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Does SDDS Subscription Reduce Borrowing Costs for Emerging Market Economies?

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Does macroeconomic data transparency—as signaled by subscription to the IMF's Special Data Dissemination Standard (SDDS)—help reduce borrowing costs in international capital markets? This question is examined using data on new issues of sovereign foreign-currency-denominated (U.S. dollar, yen, and euro) bonds for several emerging market economies. Panel econometric estimates indicate that spreads on new bond issues declined on average by close to 20 percent, or by an average of about 55 basis points for sample countries, following SDDS subscription. [JEL C22, F33, F34]

In 1996, the International Monetary Fund introduced the Special Data Dissemination Standard (SDDS). Development of this international macroeconomic data standard was prompted by the widely held view that the emerging market crises of the mid-1990s were partially attributable to a lack of market information and transparency, particularly with respect to macroeconomic and financial statistics. The SDDS is intended to guide countries that have, or seek to have, access to international capital markets in their provision of economic and financial data to the public. An important aspect of access is the cost at which it is provided; thus, it is natural to inquire whether subscription to the SDDS has reduced borrowing costs, particularly for emerging market participants.

Subscription to the SDDS is voluntary and involves no direct monetary costs, but it does require subscribers to observe the standard and provide information on data and dissemination practices (the metadata) to the IMF for redissemination,

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which could entail costs in upgrading a country's statistical reporting and compilation systems. The standard identifies four dimensions of data dissemination, prescribing monitorable elements in the areas of access, integrity, quality, and the data themselves. In particular, the data dimension lists 18 data categories providing coverage for four (real, fiscal, financial, and external) sectors of the economy and prescribes minimum timeliness and frequency standards, summarized in Table 1.[1]

Several recent studies have examined the impact of the SDDS on emerging market economies' (EMEs') access and borrowing costs in international capital markets. The Institute for International Finance (IIF, 2002) found that SDDS subscription led to a 200–300 basis point decline in U.S. dollar Eurobond spreads for a sample of emerging market economies. Subsequently, Christofides, Mulder, and Tiffin (2003), in a study of the impact of international standards and codes on spreads and credit ratings, found that adherence to international standards, including SDDS subscription, contributed significantly to explaining changes in sovereign credit costs and ratings. Spreads, measured by JPMorgan's Emerging Market Bond Index (EMBI), were found to be reduced by about 15 percent after SDDS subscription. Glennerster and Shin (2003) provide econometric evidence that implementation of transparency measures reduces emerging market spreads; in the case of the SDDS, EMBI spreads declined by 4–12 percent (equivalent to 20–60 basis points in their sample) in the period following SDDS subscription.

All of these papers investigate the impact of the SDDS on secondary-market yield spreads, with two utilizing the JPMorgan Emerging Market Bond Index that tracks the value of country-specific portfolios of U.S. dollar–denominated sovereign or quasi-sovereign debt instruments trading in secondary markets.[2] The secondary market for existing emerging market debt instruments is predominantly a global over-the-counter market composed of brokers, dealers, and investors worldwide linked daily through broker computer and telecommunications networks, offering the advantages of counterpart anonymity, efficiency, and transparency in price determination.

In the primary market for sovereign debt, new issues are generally marketed by investment banks acting as "managers of the transaction," first advising the issuer on the terms of the bond and the size of the issue, then typically organizing "road shows" to publicize the client country's debt issue to potential investors. Subsequent public or private offerings are not conducted through a formal auction process but rather by investment bankers taking orders from clients ("building the book"). At this stage, it is possible, but not routine, for new price guidance to be provided or the size of the potential issue to be altered in line with the degree of client interest. Once the order book has firmed, the managers of the transaction underwrite the bonds, set a final price, and allocate bonds to clients. Clearly, the primary and secondary markets for emerging market debt differ in terms of structure, operation, and efficiency, with the secondary market more closely resembling

[1]Further information on the SDDS is available on the IMF's Dissemination Standard Bulletin Board (DSBB): http://dsbb.imf.org/Applications/web/sddshome/.

[2]The spread for a particular country is defined as its EMBI portfolio yield over a theoretical U.S. zero-coupon curve, where the sovereign yield is set to equate the net present value of the sovereign cash flows to zero.

