IMF Working Paper

Is Transparency Good For You, and Can the IMF Help?

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INTERNATIONAL MONETARY FUND

IMF Working Paper

Policy Development and Review Department

Is Transparency Good For You, and Can the IMF Help?[1]

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Authorized for distribution by Ydahlia Metzgen

June 2003

Abstract

This paper finds that reforms introduced by the IMF to promote transparency have created more informed markets and reduced borrowing costs for those emerging market countries that volunteered for them. Using a quarterly panel estimation with fixed country effects, we find that sovereign spreads fall following the adoption of three different transparency reforms. The effects are economically important, especially for those countries with low initial transparency. We use two-stage least squares to address any endogeneity in the timing of reforms exploiting internal IMF timetables that are unrelated to country events. Next, using a panel GARCH specification, we show that spreads move more than normal in the days immediately following publication of IMF country documents.

JEL Classification Numbers: F33

Keywords: Transparency, publication, institutions, emerging markets, sovereign spreads, IMF, SDDS, ROSC, Article IV, GARCH, news effect, role of the IMF, credit ratings, borrowing costs, capital markets, data dissemination, market information.

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I. INTRODUCTION

The conviction that lack of transparency contributed to the emerging market crises of the 1990s helped precipitate a dramatic change in many countries' attitudes towards the release of data and analysis. Mexico, for example, which before the 1994/95 crisis published figures on international reserves only three times a year, now posts the main items of the Central Bank's balance sheet on the web every week and reserve figures every month (Ortiz, 2002). The IMF has been part of this trend: it has encouraged its members to be more transparent and made more of its own documents publicly available.

This paper evaluates the move towards transparency by testing whether it has led to better-informed markets and lower spreads and volatility in sovereign bond markets. [4] Specifically, we examine the effect on emerging markets bond spreads of three reforms introduced on a voluntary basis by the IMF that were designed to increase the flow of information to the public and markets. They are: the publication of IMF country documents and, in particular, Article IV reports, which evaluate the macroeconomic performance of all member countries; the production and publication of Reports on the Observance of Standards and Codes (ROSCs), which assess members' institutions; and the creation of the Special Data Dissemination Standard (SDDS), which sets common definitions for macroeconomic data as well as minimum frequency and timeliness standards.

These reforms represent a unique opportunity for studying the general effect of transparency. Because they were not available to countries before the late 1990s, the decision to adopt the reforms was primarily motivated by pre-existing attitudes to transparency rather than developments in the country at the time. In addition, the timing of publication was primarily determined by internal IMF procedures that are uncorrelated with changing conditions in the country.

In the first part of the paper, we find that countries that publish their Article IV staff reports, publish a ROSC, or comply with the SDDS experience a decline in sovereign spreads in that quarter. The effect of publishing a ROSC is consistently significantly different from zero only when endogeneity bias is corrected for. The timing of publication depends both on when a report becomes available for publication and the country's decision on publication. In most cases, an Article IV report becomes available for publication 12 to15 months after the previous report and ROSCs are usually available at the same time as Article IV reports. The decision to publish is highly correlated with long-run characteristics of the country (which will be picked up by our fixed country effects) and is not primarily driven by short-run

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[4] Much of the discussion at the IMF about whether to allow publication of country papers focused on the fear that allowing countries to publish IMF documents would mean that members would be less willing to share confidential information with the IMF; Fund staff would self-censor their reports (with sensitive information conveyed only orally, if at all, to the Executive Board); any sensitive information that remained would be deleted prior to publication; and, as a result, these documents would become so sanitized that they would cease to contain any useful information.

developments. In the same way, the decision to comply with the SDDS is related to long-run characteristics and, given the long lead times required to meet all the specifications of the SDDS, the precise timing of compliance depends more on the time since the country committed to meet the specifications of the SDDS than on concurrent events.

Nevertheless, as in some (usually program) countries, the timing of publication and SDDS compliance can be influenced by short-run developments in the country, we correct for any endogeneity bias in two ways: we exclude all program countries from our sample and use two-stage least squares. Our instruments are the time since the last Article IV report, the time since SDDS subscription, and the interaction between these and characteristics that do not change over time like 1998 per capita GDP. We find that our results are robust to both methods of correcting for endogeneity bias.

We find that the effect of increased transparency is economically large. Depending on the specification, the average country experiences a decline in spreads of 7 to 17 percent with the publication of an Article IV, and of 4 to 12 percent with SDDS compliance. The impact of publishing a ROSC is significant only in some specifications. The size of the effect depends on the initial level of transparency with a smaller effect for more transparent countries. We also find that these reforms have less of an impact in countries that are more transparent according to indices such as Transparency International's Corruption Perception Index. Our results are consistent with survey findings that internationally active banks (particularly in New York) and credit rating agencies use IMF documents and observance of the SDDS in assessing country risk.

Improving transparency has a larger effect in countries with smaller debt markets because, we suggest, the private sector has less incentive to undertake its own research in smaller, less liquid markets. We find no consistent relationship between transparency and the average volatility of sovereign spreads over the medium-term.

In the second part of our paper we present evidence that the publication of IMF documents is leading to better-informed markets. Based on a panel generalized autoregressive conditional heteroskedasticity (GARCH) model for 29 emerging market countries, we find that the price movement in the two days following publication is 22 percent per day (or a total of 44 percent) more than predicted by the model in the absence of publication. The GARCH model compares the volatility on the 2 days after the event with the volatility in a short, surrounding window; and within this short window, the timing of publication is determined by internal IMF procedures and so can be considered exogenous.

If markets were responding only to the signal sent by the decision to publish rather than the contents of the report, we would see spreads fall following the publication of the first Article IV and rise following the publication of a stand-alone Public Information Notice (PIN). However, we find no systematic difference between the distribution of changes in spread following publication of different types of document. We therefore conclude that markets do respond to the content of a report and that in the short run, this news effect swamps the response to the signal provided by the decision to publish.

We reject the hypothesis that markets are reacting to IMF documents only because they contain information about the likely future actions of the IMF. This hypothesis is inconsistent with our finding that there is no statistically significant difference in the magnitude of the news effect for program and nonprogram countries.

We conclude that being more transparent can help reduce borrowing costs. The size of the effect is consistent with the hypothesis that transparency leads to better policies. For example, countries that publish IMF reports may be under more pressure to implement the recommendations. A recent survey found that most countries have taken action to address the institutional and regulatory weaknesses identified in ROSCs, with several announcing a timetable of reforms shortly following the publication of the ROSC (IMF, 2003).

We also conclude that the IMF has been successful in promoting greater transparency and in creating more informed markets through its production and voluntary publication of country documents, including Article IV staff reports and ROSCs, and through the establishment of the SDDS. This highlights a role for the IMF in collecting and disseminating information and establishing internationally consistent standards for data. Our results suggest this role is particularly important for smaller, less liquid markets where the private sector has less incentive to do its own research.

This paper is part of a growing literature on the relationship between institutions and economic performance (e.g., La Porta et al. (1997, 1998, 2000), Johnson et al. (2000), Wurgler (2000), Kaufmann et al. (2002), Acemoglu et al. (2002), Rodrik (2002), and Frankel (2003)). However, unlike most of this literature, which looks at the implications of long-run historical developments, we examine the effect of recent specific changes in institutions. As a result, our results translate more directly into specific policy recommendations (for a discussion on this point, see Frankel, 2003). In addition, we use a narrow objective definition of transparency (namely the release of data and analysis to the public) rather than the commonly used wider definition of transparency (which includes lack of corruption and expropriation) as measures of the latter have a number of problems.[5]

Other studies that have examined the relationship between the release of data and analysis by countries and economic outcomes include Chortareas et al (2001), Alt et al (2002), Alesina et al. (1996), Gelos and Wei (2002), Institute of International Finance (2002), and Christofides, Mulder, and Tiffin (2003). These studies exploit cross-section rather than time-series variation in transparency. As several note, transparency is highly correlated with other

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[5] Popular indices used in the literature include measures of corruption and expropriation from the International Country Risk Guide used in La Porta et al. (1998) and Kaufmann et al.'s indices of rule of law used in Rodrik et al. (2002), and Transparency International's Corruption Perception Index. These indices are based on investors' perceptions, which may, in turn, be influenced by economic outcomes. In other words, investors may conclude that because a country is performing well, risk of expropriation must be low. Other indices such as those developed by La Porta et al. for shareholder and creditor rights are based on specific elements of the law and are less subject to this problem.

measures of institutions, so that it is hard to distinguish between the impact of transparency and other institutional factors using cross-section variation alone.[6]

The only study to look at news effects in relation to transparency policy is Gelos and Wei (2002) who find that markets react less to news on less transparent countries. News is measured by changes in the consensus GDP forecast and the result may reflect the fact that markets think these forecasts are less accurate in less transparent countries.

The rest of the paper is organized as follows. Section II provides descriptions of the transparency reforms introduced by the IMF and adopted by countries. Section III presents our data and estimation strategy for examining the medium-term effect of these reforms on spreads and volatility. Section IV presents results for our panel and two-stage least squares estimation. Section V estimates the short-run or news effect of publication, while Section VI assesses whether markets are responding to the content of reports or just the signal provided by the decision to publish. Section VII concludes.

II. DESCRIPTION OF REFORMS

A. Publication of Article IV Staff Reports

Article IV reports are produced on a regular (usually annual) basis for all IMF members and contain a description of recent economic developments, a short-term macroeconomic projection, and policy suggestions. The reports are written to inform other members of developments and advise the member country involved. Prior to the 1990s, they were considered highly confidential and only background material (including statistical tables and analytical work but excluding forecasts or policy advice) was published.

Following the emerging market crises of the 1990s there was growing support for greater transparency within the IMF. In 1996, publication of 2-4 page summaries of Article IV discussions called Public Information Notices or PINs was permitted and in March 1999, a pilot program of voluntary publication of Article IV staff reports was introduced. The pilot was made permanent in 2001. Given the lead times involved, the first Article IV reports were not published until the end of December 1999. For more details on the procedures involved in writing and publishing Article IV reports see Appendix I.

Article IV reports are closely followed by key market participants. Directors of country risk of the major investment banks in New York, who were interviewed on their use of IMF documents and standards, indicated that IMF Article IV reports were one of the first places they turned to in assessing country risk. They all said they would take it as a negative signal if a country decided not to publish an IMF document (including an Article IV report).

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[6] For example, Gelos and Wei find the effect of policy transparency (similar to the concept of transparency used in this paper) on foreign investment flows disappears when corporate transparency is added to the regression.

B. The Special Data Dissemination Standard

The SDDS was established following the Mexican crisis of 1994/95 and was a response to the perception that the infrequent release of reserves data had exacerbated the crisis. The SDDS was strengthened following the Thai crisis when the failure to include the forward book in official reserve data was seen by many as helping to precipitate that crisis.[7] Manipulating the official level of reserves in this way was relatively common prior to the introduction of the reserves template of the SDDS. Countries were invited to subscribe to the SDDS (i.e. commit to meet its specifications in the future) between 1996 and 1998. The first countries to meet all the specifications of the SDDS were the United States and Canada in mid-February, 1999.

The SDDS was designed for those countries with, or seeking access to, international capital markets.[8] It sets consistent definitions for macroeconomic data and in particular establishes a very detailed definition for reserves data. The standard also sets minimum timeliness and frequency standards for macroeconomic data releases. For most countries, the most difficult change necessitated by observance of the SDDS was the move to quarterly collection and release of national accounts data.

Forty-eight countries were in compliance with the SDDS by August 2002. A list of complying countries is available on the IMF website and users can click through to the latest data, data release calendars, metadata (i.e., a description of how the data is collected and compiled), and in many cases data series on central bank websites.

Observance of the SDDS is one factor in determining ratings by a major credit rating agency and a criterion in the models of country risk run by two of the largest U.S.-based investment banks (IMF, 2003).

C. Reports on the Observance of Standards and Codes

ROSCs were developed to provide an assessment of institutional issues following the emerging market crises of the 1990s. They assess members against internationally accepted standards of good practice in 11 (recently update to 12) areas covering three broad issues: transparency, financial market regulation, and corporate governance. These international standards were developed in response to the crises of the 1990s and include the Basel Core Principles of Banking Supervision and the SDDS (for a list of all the areas see Appendix II). The production and publication of ROSCs is voluntary for all members and the initiative is joint with the World Bank. All ROSCs contain a description of country practice in an area, an

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[7] The definition of reserves used at the time did not require that swaps be reported.

[8] The General Data Dissemination System was established to improve the data of countries that had not yet reached the stage of seeking access to international capital markets.

assessment of the extent to which the country meets a standard, and recommendations of where reform is most needed.[9] They explicitly avoid providing a rating.

A survey of internationally active banks in G-7 countries found that 60 percent used ROSCs in their investment decisions (IMF, 2003). Interviews with directors of country risk from the major investment banks in New York found that most had a sufficient knowledge of ROSCs to discuss the relative quality of reports for different countries.

