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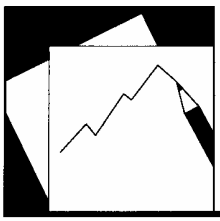

# IMF Working Paper

# Sovereign Borrowing Cost and the IMF's Data Standards Initiatives

*John Cady and Anthony Pellechio*

INTERNATIONAL MONETARY FUND

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Statistics Department

# Sovereign Borrowing Cost and the IMF's Data Standards Initiatives

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## Abstract



The effects of the IMF's data standards initiatives on sovereign borrowing costs in private capital markets are investigated for 26 emerging market and developing countries. Stable and significant panel econometric estimates indicate that subscription to the Special Data Dissemination Standard (SDDS) reduces launch spreads by an average of 20 percent while participation in the General Data Dissemination System (GDDS) reduces spreads for those countries with access to capital markets by an average of 8 percent. These estimates correspond to discounts of some 50 and 20 basis points, respectively. Evidence of similar discounts is also found when launch yields are analyzed.

JEL Classification Numbers: C22, F33, F34

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*Nothing would help improve standards more than if countries that met higher standards were rewarded with lower borrowing costs.* Stanley Fischer (2002)

## I. INTRODUCTION

A central objective of the IMF's data standards initiatives is to improve data dissemination in support of the operation of financial markets. The financial crisis in Mexico in 1994–95 heightened awareness of the need to provide better information to the public and financial markets. The IMF responded by establishing the data standards initiatives to improve timely release to the public of economic and financial data and information on their compilation procedures. The initiatives include the Special Data Dissemination Standard (SDDS) to guide countries that have, or that might seek, access to international capital markets and the General Data Dissemination System (GDDS) to establish procedures to improve the quality of data of countries not yet aspiring to meet the SDDS requirements.

In recent years, empirical evidence of lower borrowing costs for emerging market countries subscribing to the SDDS has accumulated. Several secondary bond market studies have found an interest rate discount on bonds of emerging market countries (EMCs) subscribing to the SDDS. Recently Cady (2005) found evidence of a similar discount for SDDS subscription on EMC spreads in the primary bond market. To our knowledge, the impact of GDDS participation on the cost of sovereign borrowing has yet to be examined.

This study seeks to fill this gap by examining the impact of the GDDS along with SDDS on the borrowing costs of emerging market and developing countries that have issued sovereign bonds over the past decade and a half. It extends Cady's (2005) analysis by expanding the panel regression analysis to include GDDS participants with access to international capital markets and introducing GDDS participation as a determinant of sovereign borrowing costs.

Eichengreen and Mody (1998) provide evidence of a tendency for primary market spreads to follow secondary market spreads with a three-to-four-quarter lag, but, that launch spreads can move differently over the short run. We examine primary market spreads and yields at the time of launch, as they represent the cost of borrowing relevant to EMCs and developing countries, and a discount in the primary market directly benefits the borrowing country. Our analysis provides strong and consistent econometric evidence of data standards initiatives discounts for sovereign issuers participating in the GDDS, as well as EMCs subscribing to the SDDS. The discounts amount to about 8 percent for GDDS participants and 20 percent for SDDS subscribers, or the equivalent of about 20 and 50 basis points, respectively. These results are consistent across various modeling approaches, stable over time, and broadly in line with estimates from other studies.[2] Alternative specifications—

[2] For example, estimates of SDDS discounts in secondary bond markets reported by Christofides, Mulder, and Tiffin (2003) and Glennerster and Shin (2003); however, our estimates are much lower than the 200–300 basis point decline in spreads for SDDS subscription for a sample of emerging market countries found by the Institute for International Finance (2002).

including modeling yields as well as spreads and using sovereign credit ratings as a substitute for macroeconomic indicators—reinforce the basic findings.

## II. BACKGROUND

The IMF's work on data dissemination standards began in October 1995 following the Mexican financial crisis. The international community recognized the essential role of data transparency for meeting the challenges and risks of globalization and reducing the likelihood of financial crises. It called for timely dissemination of macroeconomic and financial data and an improved early warning system that would permit a swifter response to financial shocks. The Fund endorsed the establishment of standards to guide member countries in the public dissemination of economic and financial data. The standards aimed to enhance the availability of timely statistics, thereby contributing to the formulation and pursuit of sound macroeconomic polices, as well as improved functioning of financial markets. The SDDS was approved by the IMF Executive Board in March 1996 and the GDDS in December 1997.

The SDDS is a standard monitored by the Fund that focuses on dissemination of economic and financial data used principally by financial market participants. It requires subscribing countries to observe the standard and provide descriptions of the data (metadata), advance release calendars, and other information about their data dissemination practices. Subscribers must agree to post this information on the IMF's Dissemination Standards Bulletin Board (DSBB) and establish a National Summary Data Page (NSDP), an internet site linked to the DSBB.

The GDDS is a framework to guide countries in the development of sound statistical systems and dissemination of economic and financial data to the public. The GDDS calls for participating countries to prepare metadata and describe statistical practices and development plans over the short and medium-term, along with technical assistance requirements. Participating countries must update their metadata annually and describe how their data compilation and dissemination activities are keeping pace with their development plans and best statistical practices as set forth in the GDDS. Information on both the SDDS and GDDS are available on the DSBB.

The Fund has dedicated resources to outreach and technical assistance to promote SDDS and GDDS participation among member countries. Three-fourths of the Fund membership have become either SDDS subscribers or GDDS participants. At the end of 2005, SDDS subscription stood at 62 countries, while 88 countries have participated in the GDDS, five of which have graduated to SDDS subscription (Figure 1). The Fund's technical assistance program in statistics aims to promote graduation of GDDS participants to the SDDS. To maintain the credibility of the data standards initiatives, the Fund monitors countries' observance of the standards, and aligns the structures of the SDDS and GDDS with the Fund's Data Quality Assessment Framework (DQAF).[3]

[3] The DQAF is the underlying framework for the preparation of the data module of the Report on the Observance of Standards and Codes (IMF data ROSCs).

The Fund developed the data standards initiatives at a time when international investors were showing greater interest in EMCs and developing countries, reflecting a search for yield through international portfolio diversification, an impetus for financial globalization. In the search for yield, investors compare economic prospects of developed and emerging markets supported by the continuous and predictable flow of economic and financial data. Dissemination of such data on a timely basis is the central purpose of the data standards initiatives. Improved timeliness of data provided by EMCs and developing countries borrowing on international capital markets should, all else equal, permit easier access on better terms to global finance. The transmission mechanism is well described by Eichengreen (1999): "...subscription status provides an objective indicator of countries' creditworthiness, providing an alternative to the judgments of commercial credit agencies. Investors might become reluctant to lend to countries that fail to subscribe to the standard or might use interest rate spreads to ration credit to them."

Market participants generally view the Fund's data standards initiatives as useful. In particular, timely, high frequency, quality data permit precise calculation of measurable risks and reduce uncertainty that is not precisely measurable, but is instead subjective in assessments of country risk by market participants.[4] According to a 2002 Financial Stability Forum (FSF) report, "...for market incentives to work, market participants must be aware of the standard, judge it of relevance and use it in forming their risk assessments. Further, this must be reflected in the pricing or allocation of credit or investment in a particular economy or institution operating in that economy, in the form of differentiated credit ratings, borrowing spread, or asset allocations." FSF surveys and meetings found that market participants' familiarity with twelve key international standards varied widely, but that the SDDS and the International Accounting Standard were the best known and viewed as particularly useful.

