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Who Saw Sovereign Debt Crises Coming?

This paper studies sovereign debt crises through the prism of the primary sovereign bond market and describes the behavior and interactions among the principal actors in the sovereign bond market before and after a sovereign debt crisis. The study finds that investment banks price sovereign default risk well before crises occur and before investors detect default risk. As early as three years before a crisis, countries that will eventually enter into a debt crisis pay underwriting fees that are almost twice as high as the underwriting fees paid by the average emerging market country. In contrast, sovereign bond spreads do not seem to be good leading indicators of debt crises. Between three years and one year before a crisis, there is almost no difference between the bond spreads paid by countries that will eventually enter into a crisis and the spread paid by the average emerging market country. The paper also shows that investment banks' behavior differs depending on the type of sovereign debt crisis. While Investment banks charge higher underwriting fees to countries that will later enter into crisis because of high risk of sovereign default, they do not appear to charge higher fees to countries that will eventually suffer a liquidity crisis driven by external factors or banking problems. Given that my results suggest that investment banks price default risk well before investors do, they raise the puzzle of why underwriting fees, which contain valuable publicly

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available information, are not used in pricing bonds issued by emerging market countries.

While there are many papers that study how emerging market countries access the international bond market (Grigorian 2003; Gelos, Sahay, and Sandleris 2004; Fostel and Kaminsky 2007), studies of the formation of prices in the emerging sovereign bond market are rare and tend to focus on the incidence of pricing of certain covenants, such as collective action clauses (for different perspectives, see Eichengreen and Mody 2004; Gugiatti and Richards 2003; Becker, Richards, and Thaicharoen 2003).[1] This stands in contrast to the massive literature on the determinants of underwriting fees in the primary corporate market. This literature shows that the main determinants of underwriting fees are the characteristics of the issue (such as maturity, amount, regulation, and currency denomination), the characteristics of the issuer (for example, credit risk as measured by credit rating, size of the firm, profitability indicators, and activity sector group), and a set of market variables that include secondary market conditions and volatility of prices (West 1967; Higgins and Moore 1980; Rogowski and Sorensen 1985; Lee and others 1996; Livingston and Miller 2000; Kollo and Sharpe 2006; Melnik and Nissim 2003; Hua Fang 2005). These studies tend to find an inverse relationship between the quality of the issuer and the level of underwriting fees. This is usually interpreted as a consequence of the greater effort required from intermediaries when they act as underwriters of lower-quality issues (Altinkihc and Hansen 2000).

In this paper, I ask how important credit risk is for the underwriting fees charged by investment banks in the sovereign bond market. While most of my results are based on formal econometric analysis, I also show that my results are corroborated by the responses to a survey that covered the main institutional investors in and originators of sovereign bonds issued by emerging market countries.[2]

1. Additionally, there is almost no research on the conflict of interest between the research departments and origination departments. Calomiris (2003), referring to emerging market crises, notes the possible "cooperation" between these departments. Concerning the Latin American sovereign bond market, Nieto-Parra and Santiso (2007) find that when an investment bank is acting as lead manager, 90 percent of its recommendations are positive.

2. Interviews were undertaken with the following institutional investors and investment banks on Wall Street between October 2006 and March 2007: Alliance Bernstein, Alliance Capital, Fidelity, GE Asset Management, GMO, Goldman, Invesco, and Western Asset. The investment banks interviewed were Bear Stearns, Citibank, Deutsche Bank, Goldman Sachs, J. P. Morgan, Lehman Brothers, Merrill Lynch, and Morgan Stanley.

How the Primary Sovereign Bond Market Works

The analysis of the primary market is a key element to understanding the behavior of investment banks and investors, and the formation of fees and primary sovereign bond spreads. This section describes the structure of the primary sovereign bond market and the main risks faced by investment banks when they act as lead managers in this market (for more details on the structure of the primary market and the critical steps of the issue process, see Flandreau and others 2010b).