III. DATA AND ESTIMATION METHODOLOGY

A. Data

We use JP Morgan's Emerging Market Bond Index (EMBI) which records daily bond spread data for 23 emerging market economies for the period of interest, namely January 1, 1999 through June 30, 2002 (Table 1).[10] The EMBI tracks the value of country-specific portfolios of dollar-denominated sovereign or quasi-sovereign debt instruments.[11]

We calculate average spreads and daily volatility over 14 quarters as we are interested in the medium term effect of transparency on spreads and do not want to pick up the short run volatility which may be associated with a change in policy.[12] Daily volatility is defined as the absolute value of the percentage change in the spread from one day to the next.

We construct three quarterly measures of transparency based on whether a country has published an Article IV report or ROSC, and met the specifications of the SDDS. Information on the dates of publication and SDDS compliance are available on the IMF website (www.imf.org). We focus on the publication of Article IV reports and ROSCs rather than other documents because there was a change in policy towards these documents in the period studied with the first Article IV reports published in December 1999 and the first

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[9] Formally, when a report covers just one of the 11 (now 12) areas it is called a ROSC module while a collection of all available reports on a country is called a ROSC. In practice, however, most people refer to a report on a single area as a ROSC.

[10] We use January 1, 1999 as our start date because the first ROSC was published an April 1999. Moving the start date back to July 1, 1999 would allow 3 countries to be added to the sample but we would lose the first ROSC publication. The results, however, are not sensitive to this change in sample.

[11] The spread is defined as the country's EMBI portfolio's yield over the theoretical US zero coupon curve, where the sovereign yield is set to equate the total net present value of the sovereign risk cash flows to zero. Unlike blended spread calculations, sovereign spread calculations extract Brady-style principal and interest collateral provisions.

[12] We use quarterly average data, rather than end-of-period data, because several countries in the sample published a report or came into full compliance with the SDDS on the last day of a quarter. In these cases end-of-period data would pick up the short run volatility associated with a policy change.

ROSCs produced and published in April 1999.[13] We focus on compliance with the SDDS rather than subscription (the date on which a country declared its intention to come into compliance) because the first wave of subscriptions came in 1996 and spread data exists for only 9 countries for 1996. This means we underestimate the impact of the SDDS as we only measure the effect of the last stage in the process of coming into compliance.

Table 1: Indicators for Emerging Market Economies, June 30, 2002

Country	Article IV Report		Stand-alone PIN 1999-2002 2/	ROSC		SDDS Observance 3/	Program	Size of debt market 4/ ($ millions)	Corruption Perceptions Index 5/	Governance indicators 6/		
	first published	months since last Art. IV 1/		first published	months since last Art. IV 1/					law	corruption	voice
Argentina 7/	12/19/00	22	...	04/15/99	14	11/01/99	1	134,450	3.0	0.32	-0.27	0.49
Brazil	...	...	12/22/00	12/06/01	12	03/14/01	1	184,665	4.0	-0.22	0.06	0.58
Bulgaria	04/19/00	13	...	03/17/00	13	...	1	7,013	2.9	-0.15	-0.56	0.47
China	...	...	09/01/00	...	...	...	0	109,407	3.5	-0.04	-0.29	-1.29
Colombia	12/29/99	13	...	...	...	05/09/00	1	24,442	2.2	-0.78	-0.49	0.15
Cote D'Ivoire	10/02/01	13	09/08/00	...	...	...	1	11,290	3.1	-0.33	-0.08	-0.57
Croatia 8/ 9/	01/30/00	18	...	09/../01	6	03/30/01	1	6,648	...	0.15	-0.46	-0.23
Ecuador	...	...	09/07/00	...	...	07/14/00	1	10,968	2.3	-0.72	-0.82	0.27
Korea	...	...	12/29/99	01/23/01	13	11/01/99	1	115,950	4.2	0.94	0.16	0.91
Lebanon	...	...	10/29/01	...	...	...	0	2,415	...	0.26	-0.40	-0.40
Malaysia 10/	...	...	08/10/00	12/11/00	4	09/01/00	0	34,272	5.3	0.83	0.63	-0.09
Mexico 7/	10/21/01	19	03/22/00	10/25/01	18	06/29/00	1	144,606	3.3	-0.47	-0.28	-0.11
Morocco 8/	11/13/01	16	09/01/00	...	...	...	0	11,607	3.7	0.68	0.13	-0.24
Nigeria 9/	08/06/01	20	...	...	...	...	1	19,983	1.9	-1.05	-0.95	-1.23
Panama	02/20/01	13	02/28/00	...	...	...	1	4,654	3.7	-0.39	-0.46	0.66
Peru 9/	03/19/01	20	...	...	...	07/15/99	1	18,853	4.5	-0.52	-0.20	-0.69
Philippines 10/	...	...	03/13/01	09/../01	6	01/17/01	1	29,874	3.3	-0.08	-0.23	0.63
Poland 10/	03/31/00	15	...	12/11/00	9	03/02/00	0	34,513	4.6	0.54	0.49	1.12
Russia	11/09/00	15	...	...	...	...	1	101,742	2.4	-0.72	-0.62	-0.19
South Africa	...	...	03/10/00	10/16/01	20	09/18/00	0	21,833	5.2	-0.35	0.30	0.99
Thailand	...	...	02/10/00	...	...	05/16/00	1	75,978	3.0	0.41	-0.16	0.22
Turkey 11/	...	...	01/03/00	06/27/00	6	07/20/01	1	54,298	3.4	-0.01	-0.35	-0.88
Venezuela	...	...	...	...	...	...	0	28,564	2.3	-0.66	-0.72	0.15

Source: IMF website, World Bank website, Transparency International website, Kaufmann et al (2002).

1/ Months between completion (i.e., Board discussion) of previous Article IV and publication date.
2/ Does not include stand-alone PINs published before mid-December 1999 (when the first Article IV report was published). Nor does it include PINs where the staff report was published on a different day than the PIN. In these cases, the report is usually published within a few days.
3/ Date when subscriber met SDDS specifications.
4/ Includes short and long term external sovereign debt to banks, bonds, and export credits but excludes debt to bilateral or multilateral creditors (OECD 1999).
5/ 1998 index from Transparency International's website (www.transparency.org). Data for Panama is from 2001, the only year Panama was covered. Data for Croatia is from 1999. A higher score indicates a lower perception of corruption.
6/ 1997/98 indicators from Kaufmann, Kraay, and Zoido-Lobaton (2002). These indicators go beyond the limited definition of transparency in this paper (i.e., access to information). A higher score indicates greater rule of law, less corruption, or more voice.
7/ Article IV and publication delayed.
8/ PIN published more than 2 months before staff report covering the same Article IV discussion.
9/ Article IV meeting took place more than 15 months after the previous meeting.
10/ First ROSC was done by the World Bank which does not produce ROSCs in accordance with the Article IV schedule.
11/ Data or fiscal ROSC was completed several months before the next Article IV. IMF rules allow data and fiscal ROSCs in these circumstances to be published outside the Article IV schedule.

[13] Countries have been permitted to publish PINs since 1997 and over 90 percent of members have published a PIN. There is a presumption that policy intention documents are published so there is virtually no control group of non-publishers for this type of document while countries were permitted to publish stand-alone use of Fund resources staff report only in January 2001.

We also construct an indicator of lack of transparency which measures a country's decision not to take the opportunity to publish an Article IV report. Markets are, for the most part, made aware that a country has passed up an opportunity to publish a report when a summary of the Article IV discussion (in the form of a PIN) is published without the corresponding report.[14]

By the end of the period, 12 countries in our sample had published an Article IV report, 14 had come into compliance with the SDDS, 11 countries had published a total of 15 ROSCs, and 14 had published stand-alone PINs. The rate of publication of Article IVs in our sample is similar to that for the IMF membership as a whole (Table 2). The percentage publishing a ROSC is somewhat higher and the percentage complying with the SDDS much higher than for the membership as a whole. The latter finding is not surprising as the SDDS is designed only for those members with access to or seeking access to the international capital markets. As we examine the impact of transparency on bonds spreads, all the countries in our sample have at least some access to international capital markets.

There is a pronounced regional pattern to the adoption of transparency reforms both in our sample and for the IMF membership as a whole. For example, in our sample no Asian country publishes an Article IV while all European countries do. We attribute this partly to different tastes for transparency but also to the fact that peer pressure is likely to be stronger within regions. In other words, if everyone else in your region has published or complied with the SDDS there will be much more pressure on you to publish than if others in your region had not yet published or complied.

The reform events in our sample are distributed relatively evenly over time (Figure 1). There is some clustering in the center of our sample as at the start not all the reforms had come on stream while by the end many countries had already published their first Article IV or ROSC and complied with the SDDS and the rate of new reformers had slowed. From April 2000 until the end of 2001, however, the distribution of reform events is relatively constant. In addition, there appears to be no coincidental relationship between the number of reform events and the overall EMBI index or U.S. interest rates. The possible exception is for the last quarter of 2001 when there was a peak in the number of ROSCs published and a sharp rise in the EMBI. This would tend to bias us against finding any result but we nonetheless test the robustness of our results by dropping data for this period.

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[14] In a few cases countries do not even publish the PIN following the Article IV. However, over 90 percent of countries had published a PIN by mid-2002 and in our sample only Venezuela had not published a PIN. In other cases, the staff report is published a month or more after the PIN, which may be considered a sign of lack of transparency. Including these cases in our PIN indicator does not affect our results significantly.

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Table 2. Comparative Participation in IMF Transparency Initiatives 1/

	Members	PIN published		Article IV Published		SDDS subscriber	ROSCs Completed	
		Members	Percentage	Members	Percentage	Members	Members	Percentage
Africa 2/	51	48	94%	29	57%	2	20	39%
Developing Asia	29	24	83%	10	34%	5	7	24%
Central and Eastern Europe	15	15	100%	15	100%	9	12	80%
CIS and Mongolia	13	11	85%	9	69%	0	8	62%
Western Hemisphere	32	31	97%	22	69%	8	13	41%
Middle East, Malta, and Turkey	16	10	63%	3	19%	1	7	44%
Advanced Economies	28	28	100%	26	93%	23	14	50%
Total IMF Members	184	167	91%	114	62%	48	81	44%

Source: IMF (2002b).

1/ As of August 31, 2002.
2/ The regional groupings are based on the definitions in the World Economic Outlook.

Figure 1. Distribution of Reform Events over Time
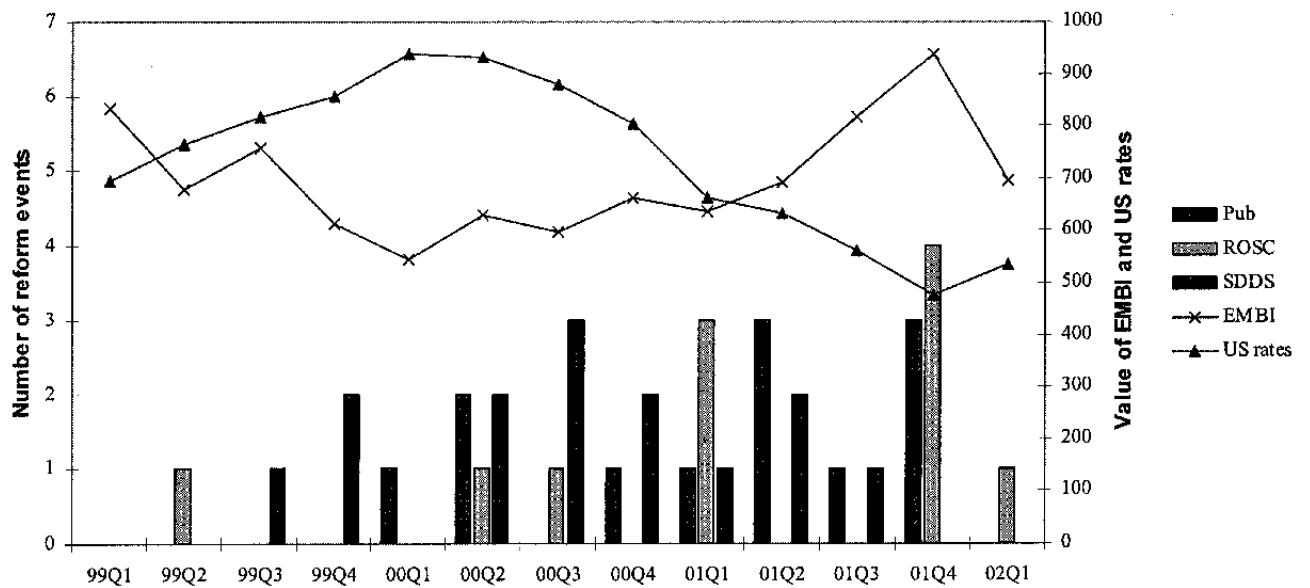
B. Estimation Methodology

We are interested in testing whether there is a relationship between a change in the level of transparency in a country and spreads or volatility in its sovereign debt market. Increased transparency might be associated with a decline in spreads for several reasons. Access to additional information may reduce investors perceived risk. For example, if investors can observe the true level of international reserves they may be more willing to invest in a country with a fixed exchange rate because they believe they will be able to get out before a potential devaluation by monitoring the level of reserves. Transparency may lead to better policies. In the short run, countries may be more willing to address the weaknesses identified in Article IV and ROSC reports if they are published. In the medium-term, transparency may impose great discipline, for example, by preventing expenditures from being hidden through off-budget transactions or quasi-fiscal measures. Finally, transparency may be taken as a signal by markets that a country has nothing to hide.

