

# **Government Bonds in Domestic and Foreign Currency: The Role of Institutional and Macroeconomic Factors**\*

Stijn Claessens  
Daniela Klingebiel  
Sergio L. Schmukler

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## **Abstract**

In contrast to some recent research, this paper finds that institutional and macroeconomic factors are related to the depth and currency composition of government bond markets. Using panel data for developed and emerging economies, we find several factors to be systematically associated with bond markets. Aside from economic size (already shown to affect the currency composition), this paper shows that investor bases matter. Economies with deeper domestic financial systems (measured by bank deposits and stock market capitalization) have larger domestic currency bond markets and issue less foreign currency debt, whereas foreign investor demand is positively related to the size and share of foreign currency bonds. Moreover, less flexible exchange rate regimes are associated with more foreign currency issuance. Other relevant variables include inflation, fiscal burden, legal origin, and capital account openness.

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Contact Author: Sergio L. Schmukler, The World Bank, MSN MC3-301, 1818 H Street, NW, Washington, DC, 20433, Tel.: (202) 458-4167, Fax: (202) 522-3518, Email: [sschmukler@worldbank.org](mailto:sschmukler@worldbank.org)

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\* Claessens: University of Amsterdam, CEPR, World Bank, 1818 H Street, NW, Washington, DC, 20433  
Klingebiel and Schmukler: World Bank, 1818 H Street, NW, Washington, DC, 20433

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## **1. Introduction**

During the last two decades, capital markets around the world have experienced rapid growth and have become increasingly more integrated. These trends are reflected in the growth of domestic public bond markets and the government participation in international capital markets. At the same time, there have been many financial crises, especially in emerging markets, a phenomenon that has been partly attributed to the increase in debt burdens, particularly in foreign currency. These factors have led to a growing interest regarding the determinants of government bond market development and the currency composition of government bonds.

The literature that studies government debt markets is large, but the particular attention on government bonds emerged in the last decade, as governments replaced bank borrowing with bond issuance. Studies on the general determinants of governments' desire and ability to issue debt have highlighted macroeconomic stability and political economy factors.<sup>1</sup> The literature following the debt crisis of the early 1980s has concentrated on a country's ability to issue external debt, then mostly in the form of commercial bank loans.<sup>2</sup> Following the Brady plan, which resolved the 1980s debt crisis by converting government debt into bonds, and as new debt took increasingly the form of international bonds, research evolved into the explanation of spreads and pricing of government bonds.<sup>3</sup> With the financial crises in the 1990s, government bonds gained even more interest as the size and structure (currency and maturity) of government debt has been identified to lead to vulnerabilities, mismatches, and possibly trigger financial crises.<sup>4</sup>

The currency composition of government bonds has especially received much attention lately, with a number of dimensions being considered. For some countries, particularly emerging economies, borrowing in foreign currency can be less expensive than in domestic currency (or at least appear to be so). But foreign currency debt exposes governments and firms to exchange rate risk, as their revenues typically relate to local currency values. This mismatch increases the likelihood of financial crises and may make self-fulfilling runs possible (see, for example, Krugman, 1999; Jeanne, 2000; Aghion, Bacchetta, and Banerjee, 2001; and Schneider and Tornell, 2004).

A recent empirical literature analyzes specifically the currency composition of debt and highlights the phenomenon of “original sin,” defined as the inability of emerging economies to borrow abroad in their domestic currency (even short term) and to borrow long term in domestic currency in the local market (Eichengreen and Hausmann, 1999; Hausmann, Panizza, and Stein, 2001; Eichengreen, Hausmann, and Panizza, 2002; Hausmann and Panizza, 2003; and Chamon and Hausmann, 2005). This literature generally finds that a small number of institutional and macroeconomic factors explain the ability of countries to issue in domestic currency. Eichengreen, Hausmann, and Panizza (2002) and Hausmann and Panizza (2003) specifically find that only country size matters for explaining their measures of “international original sin,” i.e. the currency composition of government debt issued in foreign markets. Though they also find that some institutional factors affect the ability of governments to issue domestic currency denominated debt in the local market (“domestic original sin”), given the few degrees of freedom and lack of consistency, they give little value to these results. In a different paper, Jeanne (2005) argues that monetary credibility matters for liability dollarization.

In another paper, Burger and Warnock (2004) conduct a study of how foreign investors participate in private and public domestic currency bond markets. They find that some institutional factors, specifically more creditor-friendly policies and laws, help in the development of domestic currency markets. In their study, they also analyze whether domestic currency bonds are attractive to U.S. investors and estimate a CAPM model to see how much U.S. investors value diversifiable idiosyncratic risk.<sup>5</sup>

While the original sin literature downplays the importance of specific macroeconomic and institutional factors and argues that it is difficult to pinpoint the exact causes behind the inability of governments to issue domestic currency bonds, this literature highlights the role of international factors and path dependence in foreign exchange borrowing. In the presence of international transaction costs, investors have limited incentives to hold currencies issued by small countries, since these countries offer limited diversification benefits relative to the transaction costs (Hausmann and Rigobon, 2003). This implies that larger countries have an advantage when issuing debt in local currency, consistent with the conclusion from the original sin literature that only the size of the economy matters for the currency composition of international debt. Additionally, this literature also emphasizes that historical factors have played a significant role in helping countries overcome the original sin and that network externalities have given rise to path dependence, since a currency used in some international transactions becomes more advantageous for additional traders and investors to use.<sup>6</sup> This path dependence and the evidence from the original sin literature imply that there are few policy options available to many emerging countries needing to raise financing, as policymakers cannot

alter initial conditions and improvements in policies and institutions do not seem to affect their ability to issue domestic currency debt.<sup>7</sup>

In this paper we reconsider the evidence presented by the original sin literature and ask: Are institutional and macroeconomic factors, aside from size, indeed unrelated to the development of bond markets, in particular the currency structure? To analyze this question, we study systematically whether institutional and macroeconomic factors affect the level of both domestic and foreign currency government bonds relative to GDP, as well as the share of foreign currency bonds in total bonds.<sup>8</sup> Our data cover both short- and long-term debt securities, including bonds, notes, treasury bills, and other short-term instruments issued by the government in the money market. This seems relevant because using data of a certain maturity would tilt the currency composition, as many countries tend to issue long-term bonds in foreign currency and short-term bonds in domestic one.<sup>9</sup> To conduct the analysis, we use a relatively long time period, 1993-2000, covering both developed and developing countries. Early in this period, many government bond markets were established and rapidly developed thereafter. The wide country coverage allows us to identify better some of the factors that lead and enable governments to issue bonds.

We depart from the original sin literature in various dimensions. With respect to the variables under study, there are two differences. First, we analyze the determinants of not only the currency composition but also the depth of government bond markets. Understanding the determinants of the size of bond markets is important because their depth has been related to both financial development and financial crises.<sup>10</sup> Second, we focus on the currency denomination of government bonds, without distinguishing the

place of issuance. In a world of increasing financial integration, domestic investors can purchase domestic bonds in international markets, while foreign investors can also buy domestic bonds in domestic markets. So, aside from the legal and regulatory considerations discussed elsewhere, we believe that the distinction between the places of issuance is not that informative. With respect to the sample under study, we concentrate on a sample of countries for which the Bank for International Settlements (BIS) collected data, and which have actively issued bonds during the 1990s. With respect to the explanatory variables, we analyze a wide range of macroeconomic and institutional factors, many of them not analyzed before in the context of government bonds.

We find that economies that are bigger and have greater domestic investor bases, as proxied by the size of their financial systems, have relatively larger domestic bond markets and issue relatively less foreign currency debt. On the contrary, foreign investor demand (measured alternatively by the government bonds and notes held by non-residents over GDP, holdings of a country's long-term debt securities by U.S. investors, and total debt securities held by foreign investors) is positively associated with foreign currency bond issuance, both as a share of GDP and total government bonds outstanding.<sup>11</sup> Important for the recent debate on limiting financial crises, we find that less flexible exchange rate regimes are associated with more foreign currency issuance. Other relevant variables for the size and composition of bond markets include inflation, fiscal burden, legal origin, and capital account openness. These results differ from those obtained by the original sin literature. We conclude, therefore, that it is difficult to neglect institutional and macroeconomic factors when trying to understand the development of government bond markets in domestic and foreign currency.

The rest of the paper is organized as follows. Section 2 describes the data and presents some descriptive statistics on bond markets. Section 3 discusses the empirical strategy to study the factors affecting the size and structure of government bond markets. Section 4 shows the estimation results. Section 5 discusses the results from various robustness tests and alternative specifications. Section 6 concludes.

## **2. Data on Government Bonds**

We are interested in explaining the size of government bond markets in domestic and foreign currency across countries, as well as the share of public bonds denominated in foreign exchange. We also want to cover the largest sample of countries and the longest time period available, comprising both domestic and international issuance, and detailing the currency choices. Data sources and availability differ, however, depending on the issuing country (particularly, developed versus emerging economies) and the issuing market (domestic versus international markets). While there is a fairly comprehensive coverage for domestic and international markets for many developed countries (though even here good coverage is quite recent), reliable and complete data are still scarce for many emerging market economies. Moreover, in many cases, a particular source of data covers only one market.

Reviewing the various sources available, the Bank for International Settlements (BIS) appears to be the most comprehensive one in terms of countries, years, markets, and types of securities covered. The BIS collects security-level data from the Bank of England, Capital Data, Euroclear, International Securities Market Association (ISMA), and various national sources, mostly central banks. The BIS publishes these data on an

aggregate basis, addressing, among others, the problem of double counting. For domestic markets, that is, bonds issued domestically, the BIS covers the public sectors of some 41 countries from 1989 to the present on a quarterly basis, comprising amounts outstanding as well as net new issues. For international markets, the BIS provides quarterly data for 77 countries, but the coverage starts only in the third quarter of 1993.<sup>12</sup> All data are measured in current U.S. dollars.

We want to understand the size of government bond markets in both domestic and foreign currency. While the BIS data include information on the currency composition of the amount outstanding of all government bonds, we are, however, not interested in the detailed structure of bonds across different non-local currencies.<sup>13</sup> So we use the BIS information on currency composition to classify bonds into two categories: local currency denominated issues versus foreign currency denominated issues. Foreign currency bonds aggregate all amounts outstanding in currencies other than the local currency. This classification is irrespective of the place of issuance. Note that we use data obtained from the BIS, which are unavailable in its website, as the BIS does not publish data on the currency composition of the bonds issued by each country (it only reports aggregate data on the currency composition). Our data are equivalent to the sum of long-term (bonds and notes) and short-term (money market instruments) securities reported in the BIS website.

To cross check the data, we collected independent information from finance ministries and central banks of various countries (including those of Argentina, Brazil, France, Mexico, the Netherlands, Poland, Sweden, and Turkey). In the case of Argentina, we decided to use government sources instead of the BIS data because the



domestic currency bonds from the BIS include foreign currency bonds issued domestically, which constitute a significant amount for this country. For the other countries we verified, the BIS information and the government information coincided, so we continued to use the BIS data.

Based on the compiled data, we construct year-end values of the amounts outstanding of government bonds in local and foreign currency and the year-end foreign currency share. We use year-end data, as our explanatory variables are generally available only on an annual basis. The final dataset of those countries and years for which we have the amounts outstanding in both domestic and international markets, as well as the currency breakdown, has a reduced coverage; it comprises data for 35 countries between 1993 and 2000.

Next, we provide some descriptive statistics of the bond data compiled. The overall size of the global government bond market is shown in Figure 1. In absolute (nominal) U.S. dollars terms, government bond markets in developed and emerging economies expanded from 13.1 trillion in 1993 to 19.1 trillion in 2000. In relative terms, government bond markets of emerging economies increased more, from 317 billion in 1993 to 1.1 trillion in 2000. Despite the large percentage increase, emerging markets still represented less than six percent of the world government bond market in 2000.<sup>14</sup>

The share of foreign currency denominated bonds over total bonds is displayed in Figure 2. The chart shows that emerging market economies are increasingly issuing government bonds in currencies other than their own, from a mean share of 9.2 percent in 1993 to 26.8 percent in 1998, with a decline to 22.8 percent in 2000. On the contrary, developed countries show a declining trend in the share of foreign currency bonds, from

21.8 percent to 15.5 percent over the same period. Though not reported, there are differences across countries. A large increase in foreign currency borrowing takes place for Latin American countries, from a mean of 4.3 percent in 1993 to 46.9 percent in 1996, declining somewhat to 35.6 percent in 2000, with a high in 2000 of 95.3 percent for Argentina. In Europe, transition economies also start to issue relatively more debt in foreign currency towards the end of the decade. The share of foreign currency bonds is the lowest for Germany and the U.S.<sup>15</sup>

The differences between developed countries and emerging markets in terms of absolute amounts and debt composition (that is, the share of foreign currency issues) become even clearer when analyzing in more detail the structure of the global government bond market in 2000. Figure 3 shows that of the 19.1 trillion U.S. dollars in government debt outstanding among the 35 countries covered in our sample, 95 percent is on account of developed countries. The figure also shows that foreign currency issues are much more important for emerging market governments than for developed country governments, 20 percent of total bonds outstanding versus two percent in 2000.