## III. Data and Empirical Approach

The influence of SDDS subscription and GDDS participation on sovereign borrowing costs is examined using pooled cross-section and time series data. Quarterly time series data on new issues of sovereign bonds, denominated in U.S. dollars, Japanese yen, and euros,[5] and key macroeconomic and credit indicators for a group of 26 EMCs and developing countries are analyzed (Appendix I).

Bond characteristics and issuance data were drawn from the IMF's *Bonds, Equities, Loans (BEL)* database. Spreads reported in the *BEL* database are defined as the annual yield to maturity at the time of the launch minus a "risk-free" benchmark yield. This benchmark yield is the annual yield for an industrial country government bond of the same currency and maturity. Launch yields represent actual borrowing costs incurred by EMCs and developing

[4] For further discussion of data quality, risk, and uncertainty, see Erbaş (2005).

[5] Prior to the introduction of the euro in 1999, bonds denominated in deutsche marks were included in the analysis.

countries. This is in contrast to the well-know JP Morgan EMBI family of emerging market bond indices measuring secondary market spreads.

The panel dataset is comprised of some 320 sovereign bonds issued by the group of 26 EMCs and developing countries over the period 1989–2004.[6] The dataset has an unbalanced time dimension as sample periods for countries differ (Appendix Table 1), reflecting different bond issuance histories and the availability of sovereign credit ratings and macroeconomic data. The timeframe extends approximately seven years prior to, and following the opening of, subscription to the SDDS in April 1996 and participation in the GDDS in December of 1997. 24 of the 26 countries included in this study accounted for an average of 68 percent of the value of all new bond issues by EMCs and developing countries during 2000–2004.[7] The maturity of bonds in the panel dataset ranged from 1 to 30 years with a median of 7 years.

In addition to bond characteristics, the analysis accounts for country characteristics, including key macroeconomic performance indicators or sovereign credit ratings, and changes in institutional quality. The IMF's *International Financial Statistics* and *World Economic Outlook* and the World Bank's *Global Development Finance* were the sources for the macroeconomic variables. Information on IMF financial arrangements, SDDS subscription, and GDDS participation were drawn from the IMF's records, while country indicators of institutional quality were taken from the *International Country Risk Guide* prepared by the PRS Group Inc.

Sovereign credit ratings were drawn from publications of the three principal credit rating agencies: Standard and Poor's, Moody's, and Fitch. Following several analysts, beginning with Horrigan (1966) and continuing through Montford and Mulder (2000), alphanumeric credit ratings are transformed into numerical ratings (Table A1). When more than one agency provides a rating, the mean of the numerical ratings is used.

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[6] The countries included in the panel were chosen to include countries subscribing to the SDDS and participating in the GDDS that had launched a significant number of foreign currency-denominated bonds during the period under consideration, and for which adequate quarterly macroeconomic data is available to conduct empirical analysis. Certain large EMCs, including India and Singapore, did not issue any sovereign foreign currency-denominated bonds between 1990 and 2002. Some countries, such as Ecuador, issued bonds only following SDDS subscription, providing no basis for before and after comparisons, and have not been considered. Although the Republic of South Korea's sovereign issues were quite limited during this period, bonds issued by the Korean Development Bank have been used to extend the panel database.

[7] *Global Financial Stability Report (GFSR)*, September 2005, Table 15. Bond issuance for Barbados and Panama are not included in the *GFSR*, but their inclusion would not change the reported share significantly.

## A. Sovereign Borrowing Cost Model

The cost of issuing a sovereign bond is assumed to be related to borrower and bond characteristics in a log-linear model:

$$\ln (C_{i,t}) = f(X_{i,t}) + u_{i,t}, \quad (1)$$

where the dependent variable for cost $(C_{i,t})$ can be either the natural logarithm of the spread $(SP_{i,t})$ or the yield $(YLD_{i,t})$ for country $i$ in period $t$, $X_{i,t}$ is a vector of explanatory variables, and $u_{i,t}$ is a random error term. Specifically, $X_{i,t}$ is composed of issuer and bond characteristics, indicators for macroeconomic performance or credit ratings, and participation in the Fund's data standards initiatives.

The central focus is to determine whether participation in the SDDS or GDDS reduce sovereign launch spreads or yields. After controlling for bond characteristics and macroeconomic performance, the influences of SDDS and GDDS participation are examined using dummy variables. The SDDS dummy variable equals zero prior to subscription and one in the quarter of subscription and thereafter. The GDDS dummy variable is similarly defined, and is based on the quarter that formal participation began (Table A2).

The selection of macroeconomic variables was guided by the literature[8] and include the rate of real GDP growth (*YDOT*), inflation differentials vis-à-vis the United States (*DPDOT*), primary fiscal balance (*GPBAL*), and the debt-export ratio of the borrowing country (*DXR*). In an alternative specification, these macro-indicators are replaced by the country's credit rating (*CR*), based on the view that ratings subsume the information content of macro variables and may reflect additional information, such as social and political considerations, that could bear on country risk and the cost of borrowing.[9] The potential effects of Fund-supported programs are also examined using a dummy variable (*IMF*).[10]

The maturity of the bond (*MAT*), measured in years, is included as an exogenous variable**.** This follows the view that creditors take into account the risk of default, which increases with maturity, when determining the terms of a bond. Granger causality tests were carried out on spreads and maturities to rule out the possibility of simultaneity (Table 1). The hypothesis of exogeneity was accepted for all but four countries, where the results were mixed and inconclusive. Panel estimates proved robust to the exclusion of these countries, diminishing the importance of the simultaneity issue as a practical matter.

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[8] For example, see Edwards (1984), Eichengreen and Mody (1998), and Kamin and von Kleist (1999).

[9] Cantor and Packer (1996) provide a concise explanation of this view.

[10] The dummy variable for a Fund-supported program is set equal to one in all quarters that an arrangement was in effect, and zero otherwise.

Another important bond characteristic incorporated in the model is the currency of denomination. The basic currency of denomination is the U.S. dollar, while dummy variables indicate yen and euro denominations (*YEN* and *EURO*, respectively). The dataset includes 55 bonds denominated in yen and 97 denominated in euros, representing 17 and 30 percent, respectively, of all the bonds considered.

The empirical analysis also incorporates quality indicators for a country's legal and bureaucratic framework. A measure of country institutional quality (*INST*) is included in the model so that progress in this area during the sample period by many of the countries included in this study could be estimated separately from improvements in data transparency and dissemination practices represented by SDDS and GDDS participation.

Pooled time-series cross-section estimation was carried out using Seemingly Unrelated Regression (SUR), a procedure that corrects for contemporaneous correlation and cross-section heterosckedasticity, which is particularly appropriate when dependent variables are correlated with a common or omitted variable. In this case, international liquidity conditions are a potential source of contemporaneous correlation, but cannot be accounted for in the panel estimation framework, as this would amount to a period effects model. Additionally, all estimations account for serial correlation. Panel unit root tests permitted the rejection of the hypothesis of nonstationarity at conventional levels of significance for all variables except credit ratings (Table 2).[11] The stationarity of all but one of the variables obviates cointegration in the panel, permitting use of standard panel regression analysis. Because country fixed effects cannot be estimated using SUR with an unbalanced dataset, we present pooled least squares estimates with fixed effects, as a less-than-perfect substitute.