Table 1. SDDS Data Categories and Related Periodicity and Timeliness Standards

SDDS Data Category	Periodicity	Minimum Timeliness
Real Sector		
National accounts	Quarterly	1 quarter
Production indices	Monthly	6 weeks
Employment, unemployment, wages/earnings	Quarterly	1 quarter
Consumer price index	Monthly	1 month
Fiscal Sector		
General government operations	Annual	2 quarters
Central government operations	Monthly	1 month
Central government debt	Quarterly	1 quarter
Financial Sector		
Analytical accounts of the banking sector	Monthly	1 month
Analytical accounts of the central bank	Monthly	2 weeks
Interest rates	Daily	*
Stock market	Daily	*
External Sector		
Balance of payments	Quarterly	1 quarter
International reserves	Monthly	1 week
Merchandise trade	Monthly	8 weeks
International investment position	Annual	2 quarters
External debt	Quarterly	1 quarter
Exchange rates	Daily	*
Addendum: Population	Annual	. . .

Source: IMF Statistics Department.

Note: * indicates no timeliness standards set given that data are widely available from private sources; dissemination by official data producers may be less time sensitive.

a *tâtonnement* process. 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 they note that launch spreads can, and do, move differently from secondary market spreads over the shorter run. Consequently, the empirical support for an SDDS discount found in secondary market studies does not necessarily provide evidence of a similar discount operating in primary markets, justifying separate analysis.

This paper contributes to filling the gap in primary market evidence by directly examining the influence of SDDS subscription on the cost of issuance in primary sovereign bond markets. This is important since issuers in primary markets are unambiguously the beneficiaries of any cost reductions, or discounts, associated with SDDS participation—a significant consideration for many emerging market governments, since international borrowing costs, ultimately borne by taxpayers, can play a pivotal role in public finances. The paper also contributes to the existing literature in two other areas. The empirical work analyzes launch spreads for bonds denominated in the three principal currencies used in private international bond

markets—the U.S. dollar, yen, and euro—and finds evidence of an SDDS discount for all three. Some empirical evidence is also found that mature market interest rates play a role in the determination of EME yield spreads.[3]

I. Data and Estimation Methodology

The influence of SDDS subscription on external borrowing costs is investigated for 17 emerging market countries using information on foreign-currency-denominated sovereign bond issuance and quarterly data on the principal macroeconomic determinants of interest rates and yield spreads. As subscription to the SDDS was opened in April 1996, and a dozen countries subscribed in that year, the estimation strategy seeks to consider a maximum of launch spreads for those subscribing countries both before and after their subscription, and consider data for countries subscribing to the initiative at a later stage to alleviate the bunching problem in 1996. To properly gauge the impact of the SDDS it is also important to include data on bonds issued by nonsubscribing countries. On the basis of these criteria, a panel of 17 countries was composed, including the following SDDS subscribers: Argentina, Brazil, Colombia, Croatia, Hungary, Korea, Lithuania, Malaysia, Mexico, the Philippines, Poland, South Africa, Tunisia, and Turkey, along with the nonsubscribing countries: China, Uruguay, and Venezuela (Table 2). Largely determined by the availability of macroeconomic data, the time dimension of the panel is composed of a ragged sample ranging from 1990:3 to 2002:4 (country-specific sample periods are also reported in Table 2).[4] The empirical analysis thus spans a time frame approximately six years prior to and following the opening of subscription to the SDDS in April 1996.

Data were drawn from three principal sources: sovereign bond characteristics of new issues from the *Bonds, Equities, and Loans (BEL)* database of the IMF (as sourced from Capital Data); macroeconomic data from the IMF's *International Financial Statistics (IFS)* and *World Economic Outlook (WEO);* and external debt indicators from the World Bank's *Global Development Finance (GDF).* Information on Paris Club debt reschedulings and IMF arrangements and SDDS subscriptions were drawn from the respective external websites of these organizations.

While the *BEL* database provides information on bonds issued in several currencies, spread data is available for only fixed interest rate bonds denominated in U.S. dollars, yen, and euros.[5] The panel includes observations on some 240

[3]Recently, Ferrucci (2003) and Arora and Cerisola (2001) report positive correlations between U.S. interest rates and EME spreads, consistent with their theoretical role. Earlier empirical investigations into the determinants of EME yield spreads found either no role for mature market interest rates (Min, 1998) or unexpected negative correlations (Eichengreen and Mody, 1998; and Kamin and von Kleist, 1999).