Figure 4 shows the ratio of government bond stocks relative to countries' gross domestic product (GDP).<sup>16</sup> Countries with higher debt ratios are mostly developed countries. This may be because these countries have stronger repayment capacity and can sustain higher debt-to-GDP ratios.<sup>17</sup> Figure 5 shows the share of foreign currency claims. The figure shows the importance of foreign exchange bonds for countries like Argentina, Iceland, Russia, and Sweden, as well as for some special cases like Luxembourg, which is a major financial center for the issuance and trading of

Eurobonds.<sup>18</sup> The figure also confirms that developed countries tend to issue more debt in their own currency, although there are exceptions.

### **3. Empirical Methodology**

We now turn to the empirical analysis of the determinants of the size and currency composition of government bond markets. The variables we want to explain are the ratio of local currency government bonds and the ratio of foreign currency bonds to GDP, while the currency choice variable is the ratio of foreign currency government bonds to total government bonds. The dependent variables are in logs. In the basic results, we estimate the relation between these three variables and a set of regressors using panel feasible generalized least squared (FGLS) estimations, allowing for heteroskedastic error structures and different autocorrelation coefficients within countries. We next specify the set of explanatory variables we use in our basic results.

We want to understand whether institutional and macroeconomic characteristics and policies affect the size and currency structure of government bonds. The literature suggests a long list of variables to use as controls in our regressions. For our first selection, we are mostly guided by the more recent literature. The first set of results is reported in Table 1. In subsequent tables, we do extensive robustness tests and investigate many other variables, as explained in Section 5. The specific explanatory variables included in the first set of regressions (whose definitions and sources are detailed in Appendix Table 3) are described next.

First, we control for size. To do so, we use total GDP in nominal U.S. dollars as a proxy for the size of the economy and the potential scope for developing a (liquid) local

government bond market. Second, we control for domestic financial development by using the ratio of the total deposit base in the banking system over nominal GDP, which is highly correlated with the overall development of the financial system (as shown in Beck, Demirguc-Kunt, and Levine, 2001). This measure proxies both for the overall development of the domestic financial system and for the potential domestic demand for government securities. Though more direct measures of demand would be desirable, we were unable to find them.<sup>19</sup> This lack of good measures of demand calls for caution when interpreting the impact of this variable. Third, we control for the overall institutional framework by using a measure called “institutionalized democracy,” which is part of the Polity IV political economy database maintained at the University of Maryland. This variable measures the quality of a country’s democratic institutions imposing constraints on the executive (as well as the degree to which civil liberties are being guaranteed). This proxy for the political environment addresses the arguments in the public finance literature that the nature of the political regime and political instability may have an important effect on the size and scope of government activities, including government debt. Fourth, we control for two indexes that capture important macroeconomic factors, believed to be related to government debt issuance. One is an “inflation policy” index, a subcomponent of the index of economic freedom of the Heritage Foundation. The index represents the absence of strict monetary policy and is based on the average inflation rate over the last ten years, with higher values representing worse monetary policy. The second index is the “fiscal burden of government,” also a subcomponent of the index of economic freedom. This variable measures the fiscal

pressure imposed by the government according to the level of a country's corporate tax rates and the overall size of government expenditure.

Finally, the last set of variables relates to the exchange rate regime and analyzes the link between the flexibility of the exchange regime and the size of the domestic and foreign currency debt markets. We use, alternatively, one of three indexes of exchange rate regimes. One index reflects the officially announced or "de jure" exchange rate regime. But, since countries often do not follow the regime they publicly announce, we use two other indexes that depict the actual or "de facto" exchange rate regime, one developed by Reinhart and Rogoff (RR) (2004) and another by Levy Yeyati and Sturzenegger (LYS) (2003). The use of alternative indexes is important because the correlation among them is not very high, as reported in Frankel (2004).

The inclusion of the exchange rate regime variable is important because it has already been associated to the currency denomination of debt. Two views exist in this respect. Proponents of hard (fixed) currency pegs argue that a strong domestic currency can provide credibility and lead to greater domestic currency financial intermediation, thereby allowing countries to issue more local currency debt over time.<sup>20</sup> But others argue that a fixed exchange rate increases the short-run incentives of both the government and the private sector to issue debt in foreign currency, adding to the degree of "liability dollarization." Governments with more fixed regimes may want to signal the credibility of their regime by issuing relatively more foreign currency debt. As foreign currency debt tends to be cheaper (at least in contractual terms), it is difficult to justify issuing domestic currency debt instead of less expensive foreign currency debt and, at the same time, claim that the supposedly rigid regime will persist over time. This was very clear in

the case of Argentina, where the degree of debt dollarization increased steadily over time, since the inception of its currency board in 1991 (de la Torre, Levy Yeyati, and Schmukler, 2003). For the private sector, fixed exchange rate regimes might induce agents to underestimate the possibility of future currency changes, leading to excessive foreign exchange borrowing (Eichengreen, 1994), and might also induce moral hazard in the presence of implicit or explicit government bailout guarantees (McKinnon and Pill, 1998; Dooley, 2000; Burnside, Eichenbaum, and Rebelo, 2001; and Schneider and Tornell, 2004). The exchange rate regime might also affect the currency composition of debt by modifying the relative return volatilities of domestic and foreign currency assets. Ize and Levy Yeyati (2003) show that, in a minimum variance portfolio equilibrium, financial dollarization is explained by the relative volatilities of inflation and the real exchange rate. In this context, policies that limit exchange rate volatility, such as following a crawling peg or using monetary policy to target the nominal exchange rate, increase dollarization.

Many variables suggested by the literature can be subject to the criticism of being endogenous. In our particular case, contemporaneous values of inflation, fiscal burden, and the exchange rate regime can be vulnerable to this criticism. For example, countries with larger debt may be able to avoid using inflation as a means to raise revenues and finance higher expenditure levels, leading to lower scores on the inflation and fiscal burden indexes. But what could be more problematic is the potential endogeneity of the exchange rate regime. In other words, the degree of foreign currency liabilities can affect whether countries choose to let their currencies float. This potential endogeneity of the exchange rate regime has led to the literature on “fear of floating” (Calvo and Reinhart,

2002). Also, Devereux and Lane (2003) highlight its potential endogeneity to the structure of a country's liabilities. To try to avoid endogeneity from affecting our results, we use as much as possible institutional variables and macroeconomic indexes, which should be less sensitive to the evolution of bond markets themselves. Moreover, we use lagged and, alternatively, initial values of the potentially problematic variables, since it is difficult to find good instruments and we expect those lagged and initial values to be less affected by endogeneity concerns. Section 5 further addresses this issue by reporting two additional estimates that try to deal with the potential endogeneity, describing the difficulties in finding good alternative instruments, and discussing and illustrating the possible causality patterns in the data with respect to the exchange rate regime.

#### **4. Regression Results**

The first set of econometric results are presented in Table 1, with each panel of the table displaying regression results for one dependent variable at a time – the log of local currency denominated bonds over GDP, the log of foreign currency denominated bonds over GDP, and the log of the share of foreign currency bonds – and using in every panel the same set of independent variables. The different columns display several specifications, depending on which exchange rate regime variable is used, and whether lagged or initial values of the potentially endogenous variables are used. The number of observations varies slightly, given that the exchange rate regime variables have different country and time coverage. Wald tests (not reported) show that the explanatory variables are always jointly significant.

The top panel with the log of local currency bonds over GDP as the dependent variable shows that countries with bigger economies have relatively larger local currency government bond markets. This result is very robust and holds across specifications. This suggests that scale effects exist in the development of local government bond markets. These economies of scale may exist in the development of the infrastructure of local bond markets, including incurring the fixed costs of establishing clearing and settlement systems and developing the legal framework for issuing and trading. Also, it is very likely that scale effects exist in the liquidity of secondary markets for bonds.<sup>21</sup>

Regarding the development of the financial system, as proxied by the relative size of the banking system, we find that countries with more developed systems have more developed bond markets. This result is very robust and holds across all specifications. This result may indicate that countries with a more developed financial system have more demand for government bonds. The specific significance of the banking deposit variable might reflect the fact that deposit-taking banks directly invest in government paper as well as that a more developed banking system is associated with a larger institutional investor base. In addition, a more developed banking system may create demand for government securities among the general public through better developed distribution channels, possibly including the presence of a primary dealers network, which may indirectly increase investors' interest in buying bonds, also because of more liquid secondary markets. Of course, a more developed financial system is also often characterized by a more developed bond market, so it need not be a greater demand that explains the positive coefficient.



We now turn to the other institutional and macroeconomic indicators. A robust result across almost all specifications is the sign of the institutional development variable. Specifically, countries with good, more democratic institutions have larger government bond markets relative to their GDP. This suggests that good institutions and democracy are important in the eyes of investors, maybe as they are associated with a greater credibility of the state, better quality of decision making, and an easier acceptance by the public of policies, including macroeconomic policies. This finding confirms evidence from Isham, Kaufmann, and Pritchett (1995), Acemoglu, Johnson, and Robinson (2000), and many others regarding the role of institutions in determining the quality of (macro) economic management. In a narrower sense, that is, for the development of bond markets specifically, it may be that more effective constraints on a country's executive reduce the (perceived) risks of default on government debt, including debt dilution through inflation spikes. A supply-related explanation can be that more democratic countries "desire" (and can sustain) a greater role of the government in their economies, including providing different forms of social insurance (such as unemployment and pension benefits), leading to higher fiscal expenditures as well as larger debt.

In terms of monetary policies, we find that lower inflation rates are associated with larger local currency government bond markets. This is to be expected since lower inflation rates tend to be associated with lower volatilities of inflation and, consequently, a lower tendency for governments to inflate away the outstanding debt, thus making local currency debt less risky.<sup>22</sup> Another interpretation of this result is that governments with high inflation do not need to issue large amounts of debt, as the inflation tax is a major source of government revenue. Regarding fiscal policies, we find that larger government

expenditure helps sustain larger bond markets. A general larger role of the government, including presumably the ability of the government to tax the economy more (easily) may thus affect the willingness of investors to finance the government as well as affect the desire of governments to issue debt. The significance of the larger fiscal expenditure could also reflect an underlying desire of citizens for a larger distributive role of the government, both within a given period through larger expenditures, and between generations and over time through larger deficits and higher debt stocks. Still, this result has to be interpreted with some caution since the variable becomes insignificant when using initial values (columns 5 and 6).

Finally, the three exchange rate regimes variables are mostly significant and have a positive sign. In other words, countries with a more flexible exchange rate regime (de jure or de facto) tend to have larger local currency bond markets. On the demand side, investors in bonds of countries with more flexible exchange rate regimes might be less fearful of sharp currency depreciations and of large inflation spikes that can decrease the real value of their investments. And on the supply side, governments with more flexible exchange rates might finance themselves more through local currency bonds as they have less desire to signal a commitment to a foreign exchange regime by issuing foreign currency bonds.

The middle panel presents the results for the log of foreign currency bonds over GDP. Contrary to the case of domestic currency bonds, the log of GDP variable has a negative and statistically significant coefficient in all specifications. This result reinforces the scale effect described above, in the sense that having a smaller domestic economy may make it more attractive for governments to issue in foreign currency to

meet their financing needs. This result is in line with the pattern of Figure 2, where smaller, mostly emerging economies tend to issue more debt in foreign currency. The coefficient on total deposits to GDP is negative in these regressions, that is, a relatively better developed financial system decreases the amount of debt issued in foreign currency, the opposite sign from the regression results for the local currency bond variable. The variable is also significant in all specifications.

The other institutional and macroeconomic variables are also related to the size of foreign currency bond markets. However, in contrast to the size of the economy and financial system development variables, these factors tend to affect foreign currency bonds in the same direction that they affect domestic currency bonds. Countries with good democratic institutions have larger foreign currency bond markets, suggesting that investors are more willing to buy bonds when governments are more legitimate and policies more credible. Although not always statistically significant, higher inflation is associated with a smaller stock of foreign currency bonds relative to GDP. In some sense, this result may be surprising because inflation can be expected to primarily affect the amount of local currency bonds. But, high inflation is also typically associated with macroeconomic instability and occasionally with general government defaults, what might explain the lower demand among investors for both domestic and foreign currency bonds. Also, as before, when significant, the fiscal burden variable is positively correlated with foreign currency bonds. The negative signs for the variables that capture the actual exchange rate regime suggest that countries with de-facto less flexible exchange rate regimes have larger foreign currency bond markets relative to GDP. This

result is consistent with some of the predictions discussed above, in the sense that exchange rate rigidity prompts governments to issue more debt in foreign currency.

The bottom panel presents the results for the variable foreign currency bonds over total bonds, i.e., the share of foreign exchange borrowings. To some degree, these results can already be inferred from the two previous panels, especially when the explanatory variables have different signs. But the results of this panel show explicitly how the different variables affect the share of foreign currency bonds. The panel shows that the absolute size of countries' GDP and the ratio of deposits to GDP have a negative effect on the share of foreign currency bonds, i.e., countries with larger economies and relatively more developed financial systems have a higher share of domestic currency debt.