A simple version of the structure of the sovereign bond market is summarized in Figure 1, which illustrates the interactions among actors in the sovereign bond market throughout the execution of a financial transaction. It is investment banks that act as lead managers in the emerging sovereign bond market.[3] Investors' participation in the primary market or in the secondary market (by buying or selling securities) is all done via investment banks.[4] Most of investment banks' income is derived from these transactions. In particular, the fee is deducted from the price offered to investors in the primary market, and it is agreed between investment banks and governments before the determination of the price of the bond in the primary market.[5]

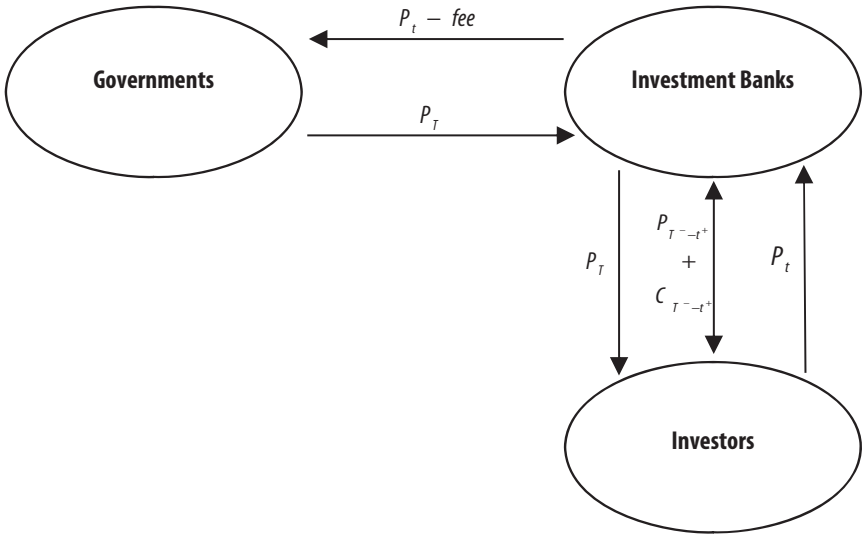
Aside from the role of intermediary between issuers and investors, one of the most important responsibilities of underwriters concerns their role in promoting the bond. A preliminary prospectus (called a red herring) is made available with all the information about the issue (with the exception of the offer price and the effective date of issuance, which are not known at the time of preparation of the red herring). With the red herring in hand, the underwriter and the issuer promote the bond through presentations, conference calls, publications, and, occasionally, "road shows." The investment banks' research departments also circulate regular publications covering various

3. I use the term lead manager to refer to agents who place bonds in the market. I do not differentiate between underwriters, lead managers, or book runners, and I assume that these three types of agents have the same responsibilities with respect to the issue during a sovereign bond issue.

4. I take investors as a single group (for example, no account is made for differences that might stem from foreign versus domestic, individual versus institutional, or international versus local). Studies of differences in investor behavior include Calvo (2002), Borensztein and Gelos (2000), and Santiso (2003).

5. In this paper, I use the terms "fee" and "underwriting fee" to refer to the remuneration paid by issuers to underwriting banks in the primary market. Other terms are used in the literature and in the financial jargon (for example, underwriting spread, gross spread, underwriting discount).

FIGURE 1. Structure of the Prices in the Sovereign Bond Market[a]



a. *T*, maturity date; *t*, issue date; *C*, commission paid by investors to investment banks; *P*, price of the sovereign bond; *fee*, underwriting fee paid by governments to investment banks.

issuers. These publications contain advice for investors regarding the kind of government bonds they should purchase.