[4]The countries included in the panel were chosen to include large emerging market countries subscribing to the SDDS that had launched a significant number of foreign-currency-denominated bonds during the period under consideration, and for which adequate quarterly macroeconomic data are available to conduct empirical analysis. Certain other large EMEs, including India and Singapore, did not issue any sovereign foreign-currency-denominated bonds between 1990 and 2002. Similarly, Korean sovereign issues were quite limited during this period, and data on bonds issued by the Korean Development Bank have been used to extend the panel database.

[5]And prior to the introduction of the euro in 1999, both deutsche mark– and ECU-denominated bonds.

Table 2. SDDS Subscription Dates, Sample Periods, and Number of Bonds in Sample

Country	Date of SDDS Subscription	Sample Period	Number of Bonds in the Sample
Argentina	16 August 1996	1994:2 to 2002:4	24
Brazil	14 March 2001	1995:3 to 2002:4	16
China*	Nonsubscriber	1994:1 to 2000:4	10
Colombia	31 May 1996	1995:2 to 2002:4	19
Croatia	20 May 1996	1997:2 to 2001:4	8
Hungary	24 May 1996	1996:1 to 2001:2	7
Korea	20 September 1996	1990:3 to 2002:4	27
Lithuania	30 May 1996	1996:1 to 2001:4	9
Malaysia	21 August 1996	2001:2 to 2002:4	2
Mexico	13 August 1996	1991:2 to 2002:4	24
Philippines	5 August 1996	1993:3 to 2002:4	8
Poland	17 April 1996	1996:2 to 2002:4	7
South Africa	2 August 1996	1990:3 to 2002:4	13
Tunisia	20 June 2001	1995:2 to 2002:4	6
Turkey	8 August 1996	1990:3 to 2002:4	34
Uruguay*	12 February 2004	1992:4 to 2001:4	12
Venezuela*	Nonsubscriber	1990:3 to 2001:4	15

Sources: IMF Statistics Department and *BEL* database (sourced from Capital Data).
Note: * indicates that the country did not subscribe to the SDDS during the sample period.

sovereign bond issues denominated in these currencies issued by the 17 countries included in the panel.[6] On average over the period 1999–2002, these 17 countries accounted for more than 65 percent of the value of all new emerging market debt issues.[7] Bonds of various maturities, ranging from 1 to 30 years (the sample period mean maturity is about 7½ years), are represented in the panel data set.

Launch spreads reported in the *BEL* are defined as the annual yield to maturity at the time of issue on the emerging market instrument less a "risk-free" benchmark yield. The risk-free yield is approximated by the annualized yield on an industrial country government bond of the same currency and maturity as the emerging market instrument. More formally:

$$SP = y - Y, \tag{1}$$

where SP is the yield spread, y represents the annualized yield on the emerging market debt instrument, and Y is the annualized yield on the industrial country benchmark bond of the same currency and maturity. In this paper all interest rates, yields, and launch spreads are measured in basis points.

[6]Most foreign-currency-bond issues are denominated in these three currencies. Additionally, the *BEL* database does not calculate spreads for variable interest rate bond issues, regardless of the currency of denomination.

[7]International Monetary Fund (2004).

Spreads are related to a range of issue and issuer characteristics and fundamental macroeconomic variables, in a standard log-linear specification:

$$\log(SP_{i,t}) = f(X_{i,t}) + u_{i,t}, \tag{2}$$

where the dependent variable is the logarithm of the spread for country i in period t, $X_{i,t}$ is a vector of issue and issuer characteristics and macroeconomic fundamentals, and $u_{i,t}$ is a random error term. The vector $X_{i,t}$ is composed of bond and issuer characteristics and global economic conditions. The objective is to determine if SDDS subscription plays a role in the determination of launch spreads after the influences of the economic fundamentals and bond and issuer characteristics have been taken into consideration. The choice of variables to represent economic fundamentals has been guided by the existing long literature on the determinants of spreads for emerging market economies (see Edwards, 1984; and Kamin and von Kleist, 1999).[8] The influence of other country-specific factors, such as official debt rescheduling with Paris Club creditors and IMF financial support, are to be accounted for with dummy variables. Other specific bond characteristics to be considered include the maturity of the bond and its currency of denomination, also to be accounted for with dummy variables indicating denomination in yen or euros.[9]

Following Eichengreen and Mody (1998) and Kamin and von Kleist (1999), the maturity of the bond is specified as an exogenous variable. However, cognizant that launch yields and maturities might be simultaneously determined, Granger causality tests were conducted on theses variables to test statistically if maturity can be considered as exogenous (Table 3). For all of the countries considered, these tests permitted acceptance of the hypothesis of exogeneity, save for Mexico and the Philippines, where the results were mixed and inconclusive. To foreshadow the discussions of the estimation results somewhat, the panel econometric estimates proved robust to the inclusion or exclusion of the data for these two countries, obviating the simultaneity question.