The relationship between transparency and volatility is less clear-cut as discussed in Furman and Stiglitz (1998). If investors have more information, they may react less to new information (surprises are less common). On the other hand, with more transparency investors may have more similar views about how an economy works and so all react to a piece of news in the same way, leading to a greater change in prices.

To test the effect empirically, we use panel estimation with fixed country effects. These country effects (α_i) pick up any characteristics which are constant through time and may be independently correlated both with spreads and with the decision about whether to publish or comply with the SDDS.[15] Quarterly dummies pick up any trends in spreads or volatility across all emerging markets in our sample. Our estimation is as follows:

$$(QP\ 1) \qquad ln(spread)_{it} = C + \alpha_i + \beta_t q_t + \gamma_1\ Pub_{it} + \gamma_2\ ROSC_{it} + \gamma_3\ SDDS_{it} + \gamma_4 Pub_{it}*ROSC_i$$

$$+ \gamma_5 Pub_{it}*SDDS_{it} + \gamma_6 SDDS_{it}*ROSC_{it} + \varepsilon_{it}$$

where our independent variables Pub_{it}, $ROSC_{it}$, and $SDDS_{it}$ are zero/one dummies which take the value one for any quarter after a country has published an Article IV report, published a ROSC, or come into compliance with the SDDS respectively.[16] We use a zero/one dummy for Article IV publication rather than the number of reports published as no country published an Article IV in one year and declined to publish in subsequent years.[17] In some

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[15] For example, countries that are less subject to shocks (and therefore have lower volatility and spreads) may find it easier to be transparent.

[16] For the quarter in which publication/SDDS compliance takes place, the dummy is given the value one if the event takes place in the first half of the quarter and zero if it is in the second half of the quarter.

[17] As ROSCs can be produced in several areas and publication in one area does not mean the country will necessarily publish reports in the other areas it would be possible to redefine ROSC as the number of reports

specifications we include PIN$_{it}$, a zero/one dummy which takes the value one for any quarter after a country has published a stand-alone PINs after December 1999.[18]

We also include interaction terms between the different measures of transparency. The expected sign of the interaction terms cannot be determined a priori as there are two effects which will work in opposite directions. First, we might expect there to be a declining marginal benefit of transparency. This would suggest that the more transparent a country to start with, the less effect an additional step to increase transparency would have. For example, if a country complies with the SDDS, markets will already have access to a lot of data which are consistent with international definitions. The additional information provided by an Article IV report would therefore be less than for a country that did not comply with the SDDS. This would suggest that the coefficient on the interaction between two measures of transparency (e.g., SDDS and Pub) would be positive. The coefficient on the interaction between SDDS and our measure of lack of transparency (PIN) would be negative.

However, there may also be a signaling effect which would mean the sign on the interaction term would go in the opposite direction. Thus if an un-transparent country does not publish an Article IV report (i.e., publishes a stand-alone PIN), the markets may conclude that this is because of a general distaste for transparency and does not signal anything negative about the contents of a report. If an otherwise transparent country publishes a stand-alone PIN, however, markets may conclude the full report contains some very negative news. In this case, the sign on the interaction terms between SDDS and PIN would be positive.

There may also be a relationship between transparency and the size of the publicly traded debt market. Specifically, the publication of IMF documents and the availability of data according to international definitions may have a bigger impact in countries with smaller, less liquid, debt markets where the private sector has less incentive to do its own research. This is because if a trader tries to exploit her private research by buying or selling debt she will have a larger impact on the price in a smaller market and more quickly transmit the results of her research to others in the market through the price mechanism.

To the extent that the timing of transparency reforms are exogenous (see below) it is not necessary to control for other determinants of spreads. Nevertheless, as a robustness check, we test the impact of including standard macro determinants of spreads in our regression to

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produced for a country rather than a zero/one dummy. As we have only 4 countries that publish more than one ROSC report our results are relatively unaffected by whether we define ROSC as a zero/one dummy or as the number of reports published. Given the difficulty of interpreting the pub*ROSC and SDDS*ROSC interaction variables when Pub and SDDS are dummies and ROSC is not we use the zero/one dummy version of ROSC.

[18] Prior to December 1999, publishing a stand-alone PINs did not indicate an opportunity to publish an Article IV had been passed up because no country was permitted to publish an Article IV before this time. As with ROSC, it would be possible to redefine PIN as the number of stand-alone reports published since December 1999 rather than a zero/one dummy. This approach runs into the same problems discussed in footnote 16 and our results are relatively unaffected by whether we choose the dummy or number of reports definition of PIN.

the extent that these are available on a quarterly basis. Specifically, we examine the effect of including consumer price inflation (defined as the percentage change in prices over the same quarter in the previous year), the current account balance as a percent of GDP, and the fiscal balance as a percent of GDP.[19] To the extent that transparency leads to better macro policies, adding these variables would bias down our coefficients. However, to the extent that transparency only affects these variables over the medium-term, any bias during our short sample would be limited. Other determinants of spreads used in the literature are either unavailable on a quarterly basis (e.g., debt and debt service) or are likely to be influenced in the short run by changes in transparency (for example the level of reserves).

Given the presence of serial correlation in our data, we use Newey-West corrected standard errors. Given the potential for bias when dynamics are included in a panel context with relatively few time periods, we do not add lags to our main specification. Nevertheless, we check the robustness of our results to the inclusion of a lagged dependent variable using the approach discussed in Arellano and Bond (1991).

Possible endogeneity in the timing of reforms to increase transparency

As a fixed-effect panel relies on within-country variation and not between-country variation, our estimated γ coefficients will only be biased if the *timing* of the decision to publish or comply with the SDDS is prompted by a *change* in circumstances in the country. We discuss this assumption below and correct for any possible bias in a number of different ways including by using two-stage least squares.

The timing of publication depends on i) whether the country decides to publish and ii) when the report becomes available for publication. We have suggested that because the opportunity to publish did not exist before 1999, a move to start publishing mainly reflects long-run characteristics of the country rather than changes in conditions at the time. If a country does decide to publish, the quarter in which it publishes is mainly determined by internal IMF procedures. Specifically, Executive Board discussion of Article IV reports takes place every 12 months with a grace period of 3 months.[20] Internal guidelines suggest that if a country decides to publish an Article IV, publication should take place within 10 days of the Board discussion (IMF 2001). More detail on publication procedures is given in Appendix I.

There are three main reasons why publication does not always followed this schedule: the Article IV discussion is delayed to coincide with a program review which itself is delayed

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[19] As quarterly GDP over this period is available for only a few countries, and given that we are mainly interested in the variation of the current account deficit and the fiscal deficit and use GDP simply as a scalar, we use 1998 GDP as the denominator for all quarters. Our macro data is from International Financial Statistics and the Economist Intelligence Unit supplemented with data from country websites.

[20] A few IMF members during this period were on an 18 or 24 month cycle but none of the countries in our sample fall into this category.

because targets have not been met; the Article IV mission is delayed because the government is new; or publication is postponed following Board discussion because of a disagreement about whether a part of the report can be deleted under IMF guidelines (IMF 2002a and 2002b). Clearly, all three of these reasons for delay could be correlated with changes in conditions in the country and therefore introduce endogeneity bias. In our sample, we have 5 cases where the first Article IV report is published more than 16 months after the last Board discussion, all of which are for program countries. In most cases, the publication of ROSCs is also determined by the timing of the Article IV. In our sample we have 7 cases where the first ROSC was published outside a 12-16 months window following the previous Article IV discussion.[21]

It is not clear a priori which way any endogeneity bias will go. If countries facing a crisis are more reluctant to be transparent then the bias will be negative. However, countries facing a crisis may be more inclined to take actions which could help reduce their spreads including by providing more information to markets. In addition, countries experiencing a crisis may be more likely to adopt IMF supported reforms. In this case, any endogeneity bias would be positive (i.e., would mitigate against us finding an effect).

Because the timing of documents for nonprogram countries is more likely to follow the standard schedule and not be influenced by changes in country conditions, our first correction for potential endogeneity bias is to compare the results for the full sample with those excluding program countries. We define a program country as one that has an IMF program at any point during our sample. Only 7 countries fall into this category.

Next we use two-stage least squares to address any potential endogeneity bias. We use the average time between Article IV discussions to instrument for when a country has the opportunity to publish a document. We use proxies for a country's taste for transparency as instruments for whether it decides to publish. First, we construct variables on the first and second opportunity to publish an Article IV based on the time since the last Article IV discussion and the average time between Article IV consultations for program and nonprogram emerging market and market access transition economies (IMF 2002a).[22] To calculate the average time between Article IVs we use data for all the emerging markets and market access transition economies over the last five years. We interact these opportunity to publish variables with indicators that are correlated with countries' decisions about whether to publish but are not directly correlated with quarterly changes in spreads or volatility during our sample. These are 1998 GDP per capita, the size of the debt market in 1998, Kaufmann et al.'s 1997/98 rule of law, voice, and corruption indicators, and regional dummies.

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[21] In several cases this was because the Article IV itself was delayed. In addition, ROSCs produced by the World Bank do not follow the Article IV schedule and if a fiscal or data ROSC (produced by the IMF) is completed several months before the conclusion of the Article IV report it can be published when completed (IMF 2001).

[22] Only one country (Korea) had a third opportunity to publish during our sample.

We also include as instruments the interaction between the second opportunity to publish and measures of initial transparency, GDP per capita, and debt squared.[23] Counties with a medium level of transparency are most likely to see the variable on publication change at the time of the second opportunity to publish. This is because the most transparent countries will publish on the first opportunity (and therefore see no change at the time of the second opportunity to publish) while the least transparent countries do not publish throughout the whole period. We drop those interactions that turn out to be weak predictors.

We instrument for SDDS observance using the time since a country announced its intention to subscribe (as long as this was announced before our sample period). Given the long lead times involved, the precise quarter in which a country meets the specifications of the SDDS will not, in most cases, be foreseeable or determined by concurrent events in the country. It is possible, however, that a crisis could delay the timetable for implementing SDDS requirements which would give a positive bias to our estimated coefficients. In fact, however, all three crisis countries met SDDS specifications by the middle of 2002 and Brazil did so in an exceptionally short time suggesting that if anything the bias goes in the opposite direction.[24] Nevertheless, we also instrument for the timing of meeting SDDS specifications. As complying with the SDDS is a time-consuming process, we use the number of months since the country announced its intention to come into compliance (the subscription date) in the first stage of our estimation. As more transparent countries are likely to find it easier to meet SDDS specifications and those with larger debt markets will have more incentive to meet them, we interact the time since subscription with 1998 measures of transparency and the size of the debt market as well as regional dummies (reflecting the taste for transparency and peer effects).

If there is a diminishing marginal impact of transparency, using two-stage least squares may underestimate the true effect on spreads. This is because the first-stage of the estimation exploits the fact that more transparent countries are more likely to publish IMF reports and comply with the SDDS. However, more transparent countries may also experience a smaller reduction in spreads from adopting any of the measures because they already provide much of the information contained in IMF reports to the markets directly. Thus, the standard panel includes a few initially less-transparent countries that decide to publish (e.g. Nigeria) and experience a larger than average reduction in spreads. However, the first stage of the estimation is likely to predict that these less-transparent countries will not publish, thus underestimating the true effect.

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[23] For measures of which have only positive values we subtract the mean level of the indicator before squaring.

[24] Brazil was the only country not to have subscribed to the SDDS by the middle of 1999 but who was fully compliant by end-March 2001.

IV. RESULTS

We find that sovereign bond spreads fall following the introduction of all three measures of transparency (Table 3), although the evidence for ROSCs is weaker than for the other reforms. Spreads rise after a country fails to publish an Article IV report (i.e., publishes a stand-alone PIN). We do not find a consistent relationship between our measures of transparency and changes in volatility in sovereign bond markets. Our results are robust to the exclusion of program countries, the use of two-stage least squares, the inclusion of macro variables, and the inclusion of dynamics.

A. Panel Estimation Results

The size of the decline in spreads associated with our transparency measures is economically large, especially for those with relatively low initial transparency. Given the size of our sample, however, the magnitude of the effect is not very precisely estimated. Depending on the specification, the mean effect is a reduction in spreads of between 7 and 17 percent for publishing an Article IV and 4 and 12 percent for complying with the SDDS. The impact of publishing a ROSC is only significant in some specifications but is of a similar magnitude to coming into observance with the SDDS. For a country like Morocco with a spread of 5.1 percentage points (which is close to the mean), a 7 percent fall in spreads represents a decline of 36 basis points.