The variable institutionalized democracy is statistically significant and positive in all specifications, suggesting that investors in foreign currency bonds value more than investors in domestic currency bonds the fact that governments are legitimate and policies more credible. A higher inflation index is associated with a lower share of foreign currency debt. The coefficient on the fiscal burden variable is positive, implying that countries with a higher fiscal burden can or want to issue a higher proportion of foreign currency debt. Though the official exchange rate regime is positively associated with the share of foreign currency debt, the two indicators for the actual exchange rate regime, the more meaningful variables, are negatively and statistically significant associated with the share. In other words, governments from countries that de facto follow a more fixed exchange rate regime tend to have a higher proportion of foreign currency debt, as various papers predict. The differences between using de jure and de

facto classifications of exchange rate regimes highlight the disparity between these classifications and suggest that it is important to analyze the effects of de facto measures.

## **5. Alternative Specifications**

In this section, we discuss the results of estimating a number of alternative specifications. We conduct these estimations to test the significance of other, previously omitted, variables and to test whether our results are robust to changes in the regressors and estimation techniques. Since we estimated a very large number of alternative specifications, we are unable to report all of them in the paper. We chose to report a set of estimations that we consider particularly interesting. We comment on the other results we obtained at the end of this section; those results are available upon request. The bottom line from this exercise is that institutional and macroeconomic factors are still important in explaining the size and currency composition of government bond markets, even when varying considerably the basic framework presented in Section 4. We turn to the description of the results next.

In the first round of alternative estimates, we focus on the variables related to the domestic and foreign investor bases. Regarding the domestic side, we consider whether the specific proxy used for the country's financial sector development affects our results. Thus, in addition to the banking system variable (total deposits over GDP), we also include in the regressions the ratio of stock market capitalization to GDP (in logs). Regarding the foreign side, we use three variables that measure holdings of debt securities by foreign investors to proxy for their demand of a country's bonds. The first one is the government bonds and notes held by non-residents over GDP. These data

come from the International Investment Position (IIP) statistics published by the IMF in its Balance of Payments Statistics (BOPS). This variable is available for 24 of the countries in our sample. As a second variable, we use the holdings of a country's long-term debt securities by U.S. investors. This variable comes from a comprehensive benchmark survey of U.S. investment abroad as of December 1997, conducted by the U.S. Treasury Department and the Board of Governors of the Federal Reserve System.<sup>23,24</sup> Similar data are used by Burger and Warnock (2004) to analyze foreign investor participation in domestic bond markets. Third, we also use data on long-term debt securities held by foreign investors, as reported in the IMF Coordinated Portfolio Investment Survey (CPIS) for 1997 (IMF, 2000).<sup>25</sup> For each country, the CPIS reports data on foreign portfolio asset holdings by residence of issuer. To calculate the holdings by foreigners of a country's securities, the holdings of investors in each of the 29 reporting countries are added.<sup>26</sup> Similar data are used by Lane (2005) to analyze the bilateral composition of international bond portfolios in the euro area.<sup>27</sup> In a previous version of the paper, we also used the variable log of international claims over GDP as an additional independent variable, yielding similar conclusions.<sup>28</sup> Table 2 displays the results with these two new sets of independent variables for all the three dependent variables; results are shown with lagged values of the independent variables, but using initial values leads to similar conclusions.

The variable stock market capitalization has a positive coefficient in the regressions that use local currency bonds over GDP as dependent variable (just as the total deposits variable does), suggesting that the specific measure for financial sector development does not drive our results. Furthermore, the total deposits variable remains

significant and positive, suggesting that the development of both the banking system and the stock market are related to domestic currency bond market development. For the regressions that use foreign currency bonds over GDP as dependent variable, the stock market capitalization variable is not significant, whereas for the ratio of foreign currency to total bonds the coefficient is significant and negative in one regression. Again, the deposit variable keeps its sign and remains statistically significant for all dependent variables.

The different variables that capture foreign investor demand have all the same sign; that is, the conclusions remain unaltered across specifications. The results indicate that as foreign investor demand increases the amount outstanding of both local and foreign currency bonds over GDP also rises. Interestingly, the effect on foreign currency bonds is much stronger. Thus, the ratio of foreign currency bonds over total bonds rises with foreign investor demand. Interestingly, these effects are different than the ones displayed by the domestic financial system development variables (banking system deposits and stock market capitalization over GDP), suggesting that domestic investors tend to purchase bonds in domestic currency, while international investors demand more bonds in foreign currency. While this supports much casual observation, it goes against the portfolio allocation models that imply that investors should spread their investment over various currencies. As such, these relations may be due to a form of home bias in that investors prefer instruments denominated in their own currency.

Second, we investigate whether our choice of institutional variables affects the results. We explore specifically whether controlling for the general degree of development, the origin of the country's legal system, and the degree of capital account

openness affects our previous results. We also study the significance of these variables. One can expect that more developed countries have better institutions and, consequently, have more developed bond markets. Furthermore, GDP per capita is the broadest measure of countries' overall level of development and would thus capture any omitted variables. Legal origin has been found to be an important factor in financial sector development, with English legal origin countries generally displaying deeper financial markets (La Porta et al., 1997). Capital account openness can be expected to influence not only foreign investor demand, since they may otherwise not be able to access the domestic market, but also that of domestic investors as it allows them to invest abroad. At the same time, the degree of openness can be an important signal as to the country's own macroeconomic policies, with more closed economies being less subject to market discipline, making domestic investors perhaps less interested in bonds.

Table 3 reports the regression results. We find that countries' general level of development, as proxied by GDP per capita, is actually statistically significant and negatively related to the size of their domestic currency bond markets, and significant in one specification for each of the other two dependent variables (columns 1 and 2). This somewhat surprising result may in part be due to the fact that we already control in the regression for a number of country factors—GDP, institutionalized democracy, inflation, and fiscal policy. But importantly, the coefficients on these and other country variables remain the same as above. This suggests that the relations found so far are not likely driven by some relevant omitted country characteristics.

As documented by others, we confirm that countries with English legal origin have relatively larger bond markets (Table 3, columns 3 and 4). English legal origin



countries have more developed domestic and foreign currency bond markets, suggesting that the fact that a country has an English legal origin provides some comfort to investors, perhaps as its legal system is more respectful of investors' property rights and might treat investors better in case of default. In relative terms though, the legal origin is more important for the domestic currency bond markets as the sign of the coefficient for the share of foreign currency bonds is negative, although statistically significant in only one of the two specifications. Again, the coefficients for the other variables remain the same as above.

Regarding capital account openness, we use the variable constructed by Chinn and Ito (2005). The results suggest that more open countries have less developed domestic currency bond markets but have larger foreign currency bond markets (Table 3, columns 5 and 6). This is consistent with domestic investors being less restricted in their asset allocation under an open capital account and no financial restrictions, leading them to demand less domestic currency debt. Similarly, foreign investors are more likely to invest in a country's bonds when its financial market is open, but they do so by purchasing foreign currency bonds, as discussed above. In terms of the share of foreign exchange bonds, the sign on the capital account openness variable is then also positive (and statistically significant). Also in these specifications, the coefficients for the other variables remain the same as above.

Third, our results so far suggest that there are some economies of scale in the development of bond markets as the sign for the coefficient on the size of the economy (log of GDP) is consistently positive in the domestic currency bond market regressions and negative in the foreign currency bond market regressions. We now explore whether

there are some non-linear effects, i.e., whether the tendency to use foreign currency bonds depends on the economic size. The idea is that it might be difficult for very small countries to borrow in foreign currency, for example because investors do not want to invest resources in analyzing the prospects of the country. Since this is an empirical question, we tested whether the relation is hump-shaped by including a quadratic term.

The results of the non-linear effects of size are reported in Table 4. We do find some support for an inverted U-shape relation, as the sign for the log of GDP is positive for foreign exchange bonds both as a ratio of GDP and as a share of total government bonds, while the sign for the square of log of GDP is negative. All other country variables have the same sign and significance as above, confirming the robustness of our results on the importance of institutional and macroeconomic factors.

Fourth, another concern might be that use of the inflation index from the Heritage Foundation rather than the inflation rate itself affects our results. We therefore also tried different measures of inflation. We report results with the average past inflation over a three-year period in Table 5. All the results using this measure instead of the index are consistent with those using the index variable, except for domestic currency bonds, where the average inflation is not statistically significant.<sup>29</sup> The coefficients for all other variables have the same sign and significance as above, confirming again the robustness of the results.

Fifth, we analyze in greater detail the possibility of endogeneity of some of our variables to the structure of a country's liabilities. We concentrate especially on the exchange rate regime, but we also consider the potential endogeneity of inflation and fiscal burden. We have dealt with this problem to some extent by using lagged dependent

variables and initial values. We now do so in two other ways. Table 6 reports new results that repeat earlier regressions, but without using the exchange rate regime to avoid reaching conclusions based on potentially biased estimates. We find that the above conclusions are unaltered. In Table 7, we instrument the actual exchange regime in two regressions (columns 1 and 2) and the exchange rate regime, the inflation index, and the fiscal burden in two other regressions (columns 3 and 4). We use as instruments lagged values of these variables, where the instruments vary across specifications. Our results that institutional and macroeconomic variables matter hold in the same manner as above: countries with less flexible exchange regimes have relative more use of foreign currency bonds, while lower inflation and higher fiscal burden are related to greater domestic and foreign currency bond markets.

It would be ideal to have other instruments that could address better the potential endogeneity problem. In search for other instruments, we have tried several variables suggested by the literature. But, given the nature of our data, it is very difficult to find good instruments to estimate the first stage. Instruments that could be used for the exchange rate regime or the inflation index typically work well with a large set of countries, since they are institutional factors that are usually available on a cross-sectional basis. In our case, we use panel data of around 30 countries. Estimates of the first stage using only those countries tend to be imprecise, making those instruments invalid. These potential instruments include indicators of the autonomy of the central bank, colonial origin, trade and geographic factors, and settler mortality.

Despite the attempts to correct for the endogeneity problem, one could still argue that the exchange rate regime can be affected by the proportion of foreign currency debt,

for example because of the fear of floating mentioned above. But even in that case, it is difficult to rule out that the exchange rate regime affects the currency structure of debt. This independent effect of the exchange rate regime on the debt currency composition may be illustrated with the experiences of several Latin American countries, including Argentina, Brazil, Colombia, Mexico, and Uruguay.

The evidence suggests that after countries moved from fixed to floating exchange rate regimes, the sovereign and corporate sectors have responded by issuing more local currency debt in the very recent past. Tovar (2005) argues that the adoption of flexible exchange regimes by Latin American countries has facilitated the issuance of domestic currency debt in international markets. The UN-ECLAC (2005), the IMF (2005), and Borensztein, Eichengreen, and Panizza (2006) also discuss these trends.<sup>30</sup> On the corporate side, the exchange rate regime also seems to have an effect. Galiani, Levy Yeyati, and Schargrotsky (2003) argue that Argentina's currency board contributed to the dollarization of firms' balance sheets by fueling beliefs in an implicit exchange rate guarantee that reduced firms' willingness to pay the cost of hedging their positions.<sup>31</sup> In the case of Mexico, Martinez and Werner (2002) propose a similar argument. They test it by analyzing the effects that the change from a fixed to a floating exchange rate regime in December 1994 had on the currency composition of corporate debt and on firms' currency mismatches. They find evidence supporting the view that this shift prompted firms to reduce their exposure to exchange rate risk. In the case of Brazil, Rossi (2004) finds that the number of firms exposed to currency risk is significantly lower during the period of floating exchange rate than during the fixed exchange rate regime. While not

ruling out reverse causality, this type of evidence suggests that the exchange rate regime is likely to be at least partially exogenous and affect the debt currency structure.

Finally, we tested (but not report here) the importance of many other variables. These tests included the share of the population over 65 to account for pension expenditures, the use of variables scaled by the U.S. inflation, measures of U.S. T-bill yields, growth rates in the U.S., G-3, and G-7 countries, measures related to interest rate parity conditions, exclusion of the financial development variables, and exclusion of the inflation variable. Furthermore, we used the level of foreign currency reserves over GDP to control, to some degree, for the ability of governments to repay outstanding bonds. We also used interaction terms between the variables of interest and a dummy for developed countries to test whether the effects of the explanatory variables differ across developed and developing countries. Again, the inclusion of those variables does not affect significantly our basic results and, in several cases, the new variables included are statistically significant.

## **6. Conclusions**

In this paper, we analyze which factors are related to government debt issuance in domestic and foreign currency, in light of the limited ability of developing countries to issue claims in their own currency and the recent debate on original sin. Consistent with previous results, we find that smaller economies tend to have smaller domestic currency bond markets but have larger amounts of bond financing in foreign currency. We also show that, besides the size of the economy, a number of institutional and macroeconomic

factors are indeed related to the development of local currency bond markets and the use of foreign currency ones.