The factor of principal interest, the date of subscription to the SDDS, is represented with a dummy variable, with values of zero prior to subscription and one thereafter for SDDS subscribers, and only zero in the case of nonsubscribers. The subscription date is considered as exogenous, an assumption particularly appropriate for the countries subscribing in 1996, which benefited from a transition period.[10]

Pooled time-series cross-section estimation was carried out using cross-section Seemingly Unrelated Regression, a procedure that corrects for equation-specific

[8]Previous studies in this literature have investigated variables such as real GDP growth, the rate of inflation, short- and long-term mature market interest rates, the fiscal and external current account balances in relation to GDP, the external debt stock- and debt service-to-exports ratios, and short-term external debt in relation to international reserves.

[9]U.S. dollar–denominated bonds serve as the excluded category to preclude perfect multicollinearity.

[10]The SDDS incorporated a formal transition period, beginning with the opening of subscription in early April 1996 and ending December 31, 1998. During this period member countries could subscribe to the SDDS even if their dissemination practices were not fully in line with the SDDS, permitting them to bring their data and dissemination practices into line with the standard according to a transition plan agreed with the IMF.

Table 3. Pairwise 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
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
Croatia	A	16	0.053	0.994	No
	B		2.341	0.154	No
Hungary	A	43	1.017	0.413	No
	B		0.712	0.589	No
Korea	A	43	1.619	0.192	No
	B		1.733	0.165	No
Lithuania	A	25	0.164	0.954	No
	B		0.814	0.535	No
Malaysia*	A	8	0.274	0.777	No
	B		0.059	0.943	No
Mexico	A	43	0.751	0.564	No
	B		4.104	0.008	Yes
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
South Africa	A	43	0.817	0.524	No
	B		0.530	0.715	No
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	A	43	1.569	0.205	No
	B		1.248	0.309	No

Source: Model estimates.

Notes: Null hypotheses: A: Maturity (MAT) does not Granger cause spread (SP); B: Spread (SP) does not Granger cause maturity (MAT); lags = 4; * based on 2 rather than 4 lags due to limited degrees of freedom.

serial correlation and cross-section heteroskedasticity.[11] However, prior to estimation, the time-series properties of all the variables in the panel were investigated using panel unit root tests. For the most part, these panel unit root tests (Table 4)

[11]Tests with other panel estimation methods yielded broadly similar results.

point to the absence of unit roots at conventional levels of significance.[12] This is not, however, the case with U.S. interest rates, and particularly the federal funds rate, which is widely considered to be nonstationary time series. Similar conclusions about the nonstationarity of the U.S. interest rates are largely borne out by the standard unit root tests performed over the sample period under consideration (bottom of Table 4).

To foreshadow the results again, regressions including and excluding short- and long-term U.S. interest rates had no appreciable impact on the estimated coefficients, and particularly that attached to the SDDS dummy variable, permitting the conclusion that the nonstationarity of the interest rate variables is benign in this context and does not require the resort to panel cointegration techniques. The interesting results from estimations including U.S. interests rates are reported since they are consistent with others' findings that U.S. interest rate increases are less than proportionately reflected in emerging market spreads.[13]

II. Estimation Results

In the estimating equation, spreads (*SP*) are modeled as a function of several fundamental macroeconomic variables, including real GDP growth (*YDOT*), the rate of consumer price inflation relative to that in the United States (*PDOT*), and the external public debt stock relative to exports (*DXR*).[14] The U.S. federal funds rate (*USFED*) and the yield on the 10-year U.S. treasury bond (*USLONG*), both measured in basis points, have been included to proxy global monetary and liquidity conditions that could possibly influence emerging market yields spreads, independent of country-specific fundamentals.[15] Other variables account for specific bond characteristics, including the term to maturity (*MAT*), measured in years, and the currency of denomination (*EURO* and *YEN*). Dummy variables account for the respective official debt rescheduling (*PARIS*) and program status (*IMF*) history of the country with the Paris Club and the IMF, as well as the issuing country's date of SDDS subscription (*SDDS*) when applicable. A time trend (*TIME*) is included in some of the estimated equations. The estimating equation is specified as:

$$\begin{aligned}\log(SP_{i,t}) = {} & \beta_0 + \beta_1 YDOT_{i,t} + \beta_2 PDOT_{i,t} + \beta_3 \log(MAT_{i,t}) + \beta_4 \log(DXR_{i,t}) \\ & + \beta_5 \log(USFED_t) + \beta_6 \log(USLONG_t) + \beta_7 EURO_{i,t} + \beta_8 YEN_{i,t} \\ & + \beta_9 IMF_{i,t} + \beta 1_{10} PARIS_{i,t} + \beta_{11} SDDS_{i,t} + \beta_{12} TIME + u_{i,t}. \end{aligned} \quad (3)$$

[12]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.

[13]See Eichengreen and Mody (1998, page 8).

[14]Several other macro variables (including fiscal and current account balance measures and the external short-term debt-to-international reserves ratio) proved insignificant or of the wrong sign and were subsequently omitted.

[15]The federal funds rate enters the regressions lagged one quarter, while *USLONG* is smoothed with a four-quarter moving average. Using U.S. interest rates to represent global liquidity conditions is consistent with the fact that the U.S. dollar–denominated bonds represent the omitted category for other dummy variables.

Table 4. Panel and Single Variable Unit Root Tests

Variable	Test	Test Value/ (Probability)*	Test Value/ (Probability)**	Accept Hypothesis of Unit Root at 5 Percent Level
SP (yield spread)	Levin, Lin, and Chu T-statistic	–3.324 (0.004)	–5.889 (0.000)	No
	Breitung T-statistic	–4.775 (0.000)	–2.295 (0.011)	No
	Im, Pesarin, and Shin W-statistic	–3.412 (0.000)	–4.618 (0.000)	No
	ADF-Fisher Chi-square	69.707 (0.003)	99.452 (0.000)	No
	PP-Fisher Chi-square	67.758 (0.000)	96.562 (0.000)	No
	Hadri Z-statistic	12.353 (0.005)	4.085 (0.000)	No
YDOT (real GDP growth)	Levin, Lin, and Chu T-statistic	–2.979 (0.001)	–1.449 (0.074)	Mixed
	Breitung T-statistic	–4.100 (0.000)	–4.694 (0.000)	No
	Im, Pesarin, and Shin W-statistic	–6.882 (0.000)	–6.161 (0.000)	No
	ADF-Fisher Chi-square	114.29 (0.000)	99.670 (0.000)	No
	PP-Fisher Chi-square	86.310 (0.000)	68.043 (0.000)	No
	Hadri Z-statistic	4.490 (0.000)	2.086 (0.019)	No
PDOT (inflation differential)	Levin, Lin, and Chu T-statistic	–14.629 (0.000)	–23.835 (0.000)	No
	Breitung T-statistic	–0.120 (0.452)	0.461 (0.678)	Yes
	Im, Pesarin, and Shin W-statistic	–27.815 (0.000)	–32.199 (0.000)	No
	ADF-Fisher Chi-square	124.48 (0.000)	596.94 (0.000)	No
	PP-Fisher Chi-square	100.23 (0.000)	337.01 (0.000)	No
	Hadri Z-statistic	3.478 (0.000)	–0.247 (0.597)	No

Table 4. *(Concluded)*

Variable	Test	Test Value/ (Probability)*	Test Value/ (Probability)**	Accept Hypothesis of Unit Root at 5 Percent Level
MAT (maturity)	Levin, Lin, and Chu T-statistic	–4.505 (0.000)	–6.383 (0.000)	No
	Breitung T-statistic	–3.814 (0.000)	–4.299 (0.000)	No
	Im, Pesarin, and Shin W-statistic	–5.889 (0.000)	–5.904 (0.000)	No
	ADF-Fisher Chi-square	111.31 (0.000)	97.756 (0.000)	No
	PP-Fisher Chi-square	117.19 (0.000)	103.07 (0.000)	No
	Hadri Z-statistic	4.590 (0.000)	4.553 (0.000)	No
DXR (debt-exports ratio)	Levin, Lin, and Chu T-statistic	–1.616 (0.053)	–0.797 (0.213)	Yes
	Breitung T-statistic	–0.834 (0.202)	–2.751 (0.003)	Mixed
	Im, Pesarin, and Shin W-statistic	–1.729 (0.040)	–5.366 (0.000)	No
	ADF-Fisher Chi-square	82.363 (0.000)	144.02 (0.000)	No
	PP-Fisher Chi-square	41.741 (0.170)	48.857 (0.048)	No
	Hadri Z-statistic	16.928 (0.000)	14.719 (0.000)	No
USFED (U.S. federal funds rate)	Augmented Dickey-Fuller	–2.710 (0.079)+	–2.806 (0.202)	Mixed
	Phillips-Perron	–1.913 (0.324)	–1.973 (0.602)	Yes
USLONG (U.S. 10-year treasury bond yield)	Augmented Dickey-Fuller	–1.286 (0.627)	–3.80 (0.0252)++	Mixed
	Phillips-Perron	–1.286 (0.629)	–2.477 (0.338)	Yes
USYC (slope U.S. yield curve)	Augmented Dickey-Fuller	–2.447 (0.135)	–2.600 (0.282)	Yes
	Phillips-Perron	–1.946 (0.309)	–2.091 (0.538)	Yes