The coefficients on our interaction terms suggest a declining marginal effect of transparency. All the interaction terms between our measures of transparency are positive although only that between Pub and SDDS is significantly different from zero in most specifications. The high standard errors on the interaction terms mean that the impact of undertaking a second transparency reform is in most cases insignificantly different from zero.

A similar declining marginal effect is observed when SDDS observance and Article IV publication are interacted with other measures of transparency, corruptions, and governance. We show the results for Transparency International's Corruption Perceptions Index (CPI)[25] and Kaufmann et al.'s rule of law index (in both cases a higher score means greater transparency/rule of law). Thus for a country with a mean level of the CPI (3.4), complying with the SDDS would reduce spreads by 17 percent. For Nigeria (which has the lowest CPI score), compliance would reduce spreads by 36 percent.

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[25] Panama is only included in the Corruption Perception Index for 2001 and Croatia only for 1999 and we therefore use these values for Panama and Croatia. Our results are not sensitive to the inclusion of Panama or Croatia in the sample.

Table 3. Impact of Transparency on Level and Volatility of Spreads: Fixed-Effect Panel

	(1) ln(spread)	(2) ln(spread)	(3) ln(spread)	(4) ln(spread)	(5) ln(spread)	(6) ln(spread)	(7) ln(spread)	(8) ln(spread)	(9) volatility	(10) volatility	(11) volatility	(12) volatility	(13) volatility	(14) volatility
pub	-0.33 (0.11)***	-0.33 (0.11)***	-0.23 (0.10)**	-0.23 (0.10)**	-0.18 (0.10)*	-0.31 (0.10)***	-0.30 (0.10)***	-0.32 (0.17)*	-0.15 (0.08)*	-0.15 (0.08)*	-0.21 (0.08)**	-0.13 (0.09)	-0.11 (0.10)	-0.15 (0.08)
rosc	-0.19 (0.16)	-0.29 (0.81)	0.08 (0.38)	-0.17 (0.16)	-0.25 (0.75)	-0.71 (0.32)**	0.52 (0.77)	-0.23 (0.13)*	0.16 (0.11)	0.26 (0.68)	-0.15 (0.26)	0.17 (0.11)	-0.05 (0.64)	-0.16 (0.15)
sdds	-0.22 (0.07)***	-2.62 (0.61)***	-0.61 (0.20)***	-0.23 (0.07)***	-2.87 (0.63)***	0.10 (0.10)	-4.31 (0.68)***	-0.18 (0.10)*	0.04 (0.07)	-0.83 (0.62)	-0.05 (0.23)	0.06 (0.07)	-0.52 (0.56)	0.21 (0.11)
pub*sdds	0.37 (0.12)***	0.48 (0.12)***	0.37 (0.12)***	0.35 (0.12)***	0.45 (0.12)***	0.14 (0.12)	0.39 (0.14)	0.67 (0.25)***	0.11 (0.09)	0.16 (0.11)	0.14 (0.10)	0.13 (0.09)	0.14 (0.10)	-0.08 (0.11)
pub*rosc	0.14 (0.17)	0.09 (0.18)	0.10 (0.18)	0.04 (0.16)	-0.05 (0.17)	0.64 (0.30)**	0.34 (0.27)	-0.27 (0.13)**	0.20 (0.10)**	0.17 (0.11)	0.26 (0.10)	0.15 (0.10)	0.15 (0.12)	0.47 (0.14)
sdds*rosc	0.11 (0.14)	-0.02 (0.13)	0.16 (0.16)	0.09 (0.14)	-0.01 (0.13)	-0.03 (0.13)	-0.25 (0.14)*	0.00 (0.00)	-0.06 (0.11)	-0.10 (0.12)	-0.12*** (0.13)	-0.13 (0.12)	-0.17 (0.13)	-0.16 (0.11)
sdds*ln(debt)		0.23 (0.05)***			0.25 (0.06)***		0.42 (0.07)***			0.08 (0.06)			0.05 (0.05)	
rosc*ln(debt)		0.02 (0.08)			0.02 (0.07)		-0.09 (0.08)				-0.01 (0.06)		0.02 (0.06)	
sdds*cpi			0.13 (0.05)***									0.02 (0.05)		
rosc*cpi			-0.08 (0.09)									0.07 (0.07)		
pin						0.20 (0.09)**	2.76 (0.49)***							-0.08 (0.08)
sdds*pin						-0.43 (0.12)**	-0.41 (0.17)**							-0.17 (0.14)
rosc*pin						0.75 (0.32)**	0.73 (0.29)**							0.46 (0.17)
pub*law				0.31 (0.10)***	0.41 (0.11)***		0.25 (0.11)**					0.10 (0.08)	0.12 (0.08)	
sdds*law				0.04 (0.08)	-0.08 (0.08)		-0.04 (0.11)					0.22 (0.10)**	0.19 (0.10)*	
pin*ln(debt)							-0.26 (0.05)***							
pin*law							0.01 (0.10)							
quarterly dummies	yes	yes	yes	yes	yes	yes	yes		yes	yes	yes	yes	yes	yes
Constant	5.77 (0.19)***	5.89 (0.18)***	5.63 (0.18)***	5.75 (0.20)***	5.88 (0.18)***	5.71 (0.18)***	5.85 (0.15)***	5.60 (0.22)***	-4.03 (0.12)***	-3.99 (0.12)***	-3.91 (0.12)***	-4.03 (0.12)***	-3.99 (0.12)***	-3.96 (0.12)
Observations	322	322	308	322	322	322	322	98	322	322	308	322	322	322
Number of countries	23	23	22	23	23	23	23	7	23	23	22	23	23	23

Source: IMF staff estimates.

Newey-West corrected standard errors in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%

We also find that the impact of SDDS observance on spreads is inversely correlated with the size of the sovereign debt market in the country (Table 3: regressions 2 and 7). This is in line with the hypothesis discussed above that the private sector has less incentive to do its own research in countries with smaller and less liquid debt markets. Our results suggest that complying with the SDDS would lead to a decline in spreads of 26 percent for a country like Venezuela that had not published a ROSC or Article IV report and had a level of sovereign debt close to the mean. Countries with the largest debt market in our sample (Argentina and Brazil) would see no decline from SDDS observance. The interaction between ROSC and the size of the debt market is not significant.[26] The debt market interaction is not simply proxying for the interaction with initial transparency or vice versa as the coefficients on both interactions change only slightly when both are included (Table 3: regression 7).

Spreads rise when a country fails to publish an Article IV staff report and publishes instead a stand-alone summary of the Article IV or PIN (Table 3: regressions 6 and 7). In different specifications, the mean effect of publishing a PIN ranges from an increase in spreads of 9 to 20 percent. We find a positive interaction with ROSC and a negative interaction with SDDS suggesting the signaling effect dominates for the interaction between ROSC and PIN but not for the interaction between SDDS and PIN. This is plausible if the decision to publish an Article IV and publish a ROSC are seen as more similar (they are more highly correlated). In this case, failing to publish an Article IV after you have published a ROSC gives a more negative signal than failing to publish an Article IV after you have complied with the SDDS. We also find that the increase in spreads is smaller in countries with larger debt markets, supporting the hypothesis that publication is particularly valued in countries where the private sector has less incentive to do its own research. Interaction terms with other measures of transparency are not significantly different from zero.

Our results are not driven by outliers. Both Argentina and Lebanon experienced very sharp increases in spreads during the sample period (spreads in Argentina increased 8-fold and in Lebanon 5-fold). The exclusion of one or both of these countries from the estimation has relatively little impact on our estimates.

There is no consistent relationship between transparency and the volatility in sovereign bond spreads (see Table 3). The coefficient on Article IV publication is negative but only statistically significant in 4 out of 7 specifications while the coefficient on ROSC is sometimes positive and is significant in 2 specifications.

Dropping program countries from the sample has little effect on the coefficients of our transparency measures except that ROSC becomes significantly different from zero (Table 3: regression 8).

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[26] We cannot test all three interactions simultaneously because they would be collinear with our country fixed effects. However, if we replace the ROSC interaction with a Pub*ln(debt) interaction term the coefficient is also insignificantly different from zero.

B. Two-Stage Least Squares

Our instruments are closely correlated with our measures of transparency. Specifically, the within country R squareds from the first stage regressions are 71 for Pub, 61 for ROSC, and 68 for SDDS (Appendix III). Our instruments pass the standard test for weak instruments (Bound, Jaeger, and Baker, 1995). Specifically, the joint F-test on excluded instruments from our first-stage regression is 14.6 for Article IV publication, 10.1 for ROSC, and 10.5 for SDDS.

Our results are strengthened by the use of two-stage least squares. The coefficients on all three measures of transparency become more negative with this approach, suggesting that any endogeneity bias may be negative (Table 4). However, it is important to note that the standard errors increase with the use of two-stage least squares so that the effect of transparency becomes less precisely estimated (this is particularly true for ROSC). In addition, the coefficient on ROSC is significant in most specifications with the use of two-stage least squares.

As with the standard panel there is no consistent relationship between volatility and transparency when two-stage-least squares is used (see Table 4).

C. Robustness Checks

Our results do not appear to be driven by a coincidental correlation between the timing of transparency reforms and macroeconomic developments (Table 5). Data on inflation, the current account balance, and fiscal balance are not available for our entire sample. In particular, Morocco, Lebanon, and Nigeria (some of the least developed and least transparent countries in our sample) do not have quarterly data on any of our macro variables over this period. We proceed by excluding those countries for which data is unavailable and then compare the coefficients with and without the relevant macro variables. Inflation and the current account balance have a significant impact on spreads in most specifications while the fiscal balance has an impact in only one specification. While including macro variables leads to a decline in the coefficients on our transparency measures in several cases, the decline is relatively small. In the majority of case, however, the coefficients on our transparency measures either increase or stay unchanged with the inclusion of macro variables. In no case does the inclusion of macro variables cause the coefficient on a transparency measure to become insignificantly different from zero.[27] The results for PIN and for many of the interactions also continue to hold even when all the macro variables are included and the sample is, as a result, very limited.

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[27] In contrast, dropping several countries from the sample does lead the coefficient on ROSC and in some cases the SDDS to become in significantly different from zero. This is unsurprising given the size of the sample and that the countries being dropped are the least transparent where improving transparency has the biggest impact

Table 4. Impact of Transparency on Level and Volatility of Spreads: Two-Stage Least Squares

	(1) ln(spread)	(2) ln(spread)	(3) ln(spread)	(4) ln(spread)	(5) ln(spread)	(6) ln(spread)	(7) ln(spread)	(8) volatility	(9) volatility	(10) volatility	(11) volatility	(12) volatility	(13) volatility	(14) volatility
pub	-0.58	-0.59	-0.52	-0.59	-0.59	-0.37	-0.84	-0.01	-0.05	-0.27	-0.02	-0.02	-0.02	0.12
	(0.18) ***	(0.18) ***	(0.20) ***	(0.20) ***	(0.19) ***	(0.18) **	(0.24) ***	(0.14)	(0.15)	(0.16) *	(0.15)	(0.15)	(0.14)	(0.16)
rosc	-0.99	-2.38	-0.86	-0.94	-4.93	-0.52	2.92	-0.06	1.33	1.37	-0.03	0.79	-0.34	-0.20
	(0.46) **	(1.42) *	(0.70)	(0.46) **	(2.18) **	(0.87)	(2.84)	(0.24)	(1.15)	(0.64) **	(0.24)	(1.33)	(0.41)	(2.00)
sdds	-0.47	-1.64	-1.29	-0.45	-0.05	-1.50	-8.58	-0.18	-1.68	-1.25	-0.16	-1.42	0.03	1.30
	(0.18) ***	(1.01)	(0.63) **	(0.22) **	(1.52)	(0.74) **	(2.35) ***	(0.17)	(1.01) *	(0.46) ***	(0.17)	(1.09)	(0.41)	(1.72)
pub*sdds	0.36	0.43	0.16	0.47	0.54	1.43	0.46	-0.04	0.05	0.07	0.04	0.09	-0.27	0.22
	(0.24)	(0.24) *	(0.24)	(0.27) *	(0.27) **	(0.69) **	(0.77)	(0.20)	(0.20)	(0.21)	(0.20)	(0.20)	(0.36)	(0.52)
pub*rosc	0.43	0.49	0.80	0.32	0.46	0.83	1.04	0.13	0.06	0.15	0.06	-0.01	0.25	-0.18
	(0.42)	(0.39)	(0.50)	(0.43)	(0.44)	(0.85)	(0.66)	(0.20)	(0.22)	(0.23)	(0.21)	(0.23)	(0.33)	(0.39)
sdds*rosc	0.74	0.22	0.55	0.51	-0.53	-0.10	-0.73	0.62	0.65	0.92	0.46	0.46	0.67	0.45
	(0.35) **	(0.35)	(0.40)	(0.42)	(0.53)	(0.48)	(0.56)	(0.26) **	(0.30) **	(0.32) ***	(0.28) *	(0.37)	(0.29) **	(0.42)
sdds*ln(debt)		0.12			-0.01		0.91		0.14			0.12		-0.20
		(0.09)			(0.13)		(0.28) ***		(0.09)			(0.09)		(0.20)
rosc*ln(debt)		0.16			0.42		-0.47		-0.13			-0.07		0.02
		(0.14)			(0.20) **		(0.31)		(0.11)			(0.13)		(0.23)
sdds*cpi			0.33							0.26				
			(0.18) *							(0.12) **				
rosc*cpi			-0.10							-0.47				
			(0.22)							(0.19) **				
pin						0.81	6.23						-0.17	-3.24
						(0.27) ***	(1.05) ***						(0.17)	(0.92) ***
sdds*pin						1.40	-1.56						-0.25	0.50
						(0.82)	(1.24)						(0.51)	(0.84)
rosc*pin						-0.09	3.00						0.34	-0.05
						(0.94)	(1.22)						(0.46)	(0.88)
pub*law				0.21	0.31		1.04				0.07	0.09		0.43
				(0.18)	(0.20)		(0.36) ***				(0.11)	(0.12)		(0.25) *
sdds*law				0.21	0.43		0.87				0.23	0.15		0.15
				(0.24)	(0.30)		(0.38)				(0.15)	(0.17)		(0.24)
pin*law							-1.23							-0.08
							(0.33) ***							(0.22)
pin*ln(debt)							-0.59							0.30
							(0.10) ***							(0.10) ***
quarterly dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	
Constant	6.07	6.20	6.05	6.14	6.31	5.60	6.28	-4.12	-4.06	-3.89	-4.07	-4.03	-4.02	-3.94
	(0.22) ***	(0.21) ***	(0.24) ***	(0.24) ***	(0.25) ***	(0.25) ***	(0.29) ***	(0.13) ***	(0.14) ***	(0.16) ***	(0.14) ***	(0.15) ***	(0.16) ***	(0.19) ***
Observations	322	322	308	322	322	322	322	322	322	308	322	322	322	322
R-squared	0.83	0.84	0.82	0.82	0.81	0.68	0.68	0.38	0.37	0.28	0.42	0.41	0.35	0.37