### B. Launch Spreads

From equation (1), the estimating equation for launch spreads as a function of macroeconomic performance variables is:

$$\ln(SP_{i,t}) = \beta_0 + \beta_1 YDOT_{i,t} + \beta_2 DPDOT_{i,t} + \beta_3 (\Delta GPBAL_{i,t}) + \beta_4 \ln(DXR_{i,t}) + \beta_5 \ln(MAT_{i,t}) + \beta_6 \ln(\mathrm{INST}_{i,t}) + \beta_7 YEN_{i,t} + \beta_8 EURO_{i,t} + \beta_9 IMF_{i,t} + \beta_{10} SDDS_{i,t\ t} + \beta_{11} GDDS_{i,t} + \beta_{12} TIME + u_{i,t} \quad (2)$$

[11] Annual data for external debt (public and publicly guaranteed) stock-to-exports ratios, drawn from the World Bank's *GDF* database, were converted to a quarterly frequency (same value for all quarters) then smoothed with the Hodrick-Prescott filter with standard quarterly parameters prior to testing the order of integration.

When specified as a function of credit ratings, the estimation equation is:

$$\ln (SP_{i,t}) = \beta_0 + \beta_1 \ln (CR_{i,t}) + \beta_2 \ln (MAT_{i,t}) + \beta_3 \ln (\text{INST}_{i,t}) + \beta_4 YEN_{i,t}$$

$$+ \beta_5 EURO_{i,t} + \beta_6 IMF_{i,t} + \beta_7 SDDS_{i,t\ t} + \beta_8 GDDS_{i,t} + \beta_9 TIME + u_{i,t} \qquad (3)$$

Panel SUR estimation of the launch spreads equation yields a coefficient estimate for GDDS participation with the expected negative sign that is statistically significant from zero at conventional confidence levels (Table 3). This point estimate implies that GDDS participation reduces launch spreads by over 9 percent, or 23 basis points on an illustrative total spread of 250 basis points (first column). The GDDS coefficient is also stable when estimated over differing time periods (Figure 2).

The estimated coefficient for GDDS participation is also significant and stable for different specifications of the model, including allowance for country fixed effects and substitution of credit ratings for macroeconomic indicators. The spread equation was estimated with country fixed effects using pooled least squares estimation owing to the unbalanced dataset (second column). The estimates of the model using SUR and pooled least squares with fixed country effects were repeated using credit rating as a substitute for the macroeconomic indicators of creditworthiness (third and fourth columns). Across these specifications, GDDS participation was estimated to reduce spreads by 20 to 35 basis points.[12] Although not reported, the model was estimated with fixed country effects using SUR over a truncated period that yielded a balanced time dimension for eleven countries. Over this truncated sample, the SUR estimate of the spread reduction for GDDS participation was over 40 basis points.

The estimated coefficient for SDDS subscription is statistically significant with the expected negative sign and magnitude very close to estimates obtained by Cady (2005). Across the specifications for fixed country effects and alternative variables for creditworthiness (macroeconomic indicators versus credit rating), SDDS subscription was estimated to reduce launch spreads by 12 to 20 percent, or 30 to 50 basis points on a total spread of 250 basis points. SUR estimation of the model with fixed country effects using a balanced timeframe and spreads for 11 countries, yielded an estimated spread reduction for SDDS subscription of 58 basis points using the macroeconomic indicators and 31 percent using credit ratings.

Other variables in the spread equation have statistically significant estimated coefficients of the expected sign, except the inflation differentials, that are broadly in line with previous studies. The estimates of the coefficient for real GDP growth imply that spreads are lower in the range of 35 to 70 basis points when growth is ½ percent point higher. If the primary fiscal balance improves by ½ percentage point of GDP, the estimated reduction in spreads is 60 to 100 basis points. A decline in the debt-export ratio from 50 to 40 percent is estimated to reduce spreads by 13 to 23 basis points. The inflation differential variable has a statistically insignificant coefficient estimate of negligible magnitude. The significance of these

[12] Estimation of the 4 specifications for the 11 GDDS countries alone and the SDDS countries alone also yielded very similar results.

macroeconomic indicators is consistent with cited studies, starting with Cantor and Packer (1996).

Improvement in the legal and bureaucratic framework of a country was found to lower spreads. Most of the countries in this study improved not only the transparency of their data and dissemination practices, but also in the quality of their institutional framework over the sample period. The variable constructed to measure institutional quality from indicators for the legal and bureaucratic framework had coefficient estimates whose magnitude and statistical significance were highly stable across the different specifications and estimation techniques employed in this study. A one-standard deviation increase in the institutional quality variable around its mean was estimated to reduce spreads by 35 to 42 basis points. By including an institutional quality variable in the model, the above discussed estimates of the benefits of GDDS participation and SDDS subscription are controlled for simultaneous improvements in institutional quality.

A country's commercial credit rating performs well as substitute for a collection of macroeconomic indicators, as found in previous studies.[13] Coefficient estimates for credit ratings are highly significant and stable. The SUR estimate for the full panel implies a 38 basis point reduction in launch spreads when the borrower's credit rating is upgraded one full notch from adequate payment capacity into the range of strong payment capacity.[14] The pooled least squares estimate with country fixed effects for the same credit upgrade was 25 basis points. Other studies that examined the stability of spread equations over different time periods also found a highly stable and significant credit rating impact, while coefficient estimates for macroeconomic indicators were less significant and varied in magnitude.[15]

As discussed above, the coefficient estimates for the GDDS and SDDS variables using a country's credit rating did not differ significantly from the estimates using macroeconomic indicators. The reduction in launch spreads owing to GDDS participation was estimated to be 20 to 30 basis points, while that for SDDS participation was 35 to 45 basis points. As with the specification using macroeconomic indicators, these estimates controlled for institutional quality. The estimated reduction of 35 basis points in spreads for a one-standard deviation increase in the institutional quality variable around its mean was highly statistically significant.

The longer the maturity of a bond, the higher the spread. Longer maturity increases the likelihood that the creditworthiness or repayment capacity of the borrower will change over the term of the bond. The higher repayment uncertainty is estimated to increase spreads by about 5 basis points for an increase in maturity from 5 to 10 years.

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[13] Eichengreen and Mody (1998) also find credit rating measures a highly significant explanatory variable in spread equations.

[14] For example, from Baa1 to A3 according to Moody's rating system (Appendix text table).

[15] Cantor and Packer (1996) and Eichengreen and Mody (1998).

Spreads on yen and euro-denominated bonds were significantly lower than on dollar-denominated bonds. The negative coefficient estimates for the yen and euro dummy variables are highly significant across alternative specifications of the model, reflecting systematically lower yields over dollar-denominated instruments throughout the sample period.

A Fund-supported program has a measurable effect on launch spreads. When Fund support becomes effective, launch spreads were estimated to decline by about 10 basis points, perhaps reflecting market expectations that Fund-supported programs help to restore macroeconomic stability. This is consistent with the findings of Eichengreen, Kletzer, and Mody (2005) and Cady (2005), providing additional evidence that Fund-supported programs are considered positively in financial markets to the extent that they convey information about a country's policies and capacity and willingness to repay.

The small positive estimated coefficient attached to the time trend (*TIME*) reflects the net effects of any time-related factors not otherwise accounted for in the model. Possible factors include an increasing investor base interested in EMCs, ample global liquidity throughout much of the sample period, as well as the Mexican and Asian crises and their subsequent dissipation. Our concern is to obtain the best possible unbiased estimators for the SDDS and GDDS coefficients, and the time trend is therefore included. As mentioned, these coefficient estimates also controlled for the overall improvement in institutional quality over the sample period. That said, all coefficient estimates are robust to the exclusion of the time trend, including the SDDS and GDDS coefficients, which remain consistently negative and statistically significant, but only marginally smaller in magnitude.