Source: Model estimates

Notes: Panel unit root tests based on individual effects (*) and individual effects and linear trends (**); automatic lag length selected using the Schwarz information criterion. For standard unit root tests, plus signs indicate rejection of the null hypothesis that the series has a unit root at the 10 percent level (+) and at the 5 percent level (++). The critical values of the Augmented Dickey-Fuller test statistics are from MacKinnon (1996).

Coefficient estimates and key summary statistics for the basic specification are reported in column 1 of Table 5. There is a relatively high degree of fit, with all estimated coefficients of the expected sign and statistically significant at conventional confidence levels.

Of principal interest is the estimated coefficient attached to the SDDS dummy variable. It is negative, strongly significant, and indicates that spreads decline by about 0.186, or close to 20 percent, following SDDS subscription.[16] An "SDDS discount" in this range is equivalent to a reduction of some 40 basis points when evaluated at the sample mean of 214 basis points and a reduction of 55 basis points when evaluated at 300 basis points, a level more representative of spreads prevailing since the establishment of the SDDS. The estimated impact of SDDS subscription is very much in line with those from the secondary market studies noted above.

Interesting results and interpretations can be given to the dummy variables representing financial and rescheduling arrangements with the IMF and Paris Club. The equation was found to fit best when these two variables were specified in change form, implying changes in launch spreads at both the outset and termination of such special arrangements. In addition, although correctly signed, initial coefficient estimates for the Paris Club dummy variable were not statistically significant. Only in the cases of rescheduling of larger Organization for Economic Cooperation and Development (OECD) member countries (Poland and Turkey) was this variable statistically significant. The coefficient attached to the OECD Paris Club dummy variable indicates that spreads for rescheduling OECD countries widen by about 30 basis points at the beginning of the consolidation period, presumably to compensate for increased default risk, then narrow at the end of the consolidation period. For countries with an IMF program,[17] spreads decline by an estimated 10 basis points at the outside of a program, perhaps reflecting market expectations that Fund-supported programs help to restore macroeconomic stability, then increase by a similar magnitude following the expiration of the arrangement.

The estimated coefficients attached to the dummy variables for yen- and euro-denominated bonds are both negative, reflecting systematically lower yield spreads than for U.S. dollar-denominated instruments through the sample period. The importance of macroeconomic performance, as proxied by real GDP growth, is reflected by its negative coefficient estimate, indicating that favorable performance tends to narrow spreads. Higher inflation relative to that in the United States tends to increase spreads. The length of maturity of the bond is estimated to exert a strong, positive influence on spreads, with longer maturities generally exhibiting higher spreads. The U.S. federal funds rate exerts a positive impact on spreads, while long-term U.S. rates are negatively correlated with spreads. Considered together, these estimates imply that a steeper U.S. yield curve is associated with

[16]A 95 percent confidence interval for the −0.186 point estimate ranges from −0.08 to −0.29, representing an SDDS discount ranging between −24 and −87 basis points, when evaluated at the sample average spread of about 300 basis points for the SDDS period 1996:2 to 2002:4.

[17]All countries in the panel except South Africa have had financial arrangements with the IMF during some part of the sample period.