Economies that have less developed domestic financial systems tend to have relatively smaller amounts of bond financing in domestic currency, while larger foreign demand is associated with more foreign currency bonds (as a share of both GDP and total government bonds). The level of inflation, democratic institutions restricting government actions, countries' legal orientation, fiscal burden, financial liberalization, and other institutional variables are related to the degree of domestic currency bond market development and the use of foreign currency bonds. Moreover, countries with less flexible exchange rate regimes have relatively more foreign currency financing. This relation may be because of incentives in place, such as moral hazard considerations arising from an international bailout, or because governments try to bind themselves to a higher commitment on macroeconomic management.

Our findings have several implications for the current discussions on the feasibility of developing domestic currency bond markets, especially for reducing exposure to foreign exchange risk for emerging markets. The result that smaller economies tend to issue more foreign currency denominated bonds suggests some scale effects in the development of local currency bond markets, perhaps due to the fixed costs of establishing the infrastructure or because of externalities in liquidity. This implies that there may be some limits to the development of local bond markets in domestic currency, especially for small economies. The findings also highlight the importance of the role of the overall domestic financial system in developing bond markets. Specifically, a well developed financial system with a relatively large pool of domestic investors may help to

develop local currency debt markets, given that domestic investors are the ones that tend to demand domestic currency debt. And since foreign investors mostly demand foreign currency debt, issuing domestic currency debt catered to international investors remains difficult, though not impossible. As many countries are small and have limited domestic investor bases, they have little choice but to issue foreign currency claims to foreign investors and incur the associated higher exchange rate risk.

Our results also suggest that policies seem to matter. The fact that more flexible regimes can support a greater share of domestic currency bonds is consistent with the claim that more rigid exchange rate regimes generate incentives to borrow in foreign currency, exposing countries to more foreign exchange risk. This implies that, in terms of risks, the exchange rate regime might be important as it affects the incentive structure to borrow in foreign currency. More generally, the policy implication of our results is that the whole institutional and macroeconomic structure, including not only the exchange rate regime but also the monetary, financial, and fiscal stance, can determine the degree of risk taking of a country. In that respect, the very recent experiences mentioned in this paper, with Chile, Colombia, Mexico, and other countries actively issuing domestic currency bonds in domestic and international capital markets, might offer some hope for other emerging economies with a high degree of dollarization. In these recent experiences, macroeconomic fundamentals appear to have played an important role in enabling access to domestic currency financing.

While this paper has provided inputs into the analysis of government bond markets, many issues remain open for future research. On the methodology front, research can continue to investigate whether good instruments exist to test and control for

potential endogeneity. We tried to address this issue by, among other things, using lags and initial values and instrumental variables regressions, as well as excluding the exchange rate regime; but it is still possible that we have not been fully successful in addressing this problem. Moreover, it would be interesting to analyze why our results are different from those of the original sin literature. Perhaps, the inclusion by that literature of many other countries with little or no bond market activity explains those differences. Finally, it would be useful to study to what extent supply-side and demand-side factors drive our results. Our results suggest that the domestic investor base is very important to develop domestic currency bond markets and help countries overcome the original sin, but more research is needed on this front.



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## Notes

<sup>1</sup> See Persson and Tabellini (1999) and Walsh (1998) for recent reviews, as well as Reinhart, Rogoff, and Savastano (2003) for a new perspective on the topic.

<sup>2</sup> See Eaton and Fernandez (1995) for a review.

<sup>3</sup> Perhaps the first study was Edwards (1986), but since has evolved into a large literature mostly focusing on secondary market prices, with some studies on primary issues (e.g., Eichengreen and Mody, 1998).

<sup>4</sup> See Broner, Lorenzoni, and Schmukler (2004) for a study of the maturity structure of government bonds and the references therein.

<sup>5</sup> A related literature has analyzed the development of government bond markets. This literature highlights many of the institutional determinants of government and corporate bond markets using experiences based mostly on developed countries. See Turner (2002) for an overview, and World Bank and International Monetary Fund (2001), Bank for International Settlements (2002), and International Organization of Securities Commissions (2002) for institutional reports. This literature stresses, among other factors, the importance of proper debt management and other institutional requirements, including public governance. See De Broeck, Guillaume, and Van der Stichele (1998),

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McCauley (1999), Schinasi and Smith (1998), Scott (2000), and Santos and Tsatsaronis (2003).

<sup>6</sup> Flandreau and Sussman (2005) find that European countries with a large presence in international trade in the nineteenth century were able to issue bonds in domestic currency abroad, irrespective of the quality of their institutions, because there was a spot and futures market for their currencies. Therefore, they argue that overcoming original sin requires that a country emerge as a leading economic power, as exemplified by the U.S. in the nineteenth century and Japan in the twentieth century.

<sup>7</sup> Eichengreen, Hausmann, and Panizza (2002) argue that the only way for emerging markets to escape the original sin is an international initiative to develop a market for claims denominated in an emerging market currency index, by having multilateral financial institutions and G-10 countries issuing debt denominated in this index.

<sup>8</sup> Although some of these instruments are often called sovereign bonds, we prefer to use the term government bonds to make clear that we include both central government as well as local government bonds, though most bonds in our sample are issued by central governments.

<sup>9</sup> See de la Torre and Schmukler (2004).

<sup>10</sup> The level of debt (especially external debt) has been identified as a significant determinant of interest rate spreads (Edwards, 1986; Eichengreen and Mody, 1998; and Min, 1998), credit ratings (Cantor and Packer, 1996), and defaults and financial crises (Rodrik and Velasco, 1999; Detragiache and Spilimbergo, 2001; and Manasse, Roubini, and Schimmelpfennig, 2003). On the other hand, some authors have argued that the development of a government bond market is necessary to foster the growth of a private

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bond market, which in turn could make countries less vulnerable to financial crises by reducing dependence on bank financing. See, for example, Herring and Chatusripitak (2000), Asian Development Bank (2001), and International Finance Corporation (2001).

<sup>11</sup> We use different measures of foreign investor participation because of the difficulty in capturing foreign investor demand. To choose the variables, we partly follow Burger and Warnock (2004) and Lane (2005).

<sup>12</sup> Potentially, selectivity bias might be a problem, but in our case, we do not think that this is an important issue. The data set we use contains a wide range of economies selected by the BIS, which have significant bond markets. Though some countries not included in the sample probably also issue bonds, the BIS does not report that information. A Heckman-type estimator would estimate the decision of the BIS to report data on certain countries, but it would not estimate the typical selection bias of only observing data of countries that do issue bonds.

<sup>13</sup> The classification takes into account the formal currency denomination of bonds. For example, indexed domestic currency bonds are considered domestic currency debt.

<sup>14</sup> The small participation of emerging economies in global markets is not driven by the relatively small number of emerging economies in the sample, as we cover 12 of the largest emerging markets. For comparison, eight of these 12 countries are part of the emerging market bond index (EMBI+), compiled by J.P. Morgan, which contains a total of 19 countries. These eight countries account for 80 percent of the combined GDP of the 19 countries in the EMBI+ in 2000. Moreover, four emerging markets not part of the EMBI+ but included in our data (Chile, China, the Czech Republic, and South Korea) are all large emerging markets.

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<sup>15</sup> The impact of the introduction of the Euro is one factor reducing arithmetically the share of foreign denominated bonds among the EMU members, but comparing pre- and post-January 1, 1999 figures shows that this fact does not affect the figures significantly.

<sup>16</sup> Summary statistics of debt stocks relative to GDP are shown in Appendix Table 1, grouped by developed and emerging economies and evaluated at three points in time, 1993, 1996, and 2000. Appendix Table 2 lists the countries included in each group.

<sup>17</sup> Note that the inclusion of debt at all maturities probably explains why the bond market in Brazil appears more developed market than those in Germany or the Netherlands; Brazil has a very large short-term debt market.

<sup>18</sup> We estimated all the regressions excluding Luxembourg and obtained results similar to those reported in the paper.

<sup>19</sup> An alternative variable to measure the potential domestic demand is the size of institutional investors. But the data coverage on this variable would have reduced the sample size substantially, so we decided not to use it.

<sup>20</sup> For example, Hausmann, Gavin, Pages-Serra, and Stein (2000) argue that in economies facing important terms of trade shocks, a fixed exchange rate regime increases financial intermediation in local currency by generating a negative covariance between domestic asset prices and the income process.

<sup>21</sup> McCauley and Remolona (2000) find that there may be a size threshold around 100-200 billion U.S. dollars of outstanding domestic government bonds, below which sustaining a liquid government bond market may not be easy.

<sup>22</sup> See Reinhart, Rogoff, and Savastano (2003) for a related argument why the ratio of debt to GDP differs across countries.



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<sup>23</sup> Given that these data are available for only one point in time (1997), we repeated the values for all the years in our sample. The survey was conducted again in 2001, but we could not use these data as our sample covers the period 1993-2000. For a description of the benchmark survey, see Griever, Lee, and Warnock (2001).

<sup>24</sup> Alternatively, we ran all the regressions using data from Thomas, Warnock, and Wongswan (2004), who estimate U.S. investors' foreign bond holdings for the period 1973-2003, and obtained in most cases similar results.

<sup>25</sup> These data are also measured at one point in time (1997). As in the other case, we repeated the values for all the years in our sample. Data are also available for 2001.

<sup>26</sup> These data are similar to those reported in the benchmark survey of U.S. investment abroad, but covering more countries may provide a better estimate of foreign investor demand than just focusing on U.S. investors. Note that data quality may differ across countries, as most countries did not carry out a fully fledged survey. (We thank Frank Warnock for bringing this issue to our attention.) Nevertheless, results for this variable are similar to those for other proxies for international investor demand.

<sup>27</sup> Lane and Milesi-Ferretti (2004) use data from the CPIS to analyze bilateral equity holdings.

<sup>28</sup> Those results are reported in the working paper version of this paper.

<sup>29</sup> We also found some evidence that it matters whether countries cross certain levels of inflation, and not necessarily the level of inflation per se. This is consistent with the results previously reported by Boyd, Levine, and Smith (2001), who find that the relation between inflation and financial development is characterized by the existence of

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thresholds. Perhaps, this might explain why the index works well, since it ranks countries in five categories, rather than as a continuous variable.

<sup>30</sup> Apart from Latin America and with a more historical perspective, Bordo, Meissner, and Redish (2005) analyze the experience of a number of former British colonies (United States, Canada, Australia, New Zealand, and South Africa) and highlight the role of shocks such as the breakdown of the Bretton Woods system in overcoming original sin in these countries.

<sup>31</sup> See Galindo, Panizza, and Schiantarelli (2003) for a review of the empirical evidence on the determinants of the currency composition of corporate debt in Latin America.

**Figure 1**

**Evolution of Government Bond Markets**

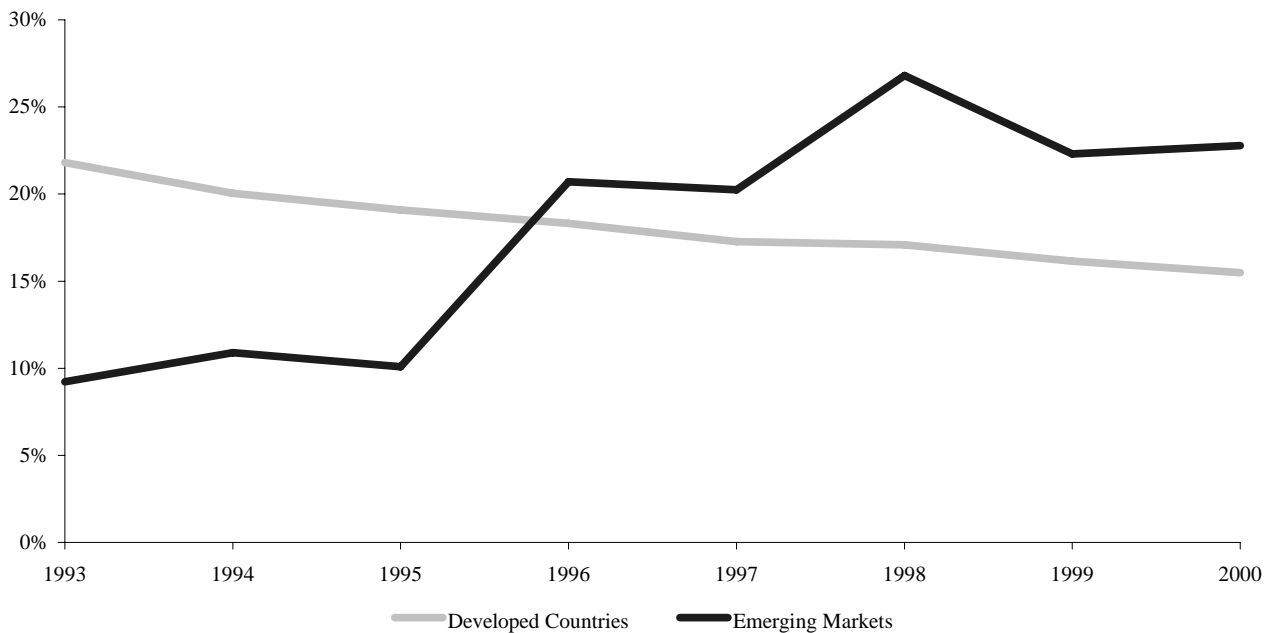
This figure shows the evolution of the amount outstanding of government bonds in billions of U.S. dollars. Bonds are issued in local and foreign currencies in domestic and international markets.