### C. Launch Yields

Using equation (1), the specification for launch yields is:

$$\ln(\mathrm{YLD}_{i,t}) = \beta_0 + \beta_1 YDOT_{i,t} + \beta_2 DPDOT_{i,t} + \beta_3 (\Delta GPBAL_{i,t}) + \beta_4 \ln(DXR_{i,t}) + \beta_5 \ln(\mathrm{INTR}_{i,t}) + \beta_6 \ln(MAT_{i,t}) + \beta_7 \ln(\mathrm{INST}_{i,t}) + \beta_8 YEN_{i,t} + \beta_9 EURO_{i,t} + \beta_{10} IMF_{i,t} + \beta 1_{11} SDDS_{i,t\ t} + \beta_{12} GDDS_{i,t} + \beta_{13} TIME + u_{i,t}\ . \quad (4)$$

The sovereign borrowing cost model was estimated using launch yields in place of spreads, with results consistent with those obtained for launch spreads. The coefficient estimates for SDDS subscription and GDDS participation are in line with those in the spread equation, with magnitudes reflecting the difference in scale between spreads and yields (Table 4). This is consistent with the spread being the component of yield that reflects country risk. Estimation of the model with country fixed effects using pooled least squares did not significantly change the results, in particular for GDDS and SDDS participation using credit rating or the set of macroeconomic indicators. As with the spread equation, the estimated effect of a country's credit rating is highly significant and stable, while coefficient estimates for macroeconomic indicators were less significant. The SDDS and GDDS discounts in terms of basis points are closer to those obtained from the spread equation estimate using credit ratings—about 50 and 20 basis points, respectively.

In addition to the variables in the spread equation, the yield equation includes the benchmark international yield, whose highly significant coefficient estimate supports the specification of sovereign borrowing costs as the benchmark international yield plus a spread determined by characteristics of the borrower and bond. The yield specification is a more general form of the spread specification. The spread formulation is nested within the yield specification, but has a unit coefficient imposed on the benchmark international yield. In the yield specification, the coefficient attached to the benchmark yield is estimated without being constrained to unity. Regressions in level terms yield coefficient estimates attached to the benchmark yields that are not statistically different from unity. Our estimates of the unconstrained specification reinforce the basic results from the spread equations, but also lend support to the convention of using spreads to measure country risk.

Other variables in the yield equation have coefficient estimates in line with those in the spread equation. The main results are:

- Macroeconomic indicators have coefficient estimates as expected. Higher real GDP growth reduces borrowing cost—a ½ percentage point increase in the growth rate of real GDP reduces the launch yield by 40 to 65 basis points on average. An improvement in the primary fiscal balance of ½ percentage point of GDP is estimated to reduce launch yields by 55 to 110 basis points. Inflation has an insignificant, negligible estimated effect. A decline in the debt-export ratio from 50 to 40 to percent reduces the launch yield by 25 to 35 basis points on average;

- Credit ratings, as mentioned, serve well as a summary measure of creditworthiness in place of the set of macroeconomic indicators. A one-notch shift in credit rating from adequate payment capacity to strong payment capacity is estimated to reduce launch yields by about 40 basis points;

- Improvement in the legal and bureaucratic framework of one standard deviation increase from the mean of the institutional quality variable is estimated to reduce launch yields by 25 to 35 basis points; and

- Fund-supported programs are estimated to reduce launch yields upon approval by an estimated 10 to 20 basis points.

## IV. CONCLUSIONS

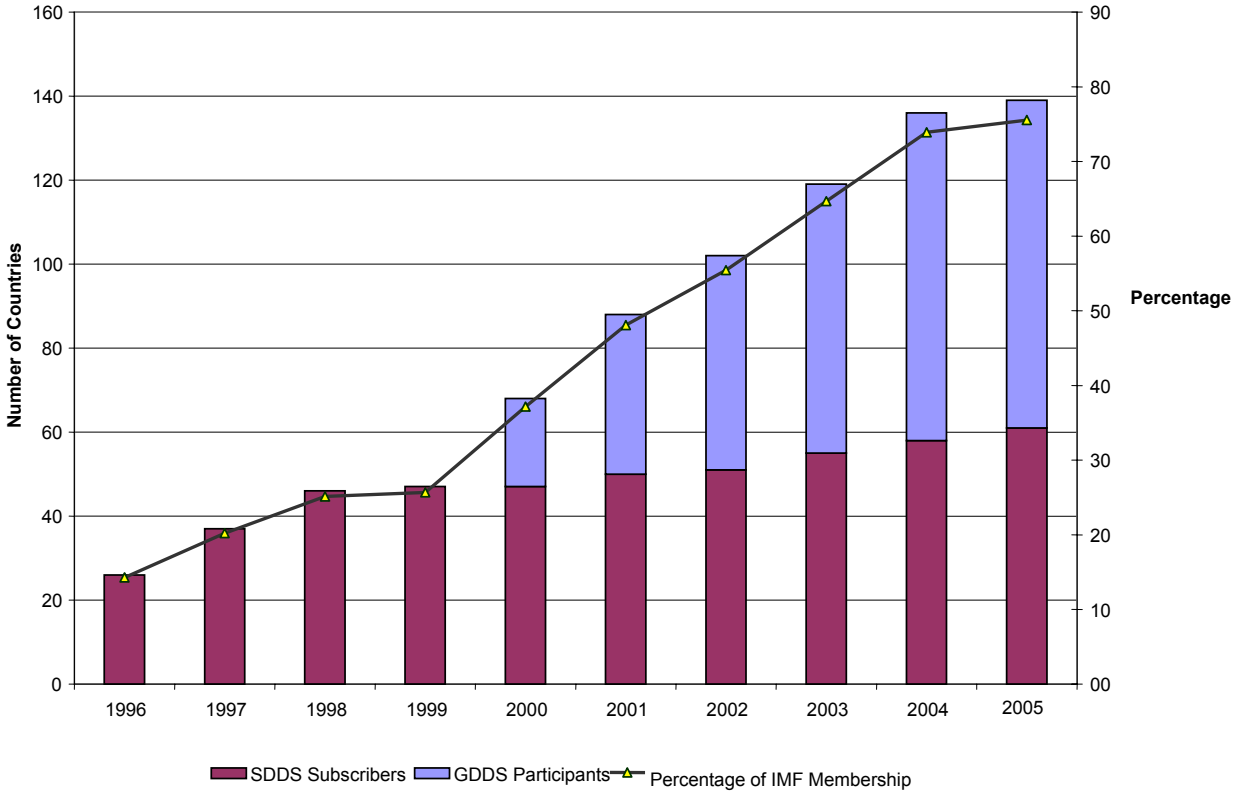
The policy implications of our findings are straightforward. Although macroeconomic performance and the level of public debt are fundamental in determining access to international capital markets on favorable terms, participation in the Fund's data standards initiatives can provide significant cost savings to sovereign borrowers. Our results indicate that sovereign borrowers have financial incentives to participate in the GDDS and even larger incentives to subscribe to the SDDS. For the Fund, maintaining the credibility of the SDDS as a monitored standard is critical, since continued financial benefits, specifically the lower cost of sovereign borrowing, to subscribers depend on their observance of all provisions of the standard. To strengthen this aspect, the Fund plans to issue annual reports on SDDS observance beginning in 2007.

The 11 GDDS participants considered in this study had borrowed in international capital markets prior to the launch of the GDDS. Consequently, our findings should not be construed as implying that GDDS participation alone contributes to market access. Generally, the rationale for GDDS participation is to improve statistical practices rather than gaining market access. However, previously established creditworthiness and access appear to have been enhanced by GDDS participation, perhaps by reducing uncertainty in the view of investors, sufficiently to warrant a small interest rate discount.