Table 5. Panel Estimation Results

Estimation Period: 1990:3–2002:4*	(1)	(2)	(3)	(4)	(5)
Constant	5.736	9.311	0.810	4.016	1.067
	(3.42)	(6.16)	(2.39)	(2.46)	(3.00)
Real GDP growth (*YDOT*)	–0.532	–0.559	–0.580	–0.509	–0.600
	(–2.22)	(–2.29)	(–2.40)	(–1.98)	(–2.42)
Inflation differential (*PDOT*)	0.210	0.173	0.155	0.177	0.162
	(1.46)	(1.04)	(1.06)	(1.17)	(1.09)
Maturity (log *MAT*)	0.056	0.062	0.054	0.051	0.052
	(2.80)	(3.08)	(2.73)	(1.87)	(2.50)
Debt-to-exports ratio (log *DXR*)	0.777	0.815	0.772	0.775	0.760
	(13.66)	(12.86)	(13.71)	(13.60)	(13.12)
Federal funds rate (log *USFED*)	0.134	0.086	—	0.153	—
	(2.03)	(1.22)		(1.94)	
U.S. 10-year bond yield (log *USLONG*)	–0.868	–1.318	—	–0.628	—
	(–3.42)	(–5.40)		(–1.92)	
Slope U.S. yield curve (log *USYC*)	—	—	—	—	–0.036
					(–2.88)
Euro-denominated issue (*EURO*)	–0.301	–0.292	–0.283	–0.272	–0.306
	(–11.42)	(–11.13)	(–10.39)	(–9.16)	(–10.73)
Yen-denominated issue (*YEN*)	–0.445	–0.426	–0.428	–0.393	–0.442
	(–13.43)	(–12.86)	(–12.96)	(–8.89)	(–12.65)
IMF arrangement (Δ*IMF*)	–0.096	–0.096	–0.091	–0.111	–0.101
	(–3.26)	(–3.23)	(–3.04)	(–2.57)	(–3.22)
Paris Club rescheduling (Δ*PARIS*)	0.288	0.289	0.275	0.290	0.285
	(1.71)	(1.68)	(1.62)	(1.70)	(1.75)
SDDS subscription (*SDDS*)	–0.186	–0.106	–0.172	–0.156	–0.192
	(–3.50)	(–1.93)	(–3.17)	(–2.44)	(–3.44)
Time trend (*TIME*)	0.018	—	0.024	0.019	(0.024)
	(4.03)		(6.47)	(3.83)	(6.22)
Adjusted R^2	0.995	0.994	0.993	0.991	0.995
Durbin-Watson statistic	2.166	2.193	2.140	2.115	2.048
Total pool observations	572	572	572	487	523
Mean of the dependent Variable (in basis points)	213.5	213.5	213.5	203.6	210.4

Source: Model estimates.

Notes: * = global estimation period; see Table 2 for country-specific sample periods; *t*-statistics reported in parentheses.

lower EME spreads.[18] The coefficient attached to the external debt stock-to-exports ratio is positive, providing evidence that higher premiums are demanded as external indebtedness increases.

As previously suggested, the basic model has been reestimated in various ways to investigate several questions and potential econometric estimation issues.

[18]Ferrucci (2003) reports similar results and suggests that this might be attributable to carry trades, with leveraged investors borrowing in the industrial countries at short-term rates to purchase longer maturity EME bonds, pushing up their prices, depressing their yields and, ultimately, yield spreads.

First, as the basic equation includes a highly significant time trend variable, the equation was reestimated without the time trend to evaluate its impact. Reported in column 2 of Table 5, estimates of this equation are broadly similar to the first estimates. The estimated SDDS coefficient remains statistically significant but does move to −0.11. It would seem that the time trend in the first is picking up unspecified time-related developments in EME launch spreads that apparently impart a downward bias to the SDDS coefficient in the second equation.

Second, the inclusion of maturity as an explanatory variable raised the questions of its exogeneity and the possibility of simultaneous equation bias. The Granger causality tests discussed earlier indicate that maturity can be considered as exogenous in all cases, except for Mexico and the Philippines. Therefore, the basic equation was reestimated excluding the data for Mexico and the Philippines to help evaluate their impact on the estimates. The results of this regression are reported in column 4 of Table 5. All of the estimated coefficients are quite similar in size, sign, and statistical significance to those of the basic model, and particularly the maturity variable itself, indicating that simultaneity bias, if any, is minimal. The estimated SDDS coefficient is only marginally different than the full panel estimate and remains statistically significant.