Source: IMF staff estimates.

Robust standard errors in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 5. Impact of Transparency on Level and Volatility of Spreads: Robustness Checks

	(1) ln(spread)	(2) ln(spread)	(3) ln(spread)	(4) ln(spread)	(5) ln(spread)	(6) ln(spread)	(7) ln(spread)	(8) ln(spread)	(9) volatility	(10) volatility	(11) volatility	(12) volatility	(13) volatility
pub	-0.27	-0.20	-0.37	-0.34	-0.38	-0.31	-0.28	-0.15	-0.26	-0.25	-0.25	-0.23	-0.25
	(0.13)**	(0.10)**	(0.13)***	(0.11)***	(0.14)***	(0.11)***	(0.10)***	(0.08)*	(0.10)**	(0.10)**	(0.10)**	(0.10)**	(0.10)**
rosc	-0.13	-0.10	0.04	0.04	0.03	0.04	-0.47	0.15	0.13	0.13	0.08	0.09	0.05
	(0.17)	(0.17)	(0.17)	(0.17)	(0.18)	(0.19)	(0.32)	(0.58)	(0.11)	(0.11)	(0.12)	(0.12)	(0.12)
sdds	-0.14	-0.18	-0.06	-0.06	-0.06	-0.06	0.13	-1.84	-0.02	-0.02	-0.04	-0.05	-0.04
	(0.07)**	(0.06)***	(0.07)	(0.06)	(0.07)	(0.06)	(0.11)	(0.55)***	(0.07)	(0.07)	(0.07)	(0.07)	(0.09)
pub*sdds	0.36	0.31	0.44	0.38	0.45	0.37	0.14	0.27	0.18	0.17	0.16	0.15	0.16
	(0.14)***	(0.12)***	(0.14)***	(0.12)***	(0.14)***	(0.12)***	(0.13)	-0.12**	(0.10)*	(0.11)	(0.11)	(0.11)	(0.11)
pub*rosc	0.13	0.05	0.17	0.14	0.19	0.14	0.57	-0.04	0.22	0.22	0.24	0.22	0.28
	(0.18)	(0.16)	(0.18)	(0.17)	(0.21)	(0.20)	(0.31)*	(0.15)	(0.10)**	(0.10)**	(0.10)**	(0.10)**	(0.11)**
sdds*rosc	0.11	0.06	-0.02	-0.09	-0.04	-0.13	-0.24	-0.20	-0.07	-0.08	-0.09	-0.09	-0.10
	(0.15)	(0.15)	(0.14)	(0.15)	(0.15)	(0.16)	(0.14)*	(0.12)	(0.11)	(0.11)	(0.12)	(0.13)	(0.13)
inflation		0.01		0.01		0.01	0.01			0.00		0.00	
		(0.00)***		(0.00)***		(0.00)***	(0.00)***			(0.00)		(0.00)	
current account				0.01		0.01	0.00						
				(0.00)**		(0.00)*	(0.00)*						
fiscal balance						-0.01	0.00						
						(0.00)	(0.00)*						
pin							2.77	0.47					
							(0.70)***	(0.31)					
sdds*pin							-0.24	-0.14					
							(0.13)*	(0.08)*					
rosc*pin							0.54	0.10					
							(0.24)**	(0.09)					
pub*law							0.65	-0.12					
							(0.28)**	(0.10)					
sdds*law							-0.59	0.11					
							(0.26)**	(0.11)					
sdds*ln(debt)							0.37	0.18					
							(0.08)***	(0.05)***					
rosc*ln(debt)							-0.02	-0.01					
							(0.08)	(0.05)					
pin*ln(debt)							-0.25	-0.04					
							(0.06)***	(0.03)					
pin*law							0.80	-0.01					
							(0.31)***	(0.07)					
ln(spread) (-1)								0.84					
								(0.05)***					
quarterly dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Constant	5.64	5.69	5.59	5.64	6.09	5.72	5.65	5.86	-3.92	-3.92	-3.96	-3.95	-3.93
	(0.18)***	(0.18)***	(0.18)***	(0.18)***	(0.17)***	(0.15)***	(0.19)***	(0.16)***	(0.12)***	(0.12)***	(0.11)***	(0.11)***	(0.11)***
Observations	280	280	247	247	221	221	221	320	280	280	247	247	221

Source: IMF staff estimates.

Newey-West corrected standard errors in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%

Similarly, while adding dynamics to our panel reduces our coefficients somewhat, it does not change our basic result (Table 5: regression 8). We cannot reject an autoregressive process of order one and so include on lag of the dependent variable. The coefficient on the lag is 0.85 and significantly different from 1.

V. Do IMF Documents Contain News?

In the next two sections we examine evidence for a possible mechanism by which greater transparency could lead to lower spreads. In this section we assess whether there is a "news effect" associated with the publication of IMF documents, i.e. whether the spread moves more than usual on the days immediately following publication. Any abnormal movement of this kind would suggest that the publication of IMF documents provides information that is new to markets. In the following section we attempt to distinguish whether this information is related to the signal provided by the decision to publish or by the contents of the report.

A. Data

Again we use JP Morgan's EMBI spread data. This time, however, we are interested in daily data and the index includes 32 emerging market economies for the time period of interest (January 2000 through August 2002). For these countries we collect the date of publication for all country related documents. There are 8 different types of country-related documents which fall into three categories: summary reports (like PINs), Article IV reports and background material (including ROSCs), and program documents, which describe how much will be lent under what conditions as well as evaluate countries' progress against these conditions (Appendix I).

A publication event is defined as the publication of at least one document for a country, although typically a bundle of several related documents are published on the same day.[28] In our sample, we have 130 such events across 29 countries (Table 6). In other words 90 percent of countries in the EMBI published at least one document during this period and 65 percent published a detailed IMF document such as a staff report. These publication rates are similar to those for the IMF membership as a whole (see Table 2).

B. Panel Regression

Because we are interested in testing whether market participants are responding to IMF publications, and would expect that in some cases the response will be an increase and in others a decrease in spreads, we focus our analysis on the magnitude of daily spread

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[28] At the conclusion of Article IV consultations or program reviews, a number of documents are available that a member can choose to publish including a staff report, staff statement, PIN, and statement by the Executive Director. In addition there may be other longer background documents including a statistical appendix or selected issues paper. Documents that are only produced for program countries, whose publication is recorded in the database include letters of intent (LOI), memoranda on economic and fiscal policy (MEFP), and technical memoranda of understanding (TMU).

Table 6. Emerging Market Economies Included in Emerging Market Bond Index

Country	Publication events	Program 1/	End-of-mission events	Summary publication events	Detailed publication events
Algeria	2	No	3	0	2
Argentina	11	Yes	4	8	3
Brazil	9	Yes	6	9	0
Bulgaria	6	Yes	2	4	2
Chile	3	No	3	0	3
China	1	No	2	1	0
Colombia	8	Yes	5	5	3
Côte d'Ivoire	3	Yes	1	2	1
Croatia	5	Yes	4	2	3
Ecuador	5	Yes	5	5	0
Egypt	1	No	2	1	0
Hungary	2	No	2	1	1
Korea	4	Yes	2	4	0
Lebanon	1	No	1	1	0
Malaysia	1	No	1	1	0
Mexico	3	Yes	2	2	1
Morocco	2	No	1	1	1
Nigeria	3	Yes	2	2	1
Pakistan	10	Yes	5	5	5
Panama	3	Yes	3	2	1
Peru	4	Yes	2	2	2
Philippines	4	Yes	3	4	0
Poland	6	No	3	3	3
Russia	4	Yes	3	1	3
South Africa	2	No	2	2	0
Thailand	2	Yes	2	2	0
Turkey	13	Yes	6	8	5
Ukraine	6	Yes	3	4	2
Uruguay	6	Yes	2	4	2

Source: IMF staff estimates.

1/ Indicates whether a country had a Fund-supported program at any point between January 2000 and August 2002. In some program cases, not all the documents published were program specific documents. In particular, Korea, Mexico, and Nigeria publsihed one document associated with a stand-alone Article IV and Ukraine published two during the sample period.

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movements, regardless of the direction.[29] Our dependent variable is the absolute value of $s_{i,t}$ the percent change in daily credit spread; where, $s_{i,t} = 100 \times (\log(spread_{i,t}) - \log(spread_{i,t-1}))$.[30] We estimate the following panel regression which includes a country specific constant (α_i):

$$(P1) \qquad | s_{i,t} | = \alpha_i + \sum_{j=1}^{q} \beta_{i,j} | s_{i,t-j} | + \gamma_P p_{i,t} + \varepsilon_{i,t}$$

where $p_{i,t}$ is a zero-one dummy variable that is equal to one for both the publication date and the day after. This accommodates the possibility of publications being released to the market after the end of the trading session of the day.[31] This inevitable choice means we are likely to underestimate the true impact of publication, because the model treats the impact as if it were spread over two days.

The lagged dependent variables are included as regressors to control for strong autocorrelation in volatility. They allow for the fact that the impact of news would be smaller, in absolute magnitude, in tranquil periods than in times of market turmoil so that in effect we are comparing the volatility on the day of publication to the volatility in the adjacent periods.

In this model, endogeneity bias will only be a problem if events in the country (which are independently correlated with spreads) can influence the precise date of publication within a short window. As discussed above, IMF documents are produced on a standard timetable. While these timetables can be delayed because of events in the country (such as the failure to meet program conditions) these delays will usually be several months. Whether a document is published on a Monday or Wednesday will be determined by internal factors (such as whether the Board schedule on a particular day was crowded) that will be uncorrelated with events in the country. The exogeneity of the lagged dependent variables is confirmed by a Ljung-Box test, which cannot reject no autocorrelation in the error term.

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[29] It is not possible to judge whether a report represents good news or bad news except by looking at the actual change in prices following release of the report for two reasons. First there is no consensus forecast for IMF reports as there is for the release of U.S. macroeconomic data. Second the reports are careful not to provide a "rating" and instead stick to a description of current policies, a forecast for the future, and advice about changes in policies. It is therefore not possible to measure objectively whether a report is more or less favorable than a previous report or than expectations. In addition, as we are interested in whether reports contain news, not how markets react to certain types of news, we have not pursued this line of enquiry.

[30] Countries are indexed by i, while t is the time subscript.

[31] It is a particular issue for those bonds that are mainly traded in London (which is a large center for over-the-counter trades in sovereign bonds), due to the time difference.

There may be cases where another announcement occurs by chance during our two-day event period and causes a large price movement unrelated to the publication of the IMF report. We therefore check for outliers which may be driving our results and find one (a 32 percent fall in the Thai spread) but our results are robust to its exclusion.

We find a significant coefficient on publication (γ_P) which is restricted to be the same for all countries, as there are relatively few publication events for each country (Table 7). We experiment with different values for q (the number of lags) but the results are comparable in all cases. We report the estimation result of (P1), when $q=5$ (Table 7). Given that the sample average daily movement is 1.2 percent, the estimated coefficient 0.15 suggests that the spread moves 12.5 percent more than usual on the two days following publication. Because we do not know which of the two days the news hits the markets, we are effectively diluting the effect. If we assume the effect is concentrated on one day, our coefficient would translate into a 25 percent greater than average movement in the spread on the day.

