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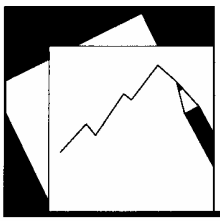

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Does SDDS Subscription Reduce Borrowing Costs for Emerging Market Economies?

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Statistics Department

Does SDDS Subscription Reduce Borrowing Costs for Emerging Market Economies?

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Abstract

Does macroeconomic data transparency—as signaled by subscription to the IMF's Special Data Dissemination Standard (SDDS)—help reduce borrowing costs in private capital markets? This question is examined using detailed 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 by about 75 basis points following SDDS subscription.

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Contents Page

I. INTRODUCTION

In 1996, the International Monetary Fund (IMF) 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 early 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 does carry a commitment by subscribers to observe the standard and provide information on data and dissemination practices (the metadata) to the IMF for redissemination, 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 monitorable minimum timeliness and frequency standards, summarized in Table 1.[2]

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 the explanation of sovereign credit costs and ratings. Spreads, measured by JP Morgan'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 JP Morgan Emerging Market Bond Index that tracks the value of country-specific portfolios of U.S. dollar-denominated sovereign or quasi-sovereign debt

[2] Complete information on the SDDS is available on the IMF's Dissemination Standard Bulletin Board (DSBB), on the Internet at *http://dsbb.imf.org/Applications/web/sddshome/*.

instruments trading in secondary markets.[3] 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

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

SDDS Data Category	Periodicity	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	1/
Stock market	Daily	1/
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	1/
Addendum: Population	Annual	...

1/ Given that data are widely available from private sources, dissemination of official producers may be less time sensitive.

[3] 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 total net present value of the sovereign risk cash flows to zero.

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 emerging market debt markets are substantially different in terms of structure, operation, and efficiency, with the secondary market more closely resembling a *tâtonnement* process. Consequently, the empirical support for a SDDS discount found in secondary-market studies does not provide evidence of a similar discount in primary markets.

This paper contributes to filling this 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 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 a SDDS discount for all three. It also finds evidence that mature market interest rates do play their theoretically expected role in the determination of EME yield spreads.[4]

II. Data and Estimation Methodology

The influence of SDDS subscription on external borrowing costs is investigated for seven emerging market countries—Argentina, Brazil, Colombia, Mexico, the Philippines, South Africa, and Turkey—using detailed information on foreign currency-denominated sovereign bond issuance and quarterly information on the key macroeconomic determinants of interest rates and yield spreads. Subscription to the SDDS were opened in April 1996; Colombia and Brazil subscribed in May 1996 and March 2001, respectively, while the remaining five countries all subscribed in August 1996. The estimation strategy essentially compares launch spreads before and after SDDS subscription, after controlling for other key factors influencing spreads. The estimation period ranges from 1990 to 2002, starting approximately six years prior to, and ending six years after, the opening of subscription to the SDDS in mid-1996.[5]

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[4] Early 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). More recently, Arora and Cerisola (2001) and Ferrucci (2003) report positive correlations between U.S. interest rates and EME spreads consistent with theoretical expectations.

[5] The countries included in the panel were chosen to include those large emerging market countries subscribing to the SDDS with sufficient quarterly macroeconomic and bond issuance data available both before and after SDDS subscription to adequately inform the empirical work. On that basis, the basic panel includes data on Mexico, the Philippines, South Africa, and Turkey, covering the period 1990:1 to 2002:4, while data for Argentina,

(continued…)

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 external debt indicators from the World Bank's *Global Development Finance (GDF)*. While the *BEL* database provides information on bonds issued in several currencies, spread data is only available for fixed interest rate bonds denominated in U.S. dollars, yen, and euros.[6] The panel therefore includes only sovereign bond issues denominated in these currencies.[7] Bonds of various maturities, ranging from 1 to 30 years (the sample period mean is 7 ½ years), are represented in the panel dataset.

Spreads are related to a range of fundamental macroeconomic and external debt variables considered in the literature (Edwards, 1984, and Kamin and von Kleist, 1999) as principal determinants of spreads for emerging market economies. These variables include real GDP growth, the ratio of investment to GDP, inflation, short- and long-term global interest rates, the fiscal and external current account balances as a percent of GDP, the public external debt stock-to-GDP and exports ratios, the debt service-to-exports ratio, and short-term external debt in relation to international reserves. The influence of other factors, such as official debt rescheduling with Paris Club creditors or IMF financial support, are examined using dummy variables. Specific bond characteristics considered include the maturity of the bond and the currency of denomination, are accounted for with dummy variables indicating denomination in yen or euros.[8]

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. The subscription date is considered as exogenous, an assumption particularly appropriate for the

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Brazil, and Colombia begin in 1994:1, 1992:4, and 1995:1, respectively, and cover the period up to and including 2002:4. Lack of data precluded the inclusion of many EMEs. In many cases, including for most of the transition countries, insufficient macroeconomic data (usually the absence of quarterly GDP estimates) prior to SDDS subscription precluded inclusion in the panel, despite several of these countries having benefited from access to private international capital markets. Certain other important EMEs, such as India and Singapore, did not issue any sovereign foreign currency-denominated bonds between 1990 and 2002.