These activities of dissemination and promotion are a source of effort and risk for investment banks acting as underwriters. The first and foremost risk concerns the potential loss of reputation in the event of government default. In a historical analysis of the sovereign bond market, Flandreau and Flores (2009) show the role of underwriters' reputations in guiding investors' portfolio allocations. Concerning the corporate market, Hua Fang (2005) finds that reputable banks charge higher fees, which can be interpreted as economic rents on reputation.[6]

6. This research challenges that of Livingston and Miller (2000) and James (1992), in the sense that it takes into account that reputable banks may have chosen (self-selected) to underwrite higher-quality issues precisely due to reputation concerns. Thus Hua Fang (2005) argues that "failing to control for this type of self-selection could lead to incorrect conclusions." From a theoretical and empirical analysis of the "underpricing" in the corporate market, Carter and Manaster (1990) show that prestigious underwriters charge higher underwriter spreads and are associated with lower-risk offerings.

Besides the reputation risk, investment banks face other risks related to the transaction itself. Key aspects of each bond issue are formalized by lead managers and the government before the bond goes to the market. One central aspect of the agreement is the distribution system. Even if most bonds are now placed with a "best efforts" contract—in which investment banks pledge to help find customers but are not forced to acquire any bonds in the absence of buyers—investment banks can incur some risks.

First, they need to buy the issue before selling it on to the investors and thus face a "settlement risk" during the "book-building" process. In this process, which lasts for a couple of hours, the lead managers (also called book runners) build up a list of "orders" at a specified price. Investors are contacted by telephone and Bloomberg messages, and are asked for "expressions of interest" aimed at helping the lead manager and the government set the price of the issue. The risk for investment banks occurs when the expression of interest is not confirmed and the bonds cannot be allocated.

Second, investment banks have the responsibility to place the bonds in the market and make an effort to stabilize the price of the bonds in the secondary market for an unspecified time. Bond prospectuses usually indicate that the underwriting bank is not forced to make a secondary market for the bonds but that it plans to make one. According to interviews in origination departments of investment banks, "market making" activities on the secondary market can extend until the maturity of the bond.[7] These interviews also suggested that the quality of this service is related to the fee paid to the underwriter, and to the desire that the underwriter has to acquire a reputation as a good supporter, thus increasing the likelihood of secure future contracts.[8]

Because of the efforts and risks described above, investment banks are likely to charge fees that are positively correlated with the probability of a debt crisis. Therefore, the fee may contain important information about investment banks' perception of sovereign risk.[9] But why do investment

7. The question asked to origination departments of investment banks was, "How long does a lead manager make a market in the secondary market?" For more than one half of the managers interviewed, market making activities may continue for the duration of the bond.

8. An example is provided by Citigroup: "As lead manager of a bond, one of the things you are compensated for is to maintain markets for the bond."

9. A crucial difference between the underwriting market of today versus the past is that, in the past, a signal of credit risk was the prestige of the underwriting bank charged to place the bond (Flandreau and others 2010a). Today, it would appear that the fee contains more information about credit risk than a bank's reputation.

banks have more information than investors? The answer has to do with the fact that underwriting involves a close, regular, and often privileged relationship with important actors in government. Such a close relationship with the treasury and ministry of finance of a country confers a unique vantage point for observing both the economic aspects as well as the behavioral patterns of the issuing government. As pointed out by one of the investment banks interviewed, "The information you get from underwriting is very important—not insider information, but a lot of knowledge on what a sovereign tends to do." The direct and strict link investment banks have with issuers can define a different type of behavior between investment banks and investors regarding sovereign risk. This difference in behavior can be particularly important in the case of countries in which the risk of default of the public bonds is high. Although public information is available (at least ex post) to distinguish these countries from other emerging countries (see appendix A), investment banks could be more concerned about these aspects than investors are. In fact, research shows that investors tend to herd and may have weak incentives to learn about individual countries (Calvo 1998).

