composition of the domestic bond market. Specifically, the size of the economy, breadth and depth of the banking system, the monetary policy stance, degree of openness, level of corruption, the degree of civil liberty and status of market access to investors all play a crucial role in the determination of the domestic bond market. The results obtained using GMM as an alternate are consistent with the first set of results. This shows the robustness of the empirical estimation.

The paper uses up-to-date data and focuses on three important sets of variables namely; macroeconomic, social and institutional factors. The paper also provides estimates for the domestic and private bond markets and a comparison between developed and emerging markets. The robustness is checked by using two different estimation procedures. These are important features of this paper.

The paper offers some interesting and important policy implications. Most of the existing literature focuses on macroeconomic and environment and financial development to discuss the development of the domestic bond market. This paper extends this focus and includes other social and institutional factors that could play an important role in the development of domestic bond market. The paper also provides a comparison between the developed and emerging economies. Not only this helps to explain why emerging economies experienced a slow development of the domestic bond market, it could help central banks and policy makers in the emerging economies to broaden their policy horizon and emphasize on the institutional factors in their policy reform package.

The discussion provided in this paper and the estimation results indicate that the emerging economies do not meet most of the pre-conditions needed to develop an efficient bond market. The macroeconomic uncertainties and lack of complete information makes the decision making process difficult for market participants. It is important that policy makers have a good understanding of these uncertainties and take appropriate measures to remove them to have an

active and efficient bond market. Within a microeconomic perspective, it is well understood that the market for government bonds helps in the development of financial infrastructure, improvement in the efficiency of channels for savings and investments, the active and competitive role of banks in the financial industry, and building long-term financial sustainability. The government could use the domestic bond market to meet the short-term cash flow needs of the financial system. At the same time, the central bank can use these markets to pursue a targeted monetary policy. However, good coordination between the government (ministry of finance) and the monetary authority (the central bank) is essential to reap this benefit. This would also require a good information dissemination system related to money market conditions and the state of fiscal budgets on a regular basis. These could be considered as important policy implications.

This paper contributes to the existing literature by using the most recent data, splitting the sample into developed and emerging and incorporating institutional factors. Although, these are important contributions, the paper has certain limitations. For example, the exclusion of the exchange rate variable. This is not included as the focus is on local currency bonds and not on foreign bonds which are more sensitive to changes in exchange rates. Exclusion of other institutional factors such as rule of law, bureaucratic quality, etc may also be considered when data on such variables are available. Another possible extension of this paper could be to investigate the determination of foreign currency bonds and compare the results. This will also involve inclusion of some of the above stated variables not included in the present research. Nevertheless, the findings of this paper have important implications for central banks to initiate policies to establish secondary market for government bonds if they wish to maximize the benefits of monetary policy.

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Table 1: Domestic Debt Securities (As of March)

Countries	All Issuers (in billions US$)				Governments (in billions US$)				Financial Instituti (in billions US$		
	2003	2004	2005	2006	2003	2004	2005	2006	2003	2004	2005
Early Reformers in Asia											
South Korea	373	479	605	696	80	130	186	241	137	182	264
Taiwan	146	174	195	198	73	83	97	100	18	27	34
Malaysia	92	100	115	127	37	42	49	53	12	13	20
Thailand	47	59	69	88	28	31	37	42	4	7	10
Singapore	54	59	66	71	34	39	44	49	16	15	16
Emerging Economies in Asia											
China	389	528	732	1015	260	373	520	711	121	143	197
India	164	221	257	287	163	218	251	275	0	1	3
Pakistan	29	31	31	34	29	31	31	34	-	-	-
Developed Markets											
Australia	229	320	370	369	77	94	94	84	84	135	172
Canada	620	698	765	804	448	512	565	587	98	100	102
New Zealand	19	23	23	20	19	23	23	20	-	-	-
U.K.	748	938	1032	1069	451	594	665	716	271	313	337
U.S.A.	16540	17892	19448	21168	4693	5202	5721	6101	9378	10147	11093

SOURCE: BIS Quarterly Review, various issues.