**Figure 2**

**Share of Foreign Currency Government Bonds**

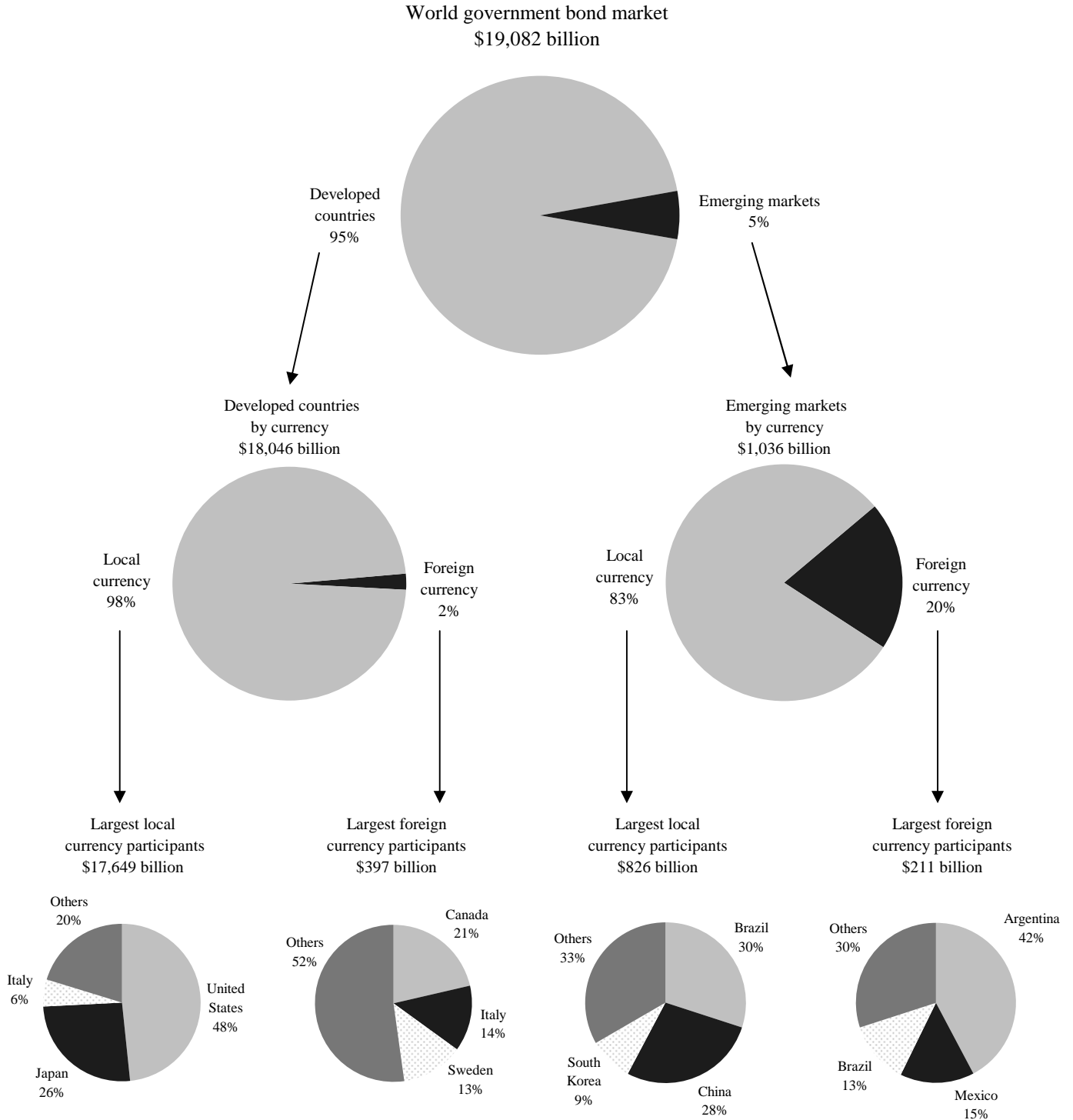
This figure shows the evolution of the amount outstanding of foreign currency denominated government bonds over the total amount outstanding of government bonds. The series are averages across countries, divided in developed countries and emerging markets following the classification used by the International Monetary Fund World Economic Outlook at the beginning of the period under study (see Appendix Table 2).



**Figure 3**

**Composition and Participants of Government Bond Markets**

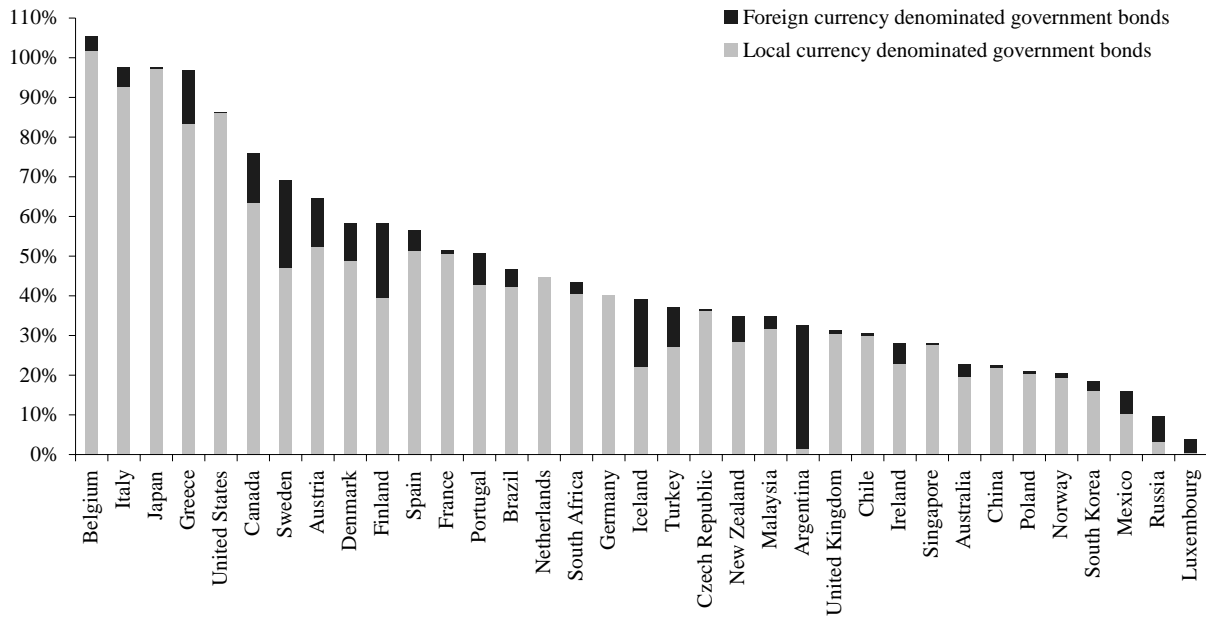
This figure shows the amount outstanding of government bonds for 35 countries (23 developed and 12 emerging) as of December 31, 2000. Bonds are issued in local and foreign currencies in domestic and international markets. Countries are divided in developed countries and emerging markets following the classification used by the International Monetary Fund World Economic Outlook at the beginning of the period under study (see Appendix Table 2).



**Figure 4**

**Country Ranking Based on Government Bonds / GDP**

This figure shows the amount outstanding of government bonds over GDP. Countries are ranked in descending order as of December 31, 2000. Data are divided in two categories based on the currency of issuance.



**Figure 5**

**Country Ranking Based on Share of Foreign Currency Government Bonds**

This figure shows the amount outstanding of foreign currency denominated government bonds over the total amount outstanding of government bonds. Countries are ranked in descending order as of December 31, 2000.

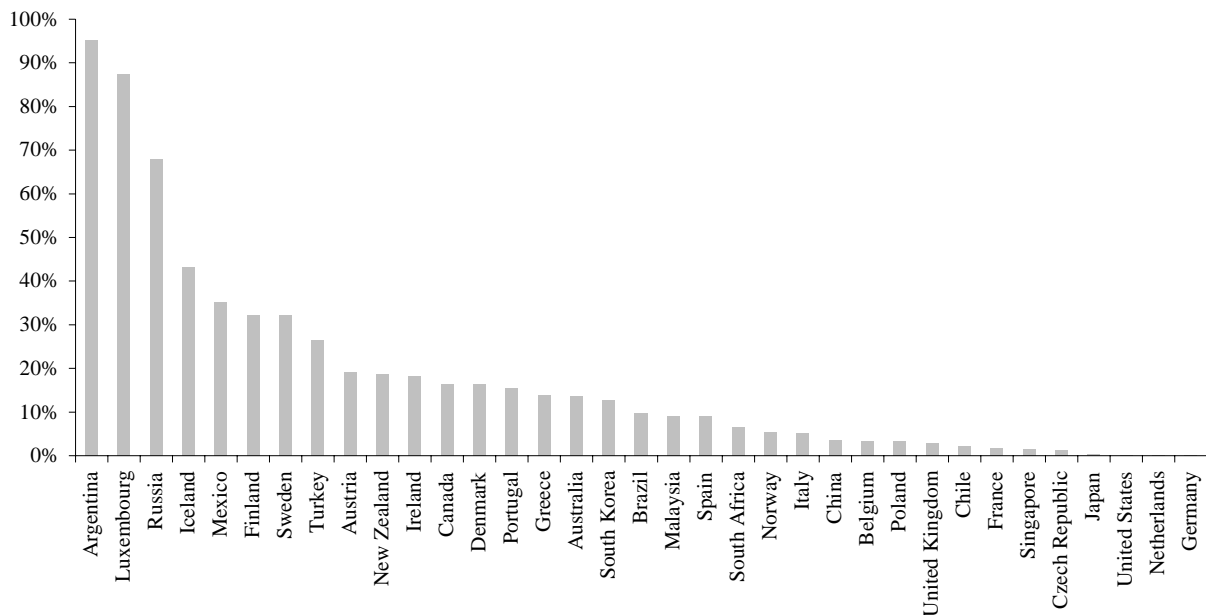


Table 1

## Determinants of Government Bond Market Development

This table shows regressions estimated through FGLS with heteroskedastic error structures and autocorrelation within countries. The data cover 35 countries between 1993 and 2000. For columns (1)-(3) inflation index, fiscal burden, and the three exchange rate regimes are lagged one period; for columns (4)-(6) the same variables are expressed as their initial values of the time series. See Appendix Table 3 for the definition of the variables. Absolute values for z-statistics are in brackets. \*, \*\*, and \*\*\* mean significance at ten, five, and one percent, respectively.

Independent variables:	Log of Local Currency Government Bonds Outstanding / GDP					
	Lagged variables			Initial values		
	(1)	(2)	(3)	(4)	(5)	(6)
Log of GDP	0.092 *** [6.028]	0.172 *** [6.270]	0.182 *** [11.142]	0.092 *** [3.130]	0.206 *** [8.584]	0.103 *** [3.111]
Log of total deposits / GDP	0.478 *** [11.120]	0.367 *** [5.768]	0.262 *** [4.010]	0.643 *** [14.148]	0.511 *** [8.941]	0.435 *** [7.316]
Institutionalized democracy	0.086 *** [9.514]	0.081 *** [5.967]	0.090 *** [2.670]	0.090 *** [5.505]	0.071 *** [2.959]	0.044 [1.465]
Inflation index	-0.010 [0.759]	-0.042 ** [2.561]	-0.066 *** [3.850]	0.055 [1.214]	-0.112 *** [3.157]	-0.166 *** [4.230]
Fiscal burden	0.110 *** [4.603]	0.072 *** [2.907]	0.067 ** [2.407]	0.357 *** [3.659]	0.113 [1.522]	-0.105 [1.578]
Official exchange rate regime	0.125 *** [7.236]			0.264 *** [6.221]		
Actual exchange rate regime (columns 2 and 5 RR, columns 3 and 6 LYS)		0.002 [0.489]	0.057 *** [3.064]		0.080 *** [8.188]	0.194 *** [4.184]
Observations	157	179	161	220	252	236
Number of Countries	30	35	32	30	35	33