One way to show that herding is more important for investors than for investment banks is to regress the perception of risk of investors (that is, the primary bond spread) and that of investment banks (the fee) against a variable that measures external market conditions, and then compare the fit (as measured by the *R* squared) of the two regressions. The finding that the *R* squared of the investors' regression is higher than the *R* squared of the investment banks' regressions would be consistent with the idea of more herding by investors (who seem to be more concerned than investment banks with external conditions in pricing sovereign risks). This is exactly what I find when I run simple regressions of fees and bond spreads over external risks as measured by the implied volatility of S&P 500 index options (VIX index).[10]

10. More precisely, I test the basic following OLS model:
risk perception agent $k_{it} = \alpha_1 + \alpha_2 \cdot VIX_{it} + \varepsilon_{it}$, and the results are
Underwriting fee = 0.32 + 0.015 * VIX and $R^2 = 0.03$
(4.16) (4.07)
Primary bond spread = 1.55 + 0.10 * VIX and $R^2 = 0.11$
(4.92) (6.92),
with underwriting fee and bond spread in percent, and *t* statistics in parentheses.

Hypothesis and Empirical Strategy

I analyze the behavior of market participants by comparing prices before sovereign debt crises with prices in tranquil periods. In particular, I test the following two hypotheses:

Hypothesis 1: Before sovereign debt crises, underwriting fees include information on the quality of the bonds that is not incorporated in sovereign bond spreads.

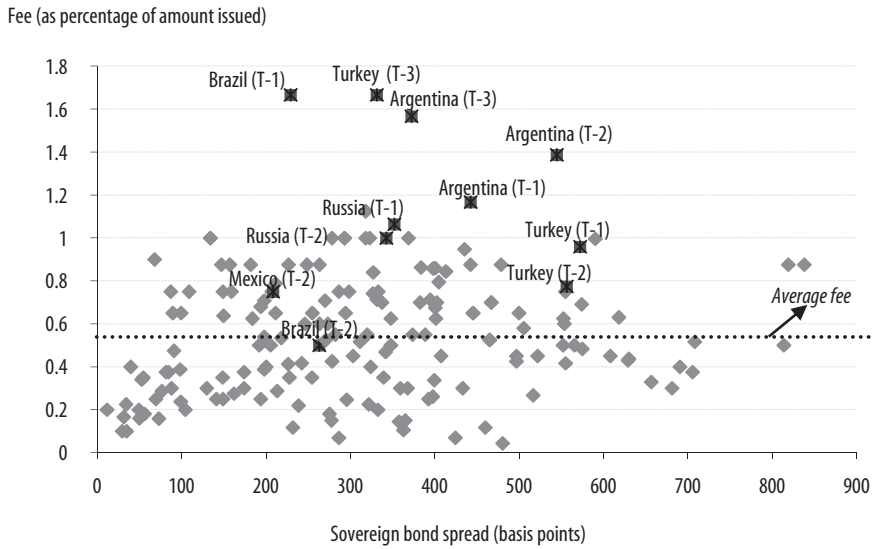
Hypothesis 2: The difference between the behavior of investment banks and investors is particularly important for countries that will enter into a crisis because of bad fundamentals (that is, sovereign default risk countries) and less important for countries that suffer liquidity crises.

These hypotheses imply that there is valuable information in underwriting fees that is not captured by sovereign bond spreads. The hypotheses are validated when, before sovereign bond crises, the fees of "crisis" countries cannot be fully explained by the behavior of sovereign bond spreads (hypothesis 1) and when this effect is stronger in countries that will enter into crisis because of their bad fundamentals (hypothesis 2). Under the alternative hypotheses, investment banks do not have any information advantage and sovereign bond spreads of "crisis" countries can explain the behavior of fees before the onset of crises.

Figure 2 shows the average annual fee and primary sovereign bond spreads. Squares indicate the fee and bond spreads between three (T − 3) and one (T − 1) year before the onset of a crisis. Fees are substantially higher (given the bond spread) for countries that will eventually suffer a crisis, relative to other emerging countries. On average, sovereign default risk countries had to pay 1.10 percent of the amount issued to investment banks between one and three years before the onset of crisis, almost twice the emerging countries' average during the sample period (0.56 percent). By contrast, when I compare the level of primary sovereign bond spreads between one and three years before crisis with respect to the total for emerging countries, I find that the former is on average only slightly higher than the latter (385 basis points versus 319 basis points) and much lower than the primary sovereign spread at the onset of this crisis (603 basis points).