Table 2: Determinants of Domestic Bonds - Government

Dependent Variable: Ln(DGB/GDP)						
	Total		**Developed Countries**		**Emerging Economies**	
LRGDPpc	0.15** (0.05)	0.17*** (0.06)	0.29*** (0.07)	0.37*** (0.08)	0.11*** (0.04)	0.14*** (0.05)
Ln(TD/GDP)	0.13** (0.06)	0.19*** (0.06)	0.34** (0.16)	0.28* (0.17)	0.12* (0.06)	0.17** (0.07)
INF(-1)	-0.004 (0.003)	-0.001 (0.003)	-0.003 (0.003)	-0.006 (0.004)	-0.003 (0.004)	-0.0001 (0.005)
CPI(-1)	0.06** (0.03)	0.04 (0.03)	0.04 (0.03)	0.05 (0.03)	0.18*** (0.06)	0.16* (0.08)
EFI(-1)	0.01*** (0.002)	0.01*** (0.003)	0.001*** (0.004)	0.001*** (0.003)	0.03*** (0.006)	0.03*** (0.008)
CAI(-1)	0.006* (0.003)		0.0005 (0.0008)		0.002 (0.006)	
ME(-1)		0.004 (0.01)		0.002 (0.002)		0.003 (0.02)
CLI(-1)	-0.08** (0.03)	-0.10*** (0.03)	-0.06*** (0.02)	-0.06*** (0.02)	-0.08** (0.04)	-0.08** (0.04)
C	0.75 (0.51)	1.16** (0.57)	-0.07*** (0.01)	-0.06*** (0.01)	1.37** (0.66)	2.34*** (0.81)
R-Square	0.11	0.11	0.48	0.50	0.21	0.20
AR(1)	1.09	0.93	1.38	0.55	0.72	0.63
AR(2)	1.11	1.04	1.55	0.93	1.64	1.19

Notes: a) Asymptotic standard errors are in the parentheses. ***, ** and * denote rejection of null of zero restriction at 1%, 5% and 10% levels of significance, respectively;

Table 3: Determinants of Domestic Bonds – Total (Government + Private)

Dependent Variable: Ln(DGB/GDP)						
	Total		**Developed Countries**		**Emerging Economies**	
LRGDPpc	0.098* (0.05)	0.11** (0.05)	0.47*** (0.09)	0.45*** (0.08)	0.023*** (0.007)	0.05*** (0.009)
Ln(TD/GDP)	0.23*** (0.06)	0.21*** (0.04)	0.32*** (0.09)	0.36*** (0.08)	0.18*** (0.04)	0.18*** (0.04)
INF(-1)	-0.01** (0.006)	-0.01** (0.005)	-0.0004 (0.01)	-0.002 (0.01)	-0.02** (0.007)	-0.02** (0.007)
CPI(-1)	0.04** (0.02)	0.05* (0.03)	0.06** (0.03)	0.07** (0.03)	0.03** (0.01)	0.09* (0.06)
EFI(-1)	0.008*** (0.003)	0.007*** (0.002)	0.002 (0.002)	0.003 (0.002)	0.03*** (0.009)	0.03*** (0.009)
CAI(-1)	0.0004 (0.003)		0.0004 (0.003)		0.001 (0.007)	
ME(-1)		0.02* (0.01)		0.02*** (0.008)		0.02* (0.01)
CLI(-1)	-0.04 (0.04)	-0.03 (0.04)	-0.07 (0.04)	-0.06 (0.04)	-0.01 (0.05)	-0.06 (0.05)
C	-1.02** (0.50)	-1.22 (0.51)	-4.67*** (0.93)	-4.22*** (0.87)	-0.25 (0.56)	-0.63 (0.62)
R-Square	0.21	0.20	0.27	0.28	0.29	0.29
AR(1)	1.43	1.10	0.81	0.86	0.54	0.66
AR(2)	1.65*	1.49	1.02	1.24	1.03	1.35

Notes: a) Asymptotic standard errors are in the parentheses. ***, ** and * denote rejection of null of zero restriction at 1%, 5% and 10% levels of significance, respectively;

Table 4: Determinants of Domestic Bonds - Government (GMM Estimates)

Dependent Variable: Ln(DGB/GDP)						
	Total		Developed Countries		Emerging Economies	
Ln(DGB(-1) /GDP(-1))	0.70*** (0.09)	0.69*** (0.09)	0.81*** (0.05)	0.80*** (0.05)	0.68*** (0.12)	0.65*** (0.13)
LRGDPpc	0.36** (0.15)	0.39** (0.18)	0.10*** (0.04)	0.14*** (0.05)	0.40** (0.13)	0.43*** (0.15)
Ln(TD/GDP)	0.15** (0.08)	0.35** (0.16)	0.06** (0.03)	0.05** (0.02)	0.48** (0.18)	0.60*** (0.12)
INF(-1)	-0.0008 (0.002)	-0.002 (0.003)	-0.01 (0.009)	-0.01 (0.01)	-0.0007 (0.003)	-0.001 (0.003)
CPI(-1)	0.06** (0.03)	0.05* (0.03)	0.05*** (0.01)	0.05*** (0.01)	0.08** (0.04)	0.08* (0.05)
EFI(-1)	0.004** (0.002)	0.005* (0.003)	0.002* (0.001)	0.002** (0.009)	0.01** (0.006)	0.008*** (0.09)
CAI(-1)	0.003* (0.002)		0.0003 (0.001)		0.005* (0.003)	
ME(-1)		0.006 (0.007)		0.007 (0.005)		0.003 (0.01)
CLI(-1)	-0.04** (0.02)	-0.06** (0.03)	-0.02** (0.01)	-0.04** (0.02)	-0.10*** (0.03)	-0.11*** (0.04)
C	0.02* (0.01)	0.03* (0.01)	-0.0006 (0.007)	0.01*** (0.004)	0.03** (0.01)	0.03* (0.01)
R-Square	0.15	0.13	0.18	0.19	0.16	0.13
Sargan Test	148.6 Prob = 1.00	123.0 Prob =1.00	173.3 Prob = 1.00	163.6 Prob=1.00	151.7 Prob = 1.00	147.8 Prob = 1.00
AR(1)	-1.98**	-1.96**	-2.69***	-2.91***	-1.73*	-1.77*
AR(2)	1.09	1.45	1.15	1.00	1.32	1.31