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

[7] 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.

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

countries subscribing in 1996, who benefited from a transition period, and who's relatively advanced statistical systems and existing dissemination policies required minimal adjustments that could have meaningfully altered public perceptions about economic prospects and ultimately launch spreads.[9]

The time series properties of the above-mentioned variables were investigated for each country with augmented Dickey-Fuller (ADF) tests. All of the time series included in reported regressions were found to be stationary at conventional levels of significance (Appendix I, Table A1).[10] Pooled time series cross-section estimation with fixed effects was carried out with a procedure that corrects for equation-specific serial correlation and cross-section heterosckedasticity.[11] In initial tests several variables (including the fiscal and current account balance measures, the share of investment in GDP, inflation rates, and the external short-term debt-to-international reserves ratio) proved insignificant or of the wrong sign, and were subsequently omitted.

III. Estimation Results

In the estimated equation, spreads (SP), measured in basis points, are modeled as a function of several fundamental macroeconomic variables, including real GDP growth (YDOT) and the external public debt stock relative to exports (DXR). 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 possibly affecting emerging market yields spreads, independently of country-specific fundamentals.[12] [13] Other variables account for specific bond characteristics, including the term to maturity, measured in years (MAT), and the currency of denomination (EURO and YEN). Dummy

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[9] 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 Fund members could subscribe to the SDDS even if their dissemination practices were not fully in line with the SDDS at that time. This gave subscribers time to bring their data and dissemination practices into line with the standard according to a acknowledged transition plan.

[10] 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.

[11] Tests with other pooled estimation techniques yielded broadly similar results.

[12] Smoothed measures (four quarter moving averages) of real GDP growth rates and the two U.S. interest rates have been used in the regressions.

[13] U.S. interest rates have been retained in the regressions, consistent with the fact that the U.S. dollar-denominated bonds represent the omitted category for other dummy variables. The correlation between the smoothed series USFED and USLONG for the period 1990:1 to 2002:4 is 0.64.

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).

Coefficient estimates and summary statistics for the basic specification are reported as Equation (1) in Table 2. There is a relatively high degree of fit, with all estimated coefficients of the expected sign and statistically significant at conventional confidence levels. 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. The length of maturity of the bond is estimated to exert a strong, positive influence on spreads, similar to yield curve considerations. The U.S. federal funds rate exerts a positive impact on spreads, as theoretically expected, 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 lower EME spreads.[14] The coefficient attached to the external debt stock-to-exports ratio is positive, providing evidence that premia are demanded as external indebtedness increases.

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.[15] The coefficient attached to the Paris Club dummy variable indicates that spreads for rescheduling countries[16] widen by about 40 basis points during consolidation period, presumably to compensate for increased default risk. For countries with an IMF program,[17] spreads decline by an estimated 27 basis points during the program period, perhaps reflecting market expectations that Fund-supported programs help to restore macroeconomic stability.

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[14] Ferrucci (2003) reports similar results, and suggests that this might be attributable to leveraged investors borrowing at short-term rates to lend at longer-term rates to EMEs. Tests with a single variable measuring the slope of the U.S. yield curve (10-year bond rate minus the 3-month Treasury yield) yielded a statistically significant negative coefficient estimate, but constraining the two coefficients to be equal but opposite in sign, proved overly restrictive and reduced the explanatory power of the regression.

[15] These two coefficients test as statistically insignificantly from each other, and, at least in the spread specification, tests of their equality are readily accepted by the data.

[16] Argentina: several reschedulings, including December 1989, September 1991, and July 1992, with the consolidation period of the latter ending in December 1994; Brazil: several reschedulings, with those of July 1988 and February 1992 falling within the sample period; Mexico: several reschedulings, including May 1989, with the consolidation period ending in May 1992; Philippines: several reschedulings, including May 1989 to July 1994, with the consolidation period of the latter ending in December 1995; Turkey: several reschedulings, from May 1979 to July 1980, but none during sample period. Colombia and South Africa have never rescheduled with Paris Club creditors.

[17] All countries in the panel, save South Africa, have had financial arrangements with the IMF at some time over the course of the sample period.