Moreover, as crisis countries approach the onset of the crisis, the *retention coefficient* (fee over sovereign bond spread) decreases, showing that information on underwriting fees is less relevant with respect to bond spreads (Figure 3). As one moves away from the onset of a sovereign debt crisis, the information obtained from the underwriting fee regarding the sovereign debt

FIGURE 2. Fees and Primary Sovereign Bond Spreads, Annual Basis, 1993–2006



Source: Author's calculations based on Dealogic database.

The fee and sovereign bond spreads for countries between three and one year before the onset of a twin crisis (date T) are indicated with a *square*. Twin crises refer to the combination of sovereign default risk crisis and currency crisis. The Argentinean crisis occurred in 2001, the Brazilian in 1998, the Mexican in 1995, the Russian in 1998, and the Turkish in 2000. The average of the fees and sovereign bond spreads for the rest of sovereign bond issues of emerging countries are indicated with a *diamond*.

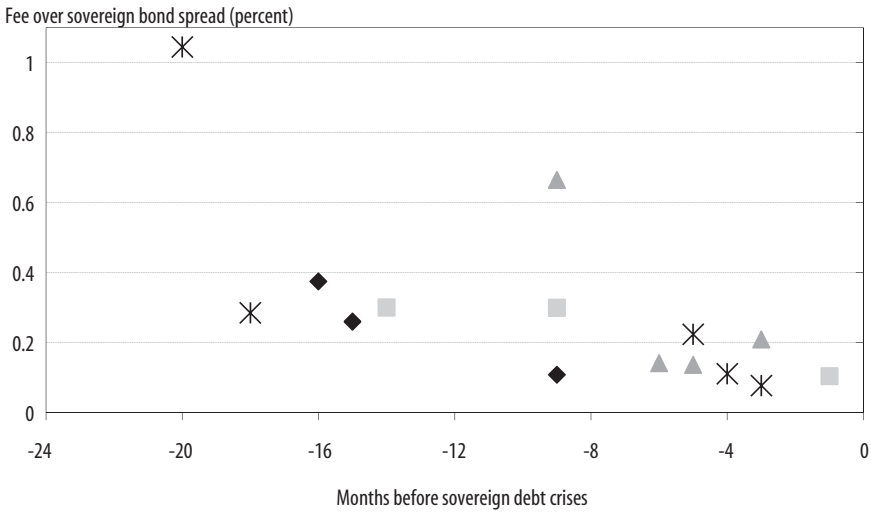
crisis is more relevant than that contained in bond spreads. This is consistent with figure 2 showing that underwriting fees during precrisis periods are abnormally high (controlling for bond spreads) more than twelve months before the onset of the crisis.

I test hypotheses 1 and 2 using a bond-level panel that covers twenty-nine emerging market countries for the period 1993–2006. I start with a simple model in which I regress underwriting fees over bond spreads, time fixed effects, country fixed effect, and a set of dummies that track the evolution of the crisis. In particular, I test the following model:

$$(1) \qquad FEE_{it} = \alpha_1 + \alpha_2 \cdot SBS_{it} + \sum_{K=-5}^{5} \beta_K \left(T + K\right)_{it} + \tau_t + \upsilon_i + \varepsilon_{it},$$

where *FEE* is the underwriting fee (*i* and *t* are index countries and time, respectively), *SBS* is the primary sovereign bond spread, $T + K$ is a dummy variable that takes the value of 1 for countries placed at the year K with

FIGURE 3. Fees over Primary Sovereign Bond Spreads before a Crisis and for Crisis Countries, Monthly Basis, 1993–2006[a]



Source: Author's calculations based on Dealogic database.

a. Each point represents a sovereign bond issue in the primary bond market. Symbols: *diamond*, Argentina; *square*, Russia; *triangle*, Turkey; *asterisk*, Brazil.