Notes: a) Asymptotic standard errors are in the parentheses. ***, ** and * denote rejection of null of zero restriction at 1%, 5% and 10% levels of significance, respectively;

b) Sargan statistic tests over-identifying restrictions (asymptotically chi-squared distributed). AR(1) and AR(2) are tests for first-order and second order serial correlation (asymptotically standard normally distributed).

Table 5: Determinants of Domestic Bonds – Total (Government + Private): (GMM Estimates)

Dependent Variable: Ln(DGB/GDP)						
	Total		Developed Countries		Emerging Economies	
Ln(DGB(-1) /GDP(-1))	0.66*** (0.09)	0.65*** (0.10)	0.90*** (0.09)	0.79*** (0.09)	0.26** (0.12)	0.23** (0.11)
LRGDPpc	0.03** (0.01)	0.01** (0.005)	0.02** (0.009)	0.01** (0.005)	0.04** (0.02)	0.02*** (0.009)
Ln(TD/GDP)	0.26*** (0.06)	0.33** (0.16)	0.09*** (0.03)	0.04*** (0.01)	0.88*** (0.16)	0.88*** (0.13)
INF(-1)	-0.01* (0.005)	-0.04** (0.005)	-0.02* (0.01)	-0.03 (0.02)	-0.003 (0.003)	-0.004 (0.003)
CPI(-1)	0.02** (0.01)	0.05** (0.03)	0.02** (0.01)	0.04** (0.01)	0.06* (0.04)	0.07* (0.04)
EFI(-1)	0.002** (0.001)	0.004** (0.002)	0.0002 (0.0004)	0.0002 (0.0005)	0.01*** (0.004)	0.01*** (0.003)
CAI(-1)	0.004 (0.003)		0.002 (0.002)		0.0006 (0.003)	
ME(-1)		0.009* (0.006)		0.03*** (0.004)		0.003* (0.002)
CLI(-1)	-0.03 (0.02)	-0.003 (0.003)	0.002 (0.002)	0.01 (0.02)	0.005 (0.02)	-0.002 (0.02)
C	0.03** (0.01)	0.03** (0.01)	0.004 (0.006)	0.009* (0.005)	-0.02*** (0.008)	-0.02*** (0.007)
R-Square	0.19	0.20	0.26	0.28	0.31	0.32
Sargan Test	156.2 Prob=1.00	148.1 Prob=1.00	144.4 Prob=1	144.0 Prob=1	184.4 Prob=1	158.01 Prob=1
AR(1)	-3.31***	-3.30***	-3.11***	-2.91***	-1.68*	-2.65***
AR(2)	1.17	1.32	0.32	0.32	0.03	1.56

Notes: a) Asymptotic standard errors are in the parentheses. ***, ** and * denote rejection of null of zero restriction at 1%, 5% and 10% levels of significance, respectively;

b) Sargan statistic tests over-identifying restrictions (asymptotically chi-squared distributed). AR(1) and AR(2) are tests for first-order and second order serial correlation (asymptotically standard normally distributed).

Table 6: Summary of Results

		Total	Developed Countries	Emerging Economies
Macroeconomic Factors	**Government**	GDP Growth, Banking System	GDP Growth, Banking System	GDP Growth, Banking System
	Total	GDP Growth, Banking System, INF	GDP Growth, Banking System	GDP Growth, Banking System, INF
Social Factors	**Government**	CPI, EFI, CLI	EFI, CLI	CPI, EFI, CLI
	Total	CPI, EFI	CPI	CPI, EFI
Institutional Factors	**Government**	CAI	CAI	CAI
	Total	ME	ME	ME