Independent variables:	Log of Foreign Currency Government Bonds Outstanding / GDP					
	Lagged variables			Initial values		
	(1)	(2)	(3)	(4)	(5)	(6)
Log of GDP	-0.944 *** [11.930]	-0.570 *** [8.435]	-0.733 *** [12.634]	-1.111 *** [15.912]	-0.763 *** [9.317]	-0.842 *** [9.778]
Log of total deposits / GDP	-0.389 *** [3.141]	-1.253 *** [10.766]	-1.091 *** [10.667]	-0.339 *** [3.145]	-0.376 *** [2.715]	-0.368 *** [2.810]
Institutionalized democracy	0.249 *** [5.740]	0.111 *** [3.706]	0.160 *** [3.245]	0.203 *** [4.711]	0.154 *** [3.379]	0.178 *** [3.303]
Inflation index	0.043 [1.361]	-0.085 *** [2.581]	-0.086 *** [3.088]	-0.104 [0.884]	-0.043 [0.386]	-0.155 [1.369]
Fiscal burden	0.065 [1.441]	0.342 *** [5.352]	0.422 *** [6.238]	-0.148 [0.460]	0.306 * [1.680]	0.738 *** [3.504]
Official exchange rate regime	0.113 ** [2.407]			0.325 *** [3.733]		
Actual exchange rate regime (columns 2 and 5 RR, columns 3 and 6 LYS)		-0.074 *** [4.490]	-0.102 * [1.801]		-0.124 *** [4.034]	-0.269 * [1.807]
Observations	157	179	161	220	252	236
Number of Countries	30	35	32	30	35	33

Independent variables:	Log of Foreign Currency Government Bonds Outstanding / Total Government Bonds Outstanding					
	Lagged variables			Initial values		
	(1)	(2)	(3)	(4)	(5)	(6)
Log of GDP	-1.043 *** [16.561]	-0.873 *** [16.730]	-0.947 *** [20.456]	-0.970 *** [15.056]	-0.805 *** [14.413]	-0.829 *** [13.467]
Log of total deposits / GDP	-1.007 *** [11.938]	-0.887 *** [8.986]	-1.114 *** [16.312]	-0.726 *** [7.197]	-0.645 *** [6.918]	-0.638 *** [7.287]
Institutionalized democracy	0.095 ** [2.572]	0.103 *** [5.275]	0.095 *** [5.911]	0.114 ** [2.319]	0.111 ** [2.161]	0.088 * [1.774]
Inflation index	-0.019 [0.800]	-0.091 *** [4.321]	-0.068 *** [3.926]	-0.118 ** [2.090]	-0.219 *** [4.662]	-0.141 ** [2.386]
Fiscal burden	0.029 [0.739]	0.081 * [1.930]	0.236 *** [4.742]	-0.243 [1.424]	0.236 [1.335]	0.374 ** [2.315]
Official exchange rate regime	0.083 *** [3.292]			0.075 [0.852]		
Actual exchange rate regime (columns 2 and 5 RR, columns 3 and 6 LYS)		-0.037 *** [4.068]	-0.092 ** [2.490]		-0.118 *** [6.062]	-0.418 *** [4.208]
Observations	157	179	161	220	252	236
Number of Countries	30	35	32	30	35	33

Table 2

## Alternative Estimates - Domestic Stock Markets and International Investor Demand

This table shows regressions estimated through FGLS with heteroskedastic error structures and autocorrelation within countries. The data cover 35 countries between 1993 and 2000. In columns (3) and (4) the international investor demand variable is the logarithm of the government bonds and notes held by non-residents over GDP. In columns (5) and (6) the international investor demand variable is the logarithm of the long-term debt securities held by U.S. investors over GDP in 1997. In columns (7) and (8) the international investor demand variable is the logarithm of total debt securities held by foreign investors over GDP in 1997. Inflation index, fiscal burden, and the two exchange rate regimes are lagged one period. See Appendix Table 3 for the definition of the variables. Absolute values for z-statistics are in brackets. \*, \*\*, and \*\*\* mean significance at ten, five, and one percent, respectively.

Independent variables:	Log of Local Currency Government Bonds Outstanding / GDP							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log of GDP	0.251 *** [13.927]	0.187 *** [10.424]	0.134 *** [7.339]	0.120 *** [3.135]	0.057 *** [3.398]	0.038 * [1.683]	0.084 *** [3.871]	0.066 *** [2.892]
Log of total deposits / GDP	0.383 *** [7.268]	0.245 *** [4.128]	0.362 *** [5.450]	0.266 *** [3.690]	0.836 *** [15.586]	0.798 *** [16.007]	0.784 *** [15.441]	0.732 *** [14.111]
Log of stock market capitalization / GDP	0.161 *** [7.122]	0.190 *** [6.800]						
International investor demand			0.089 *** [2.915]	0.086 ** [2.323]	0.099 *** [3.040]	0.122 *** [3.472]	0.103 *** [2.696]	0.093 ** [2.361]
Institutionalized democracy	0.078 *** [4.401]	0.118 *** [4.591]	0.188 *** [3.113]	0.193 *** [2.693]	0.105 *** [10.626]	0.096 *** [5.355]	0.103 *** [4.300]	0.109 *** [4.760]
Inflation index	-0.001 [0.048]	-0.002 [0.123]	-0.069 *** [4.326]	-0.063 *** [3.061]	0.002 [0.193]	-0.002 [0.141]	-0.025 [1.750]	-0.023 * [1.736]
Fiscal burden	0.049 ** [2.135]	0.017 [0.583]	0.107 *** [3.883]	0.080 *** [2.622]	0.062 *** [3.336]	0.085 *** [3.928]	0.030 [1.531]	0.050 ** [2.399]
Actual exchange rate regime (odd columns RR, even columns LYS)	0.001 [0.324]	0.038 ** [2.224]	0.029 *** [4.797]	0.031 * [1.682]	0.000 [0.097]	0.007 [0.508]	0.009 *** [2.544]	0.035 *** [2.724]
Observations	175	161	123	112	171	153	177	159
Number of Countries	34	32	24	22	33	30	34	31

Independent variables:	Log of Foreign Currency Government Bonds Outstanding / GDP							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log of GDP	-0.679 *** [9.145]	-0.863 *** [16.233]	-0.721 *** [10.114]	-0.800 *** [12.381]	-0.588 *** [7.474]	-0.701 *** [10.187]	-0.710 *** [8.868]	-0.777 *** [9.878]
Log of total deposits / GDP	-1.311 *** [9.078]	-0.957 *** [8.591]	-1.216 *** [7.619]	-0.955 *** [5.126]	-0.728 *** [5.318]	-0.552 *** [3.936]	-0.600 *** [4.451]	-0.686 *** [5.731]
Log of stock market capitalization / GDP	-0.095 [1.289]	0.042 [0.490]						
International investor demand			0.607 *** [10.282]	0.958 *** [15.408]	0.406 *** [3.982]	0.649 *** [7.860]	0.462 *** [2.847]	0.975 *** [6.287]
Institutionalized democracy	0.127 *** [3.912]	0.175 *** [4.175]	0.044 [0.822]	-0.044 [0.806]	0.209 *** [7.862]	0.220 *** [6.680]	0.167 *** [5.393]	0.135 *** [3.941]
Inflation index	-0.102 *** [2.894]	-0.072 *** [3.224]	-0.098 [2.078]	-0.122 [2.170]	-0.024 [0.578]	-0.066 * [1.828]	0.008 [0.218]	0.006 [0.173]
Fiscal burden	0.335 *** [5.209]	0.438 *** [7.547]	0.007 [0.187]	0.005 [0.110]	0.125 ** [2.231]	0.238 *** [3.670]	0.165 *** [2.922]	0.292 *** [4.663]
Actual exchange rate regime (odd columns RR, even columns LYS)	-0.077 *** [4.969]	-0.134 ** [2.259]	-0.110 [6.933]	-0.040 [0.807]	-0.048 *** [3.349]	-0.089 ** [1.996]	-0.028 ** [2.002]	-0.038 [0.922]
Observations	175	161	123	112	171	153	177	159
Number of Countries	34	32	24	22	33	30	34	31

Independent variables:	Log of Foreign Currency Government Bonds Outstanding / Total Government Bonds Outstanding							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log of GDP	-0.903 *** [21.008]	-0.965 *** [18.889]	-0.796 *** [12.497]	-0.979 *** [13.935]	-0.610 *** [11.263]	-0.693 *** [10.016]	-0.708 *** [12.961]	-0.725 *** [13.150]
Log of total deposits / GDP	-0.954 *** [10.084]	-1.132 *** [14.754]	-0.905 *** [5.989]	-0.950 *** [5.306]	-1.128 *** [10.475]	-1.124 *** [10.984]	-0.842 *** [7.333]	-1.220 *** [16.235]
Log of stock market capitalization / GDP	-0.088 ** [1.993]	-0.022 [0.540]						
International investor demand			0.473 *** [7.115]	0.550 *** [6.383]	0.374 *** [4.594]	0.371 *** [3.303]	0.547 *** [5.627]	0.638 *** [5.743]
Institutionalized democracy	0.106 *** [5.413]	0.096 *** [5.021]	-0.089 [1.376]	-0.293 *** [2.635]	0.098 *** [4.187]	0.114 *** [4.051]	0.048 ** [2.085]	-0.007 [0.328]
Inflation index	-0.122 *** [6.481]	-0.064 *** [3.227]	-0.043 [1.190]	-0.216 *** [6.108]	-0.060 ** [2.139]	-0.054 * [1.733]	-0.042 [1.664]	-0.016 [0.645]
Fiscal burden	0.079 ** [2.057]	0.258 *** [5.091]	0.045 [1.126]	0.052 [0.994]	0.052 [1.244]	0.179 *** [3.156]	0.104 ** [2.014]	0.299 *** [5.096]
Actual exchange rate regime (odd columns RR, even columns LYS)	-0.042 *** [4.945]	-0.107 *** [2.841]	-0.039 *** [2.980]	-0.003 [0.094]	-0.038 *** [3.993]	-0.083 ** [2.276]	-0.025 *** [2.787]	-0.070 ** [2.151]
Observations	175	161	123	112	171	153	177	159
Number of Countries	34	32	24	22	33	30	34	31

Table 3

## Alternative Estimates - GDP per capita, Legal Origin, and Capital Account Openness

This table shows regressions estimated through FGLS with heteroskedastic error structures and autocorrelation within countries. The data cover 35 countries between 1993 and 2000. Inflation index, fiscal burden, and the two exchange rate regimes are lagged one period. See Appendix Table 3 for the definition of the variables. Absolute values for z-statistics are in brackets. \*, \*\*, and \*\*\* mean significance at ten, five, and one percent, respectively.

Independent variables:	Log of Local Currency Government Bonds Outstanding / GDP					
	(1)	(2)	(3)	(4)	(5)	(6)
Log of GDP	0.177 *** [6.555]	0.255 *** [10.095]	0.143 *** [5.660]	0.217 *** [12.855]	0.053 *** [3.074]	0.081 *** [4.031]
Log of total deposits / GDP	0.379 *** [5.476]	0.339 *** [4.944]	0.400 *** [6.332]	0.309 *** [5.380]	0.666 *** [12.345]	0.581 *** [10.702]
Log of GDP per capita	-0.139 *** [3.036]	-0.282 *** [5.478]				
English legal origin			0.521 *** [8.240]	0.625 *** [11.528]		
Capital account openness					-0.057 *** [2.872]	-0.069 *** [3.547]
Institutionalized democracy	0.116 *** [6.977]	0.199 *** [5.408]	0.115 *** [6.631]	0.066 *** [3.174]	0.122 *** [12.712]	0.109 *** [7.899]
Inflation index	-0.085 *** [4.408]	-0.082 *** [3.870]	-0.009 [0.548]	-0.032 *** [2.821]	-0.030 * [1.687]	-0.037 ** [2.167]
Fiscal burden	0.102 *** [3.702]	0.121 *** [3.987]	0.077 *** [3.304]	0.088 *** [3.214]	0.155 *** [6.658]	0.158 *** [5.114]
Actual exchange rate regime (odd columns RR, even columns LYS)	0.004 [0.904]	0.026 [1.408]	-0.003 [0.666]	0.014 [0.856]	0.011 * [1.883]	0.079 *** [4.407]
Observations	179	161	179	161	119	111
Number of Countries	35	32	35	32	28	26

Independent variables:	Log of Foreign Currency Government Bonds Outstanding / GDP					
	(1)	(2)	(3)	(4)	(5)	(6)
Log of GDP	-0.498 *** [8.648]	-0.709 *** [11.011]	-0.594 *** [10.173]	-0.637 *** [10.531]	-0.750 *** [15.098]	-0.952 *** [19.378]
Log of total deposits / GDP	-1.026 *** [8.729]	-1.033 *** [7.589]	-1.173 *** [9.083]	-1.099 *** [10.219]	-0.624 *** [4.982]	-0.545 *** [4.241]
Log of GDP per capita	-0.443 *** [3.401]	-0.104 [0.754]				
English legal origin			0.522 *** [2.864]	0.073 [0.441]		
Capital account openness					0.240 *** [4.073]	0.222 *** [3.020]
Institutionalized democracy	0.232 *** [5.124]	0.185 *** [3.129]	0.126 *** [3.890]	0.062 [1.589]	0.451 *** [11.176]	0.500 *** [13.741]
Inflation index	-0.108 *** [3.142]	-0.092 *** [3.143]	-0.074 ** [2.049]	-0.092 ** [2.481]	0.132 *** [3.290]	0.121 ** [2.505]
Fiscal burden	0.316 *** [5.005]	0.410 *** [5.855]	0.352 *** [5.204]	0.391 *** [5.207]	0.152 ** [2.294]	0.163 ** [2.058]
Actual exchange rate regime (odd columns RR, even columns LYS)	-0.077 *** [4.872]	-0.113 * [1.928]	-0.072 *** [3.516]	-0.082 [1.228]	-0.053 *** [4.104]	0.004 [0.113]
Observations	179	161	179	161	119	111
Number of Countries	35	32	35	32	28	26