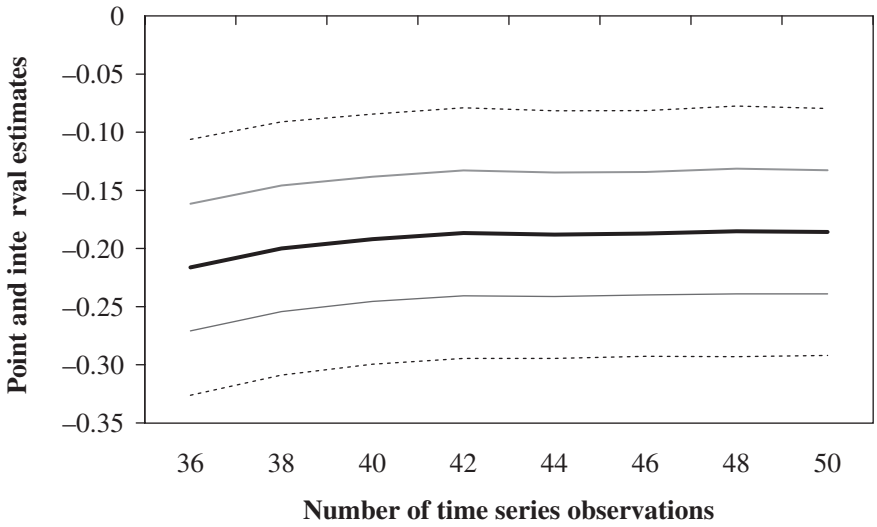
Finally, the inclusion of nonstationary U.S. interest rates in the regressions raises concerns over the appropriateness of the estimation techniques employed. This question was investigated in two ways. First, the basic model was reestimated with all U.S. interest rates excluded. Reported in Table 5 under column 3, these coefficient estimates are similar in sign, magnitude, and statistical significance to the initial estimates, and in particular the estimated coefficient of the SDDS variable remains very close to the initial estimate. On this basis it is concluded that the nonstationarity of the interest rate variables is benign and that the application of panel cointegration techniques would be of marginal benefit.

A second approach was to replace the U.S. interest rates with a single variable, the slope of the yield curve, *USYC*[19] (lagged three quarters). In the event, this approach does not prove useful since the slope of the yield curve also appears to be a nonstationary series (Table 4). The estimation results are, nonetheless, interesting in their own right and illustrate the general parameter constancy of the estimated equation, and particularly the estimated impact of SDDS subscription on launch spreads. Reported in Table 5 under column 5, all of the estimated coefficients are broadly similar in terms of sign, magnitude, and statistical significance, and most notably the SDDS coefficient, at −0.192.

Establishing whether the magnitude of the SDDS discount changes over time or remains stable is also important. To investigate this aspect the basic equation was reestimated recursively. Figure 1 presents a plot of recursive SDDS dummy variable coefficient estimates, starting with the estimates from the shortest feasible sample period (1992:2 to 2000:1), then successively adding two additional observations at the beginning and end of the estimation period until the full sam-

[19]Measured as the 10-year treasury bond rate (*USLONG*) minus the three-month treasury bill rate, both measured in basis points.

Figure 1. Recursive Estimates of the SDDS Coefficient
(Solid and dotted bands denote one and two standard error bands)



Source: Model estimates.
Note: SDDS = Special Data Dissemination Standard

ple period (1990:3 to 1992:4) is utilized. The plot indicates that the recursive estimates of the SDDS coefficient are indeed quite stable (as are all of the other parameter estimates). The signs, magnitudes, and statistical significance of all the estimated coefficients, along with the degree of fit, of the recursively estimated equations are broadly similar to those of equation (1), indicative of a relatively stable empirical relationship over time.

III. Conclusions

This paper presents econometric evidence of an SDDS discount in primary international capital markets for sovereign countries issuing foreign-currency-denominated bonds, very much in line with the findings of secondary-market-based research. Specific bond characteristics—the currency denomination, global liquidity conditions, and a country's fundamental macroeconomic and debt situation—remain the primary determinants of sovereign borrowing costs, but subscription to the SDDS also appears to lead to significant savings. Based on sovereign foreign currency bond issues in primary capital markets over the period 1990 to 2002, the SDDS spread discount for a group of 17 emerging market economies borrowing in the three principal global currencies is estimated to be close to 20 percent.

The policy implications for sovereign borrowers are clear: macroeconomic and public debt fundamentals are of primary importance in the determination of international borrowing costs, but subscription to the SDDS can provide important cost savings to the sovereign borrower and ultimately its taxpayers.

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