With regard to the SDDS, in practice it is difficult to distinguish if it is the content of the standard or the fact that observance is monitored by the IMF that is most relevant to investors. Further, investors may not fully distinguish between the GDDS as a statistical development system and the SDDS as a monitored standard. Investors could view both SDDS subscription and GDDS participation as a signal of lower uncertainty about the reliability and serviceability of economic and financial data. This may enable investors to make better-informed assessments, which, in turn, could warrant lower risk premiums for EMCs and developing countries. Our estimates indicate that the SDDS discount is larger than the GDDS discount, consistent with the fact that the requirements of the SDDS, the monitored standard, are significantly more stringent than those of the GDDS, the developmental system.

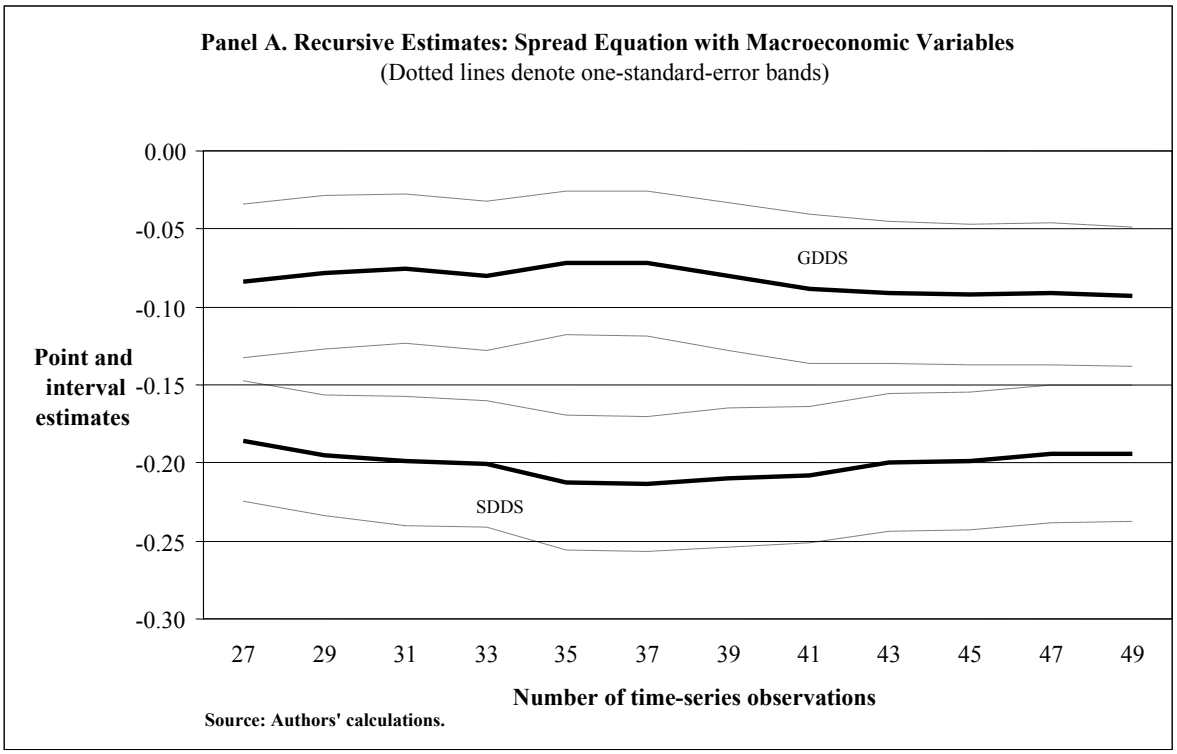
Financial globalization, or at least that aspect related to international investors' search for yield in EMCs and developing countries, is supported by the Fund's maintenance of the credibility of standards for statistical dissemination and development. The dedication of resources to technical assistance to support participation in the IMF's data standards initiatives and to monitor countries' observance of these standards, as well as to align both the SDDS and GDDS with the Fund's data quality framework, encourages dissemination of high-quality economic and financial data. This study found evidence of lower sovereign borrowing costs for EMCs and developing countries that met these standards. This financial incentive can, in turn, improve data quality and dissemination standards in the virtuous cycle alluded to by Fischer (2002).

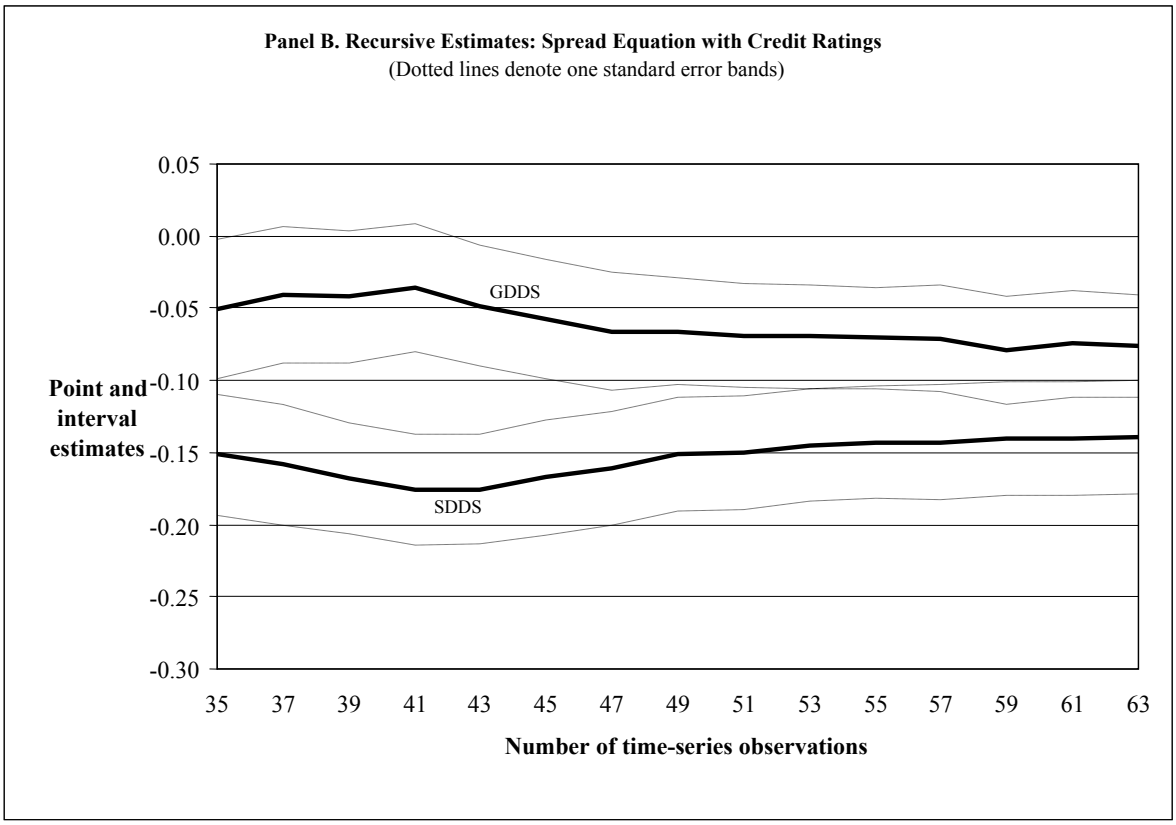
Figure 1. Number of SDDS Subscribers and GDDS Participants




Source: IMF Statistics Department.