Independent variables:	Log of Foreign Currency Government Bonds Outstanding / Total Government Bonds Outstanding					
	(1)	(2)	(3)	(4)	(5)	(6)
Log of GDP	-0.876 *** [16.559]	-1.047 *** [17.352]	-0.906 *** [16.002]	-0.927 *** [17.748]	-0.886 *** [15.726]	-0.982 *** [16.037]
Log of total deposits / GDP	-0.948 *** [9.932]	-1.204 *** [13.512]	-0.826 *** [7.566]	-0.950 *** [11.796]	-0.842 *** [7.010]	-1.037 *** [8.164]
Log of GDP per capita	0.003 [0.036]	0.467 *** [4.427]				
English legal origin			-0.233 [1.475]	-0.802 *** [4.696]		
Capital account openness					0.162 *** [3.928]	0.141 ** [2.485]
Institutionalized democracy	0.094 *** [3.491]	-0.005 [0.155]	0.094 *** [3.202]	0.006 [0.255]	0.171 *** [6.505]	0.258 *** [6.938]
Inflation index	-0.096 *** [5.175]	-0.020 [0.807]	-0.062 ** [2.429]	-0.096 *** [3.429]	0.012 [0.422]	0.009 [0.268]
Fiscal burden	0.098 ** [2.351]	0.223 *** [3.965]	0.058 [1.244]	0.164 *** [3.047]	0.203 *** [2.833]	0.260 *** [3.529]
Actual exchange rate regime (odd columns RR, even columns LYS)	-0.040 *** [4.360]	-0.062 * [1.809]	-0.034 *** [3.193]	-0.037 [0.965]	-0.064 *** [4.821]	-0.001 [0.033]
Observations	179	161	179	161	119	111
Number of Countries	35	32	35	32	28	26



**Table 4**

**Alternative Estimates - Size (non-linear effects)**

This table shows regressions estimated through FGLS with heteroskedastic error structures and autocorrelation within countries. The data cover 35 countries between 1993 and 2000. Inflation index, fiscal burden, and the two exchange rate regimes are lagged one period. See Appendix Table 3 for the definition of the variables. Absolute values for z-statistics are in brackets. \*, \*\*, and \*\*\* mean significance at ten, five, and one percent, respectively.

Independent variables:	Log of Foreign Currency Government Bonds Outstanding / GDP		Log of Foreign Currency Government Bonds Outstanding / Total Government Bonds Outstanding	
	(1)	(2)	(3)	(4)
Log of GDP	4.760 *** [6.740]	7.186 *** [7.613]	3.208 *** [12.631]	4.399 *** [5.620]
Square log of GDP	-0.216 *** [7.657]	-0.312 *** [8.364]	-0.160 *** [14.264]	-0.206 *** [6.686]
Log of total deposits / GDP	-0.977 *** [7.959]	-0.484 *** [3.784]	-0.992 *** [13.022]	-0.867 *** [11.884]
Institutionalized democracy	0.159 *** [5.792]	0.282 *** [4.851]	0.101 *** [4.596]	0.109 *** [5.001]
Inflation index	-0.135 *** [4.290]	-0.130 *** [5.261]	-0.120 *** [7.841]	-0.111 *** [7.663]
Fiscal burden	0.055 [1.170]	0.110 ** [2.281]	0.043 [1.608]	0.070 ** [2.027]
Actual exchange rate regime (RR)	-0.052 *** [3.876]		-0.031 *** [3.678]	
Actual exchange rate regime (LYS)		-0.089 * [1.852]		-0.079 ** [2.450]
Observations	179	161	179	161
Number of Countries	35	32	35	32

**Table 5**

**Alternative Estimates - Inflation**

This table shows regressions estimated through FGLS with heteroskedastic error structures and autocorrelation within countries. The data cover 35 countries between 1993 and 2000. Inflation, fiscal burden, and the two exchange rate regimes are lagged one period. See Appendix Table 3 for the definition of the variables. Absolute values for z-statistics are in brackets. \*, \*\*, and \*\*\* mean significance at ten, five, and one percent, respectively.

Independent variables:	Log of Local Currency Government Bonds		Log of Foreign Currency Government		Log of Foreign Currency Government	
	Outstanding / GDP	Bonds Outstanding / GDP	Bonds Outstanding / GDP	Bonds Outstanding / Total Government	Bonds Outstanding / Total Government	Bonds Outstanding
	(1)	(2)	(3)	(4)	(1)	(2)
Log of GDP	0.211 *** [7.676]	0.189 *** [9.987]	-0.573 *** [8.186]	-0.731 *** [12.595]	-0.868 *** [16.198]	-0.903 *** [18.847]
Log of total deposits / GDP	0.424 *** [7.277]	0.393 *** [6.635]	-1.225 *** [10.536]	-1.115 *** [11.957]	-0.916 *** [9.208]	-1.173 *** [18.030]
Institutionalized democracy	0.054 *** [2.946]	0.065 ** [2.203]	0.146 *** [4.091]	0.172 *** [3.280]	0.123 *** [5.866]	0.092 *** [4.867]
Inflation (three-year average)	-0.073 [0.791]	-0.060 [0.695]	-0.813 *** [8.593]	-0.630 *** [5.757]	-0.522 *** [5.605]	-0.499 *** [6.838]
Fiscal burden	0.077 *** [3.224]	0.091 *** [3.471]	0.307 *** [5.168]	0.387 *** [5.643]	0.059 [1.424]	0.260 *** [4.854]
Actual exchange rate regime (RR)	0.001 [0.233]	0.028 * [1.682]	-0.072 *** [4.566]	-0.109 * [1.818]	-0.037 *** [3.864]	-0.068 * [1.805]
Actual exchange rate regime (LYS)						
Observations	177	160	177	160	177	160
Number of Countries	35	32	35	32	35	32

Table 6

## Alternative Estimates - Excluding the Exchange Rate Regime

This table shows regressions estimated through FGLS with heteroskedastic error structures and autocorrelation within countries. The data cover 35 countries between 1993 and 2000. In column (3) the international investor demand variable is the logarithm of the government bonds and notes held by non-residents over GDP. Inflation index and fiscal burden are lagged one period. See Appendix Table 3 for the definition of the variables. Absolute values for z-statistics are in brackets. \*, \*\*, and \*\*\* mean significance at ten, five, and one percent, respectively.

Independent variables:	Log of Local Currency Government Bonds Outstanding / GDP					
	(1)	(2)	(3)	(4)	(5)	(6)
Log of GDP	0.160 *** [5.855]	0.279 *** [15.931]	0.159 *** [8.586]	0.169 *** [6.350]	0.132 *** [5.876]	0.064 *** [4.210]
Log of total deposits / GDP	0.352 *** [5.988]	0.376 *** [7.103]	0.123 ** [2.183]	0.351 *** [5.657]	0.395 *** [6.834]	0.695 *** [12.986]
Log of stock market capitalization / GDP		0.155 *** [6.968]				
International investor demand			0.064 * [1.775]			
Log of GDP per capita				-0.140 *** [3.042]		
English legal origin					0.484 *** [8.037]	
Capital account openness						-0.072 *** [3.625]
Institutionalized democracy	0.082 *** [5.723]	0.064 *** [3.649]	0.256 *** [3.666]	0.119 *** [6.889]	0.114 *** [6.685]	0.123 *** [12.228]
Inflation Index	-0.042 ** [2.547]	0.007 [0.431]	-0.070 *** [3.701]	-0.085 *** [4.511]	-0.018 [1.110]	-0.024 [1.283]
Fiscal burden	0.072 *** [2.831]	0.061 *** [2.902]	0.096 *** [3.107]	0.103 *** [3.639]	0.081 *** [3.410]	0.165 *** [6.891]
Observations	179	175	123	179	179	119
Number of Countries	35	34	24	35	35	28

Independent variables:	Log of Foreign Currency Government Bonds Outstanding / GDP					
	(1)	(2)	(3)	(4)	(5)	(6)
Log of GDP	-0.626 *** [12.673]	-0.682 *** [10.573]	-0.713 *** [10.828]	-0.526 *** [15.082]	-0.566 *** [11.744]	-0.874 *** [23.921]
Log of total deposits / GDP	-1.019 *** [11.333]	-1.174 *** [8.659]	-0.592 *** [3.917]	-0.724 *** [9.462]	-0.913 *** [10.240]	-0.496 *** [3.858]
Log of stock market capitalization / GDP		-0.003 [0.041]				
International investor demand			0.739 *** [11.843]			
Log of GDP per capita				-0.515 *** [4.249]		
English legal origin					0.360 ** [2.543]	
Capital account openness						0.264 *** [4.092]
Institutionalized democracy	0.080 ** [2.256]	0.093 *** [2.658]	-0.014 [0.140]	0.193 *** [4.399]	0.082 ** [2.445]	0.448 *** [13.264]
Inflation Index	-0.110 *** [2.909]	-0.109 *** [2.876]	-0.059 [1.258]	-0.123 *** [3.648]	-0.085 ** [2.243]	0.156 *** [3.678]
Fiscal burden	0.351 *** [5.903]	0.283 *** [4.114]	0.012 [0.315]	0.287 *** [4.868]	0.266 *** [4.294]	0.227 *** [3.014]
Observations	179	175	123	179	179	119
Number of Countries	35	34	24	35	35	28

Independent variables:	Log of Foreign Currency Government Bonds Outstanding / Total Government Bonds Outstanding					
	(1)	(2)	(3)	(4)	(5)	(6)
Log of GDP	-0.862 *** [19.477]	-0.950 *** [18.518]	-0.753 *** [12.205]	-0.845 *** [17.581]	-0.954 *** [16.975]	-0.911 *** [17.050]
Log of total deposits / GDP	-0.918 *** [10.993]	-0.876 *** [10.442]	-0.666 *** [4.690]	-0.912 *** [10.879]	-0.832 *** [9.551]	-0.893 *** [7.180]
Log of stock market capitalization / GDP		-0.053 [1.267]				
International investor demand			0.487 *** [7.134]			
Log of GDP per capita				-0.038 [0.402]		
English legal origin					-0.405 *** [2.746]	
Capital account openness						0.224 *** [3.485]
Institutionalized democracy	0.074 ** [2.430]	0.087 *** [3.127]	-0.048 [0.415]	0.080 ** [2.191]	0.056 [1.629]	0.192 *** [6.777]
Inflation Index	-0.062 *** [2.602]	-0.078 *** [2.930]	-0.039 [1.152]	-0.067 *** [2.709]	-0.059 ** [2.186]	0.095 ** [2.405]
Fiscal burden	0.068 [1.453]	0.057 [1.340]	0.068 [1.452]	0.070 [1.483]	0.058 [1.236]	0.286 *** [3.619]
Observations	179	175	123	179	179	119
Number of Countries	35	34	24	35	35	28

Table 7

## Alternative Estimates - Instrumental Variables

This table shows regressions estimated through FGLS with heteroskedastic error structures and autocorrelation within countries. The data cover 35 countries between 1993 and 2000. In columns (1) and (2) the actual exchange rate regime is estimated from OLS regressions, using the macroeconomic and institutional variables and its own lags as regressors. In columns (3) and (4) the actual exchange rate regime, inflation index, and fiscal burden are estimated from OLS regressions, using the macroeconomic and institutional variables and their own lags as regressors. Since these variables are generated regressors in the FGLS regressions, the estimates of the standard errors may be biased. However, under the null hypothesis that the estimated coefficients are zero, the standard errors are unbiased. Therefore, the t-statistic for the null hypothesis is not invalidated (Pagan, 1984). Inflation index and fiscal burden are lagged one period. See Appendix Table 3 for the definition of the variables. Absolute values for z-statistics are in brackets. \*, \*\*, and \*\*\* mean significance at ten, five, and one percent, respectively.