However, as Brown and Warner (1985) and others have documented, high-frequency financial market data exhibits skewness and fat-tails that lead to a bias toward detecting "news effects." As our daily credit spread data also exhibits volatility clustering and fat-tails, we follow the recent news effect literature (e.g., Andersen et al. 2003) and use a generalized autoregressive conditional heteroskedasticity (GARCH) framework which will lead us to valid statistical inferences.[32] Unlike much of this literature, however, we are interested in whether a news event leads to a change in price (either up or down) and not the direction of the markets response to a particular pieces of macroeconomic news.

C. Panel GARCH Estimation of the News Impact of IMF Country Documents

The model that we estimate is as follows:

(G1)
$$s_{i,t} = \alpha_i + \sum_{j=1}^{q_i} \rho_{i,j} s_{i,t-j} + \sqrt{h_{i,t}}\varepsilon_{i,t}$$
$$h_{i,t} = \lambda_i + \gamma_G p_{i,t} + \beta_{1i} h_{i,t-1} + \beta_{2i}\varepsilon_{i,t-1}^2 + \phi_{1,i} h_{i,t}^R + \phi_{2,i} h_{i,t}^E$$

where the top equation models the daily percent change in credit spread as a function of its own lags; i.e. a stationary autoregressive process. The number of lags included in this autoregressive specification (denoted by q_i) is allowed to differ across countries. $h_{i,t}$ is the time varying conditional variance of the error term, $\varepsilon_{i,t}$. The unconditional variance of $\varepsilon_{i,t}$ is factors out from the conditional variance process, so that the unconditional means of $h_{i,t}$ is

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[32] The GARCH-family of models is useful for the following reasons: it is constructed to address volatility clustering (which as discussed is typical of high frequency financial market data); it captures, to some degree, excess kurtosis (also typical in high frequency financial market data); and it is computationally tractable.

Table 7. Estimation of the Publication Impact of IMF Documents and Changes in Credit Ratings

	(1)	(2)		(3) Definition 1		(4) Definition 2		(5) Definition 2		(6)
Panel					GARCH					
		entire sample	w/o Thailand	program	non-program	program	non-program	program	non-program	credit rating
Publication effect	0.15	0.22	0.20	0.17	0.23	0.13	0.37	0.12	0.33	1.61
standard error	(0.07)**	(0.10)***	(0.07)***	(0.07)***	(0.19)	(0.09)	(0.11)***	(0.08)	(0.09)***	(0.18)***
Post publication effect										
standard error										
End of mission effect								0.14	0.12	
standard error								(0.07)*	(0.07)*	

Source: IMF staff estimates.

* significant at 10%; ** significant at 5%; *** significant at 1%
Definition 1: Program country if had a program at any point during the sample.
Definition 2: Program country if had a program at the time the document was issued.

normalized to one for each country.[33] The second equation describes the law of motion for this conditional variance as a linear function of its own lagged value, a squared lagged error term, two conditional variance terms, and the event dummies.

A challenge for estimating a multivariate GARCH model is that the number of parameters to be estimated is proportional to N^2, where N is the number of variables. This is due to the pairwise covariance terms in the variance equations. We therefore need to make some simplifying assumptions about the nature of the covariances.[34] We impose the restriction that the individual country volatility process is correlated only with the regional average volatility and the emerging market average volatility process. Our conditional variance terms are then the weighted-average variance of other countries in its region ($h_{i,t}^R$)[35] and the weighted-average variance for the emerging markets as a whole ($h_{i,t}^E$).[36] The event coefficient, γ_σ is common for all countries, while the other parameters are country-specific.

The first step in GARCH estimation is to make a distributional assumption on the error term, $\varepsilon_{i,t}$. We choose a mixture normal distribution as it is a good description of the data and has a known density function (Appendix IV).

There is a significant news effect for the sample as a whole (see Table 7). On average, both on the day of publication (day t) and the day after publication (day $t+1$), the conditional variance is 22 percent higher than the GARCH model projects based on information up to day $t-1$ and assuming no publication. Dropping Thailand from the sample lowers the effect to 20 percent. It is not straightforward to assess what the impact would have been if it was

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[33] This normalization facilitates the interpretation of the magnitude of event dummy coefficients. If the coefficient estimate is w, it means that the conditional variance is higher by $100w$ percent than it would have been in the absence of the event.

[34] Bollerslev (1990), proposed the constant conditional correlation multivariate GARCH, where the conditional correlation for any two variables is assumed to be time-invariant. This restriction allows the researcher to run separate univariate GARCHs and then reconstruct the conditional correlation parameters (essential for asset pricing models) from the transformed residuals (e.g. Engle and Sheppard, 2001, and Ledoit, Santa-Clara and Wolf, 2002). However, the estimation of conditional covariance is not our objective and a univariate GARCH would not allow us to estimate a common coefficient on publication across countries. We therefore need to impose stronger restrictions on the pairwise covariances to estimate a 29 country multivariate GARCH model.

[35] We use the weights in the EMBI index.

[36] Our restrictions on the nature of the cross correlation of volatility which reduces the number of conditional covariance parameters to 58, are unlikely to impact our results as we find that the conditional volatility processes of the regional and emerging market-wide aggregates explain relatively little of member countries' volatility at daily frequency. Specifically, the pairwise correlations between countries range from only −0.3 to 0.3. In addition, the coefficients on the regional and emerging market aggregates were all close to zero.

concentrated on one day, as the increased variance on day t will affect the projected variance on day $t+1$. However, given the linear-in-variance structure, a rough estimate is a 44 percent increase in the conditional variance over the level projected by GARCH (40 percent of Thailand is excluded). This, however, is an underestimate of the news effect because we have effectively restricted the impact to be equally split over two days. To get an upper bound on the effect, we take our two publication days for each event and assume that the news effect occurs on the day with the larger movement. In this case, the effect rises to 99 percent. In other words, if our assumption is valid, the conditional variance on the day of the event is, on average, twice what it would have been in the absence of publication.

As the GARCH approach compares the volatility on event days with the volatility in the short window surrounding the event it is possible that if volatility is lower in the run up to a predicted event this will bias upwards our coefficient. In practice, however, we find that volatility is somewhat higher than predicted before the event (possibly as traders speculate on the event or the news in the report leaks out) and lower than predicted after the event.

VI. Why Do Markets Respond to the Publication of IMF Documents?

In this section we examine whether there is a differential news effect for different types of countries and for different types of documents. In particular, we are interested in whether it is the signal provided by the decision to publish that markets are responding to or the contents of the reports.

One reason why this distinction is important is that if markets are only interested in the signal sent by the decision to publish, an increase in transparency in one country may lead to a decline in spreads in that country but an increase in spreads in another country with no overall benefit to the international financial system. On the other hand, if markets lower risk premia for countries on which they have more information, or transparency leads to better policies, greater transparency is more likely to generate a net benefit to the international financial system.

To the extent that markets respond to the content of the report we also assess whether they find the assessment of the economy in the report useful or only react to information about whether the IMF is going to lend to a country. We do this by comparing the news effect for program and nonprogram countries.

A. Are Markets Responding to the Content or the Decision to Publish?

We can assess whether markets are responding to the decision to publish or to the contents of reports by examining the direction of change following the publication of reports. If the short-run change in spreads following publication was entirely a response to the decision to publish, spreads would always fall following the first publication of an Article IV report, rise following the publication of a stand-alone PIN, and not move more than normal following the publication of program documents where publication is presumed (i.e. close to required). If the abnormal movement in spreads immediately following publication was due to the content of a report, we would expect to see a roughly even distribution between positive and

negative responses to publication and no systematic difference in the pattern of responses between PINs and first-time Article IV reports. Note that in the medium term, the news effect is likely to die out and the medium-term impact of transparency (whether through the positive signal given or changes in policies) is likely to dominate. This is the effect we measure in the first half of the paper.

We find a relatively even distribution of changes in spreads following publication of different types of document. Figure 2 shows the percentage change in spreads on the day of publication and the day after publication for all documents, and separately for first-time Article IVs, stand-alone PINs, and program documents. In all cases, the change in spreads is relatively evenly distributed between positive and negative with no clear difference between different types of document. The mean change for the whole sample is –0.1 percent. For first-time Article IV s it is 0.06 percent, for PINs –0.08 percent, and for program documents 0.02 percent. Similarly, the percentage of event days on which there was an increase in spreads was 53 percent for the sample as a whole, 56 percent for first-time Article IVs, 52 percent for PINs, and 54 percent for program documents.

We conclude that the abnormal movement in spreads immediately following publication is largely a response to the content of the report rather than the decision to publish. We go on to examine whether markets are responding to information on whether the IMF is likely to lend to a country or whether they are responding to the content of the report because it contains useful information about economic prospects and policies.

B. The Publication Effect for Program vs. Nonprogram Countries

Country documents for program countries usually contain information on the likely future actions of the IMF. Press Releases or News Briefs, which are released shortly after the Board discussion, will announce whether or not the Board has approved a loan to the country. The related staff report will also contain detailed information about the timetable and amounts of future disbursements and conditions attached to these disbursements which will be useful for pricing sovereign debt. We test whether this information on the likely actions of the Fund is the primary reason why IMF documents are moving markets by comparing the publication effect of documents for program and nonprogram countries. The fact that documents for nonprogram countries deviate from pre-set timetables less often is another reason to examine nonprogram countries separately.

We use two different definitions of program countries: if a country had a program at any point during our sample; and if a country had a program at the time the document was issued. According to the first definition, there were 109 publication events for program countries and 21 publication events for nonprogram countries. According to the second definition there were 88 publication events for program countries and 42 publication events for nonprogram countries. We estimated separate coefficients for the publication effect for program and nonprogram countries using the following specification:

Figure 2. Percentage Change in Spreads on Day Of and Day After Publication for Different Categories of Documents
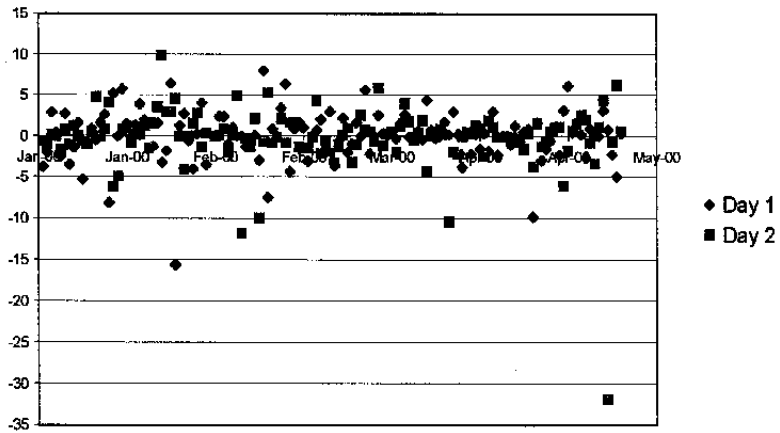
Figure 2a. All Documents
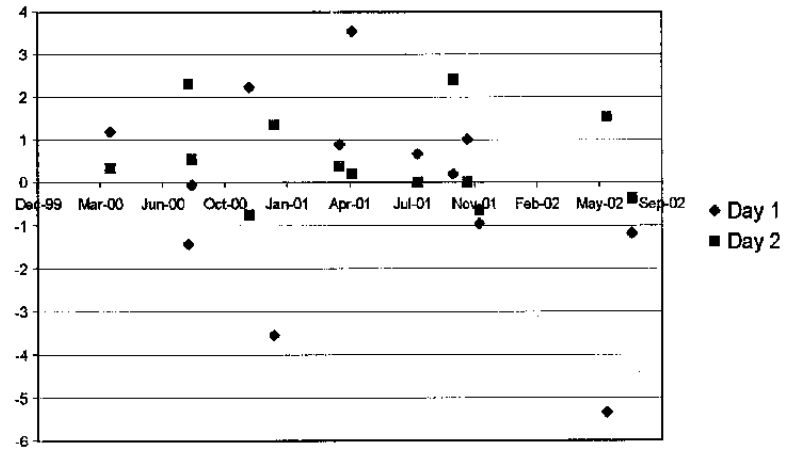