Figure 2. Recursive SDDS and GDDS Coefficient Estimates




Source: Authors' calculations.

Table 1. Granger Causality Tests: Launch Spreads and Maturity

| Country | Hypothesis | Observations | F-Statistic | Probability | Null Rejected at 1 Percent Level |
|---|---|---|---|---|---|
| Argentina | A | 39 | 2.536 | 0.061 | No |
| | B | | 0.618 | 0.653 | No |
| Barbados | A | 39 | 0.592 | 0.671 | No |
| | B | | 2.065 | 0.110 | No |
| Brazil | A | 27 | 0.670 | 0.621 | No |
| | B | | 1.294 | 0.310 | No |
| China | A | 33 | 2.046 | 0.120 | No |
| | B | | 0.182 | 0.945 | No |
| Colombia | A | 28 | 1.445 | 0.258 | No |
| | B | | 0.542 | 0.707 | No |
| Costa Rica | A | 23 | 1.625 | 0.449 | No |
| | B | | 0.982 | 0.223 | No |
| Croatia | A | 16 | 0.053 | 0.994 | No |
| | B | | 2.341 | 0.154 | No |
| Guatemala* | A | 28 | NA | NA | NA |
| | B | | NA | NA | NA |
| Hungary | A | 43 | 1.017 | 0.413 | No |
| | B | | 0.712 | 0.589 | No |
| Jamaica | A | 27 | 1.850 | 0.162 | No |
| | B | | 1.451 | 0.258 | No |
| Kazakhstan | A | 31 | 0.615 | 0.549 | No |
| (lags=2) | B | | 4.330 | 0.024 | Yes |
| Korea, Rep. of | A | 43 | 1.619 | 0.192 | No |
| | B | | 1.733 | 0.165 | No |
| Lebanon | A | 38 | 0.528 | 0.716 | No |
| | B | | 1.440 | 0.246 | No |
| Lithuania | A | 25 | 0.164 | 0.954 | No |
| | B | | 0.814 | 0.535 | No |
| Malaysia** | A | 8 | 0.274 | 0.777 | No |
| (lags=2) | B | | 0.059 | 0.943 | No |
| Mexico | A | 43 | 0.751 | 0.564 | No |
| | B | | 4.104 | 0.008 | Yes |
| Panama | A | 28 | 1.434 | 0.261 | No |
| | B | | 0.086 | 0.986 | No |
| Philippines | A | 35 | 4.652 | 0.006 | Yes |
| | B | | 2.133 | 0.105 | No |
| Poland | A | 27 | 0.422 | 0.791 | No |
| | B | | 1.527 | 0.237 | No |
| Romania** | A | 20 | 0.090 | 0.768 | No |
| (Lags=1) | B | | 4.404 | 0.051 | No |
| South Africa | A | 43 | 0.817 | 0.524 | No |
| | B | | 0.530 | 0.715 | No |
| Trinidad and Tobago | A | 45 | 0.208 | 0.932 | No |
| | B | | 7.156 | 0.000 | Yes |
| Tunisia | A | 28 | 1.196 | 0.345 | No |
| | B | | 0.906 | 0.480 | No |
| Turkey | A | 43 | 3.022 | 0.031 | No |
| | B | | 2.881 | 0.037 | No |
| Uruguay | A | 39 | 0.726 | 0.581 | No |
| | B | | 1.015 | 0.415 | No |
| Venezuela, Rep. Bolivariana de | A | 52 | 1.834 | 0.140 | No |
| | B | | 1.494 | 0.221 | No |

Source: Authors' calculations.

Notes: Null hypotheses: A: Maturity (MAT) does not Granger cause spread (SP); B: Spread (SP) does not Granger cause maturity (MAT); lags = 4. * All bonds issued by Guatemala have had 10-year maturities, and with no variability in MAT, the test is not feasible. ** Lags reduced owing to limited degrees of freedom:

Table 2. Panel Unit Root Tests

| Variables | Test | Cross-sections | Test* Value (Probability) [Lags] | Test** Value (Probability) [Lags] | Null Hypothesis of Unit Root (1 Percent Level) |
|---|---|---|---|---|---|
| Yield spread *(SP)* | LLC | 26 | –2.741 (0.0031) [0-2] | –4.040 (0.0000) [0-7] | Rejected |
| | IPS | 26 | –3.109 (0.0009) [0-2] | –3.536 (0.0002) [0-7] | Rejected |
| Real GDP growth *(YDOT)* | LLC | 26 | –3.529 (0.0002) [0-9] | –1.872 (0.0306) [0-9] | Mixed (Rejected at 5% ) |
| | IPS | 26 | –7.666 (0.0000) [0-9] | –6.433 (0.0000) [0-9] | Rejected |
| Debt-export ratio *(DXR)* | LLC | 19 | –2.692 (0.0035) [3-10] | 1.571 (0.9419) [3-8] | Mixed |
| | IPS | 19 | –2.575 (0.0050) [3-10] | –5.078 (0.0000) [3-8] | Rejected |
| Credit rating *(CR)* | LLC | 26 | 0.841 (0.7999) [0-2] | 0.440 (0.6701) [0-2] | Not Rejected |
| | IPS | 26 | 2.900 (0.9981) [0-2] | 1.354 (0.9122) [0-2] | Not Rejected |
| Maturity *(MAT)* | LLC | 23 | –4.172 (0.0000) [0-7] | –6.822 (0.0000) [0-7] | Rejected |
| | IPS | 23 | –6.573 (0.0000) [0-7] | –7.729 (0.0000) [0-7] | Rejected |
| Yield *(YLD)* | LLC | 25 | –4.213(0.000) [0-2] | –6.181 (0.0000) [0-5] | Rejected |
| | IPS | 25 | –4.880(0.000) [0-2] | –5.861 (0.0000) [0-5] | Rejected |
| Institutional change *(INST)* | LLC | 24 | –2.055(0.020) [0-1] | 0.5666(0.715) [0-1] | Mixed |
| | IPS | 24 | –0.3349(0.369) [0-1] | 3.0175(0.999) [0-1] | Not Rejected |
| Benchmark international yield *(INTR)* | LLC | 26 | –3.865 (0.0001) [0-7] | –4.251 (0.0000) [0-9] | Rejected |
| | IPS | 26 | –5.161 (0.0000) [0-9] | –4.539 (0.0000) [0-9] | Rejected |

Source: Authors' calculations.

Notes: LLC and IPS signify the Levin, Lin, and Chu test and the Im, Pesarin, and Shin test, respectively. Asterisks indicate unit root tests based on individual effects (*) and individual effects and linear trends (**) with automatic lag length (minimum to maximum) selected using the Schwarz information criterion. For the debt-export ratios (*DXR*), the series for Costa Rica, Croatia, Jamaica, Lebanon, Lithuania, Romania, and Uruguay exhibited insufficient variability to estimate first round regressions and were dropped from the tests. For the maturity variables (*MAT*), the time series for Guatemala, Malaysia, and Romania exhibited insufficient variability to estimate first round regressions and were dropped from the test, as was Malaysia in the case of the tests for *YLD*.