Table 2. Panel Estimation Results 1/

Equation	1	2	3
Estimation period	1990:2 to 2002:4 2/	1990:2 to 2002:4 2/	1992:3 to 2000:3 2/
Parameter estimates			
YDOT *(real growth)*	-6.61 (-2.88)	-5.55 (-2.32)	-9.36 (-3.30)
MAT *(maturity)*	3.11 (4.38)	3.11 (4.38)	3.70 (4.85)
DXR *(debt-exports ratio)*	1.37 (1.97)	0.85 (6.33)	1.48 (1.75)
USFED *(federal funds rate)*	0.16 (2.21)	0.13 (1.83)	0.33 (2.33)
USLONG *(10-year bond rate)*	-0.63 (-5.29)	-0.60 (-5.03)	-0.57 (-3.94)
EURO *(euro-denominated)*	-94.69 (-8.60)	-95.69 (-8.70)	-119.17 (-8.64)
YEN *(yen-denominated)*	-126.26 (-11.27)	-127.05 (-11.39)	-104.90 (-7.67)
PARIS *(Paris Club)*	38.56 (2.19)	36.52 (2.07)	30.00 (1.64)
IMF *(IMF arrangement)*	-27.04 (-1.82)	-25.07 (-1.70)	-19.93 (-1.25)
SDDS *(subscription)*	**-74.86 (-3.97)**	**-82.56 (-4.36)**	**-65.49 (-3.15)**
Constant terms and (AR1 coefficients):		Common 555.66	
Argentina	347.51 (0.37)	(0.52)	157.33 (0.35)
Brazil	460.03 (0.85)	(0.88)	231.55 (0.80)
Colombia	614.91 (0.86)	(0.87)	437.20 (0.89)
Mexico	546.27 (0.80)	(0.83)	429.14 (0.68)
Philippines	550.88 (0.88)	(0.87)	380.10 (0.75)
South Africa	527.85 (0.61)	(0.61)	404.03 (0.62)
Turkey	565.08 (0.82)	(0.85)	418.02 (0.73)
Adjusted R^2	0.797	0.793	0.740
Durbin-Watson	2.24	2.25	2.16
Number of observations	303	303	205
Mean of the dependent variable	340.30	304.30	322.16

Source: Model estimates.

1/ T-statistics reported in parentheses below the coefficient estimates.

2/ For Argentina, Brazil, and Colombia, the sample period for equations (1) and (2) begin in 1994:1, 1992:4, and 1995:1, respectively, and cover the period up to and including 2002:4. For equation (3) the sample period begins at these dates and end at 2000:3.

Of principal interest is the coefficient for SDDS dummy variable; it is negative, strongly significant, and indicates that spreads declined by some 75 basis points following SDDS subscription.[18] An "SDDS discount" in the range 75 basis points represents a reduction of about 19 percent of the average sample spread over the period 1996:3 to 2002:4, very much in line with estimates from the previously cited secondary market studies.

To investigate the possibility that the SDDS coefficient estimates may also be reflecting the influence of other recent IMF transparency initiatives, Equation (1) was re-estimated with a dummy variable for the public release of any IMF reports on the observance of standards and codes (ROSCs) for any of the panel countries. The regression (not reported) yielded a coefficient estimate very close to, and statistically insignificant from, zero, as well as a statistically significant negative SDDS coefficient estimate of 75 basis points, lending support to the notion that the SDDS coefficient estimate reflects only the influence of SDDS subscription on launch spreads.[19] Similarly, to illustrate that the use of a fixed effects specification has no appreciable effect on the estimated SDDS coefficient, the basic specification was re-estimated with a common constant term are reported as Equation (2) in Table 2. While the magnitude of certain coefficient estimates change somewhat, the magnitude of SDDS coefficient increases only marginally to about 83 basis points.

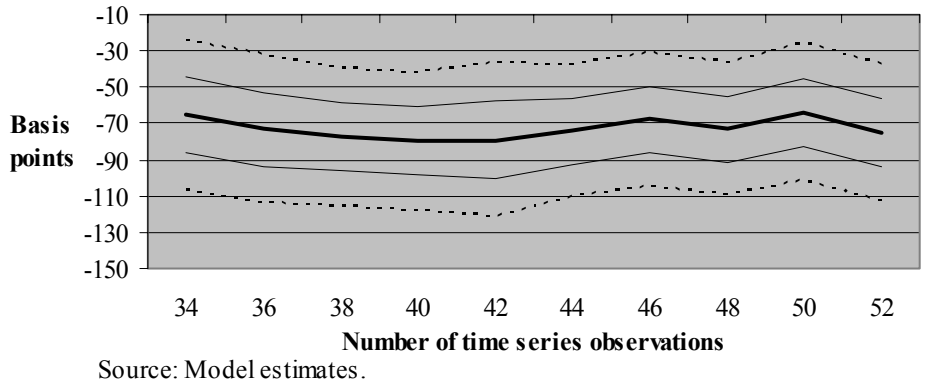
Establishing whether the magnitude of the SDDS discount changes over time or is stable is also important. To this end, the model was also estimated with the sample period shortened by 9 quarters at both the beginning and end, thereby preserving a sample broadly centered on mid-1996. Equation (3) of Table 2 presents coefficient estimates and summary statistics for the basic specification estimated over the period 1992:3 to 2000:3 (and for Argentina, Brazil, and Colombia beginning in 1994:1, 1992:4, and 1995:1, respectively, and ending in 2000:3). The signs, magnitudes, and statistical significance of all the estimated coefficients, along with the degree of fit, are broadly similar to those of Equation (1), supporting to the notion of a relatively stable empirical relationship over time. The estimated negative coefficient attached to the SDDS dummy variable decreases to about 65 basis points, and remains strongly significant.