Figure 2b. First Article IV

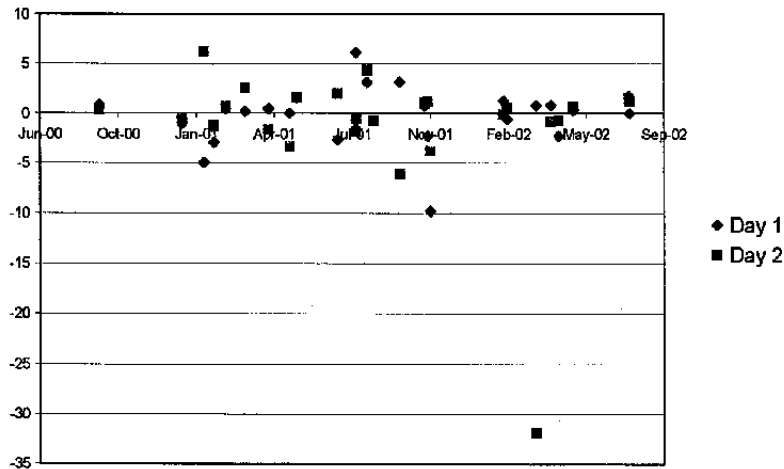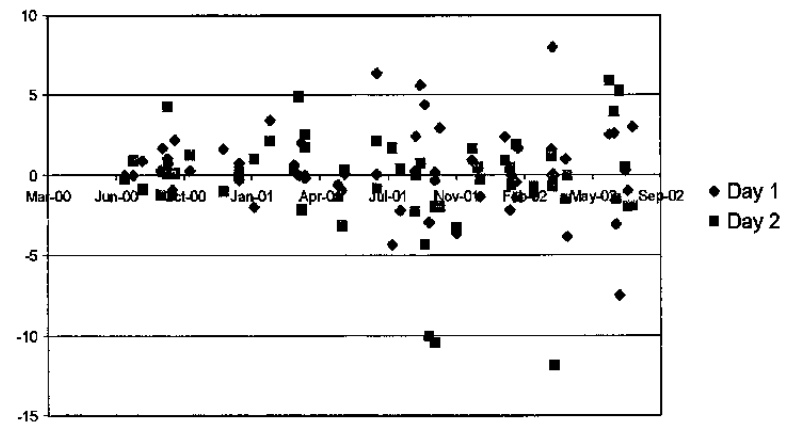

Figure 2c. Public Information Notices

Figure 2d. Program Documents

$$s_{i,t} = \alpha_i + \sum_{j=1}^{q_i} {}_{i,j}s_{i,t-j} + \sqrt{h_{i,t}}\,\varepsilon_{i,t}$$

(G3)

$$h_{i,t} = \lambda_i + \gamma_1 p_{1i,t} + \gamma_2 p_{2i,t} + \beta_{1i}h_{i,t-1} + \beta_{2i}\varepsilon_{i,t-1}^2 + \phi_{1,i}h_{i,t}^R + \phi_{2,i}h_{i,t}^E$$

where $p_{1i,t}$ is equal to one if a document for a program country was published on that day or the previous day. $p_{2i,t}$ is set equal to one if a document for a nonprogram country was produced on that day or the previous day.

If markets were responding only to information about the future actions of the Fund including the magnitude and timing of future disbursements, there would be a publication effect only for program or near-program countries. While our first definition of program country is closer to capturing both program and near-program countries it has the disadvantage that the sample of nonprogram events is very small and the standard errors therefore high. There is, however, no significant difference between the magnitude of the publication effect for program and nonprogram countries using this definition. Indeed, the point estimate for nonprogram countries is slightly higher than that for program countries although the estimated coefficient is not significantly different from zero (Table 8). Using the second definition, we again find no statistical difference between the coefficients for nonprogram and program countries and in this case the coefficient on nonprogram countries is significantly different from zero.

It is possible that markets could be reacting to Fund documents for nonprogram countries because of the information they provide about future Fund actions if the country had a crisis and came to the Fund for support. However, the magnitude of the publication effect for these countries, a cumulative 74 percent excess volatility using the second definition makes this very unlikely. Indeed, newspaper articles suggest that IMF reports may even be news worthy for advanced countries where there is no prospect of IMF lending.[37]

While the results suggest that markets are responding to information about economic fundamentals rather than just future financing from the Fund, the finding that, using the second definition of program countries, the magnitude of the publication effect is three times larger for nonprogram than program countries and that the effect for program countries is insignificant is somewhat counter intuitive. One reason for the finding may be that information about programs tends to be announced prior to the publication of the official Fund documents. Another reason is that documents for program countries are produced, and therefore potentially published, much more frequently. This would tend to dilute the news contained in each report. To illustrate, program countries in our sample had three times as

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[37] The Financial Times, for example, reported on August 14, 2001 that "Investor sentiment was also hit by a warning from the IMF that Japan would enter a recession this year with the economy contracting by 0.2 percent."

many events as nonprogram countries. It is perhaps not surprising that the size of the news effect for each event was 1/3 the size. While it is impossible to disentangle the program effect from the frequent publication effect as the two are so highly correlated, we can test the hypothesis that news leaks out prior to publication. We report the results below.

C. The Impact of End-of-Mission Press Conferences and Mission Statements

Two important ways that information about programs is publicly released prior to Board discussion are at press conferences held by missions in the member country and in end-of-mission statements. For program countries, a press conferences and/or in a mission statement will usually state whether a tentative agreement on a program has been reached and what the main conditions are. These tentative agreements are rarely overturned by Fund Management or the Executive Board. While there is no systematic data on mission statements or press conferences, these usually occur (if they happen at all) on the last day of a mission.[38] Thus we use the last day of the mission as a proxy for the date of a press conference and mission statement.[39] We include an end-of-mission dummy in (G1) and allow the coefficient on the dummy to be different for program and nonprogram countries.[40]

One potential problem with this approach is that the last day of a mission is not exogenous, at least in program cases, as a mission is often extended in order to try and reach an agreement on a program. Reaching agreement may involve the government making and announcing a new policy. Thus the announcement effect of the end of mission press conference may in some cases be picking up some of the announcement effect of a policy decision by the government. In contrast, missions for nonprogram countries rarely overrun their scheduled time and members are very unlikely to announce a change in policy at the end of a Fund mission as they are keen to demonstrate their independence from the Fund. Thus the coefficient on the end-of mission dummy may be biased upwards for program countries and may be biased downwards for nonprogram countries.

The results indicate that markets change the price of emerging market bonds in response to end-of-mission press conferences and mission statements (Table 8). The magnitude of the effect for program countries appears to be somewhat larger than that for nonprogram countries although the difference between the two coefficients is not significant. It is possible that the potential positive bias for program countries and negative bias for nonprogram countries exactly balances a small true effect for program countries and a large true effect for

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[38] The dates of the mission or missions on which a report is based are recorded in all IMF staff reports.

[39] As not all missions hold press conferences or issue statements we underestimate the true effect on spreads.

[40] Including an end of mission dummy in the estimation for the sample as a whole has very little impact on the magnitude or significance of either the publication coefficient reported earlier. The coefficient on the end of mission dummy for the whole sample is significant.

nonprogram countries. A more parsimonious explanation is that the true effects are similar and exogeneity biases are not large.

D. A Comparison with the News Effect of a Change in Credit Ratings

Finally, to provide some context to assess the magnitude of the publication impact of IMF documents, we estimate the publication impact of a change in a member's credit rating. We use data on the day on which S&P and Moody's changed their credit rating (available at www.standardpoor.com and www.moodys.com). We used the same country coverage and time period used above except that only 23 of the 29 countries in our sample had changes in credit rating over this period. From January 2000 to July 2002, there were 109 sovereign rating actions, 67 from S&P and 42 from Moody's. Many of these were for Argentina (19 events) and Russia (13 events). We estimated a modified version of G1 with $p_{i,t}$ replaced by a dummy set equal to one for the day and day after a credit rating change took place.

We find that a change in credit rating has a large and significant impact on emerging market sovereign bond spreads. The magnitude of the effect is roughly seven times the average publication effect of an IMF document and just over four times the publication effect for a nonprogram country document. One reason why the effect of a change in credit rating is likely to be much larger than for the publication of an IMF document is that the former take place less frequently and only occur when there is a sharp change in the perceptions of the long run economic prospects of an economy. In contrast, IMF documents are produced at regular intervals whether or not there has been a change to the assessment of economic conditions. The timing of changes to credit rating is not exogenous. Announcements and actions by countries can trigger both a change in credit rating and a change in spreads. This will tend to bias upwards the coefficient on ratings changes, possibly substantially. Given these factors, we conclude that the relative magnitude of the IMF publication effect, particularly for nonprogram countries is large.

VII. CONCLUSION

This paper provides evidence that transparency can reduce borrowing costs in capital markets in some cases by substantial amounts, and that reforms supported by the IMF have contributed to better-informed markets.

We show that those emerging market countries that adopt transparency reforms introduced by the IMF in the late 1990s see lower spreads in subsequent quarters. The transparency measures are publication of IMF reports on macro developments (Article IV reports), publication of IMF reports on financial regulation and other institutional issues (ROSCs), and compliance with the Fund's SDDS, which establishes consistent definitions and minimum timeliness and frequency standards for the release of macroeconomic data. The effect for ROSCs, however, is only consistently significant when endogeneity bias is corrected for. Where markets observe that a country does not take the opportunity to publish an Article IV report (through the release of a stand-alone PIN), spreads rise.

The reduction in spreads associated with increased transparency is larger for those countries that start out less transparent. The marginal impact of adopting each additional measure declines sharply. Similarly, countries with high existing levels of transparency (according to measures such as Transparency International's Corruption Perceptions Index) also experienced smaller-than-average reductions in spreads following publication or compliance with the SDDS.

We find that countries with smaller debt markets see larger reductions in spreads when they meet the specifications of the SDDS. We suggest this is because the private sector has less incentive to undertake its own research in countries with smaller, less liquid debt markets.

All our results are robust to the exclusion of program countries, the use of two-stage least squares, and the inclusion of macroeconomic variables and time dynamics. Any endogeneity bias in the timing of publication (a problem mainly for program countries) or SDDS observance is working against us finding a result. We are able to predict relatively accurately the timing of publication and SDDS observance using the time since the last Article IV and the time since a country announced its intention to comply with the SDDS interacted with fixed characteristics like initial per capita GDP and initial level of transparency.

We find that international capital markets are responding to the publication of country reports by adjusting the price of sovereign debt. The direction of change immediately after publication is consistent with the hypothesis that IMF reports contain new information. It is not consistent with the hypothesis that markets are only responding to the signal provided by the decision to publish. This suggests that increased transparency could have a net benefit for the international financial system. The large effect for nonprogram countries (equivalent to at least a quarter of the impact of a change in credit rating) suggests markets are responding to news about economic fundamentals and not just information about future IMF lending.

Our results provide support for the proposition that improving transparency is an important way for countries to lower their borrowing costs. A key mechanism by which this reduction may take place is that transparency may lead to better policies. Indeed, this potential mechanism was one of the main reasons why greater transparency was advocated following the crises of the 1990s. The magnitude of our effect is consistent with this potential mechanism. For example, if a country knows it has to reveal the true level of its reserves, it may take more care to ensure that it maintains a high level of reserves. Similarly, a country that is more transparent about evaluations of its policy will be under more pressure to implement the recommendations. Thus the decline in spreads associated with SDDS observance may well include the market response to higher reserves resulting from observance. Similarly the decline in spreads associated with publication of Article IV reports is likely to include the market response to policy actions taken to implement the recommendations in these reports.

Our results also suggest a role for the IMF as a provider of information to the markets. This role appears to be particularly important for countries with smaller debt markets where the private sector may be less able to recoup the benefits of undertaking research.

APPENDIXES

I. Description of IMF Country Documents and Publication Procedures

Types of Documents

Article IV Staff Reports and Background Documents

These are written on every IMF member on a regular (usually annual) basis. The main report, typically around 20-30 pages plus tables, contains a description of recent economic developments, a short-term projection, and policy suggestions. The reports are written to inform other members of developments and advise the member country involved. They are explicitly not designed to provide a rating of a member's performance or policies.

Background documents are also produced and can be in the form of detailed tables (Statistical Appendices), a description of recent developments and institutions (Recent Economic Developments, which are no longer produced), and more analytical studies such as an estimation of potential growth or the real equilibrium exchange rate (Selected Issues). Reports on the Observance of Standards and Codes (ROSCs) are also background documents to Article IV reports.

Member countries that agree to the publication of their Article IV staff report can have a response published alongside the report. This "right of reply" usually takes the form of a statement by the member's Executive Director and is about 2-4 pages.

Program Documents

These are produced only for countries that have an arrangement (i.e. are borrowing) from the IMF. Some simply describe the timing, amounts, and conditions of the arrangement and are signed by the authorities (Letters of Intent, Memoranda on Economic and Fiscal Policy, and Technical Memoranda of Understanding). Requests or reviews of arrangements evaluate how a member has performed under an arrangement, whether it has met its targets, and recommend whether the member should receive additional money. These tend to be shorter than Article IV staff reports and some provide more detailed forecasts. They also come closer to a quantitative rating in that they indicate whether, in the view of the staff, the country should receive the next tranche of a loan. However, as discussed above, the key points of the assessment are usually made public before the document is released.

In some cases, program requests and reviews are combined with an Article IV staff report. The integrated report assesses economic conditions and performance under the arrangement.

Public Information Notices, Press Releases, and News Briefs

Public Information Notices, Press Releases, and News Briefs provide short (usually 3-4 page) summaries of Executive Board discussions of Article IV reports (PINs) and program reviews (Press Releases and News Briefs). They are based on the staff report and modified to reflect

the comments of Directors during the discussion. They usually also contain a summary table of the key economic statistics from the report.