Table 3. Panel Estimation of Spread Equations: Macro Variables and Credit Ratings

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Sample Period* | 1991:4–2003:4 | 1991:4–2003:4 | 1989:2–2004:4 | 1989:2–2004:4 |
| Estimation Method | SUR | Pooled LS Fixed effects | SUR | Pooled LS Fixed effects |
| Constant | 3.908 | 4.668 | 3.439 | 4.108 |
| | (8.48) | (5.08) | (8.47) | (7.57) |
| Real GDP growth (*YDOT*) | –0.277 | –0.563 | -- | -- |
| | (–1.70) | (–1.79) | | |
| Inflation differential (*DPDOT*) | 0.010 | 0.008 | -- | -- |
| | 1.55 | (0.81) | | |
| Primary balance (Δ*GPBAL*) | –0.491 | –0.803 | -- | -- |
| | (–1.79) | (–1.33) | | |
| Debt-export ratio (ln *DXR*) | 0.417 | 0.239 | -- | -- |
| | (5.96) | (1.35) | | |
| Credit rating (ln *CR*) | -- | -- | 1.140 | 0.755 |
| | | | (9.26) | (4.59) |
| Maturity (ln *MAT*) | 0.038 | 0.020 | 0.021 | 0.019 |
| | (2.66) | (0.67) | (1.43) | (0.68) |
| Institutions (ln *INST*) | –0.336 | –0.403 | –0.337 | –0.364 |
| | (–3.93) | (–2.43) | (–4.18) | (–2.29) |
| Yen-denominated issue (*YEN*) | –0.446 | –0.445 | –0.450 | –0.459 |
| | (–16.36) | (–10.01) | (–16.02) | (–10.83) |
| Euro-denominated issue (*EURO*) | –0.308 | –0.316 | –0.318 | –0.339 |
| | (–14.56) | (–8.02) | (–13.91) | (–9.25) |
| IMF arrangement (*IMF*) | –0.036 | 0.002 | –0.049 | –0.029 |
| | (–1.39) | (0.06) | (–1.86) | (–0.61) |
| SDDS subscription (*SDDS*) | –0.194 | –0.122 | –0.139 | –0.176 |
| | (–4.43) | (–1.59) | (–3.52) | (–2.42) |
| GDDS participation (*GDDS*) | –0.093 | –0.135 | –0.076 | –0.116 |
| | (–2.08) | (–1.35) | (–2.15) | (–1.50) |
| Time trend (*TIME*) | 0.013 | 0.016 | 0.006 | 0.012 |
| | (2.66) | (4.90) | (2.06) | (4.12) |
| Autocorrelation coefficient | 0.869 | 0.634 | 0.809 | 0.650 |
| | (46.96) | (22.55) | (36.93) | (24.47) |
| Adjusted $R^2$ | 0.8204 | 0.8361 | 0.8320 | 0.8419 |
| Durbin-Watson statistic | 2.171 | 1.953 | 2.139 | 1.958 |
| Countries in panel | 26 | 26 | 26 | 26 |
| Total pool observations | 778 | 778 | 852 | 852 |
| Mean of the dependent variable (basis points) | 262.4 | 262.4 | 265.7 | 265.7 |
| Memorandum items: | | | | |
| Point estimate of discount (evaluated at an illustrative spread of 250 basis points): | | | | |
| SDDS | 48.50 | 30.50 | 34.75 | 44.00 |
| GDDS | 23.25 | 33.75 | 19.00 | 29.00 |

Source: Authors' calculations.

Notes: * = global estimation period for the unbalanced panel; see Table 1 for country-specific sample periods; t-statistics reported in parentheses.

Table 4. Panel Estimation of Yield Equations: Macro Variables and Credit Ratings

| Sample Period* | (1) 1991:4–2003:4 | (2) 1991:4–2003:4 | (3) 1991:1–2004:4 | (4) 1991:1–2004:4 |
|---|---|---|---|---|
| Estimation Method | SUR | Pooled LS Fixed effects | SUR | Pooled LS Fixed effects |
| Constant | 3.610 | 3.956 | 3.583 | 4.070 |
| | (16.20) | (8.91) | (19.11) | (16.70) |
| Real GDP growth (*YDOT*) | –0.113 | –0.181 | -- | -- |
| | (–1.66) | (–1.58) | | |
| Inflation differential (*DPDOT*) | 0.005 | 0.005 | -- | -- |
| | (0.81) | (1.26) | | |
| Primary balance (Δ*GPBAL*) | –0.149 | –0.297 | -- | -- |
| | (–1.30) | (–1.41) | | |
| Debt-export ratio (ln *DXR*) | 0.162 | 0.146 | -- | -- |
| | (4.93) | (1.75) | | |
| Credit rating (ln *CR*) | -- | -- | 0.366 | 0.228 |
| | | | (7.48) | (3.47) |
| Benchmark international yield (ln *INTR*) | 0.390 | 0.342 | 0.399 | 0.354 |
| | (26.80) | (18.95) | (28.34) | (20.33) |
| Maturity (ln *MAT*) | 0.045 | 0.038 | 0.032 | 0.029 |
| | (7.02) | (3.41) | (4.98) | (2.75) |
| Institutions (ln *INST*) | –0.079 | –0.079 | –0.118 | –0.078 |
| | (–2.29) | (–1.25) | (–3.64) | (–1.24) |
| Yen-denominated issue (*YEN*) | –0.346 | –0.405 | –0.336 | –0.395 |
| | (–15.16) | (–14.33) | (–14.78) | (–14.58) |
| Euro-denominated issue (*EURO*) | –0.115 | –0.127 | –0.116 | –0.133 |
| | (–13.60) | (–8.97) | (–13.41) | (–9.84) |
| IMF arrangement (*IMF*) | –0.015 | –0.004 | –0.028 | –0.015 |
| | (–1.43) | (–0.21) | (–2.65) | (–0.80) |
| SDDS subscription (*SDDS*) | –0.088 | –0.061 | –0.061 | –0.065 |
| | (–5.11) | (–2.05) | (–4.07) | (–2.26) |
| GDDS participation (*GDDS*) | –0.034 | –0.051 | –0.025 | –0.038 |
| | (–2.00) | (–1.32) | (–1.77) | (–1.25) |
| Time trend (*TIME*) | 0.002 | 0.002 | 0.000 | 0.002 |
| | (0.96) | (1.53) | (0.19) | (1.16) |
| Autocorrelation coefficient | 0.879 | 0.720 | 0.814 | 0.719 |
| | (47.95) | (27.43) | (37.07) | (28.95) |
| Adjusted $R^2$ | 0.9304 | 0.9337 | 0.9288 | 0.9312 |
| Durbin-Watson statistic | 2.194 | 2.060 | 2.135 | 2.046 |
| Countries in panel | 26 | 26 | 26 | 26 |
| Total pool observations | 778 | 778 | 840 | 840 |
| Mean of the dependent variable (basis points) | 781.3 | 770.9 | 782.3 | 782.3 |
| Memorandum items: | | | | |
| Point estimate of discount (evaluated at an illustrative yield of 750 basis points): | | | | |
| SDDS | 66.00 | 45.75 | 45.75 | 48.75 |
| GDDS | 25.50 | 38.25 | 18.75 | 28.50 |

Source: Authors' calculations.

Notes: * = global estimation period for the unbalanced panel; see Table 1 for country-specific sample periods; t-statistics reported in parentheses.

## I. MAIN DATA SOURCES AND DESCRIPTION

- *Bonds, Equities, Loans (BEL)* database for the spreads, yields, maturity, and currency of denomination (U.S. dollars, Japanese yen, or euros) of sovereign bonds issued by 26 emerging market and developing countries during 1989–2004. Appendix Table 1 presents the sample of countries, their dates of GDDS participation or SDDS subscription, respective sample time periods, and number of bonds issued during this period.

- *International Financial Statistics* and *World Economic Outlook* for quarterly growth rate and inflation rate, and annual fiscal deficit in percent of GDP. The World Bank's *Global Development Finance* for external debt stocks used in constructing the debt-export ratio.