Independent variables:	Log of Local Currency Government Bonds Outstanding / GDP			
	(1)	(2)	(3)	(4)
Log of GDP	0.157 *** [5.611]	0.177 *** [8.631]	0.083 *** [3.011]	0.110 *** [5.156]
Log of total deposits / GDP	0.378 *** [5.936]	0.326 *** [4.426]	0.672 *** [10.585]	0.632 *** [10.672]
Institutionalized democracy	0.078 *** [5.764]	0.067 *** [2.805]	0.076 *** [3.265]	0.093 *** [5.059]
Inflation index	-0.040 ** [2.463]	-0.054 *** [2.855]	-0.057 *** [2.725]	-0.052 *** [2.608]
Fiscal burden	0.076 *** [3.083]	0.137 *** [4.343]	0.081 *** [2.647]	0.155 *** [4.757]
Actual exchange rate regime (columns 1 and 3 RR, columns 2 and 4 LYS)	0.003 [0.647]	0.161 *** [4.979]	0.000 [0.040]	0.083 *** [3.367]
Observations	178	152	144	122
Countries	35	31	33	28
Instruments	Actual exchange rate regime (t-1; t-2)		Inflation index (t-1; t-2) Fiscal burden (t-1; t-2) Actual exchange rate regime (t-1; t-2)	

Independent variables:	Log of Foreign Currency Government Bonds Outstanding / GDP			
	(1)	(2)	(3)	(4)
Log of GDP	-0.563 *** [7.952]	-0.642 *** [7.969]	-0.738 *** [11.348]	-0.813 *** [10.070]
Log of total deposits / GDP	-1.306 *** [10.857]	-1.313 *** [9.746]	-0.879 *** [5.997]	-1.114 *** [7.592]
Institutionalized democracy	0.126 *** [4.113]	0.223 *** [4.093]	0.139 *** [4.087]	0.243 *** [5.680]
Inflation index	-0.085 ** [2.431]	-0.085 ** [2.174]	-0.113 ** [2.461]	-0.158 *** [3.738]
Fiscal burden	0.307 *** [4.667]	0.361 *** [4.902]	0.325 *** [4.517]	0.480 *** [5.810]
Actual exchange rate regime (columns 1 and 3 RR, columns 2 and 4 LYS)	-0.083 *** [4.515]	-0.514 *** [4.605]	-0.070 *** [4.562]	-0.614 *** [6.969]
Observations	178	152	144	122
Countries	35	31	33	28
Instruments	Actual exchange rate regime (t-1; t-2)		Inflation index (t-1; t-2) Fiscal burden (t-1; t-2) Actual exchange rate regime (t-1; t-2)	

Independent variables:	Log of Foreign Currency Government Bonds Outstanding / Total Government Bonds			
	(1)	(2)	(3)	(4)
Log of GDP	-0.882 *** [16.064]	-0.973 *** [14.259]	-0.792 *** [18.878]	-0.906 *** [17.933]
Log of total deposits / GDP	-0.928 *** [9.117]	-0.951 *** [9.807]	-1.146 *** [10.308]	-1.371 *** [14.611]
Institutionalized democracy	0.113 *** [5.524]	0.156 *** [5.155]	0.051 * [1.917]	0.135 *** [4.512]
Inflation index	-0.090 *** [4.045]	-0.085 *** [4.496]	-0.145 *** [5.240]	-0.151 *** [4.343]
Fiscal burden	0.054 [1.277]	0.128 *** [2.810]	0.236 *** [3.721]	0.390 *** [5.374]
Actual exchange rate regime (columns 1 and 3 RR, columns 2 and 4 LYS)	-0.051 *** [4.771]	-0.296 *** [3.930]	-0.068 *** [7.417]	-0.431 *** [6.717]
Observations	178	152	144	122
Countries	35	31	33	28
Instruments	Actual exchange rate regime (t-1; t-2)		Inflation index (t-1; t-2) Fiscal burden (t-1; t-2) Actual exchange rate regime (t-1; t-2)	

**Appendix Table 1**  
**Summary Statistics**

This table shows summary statistics of local currency denominated government bonds outstanding over GDP and foreign currency denominated government bonds outstanding over GDP. The series are divided in two groups (developed countries and emerging markets) following the classification used by the International Monetary Fund World Economic Outlook at the beginning of the period under study (see Appendix Table 2). The statistics are shown for three points in time: 1993, 1996, and 2000. The minimum values that appear with a 0.00 are generally low values but not absolute zeros.

**Local Currency Government Bonds Outstanding / GDP**

	1993						1996						2000					
	No. Obs.	Mean	Median	Max	Min	Std. Dev.	No. Obs.	Mean	Median	Max	Min	Std. Dev.	No. Obs.	Mean	Median	Max	Min	Std. Dev.
Developed Countries	21	0.46	0.37	1.01	0.00	0.26	22	0.52	0.42	1.10	0.00	0.27	23	0.48	0.45	1.02	0.00	0.28
Emerging Markets	9	0.23	0.11	0.66	0.10	0.20	10	0.18	0.15	0.49	0.03	0.14	12	0.23	0.24	0.42	0.02	0.14
<b>Total</b>	<b>30</b>	<b>0.39</b>	<b>0.34</b>	<b>1.01</b>	<b>0.00</b>	<b>0.26</b>	<b>32</b>	<b>0.41</b>	<b>0.37</b>	<b>1.10</b>	<b>0.00</b>	<b>0.28</b>	<b>35</b>	<b>0.40</b>	<b>0.36</b>	<b>1.02</b>	<b>0.00</b>	<b>0.26</b>

**Foreign Currency Government Bonds Outstanding / GDP**

	1993						1996						2000					
	No. Obs.	Mean	Median	Max	Min	Std. Dev.	No. Obs.	Mean	Median	Max	Min	Std. Dev.	No. Obs.	Mean	Median	Max	Min	Std. Dev.
Developed Countries	21	0.10	0.07	0.37	0.00	0.10	22	0.09	0.06	0.34	0.00	0.10	23	0.06	0.05	0.22	0.00	0.07
Emerging Markets	9	0.02	0.01	0.06	0.00	0.02	10	0.04	0.01	0.22	0.00	0.07	12	0.06	0.03	0.31	0.00	0.08
<b>Total</b>	<b>30</b>	<b>0.08</b>	<b>0.04</b>	<b>0.37</b>	<b>0.00</b>	<b>0.09</b>	<b>32</b>	<b>0.08</b>	<b>0.04</b>	<b>0.34</b>	<b>0.00</b>	<b>0.09</b>	<b>35</b>	<b>0.06</b>	<b>0.04</b>	<b>0.31</b>	<b>0.00</b>	<b>0.07</b>

**Appendix Table 2**  
**Country Classification**

This table shows the list of countries in the database, divided into two groups following the classification used by the International Monetary Fund World Economic Outlook at the beginning of the period under study (1993).

Developed Countries	Emerging Markets
Australia	Argentina
Austria	Brazil
Belgium	Chile
Canada	China
Denmark	Czech Republic
Finland	Malaysia
France	Mexico
Germany	Poland
Greece	Russia
Iceland	South Africa
Ireland	South Korea
Italy	Turkey
Japan	
Luxembourg	
Netherlands	
New Zealand	
Norway	
Portugal	
Singapore	
Spain	
Sweden	
United Kingdom	
United States	

**Appendix Table 3  
Series Description and Data Sources**

<u>Series Names</u>	<u>Description</u>	<u>Source</u>
<u>Dependent Variables</u>		
Local and foreign currency denominated government bonds outstanding (in current U.S. dollars)	Amounts outstanding of bonds (including long-term bonds, notes, treasury bills, and money-market instruments) issued by the public sector denominated in their own local currency and in foreign currencies at year-end values. The public sector includes all government levels and state agencies. This variable comprises issues in all markets (domestic and international). Comprehensive data are available for 35 countries from 1993 to 2000. The BIS sources are: Bank of England, Capital DATA, Euroclear, ISMA, Thomson Financial Securities Data, and national sources. For Argentina data from the Ministry of Finance are used instead.	Bank for International Settlements, International Financial Statistics, and the Argentine Ministry of Finance
Share of foreign currency denominated government bonds	This ratio is constructed by dividing foreign currency denominated government bonds by the total government bonds outstanding.	Bank for International Settlements, International Financial Statistics and the Argentine Ministry of Finance
<u>Independent Variables</u>		
GDP at market prices (in current U.S. dollars)	Gross domestic product (GDP) at purchaser prices. GDP data is converted from domestic currencies using yearly official exchange rates. The data cover 35 countries from 1993 to 2000.	The World Bank, World Development Indicators
Fiscal burden of government	Fiscal burden of government is a component of the index of economic freedom published by The Heritage Foundation and encompasses income tax rates, corporate tax rates, and government expenditures as percentage of output. The variable is a five-category scale in which higher scores represent higher level of government expenditure as percentages of GDP and higher corporate tax rates. The data cover 35 countries from 1994 to 2001.	The Heritage Foundation
Inflation index	Inflation index is a component of the index of economic freedom published by The Heritage Foundation. The variable is based on a country's weighted average annual inflation rate over the previous ten years and has a five point scale, where higher values represent higher average inflation rate or worse monetary policy. The original name of the variable is monetary policy. The data cover 35 countries from 1994 to 2001.	The Heritage Foundation
Institutionalized democracy	Institutionalized democracy is conceived as three essential, interdependent elements. One is the presence of institutions and procedures through which citizens can express effective preferences about alternative policies and leaders. Another is the existence of institutionalized constraints on the exercise of power by the executive. The third one is the guarantee of civil liberties to all citizens in their daily lives and in acts of political participation. Other aspects of plural democracy, such as the rule of law, systems of checks and balances, freedom of the press, and so on are means to, or specific manifestations of, these general principles. The institutionalized democracy indicator is an additive eleven-point scale (0-10). The data cover 35 countries from 1993 to 2000.	Polly IV, INSCR Program, CIDCM, University of Maryland
Total deposits (current U.S. dollars)	This variable is composed by all the deposits held by commercial banks and other financial institutions that accept transferable deposits including demand, time, and savings deposits, and deposits from the government. As the original data are available in domestic currency, the year-end market exchange rates are used to convert the variable into U.S. dollars. The data cover 35 countries from 1993 to 2000.	International Monetary Fund, International Financial Statistics

<b>Series Names</b>	<b>Description</b>	<b>Source</b>
Official exchange rate regime	Official exchange rate regime is coded from 1 to 4 as follows: (1) exchange rate pegged to a single currency, (2) limited flexibility, (3) managed floating, and (4) independently floating. The variable covers 30 countries from 1993 to 1999.	International Monetary Fund, Exchange Arrangements and Exchange Restrictions
Actual exchange rate regime (RR)	Actual exchange rate regime (RR) is coded from 1 to 15 where higher values represent more flexible exchange arrangements and lower values more fixed arrangements. The classification is based on market-determined dual or parallel exchange rates as well as exchange rates and inflation rates from a variety of sources. The variable covers 35 countries from 1993 to 2000.	Reinhart and Rogoff (2002)
Actual exchange rate regime (LYS)	Actual exchange rate regime (LYS) is a three-way classification of exchange rate regimes. The variable has been transformed to have higher values for more flexible exchange arrangements and lower values more fixed arrangements. The classification is based on the volatility of the nominal exchange rate, the volatility of its rate of change, and the volatility of the international reserves. The variable covers 33 countries from 1993 to 2000.	Levy Yeyati and Sturzenegger (2003)
Stock market capitalization (current U.S. dollars)	Total market capitalization in domestic stock markets.	Standard & Poor's (former IFC) Emerging Markets Database
Government bonds and notes held by non-residents (current U.S. dollars)	General government bonds and notes portfolio liabilities at year end. The data are part of the International Investment Position (IIP) statistics reported by the IMF and represent the stock of government bonds and notes held by non-residents.	International Monetary Fund, Balance of Payments Statistics
Long-term debt securities held by U.S. investors (current U.S. dollars)	U.S. investors' holdings of foreign long-term debt securities as of December 31, 1997. The data are drawn from a comprehensive benchmark survey jointly undertaken by the U.S. Treasury Department and the Board of Governors of the Federal Reserve System.	U.S. Treasury Department
Total debt securities held by foreign investors (current U.S. dollars)	Sum of long- and short-term debt portfolio liabilities as of December 1997. The data are derived from creditor data (data on foreign debt securities held by investors in each of the reporting countries). The data are drawn from a survey of portfolio investment assets where 29 economies participated.	International Monetary Fund, Coordinated Portfolio Investment Survey (CPIS)
GDP per capita	Gross domestic product (GDP) divided by mid-year population.	The World Bank, World Development Indicators
English legal origin	Dummy identifying the legal origin of the Company Law or Commercial Code of each country. There are five possible origins: (1) English Common Law; (2) French Commercial Code; (3) German Commercial Code; (4) Scandinavian Commercial Code; and (5) Socialist/Communist Laws. The dummy equals one if the country's Company Law originates from English Common Law and zero otherwise.	La Porta et al. (1999)
Capital account openness	Index on capital account openness based on the four binary dummy variables reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions: (1) presence of multiple exchange rates, (2) restrictions on current account transactions, (3) restrictions on capital account transactions, and (4) requirement of the surrender of export proceeds. In order to focus on the effect of financial openness – rather than controls – the variables are equal to one when the capital account restrictions are non-existent. For controls on capital transactions the index considers the share of a five-year window that capital controls were not in effect (3b). The capital account openness index is calculated as the first standardized principal component of (1), (2), (3b), and (4). The index takes on higher values the more open the country is to cross-border capital transactions. By construction, the index has a mean of zero.	Chinn and Ito (2005)
Inflation (three-year average)	Three-year moving average of annual inflation rate, as measured by the consumer price index.	The World Bank, World Development Indicators