Figure 1 presents a plot of recursive SDDS dummy variable coefficient estimates, starting with the shortened sample period (that of Equation (3)), then successively adding two additional observations at the beginning and end of the sample until the reaching the full sample period (that of Equation (1)). The plot indicates that the SDDS coefficient estimate is quite stable (as are all of the other parameter estimates, including those attached to the U.S. interest rates). Interesting extensions of this work might include a comparison of the SDDS discount between subscribers and non-subscribers, and whether or not the discount diminishes as more countries subscribe and SDDS subscription becomes the norm in international capital markets. Another obvious extension would be an investigation to

[18] A 90 percent confidence interval for this estimate ranges from -51 to -99 basis points.

[19] Ideally, one would also wish to determine if increased capital market competition also played a role in reducing costs.

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



Source: Model estimates.

determine whether the IMF's General Data Dissemination System (GDDS)[20] also benefits participating countries by reducing international borrowing costs.

IV. CONCLUSIONS

This paper presents econometric evidence of a 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 of issue, global monetary conditions, and a country's fundamental macroeconomic and debt situation—remain the primary determinates of sovereign borrowing costs, but subscription to the SDDS also appears to entail 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 emerging market economies borrowing in the three principal global currencies is estimated to be about 75 basis points.

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 entail important economies to the sovereign borrower and ultimately its taxpayers.

[20] The GDDS also guides member countries in the dissemination of their economic and financial data to the public. Introduced in 1997, the GDDS is open to all IMF member counties, but not intended for those seeking access to international capital markets.

Table A1. Time-Series Properties of the Macroeconomic and Debt Variables

Time series/Country	Augmented Dickey-Fuller Test Statistic	Order of Integration
SP *(yield spread)*		
Argentina	-4.22 *** (c,t)	I(0)
Brazil	-3.40 * (c,t)	I(0)
Colombia	-3.77 ** (c,t)	I(0)
Mexico	-2.85 * (c)	I(0)
Philippines	-2.64 * (c)	I(0)
South Africa	-2.69 * (c)	I(0)
Turkey	-3.78 ** (c,t)	I(0)
YDOT *(real growth)*		
Argentina	-3.61 ** (c)	I(0)
Brazil	-6.67 *** (c,t)	I(0)
Colombia	-4.74 *** (c)	I(0)
Mexico	-4.91 *** (c)	I(0)
Philippines	-2.98 ** (c)	I(0)
South Africa	-4.66 *** (c,t)	I(0)
Turkey	-2.65 * (c)	I(0)
MAT *(maturity)*		
Argentina	-4.89 *** (c)	I(0)
Brazil	-3.16 ** (c)	I(0)
Colombia	-4.35 *** (c)	I(0)
Mexico	-3.77 *** (c)	I(0)
Philippines	-3.03 ** (c)	I(0)
South Africa	-4.31 *** (c,t)	I(0)
Turkey	-4.07 *** (c)	I(0)
DXR *(debt-exports ratio)*		
Argentina	-3.63 ** (c,t)	I(0)
Brazil	-5.21 *** (c,t)	I(0)
Colombia	-4.65 *** (c,t)	I(0)
Mexico	-4.77 *** (c,t)	I(0)
Philippines	-3.89 *** (c)	I(0)
South Africa	-1.97 ** (n)	I(0)
Turkey	-3.91 *** (c)	I(0)
USFED *(federal funds rate)*	-3.30 ** (c)	I(0)
- raw series	-2.68 * (c)	I(0)
USLONG *(10-year bond rate)*	-3.80 ** (c,t)	I(0)
- raw series	-3.70 ** (c,t)	I(0)

Source: Model estimates.

Notes: Asterisks indicate rejection of the null hypothesis that the series has a unit root at the 10 percent level (*), the 5 percent level (**), and the 1 percent level (***). The critical values of the ADF test statistics are from MacKinnon (1996). The bracketed information indicates the inclusion of exogenous variables in the ADF test equation: c=constant, t=trend, n=none; lag lengths in test equations determined using the Akaike Information Criterion.

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