- Fitch Ratings, *Fitch—Complete Sovereign Rating History*, March 2, 2005, Moody's Investors Service, *Sovereign Ratings History*, March 4, 2004, and Standard & Poor's Ratings Services, *Sovereign Ratings History Since 1975,* March 3, 2005 for credit ratings. Alphanumeric credit ratings are transformed into numerical ratings based on the following table:

Table 1A. Alphanumeric Credit Ratings and Equivalent Numerical Ratings

| Standard and Poor's | Moody's | Fitch | Description | Numerical value |
|---|---|---|---|---|
| AAA | Aaa | AAA | Highest quality | 1 |
| AA+ | Aa1 | AA+ | High quality | 2 |
| AA | Aa2 | AA | | 3 |
| AA- | Aa3 | AA- | | 4 |
| A+ | A1 | A+ | Strong payment capacity | 5 |
| A | A2 | A | | 6 |
| A- | A3 | A- | | 7 |
| BBB+ | Baa1 | BBB+ | Adequate payment capacity | 8 |
| BBB | Baa2 | BBB | | 9 |
| BBB- | Baa3 | BBB- | | 10 |
| BB+ | Ba1 | BB+ | Likely to fulfill obligations | 11 |
| BB | Ba2 | BB | | 12 |
| BB- | Ba3 | BB- | Ongoing uncertainty | 13 |
| B+ | B1 | B+ | High-risk obligations | 14 |
| B | B2 | B | | 15 |
| B- | B3 | B- | | 16 |
| CCC+ | Caa1 | CCC+ | Current vulnerability to default | 17 |
| CCC | Caa2 | CCC | | 18 |
| CCC- | Caa3 | CCC- | | 19 |
| C | Ca | DD | In bankruptcy or default | 20 |
| SD | D | DDD | | 21 |

All three ratings agencies qualify their ratings with outlook and review/watch qualifications to signal a possible upgrade or downgrade. Basic ratings are decreased by 0.2 for positive outlook and watchs/review qualifications while negative outlook or

watchs/review are increased 0.2 each. For Example, a soverieign with an A+ rating from S&P and Fitch would be assigned a numerical value of 5; A+ with a positive outlook would be assigned 4.8 and a positive review 4.6. A+ with a negative outlook would be assigned a value of 5.2 and a negative review 5.4.

- International Monetary Fund DSBB website for GDDS participation and SDDS subscription, and Fund record for the quarters in which a Fund arrangement became effective and expired.

- *International Country Risk Guide*, PRS Group Inc., for indicators of law and order and bureaucratic quality. The institutional quality index used in this study is the sum of these components of the *ICRG's* overall political risk rating. The law and order indicator ranges from 1 to 6 and bureaucratic quality from 0 to 4. In this study's sample of countries and time period, the institutional quality variable varies from zero to 10, with a mean of 5.3 and standard deviation of 2.2. This study experimented with including other components of the *ICRG*'s overall political risk rating, but found the indicators for law and order and bureaucratic quality to produce the most robust estimates of the effect of institutional quality in the models for launch spreads and yields. Experimentation with adding other indicators produced only negligible and statistically insignificant variation in the empirical results for the GDDS and SDDS variables.

Table A2. SDDS Subscription and GDDS Participation Dates, Sample Periods, and Number of Bonds in Panel

| Data Initiative and Country | Date of Subscription or Participation | Sample Period with Macro Variables/Credit Ratings | Number of Bonds Issued During the Sample Period |
|---|---|---|---|
| SDDS | | | |
| Argentina | August 16, 1996 | 1994:2 to 2002:4 | 24 |
| | | 1992:3 to 2002:4 | 24 |
| Brazil | March 14, 2001 | 1995:3 to 2002:4 | 16 |
| | | 1995:3 to 2002:4 | 16 |
| Colombia | May 31, 1996 | 1995:2 to 2002:4 | 19 |
| | | 1995:2 to 2002:4 | 19 |
| Costa Rica | November 28, 2001 | 1998:3 to 2003:4 | 7 |
| | | 1998:3 to 2004:4 | 8 |
| Croatia | May 20, 1996 | 1997:2 to 2001:4 | 8 |
| | | 1997:2 to 2001:4 | 8 |
| Hungary | May 24, 1996 | 1996:1 to 2001:2 | 7 |
| | | 1992:3 to 2002:4 | 7 |
| Korea, Rep. of | September 20, 1996 | 1990:3 to 2002:4 | 27 |
| | | 1990:3 to 2002:4 | 27 |
| Lithuania | May 30, 1996 | 1996:1 to 2001:4 | 9 |
| | | 1996:4 to 2002:4 | 9 |
| Malaysia | August 21, 1996 | 2000:4 to 2002:4 | 2 |
| | | 2000:4 to 2002:4 | 2 |
| Mexico | August 13, 1996 | 1991:2 to 2002:4 | 24 |
| | | 1991:2 to 2002:4 | 24 |
| Philippines | August 5, 1996 | 1993:3 to 2002:4 | 8 |
| | | 1993:4 to 2002:4 | 8 |
| Poland | April 17, 1996 | 1996:2 to 2002:4 | 7 |
| | | 1995:3 to 2002:4 | 7 |
| South Africa | August 2, 1996 | 1990:2 to 2002:4 | 13 |
| | | 1994:4 to 2002:4 | 13 |
| Tunisia | June 20, 2001 | 1995:2 to 2002:4 | 6 |
| | | 1995:4 to 2002:4 | 6 |
| Turkey | August 8, 1996 | 1990:2 to 2002:4 | 34 |
| | | 1992:3 to 2002:4 | 34 |
| Uruguay | February 12, 2004 | 1992:3 to 2001:4 | 12 |
| | | 1994:1 to 2002:4 | 12 |
| GDDS | | | |
| Barbados | May 22, 2000 | 1994:3 to 2003:4 | 4 |
| | | 1995:1 to 2004:4 | 2 |
| China, People's Republic of | April 15, 2002 | 1994:1 to 2000:4 | 12 |
| | | 1994:1 to 2002:4 | 13 |
| Guatemala | December 6, 2004 | 1997:3 to 2003:4 | 3 |
| | | 1997:4 to 2004:4 | 3 |
| Jamaica | February 28, 2003 | 1997:3 to 2002:4 | 8 |
| | | 1998:2 to 2004:4 | 9 |
| Kazakhstan | May 22, 2000 | 1997:1 to 2002:4 | 7 |
| | Graduated to SDDS Mar. 2003 | 1997:1 to 2004:4 | 7 |
| Lebanon | January 16, 2003 | 1994:4 to 2003:4 | 22 |
| | | 1997:2 to 2004:4 | 24 |
| Panama | December 28, 2000 | 1997:2 to 2003:4 | 10 |
| | | 1997:2 to 2004:4 | 12 |
| Romania | February 14, 2001 | 1996:3 to 2001:2 | 7 |
| | Graduated to SDDS May 2005 | 1996:3 to 2002:4 | 7 |
| Trinidad and Tobago | September 30, 2004 | 1993:1 to 2001:4 | 6 |
| | | 1993:2 to 2004:4 | 6 |
| Venezuela, Rep. Bolivariana de | March 29, 2001 | 1989:3 to 2001:4 | 15 |
| | | 1989:3 to 2002:4 | 15 |
| Totals | | Macro variable sample | 317 |
| 26 Countries | -- | Credit rating sample | 322 |

Sources: IMF Statistics Department; and the IMF's *BEL* database (sourced from Dealogic).

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