Staff Concluding Statements

At the end of an Article IV or program mission, staff prepare a concluding statement which the authorities can choose to make public. Staff may also hold a press conference at the end of the mission, particularly if the concluding statement is to be made public. Concluding statements are a few pages and provide a summary assessment of the economy. In program cases, the statement will announce whether an agreement on an arrangement has been reached in principle. It will indicate the amount of money a country is expected to receive from the IMF and the timing and main conditions of a program. These tentative agreements are rarely overturned either by senior management or the Executive Board.

Procedures for Document Preparation and Publication

There are standard timetables for the preparation, discussion, and publication of IMF country documents that are, for the most part, independent of events in the country. Article IV reports are usually produced on an annual basis while programs are usually reviewed every six months. In exceptional cases, members receive an Article IV report every 2 years but this timetable is agreed well in advance and none of the countries in our sample fall into this category. The intermediate steps in the production of reports also follow a standard timetable.

After returning from a mission, staff draft a report which, after internal review, is circulated to the Executive Board at least three weeks prior to the Board discussion. The date of the Board discussion has to be booked several months in advance given the limited slots available and is chosen to allow staff time to write the report and guide it through the review process. The Board date is generally unrelated to events in the country but there are two main exceptions. The IMF tries to avoid discussions in the run up to elections or shortly after a change in government, and, for program countries, a discussion may be delayed due to the failure to meet one of the conditions. However, this type of delay (which usually occurs before the publication of the staff paper) will typically lead to a delay of several months. Thus while events in a country can determine whether a Board meeting takes place in the spring or fall, given the lead times involved, events in the country will not determine whether the Board or the publication takes place on the April 5 or 12. Endogeneity in timing is therefore an issue when we use quarterly data but not for our GARCH estimation, where we compare the volatility on two days with the volatility in surrounding days.

Following Board discussion of the report, minor modifications may be made (see below) and, if the authorities agree, the report is made public usually within 10 days of the Board discussion. In most cases several different documents (e.g. an Article IV report, background material, PIN and/or Press Release, and Executive Director's statement) are posted on the IMF's external website at the same time. Those, including many market participants, who have signed up to the service are notified electronically of new releases on the website.

The authorities, who see the report for the first time when it is circulated to the Board, must indicate ahead of time whether they intend to publish (although they can change their mind later). They can request factual corrections and the deletion of highly market sensitive . material (usually referring to the exchange rate). Any changes must be circulated to the Board and any deletions must go through an internal review procedure.

II. Areas Where Standards Have Been Endorsed by the Fund and the World Bank as Useful to Their Work and for Which Reports on the Observance of Standards and Codes Are Produced [1]

Transparency Standards: the following standards cover transparency issues and are assessed by the IMF.

- **Data**: the Fund's *Special Data Dissemination Standard* and *General Data Dissemination System.*

- **Fiscal Transparency**: the Fund's *Code of Good Practices on Fiscal Transparency.*

- **Monetary and Financial Policy Transparency**: the Fund's *Code of Good Practices on Transparency in Monetary and Financial Policies.*

Financial Market Regulation Standards: the following standards focus on financial market regulation and are usually assessed under the joint IMF-Bank Financial Sector Assessment Program.

- **Banking Supervision:** the Basel Committee's *Core Principles for Effective Banking Supervision* (BCP).

- **Securities:** the International Organization of Securities Commissions' (IOSCO) *Objectives and Principles for Securities Regulation.*

- **Insurance:** the International Association of Insurance Supervisors' (IAS) *Insurance Supervisory Principles.*

- **Payments Systems:** Committee on Payments and Settlements Systems' (CPSS) *Core Principles for Systemically Important Payments Systems.*

Corporate Governance Standards: the following standards cover regulations of the corporate sector and are assessed by the World Bank.

- **Corporate Governance:** the OECD's *Principles of Corporate Governance.*

- **Accounting:** the International Accounting Standards Committee's *International Accounting Standards.*

- **Auditing:** the International Federation of Accountants' *International Standards on Auditing.*

- **Insolvency and Creditor Rights:** World Bank's *Draft Principles and Guidelines for Effective Insolvency and Creditor Rights Regimes.*

Source: IMF 2001

1/ In November 2002, after the period covered in this paper, the IMF and World Bank agreed to add Anti-Money Laundering/Combating the Financing of Terrorism to the list of areas where ROSCs will be produced and the Financial Action Task Force 40 + 8 Recommendations as the associated standard.

Impact of Transparency on Level and Volatility of Spreads: First Stage

	(1) pub	(2) rosc	(3) sdds	(4) pub*sdds	(5) pub*rosc	(6) sdds*rosc
fop	0.05	2.29	1.39	0.41	0.27	1.03
	(0.53)	(0.55)***	(0.61)**	(0.43)	(0.38)	(0.52)**
fop*europe	0.99	0.11	0.44	0.46	0.15	-0.09
	(0.20)***	(0.21)	(0.23)*	(0.16)***	(0.15)	(0.20)
fop*latin	0.45	-0.23	-0.02	0.51	0.13	-0.15
	(0.08)***	(0.09)***	(0.10)	(0.07)***	(0.06)**	(0.08)*
fop*middleeast	-0.16	-0.34	0.00	-0.15	-0.12	-0.03
	(0.18)	(0.19)	(0.21)	(0.15)	(0.13)	(0.18)
fop*ln(debt)	-0.01	-0.22	-0.12	-0.03	-0.03	-0.09
	(0.05)	(0.05)***	(0.06)**	(0.04)	(0.04)	(0.05)*
fop*law	0.02	0.04	-0.62	0.03	0.29	0.02
	(0.17)	(0.18)	(0.20)***	(0.14)	(0.13)**	(0.17)
fop*corruption	0.13	0.20	1.39	0.36	-0.28	0.30
	(0.24)	(0.25)	(0.28)***	(0.19)*	(0.17)	(0.23)
sop	-1.26	-0.98	4.15	4.52	3.05	-3.21
	(1.84)	(1.91)	(2.13)*	(1.48)***	(1.34)**	(1.80)*
sop*europe	-2.80	6.11	4.47	2.24	1.68	4.62
	(0.89)***	(0.93)***	(1.03)***	(0.72)***	(0.65)**	(0.87)***
sop*asia	-2.87	5.79	1.89	-0.99	-0.32	4.00
	(0.88)***	(0.92)***	(1.02)*	(0.71)	(0.64)	(0.87)***
sop*latin	-1.92	4.40	3.63	2.74	2.13	3.29
	(0.70)***	(0.73)***	(0.82)***	(0.57)***	(0.51)***	(0.69)***
sop*middleeast	-1.71	6.09	0.98	-2.22	-0.77	4.57
	(1.06)	(1.10)	(1.22)	(0.85)***	(0.77)	(1.03)***
sop*law	1.32	-5.13	-0.76	2.23	1.00	-4.16
	(0.91)	(0.94)***	(1.05)	(0.73)***	(0.66)	(0.89)***
sop*lgdp	0.38	0.33	-0.13	-0.60	-0.56	0.63
	(0.25)	(0.26)	(0.28)	(0.20)***	(0.18)***	(0.24)***
sop*ln(debt)	0.04	-0.50	-0.55	-0.11	0.06	-0.43
	(0.09)	(0.09)***	(0.11)***	(0.07)	(0.07)	(0.09)***
sop*corruption	-1.90	6.15	2.74	-0.47	0.75	5.10
	(0.84)**	(0.87)***	(0.97)***	(0.67)	(0.61)	(0.82)***
sop*voice	-0.26	0.14	-1.36	-1.30	-0.59	-0.27
	(0.21)	(0.22)	(0.25)***	(0.17)***	(0.16)***	(0.21)
sop*ln(debt)2	-0.62	2.25	0.80	0.01	0.29	1.70
	(0.32)*	(0.34)***	(0.37)**	(0.26)	(0.23)	(0.32)***
sop*ln(gdp)2	0.16	-2.35	0.76	2.59	0.29	-1.82
	(0.61)	(0.64)***	(0.71)	(0.49)***	(0.44)	(0.60)***
sop*law2	0.56	-1.70	-0.62	0.07	-0.28	-1.06
	(0.26)**	(0.27)***	(0.30)**	(0.21)	(0.19)	(0.25)***
sop*voice2	1.05	-2.26	-2.30	-3.04	-0.96	-1.37
	(0.80)	(0.83)***	(0.93)**	(0.65)***	(0.58)	(0.79)*
sop*corruption2	0.02	-0.17	-0.28	0.02	0.02	-0.13
	(0.06)	(0.06)***	(0.07)***	(0.05)	(0.04)	(0.06)**
tsub	0.00	0.00	-0.10	-0.01	0.03	0.00
	(0.03)	(0.03)	(0.04)***	(0.02)	(0.02)	(0.03)
tsub*europe	-0.01	0.02	0.05	0.00	0.00	0.03
	(0.02)	(0.02)	(0.02)**	(0.02)	(0.01)	(0.02)
tsub*law	0.00	0.02	0.03	0.00	0.00	0.02
	(0.01)	(0.01)***	(0.01)***	(0.00)	(0.00)	(0.01)***
tsub*ln(debt)	-0.02	0.01	0.04	-0.02	0.00	0.01
	(0.01)**	(0.01)	(0.01)***	(0.01)***	(0.00)	(0.01)*
tsub*voice	0.02	-0.01	-0.11	0.01	0.01	-0.02
	(0.03)	(0.03)	(0.03)***	(0.02)	(0.02)	(0.03)
tsub*corruption	0.00	-0.22	-0.23	0.02	-0.03	-0.18
	(0.06)	(0.07)***	(0.07)***	(0.05)	(0.05)	(0.06)***
Constant	-0.01	-0.13	-0.27	-0.02	-0.04	-0.11
	(0.07)	(0.07)*	(0.08)***	(0.05)	(0.05)	(0.07)*
Observations	322	322	322	322	322	322
Number of countries	23	23	23	23	23	23
R-squared: within	0.71	0.61	0.68	0.64	0.63	0.63
R-squared: overall	0.61	0.37	0.41	0.47	0.46	0.47
Joint F-test on excluded variables	14.6	10.1	10.5	13.2	13.3	10.5

Standard errors in brackets

IV. GARCH Estimation

For a given country spread series i, $\varepsilon_{i,t}$ is identically and independently distributed over time. $\varepsilon_{i,t}$ is assumed to be drawn from a mixture normal distribution. More specifically, the mixture is $N(0,\sigma_i^2)$ with probability 0.8, $N(v_i,\sigma_i^2)$ and $N(-v_i,\sigma_i^2)$ with probability 0.1 respectively. The mixture distribution is constructed to be symmetric, because the $s_{i,t}$ series do not exhibit significant skewness. In this type of mixture normal models, the probability of each normal distribution must be given, possibly somewhat arbitrarily. The reason is that the probabilities cannot be estimated unless we know which distribution each $\varepsilon_{i,t}$ is drawn from. The probabilities chosen here have an intuitive appeal, since our data exhibits extreme movements in either direction that happen with a very low probability. These extremities are the very reason why we cannot use a homoskedastic model to make valid statistical inferences with regard to the new effect. At first, we tried a normal distribution specification for $\varepsilon_{i,t}$, but the excess kurtosis could not be explained away by the GARCH effect alone. The estimation procedure is described below.

1. Determine the number of lags, q_i, for each individual mean equation: the top equation of (G1). We applied Schwarz Bayesian Information Criterion.
2. Estimate GARCH(1,1) of individual series, and compute the kurtosis of the standardized residuals.
3. Solve for (v_i,σ_i^2) to match the kurtosis from Step 2 and to match the second moment of $\varepsilon_{i,t}$.
4. Proceed with a maximum likelihood estimation of the parameters, with σ_i^2 and v_i from Step 2.
5. The result from steps 2 through 4 provides useful starting point for a joint maximization. We combine steps 3 and 4 to jointly estimate the components of the mixture normal with GARCH coefficients.

One caveat is that $h_{i,t}$, the conditional variance process, must remain non-negative. To ensure non-negativity of the conditional variance for GARCH(1,1) processes, it suffices to have $\lambda_i, \beta_{1i}, \beta_{2i} > 0$, for all i. In addition, stationarity requires $\beta_{1i} + \beta_{2i} < 1$, for all i.

As we calibrate up to the fourth moment of the process, the quasi-maximum likelihood function is a close approximation of the true distribution. (We do not try to match any higher moments, as their estimation is notoriously imprecise.) As we can easily write down the likelihood function of the mixture normal distribution, the computation is tractable. The statistical inference is straightforward, in that we can readily apply the standards results (e.g. consistency and asymptotic normality) of quasi-MLE asymptotics.

Note that we can easily incorporate contemporaneous and/or cross-country serial correlation in $\varepsilon_{i,t}$ and/or $h_{i,t}$, as long as we keep the correlation parameterization parsimonious.

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