respect to the onset of crisis (T) and the value of 0 in all other periods, τ is a year fixed effect, υ is a country fixed effect, and ϵ is the error term. With this setup, α_2 measures the elasticity of underwriting fees with respect to sovereign bond spreads in tranquil periods, and β_K measures the difference between fees in tranquil periods and around crisis periods (from [T − 5] to [T + 5] years before and after the onset of crisis) after controlling for sovereign bond spreads.[11]

Next, I check whether the relationship between bond spreads and fees changes in the run-up to a crisis by testing the following model:

$$(2) \qquad FEE_{it} = \alpha_1 + \alpha_2 \cdot SBS_{it} + \alpha_3 \cdot CRISIS_{it} + \tau_t + \upsilon_i + \varepsilon_{it},$$

where *CRISIS* is a dummy variable that takes the value of 1 in the X years before crisis (that is, $T - X$, $T - X + 1$, . . . , $T - 1$) and the value of 0 in

11. I also experiment with the lag structure, using dummy variables for different precrisis periods, starting with the set of periods from T − 5 to T − 1 and finishing with T − 1, the year before crisis. Results are provided upon request.

all other periods (X years is determined using the significance of the β_K coefficients in equation 1). Within this setup, α_2 measures the elasticity of underwriting fees with respect to sovereign bond spreads in tranquil periods, and α_3 measures the difference between underwriting fees in tranquil and precrisis periods.

The first hypothesis is validated when α_3 is positive and statistically significant. The alternative hypothesis is that α_2 is positive and significant and α_3 is not significant. In that case, investment banks observe crisis countries at the same time as investors do.

The same procedure is used to test hypothesis 2. I only differentiate among sovereign debt crises to test that the difference between investment banks and investors in pricing a crisis is especially noticeable in the case of sovereign risk default countries.

Data and Typology of Sovereign Debt Crises

This section analyzes two inputs for the study of the behavior of investment banks and investors around sovereign debt crises. The first is the dataset used; the second, the variety of sovereign debt crises included in the sample.

Data

I focus on the period 1993 to 2006 and cover twenty-nine emerging economies included in the Emerging Markets Bond Index (EMBI) Global for which I could obtain information on fees. My main source of information on the structure of the primary sovereign bond market is the DCM Analytics database created by Dealogic. In building my sample, I use the following four criteria:

—I only take into account sovereign bond issues for which I have information on the ISIN (International Securities Identifying Number) reference of the issues and for which I have data on the fee and the sovereign bond spread.

—I exclude issues with floating coupon rates, which alter the true value of the bond spread.[12]

12. For these kinds of issues, the primary sovereign bond spread reported corresponds to basis points added to the benchmark rate used to determine the coupon rate. For instance, for the Brazilian Global Bond 21/06/04 (ISIN number US105756BC32), the coupon rate is 3 months Libor + 575 basis points, and the primary sovereign bond spread reported is 575 basis points.

—I only use issues denominated in euros, yen, or U.S. dollars, which are the most commonly used currencies in the sovereign bond market.

—I exclude issues partially or totally guaranteed by international organizations, such as the World Bank, or the regional development banks.

This set of restrictions yields a sample of 436 bond issues.[13] Table 1 presents a description by country of the sovereign bonds used in the sample. The total amount of sovereign bonds used in the sample exceeds U.S.$300 billion, and the average amount issued by country and per issue is close to U.S.$700 million. The total income received by underwriting banks is more than U.S.$1.5 billion (on average, close to U.S.$3.5 million per issue). The averages of the fee and of the sovereign bond spread in the sample are 0.54 percent of the amount issued and 329 basis points, respectively.

The number of lead managers in the emerging sovereign bond market is small. Like the U.S. corporate bond market (Livingston and Miller 2000; Hua Fang 2005), approximately 90 percent of the issues were realized by the top ten book runners and more than 75 percent by the seven most important book runners. Table 2 shows the investment bank market share for the top ten lead managers of the emerging sovereign bonds used in the sample.[14]

I measure secondary sovereign bond spreads with the EMBI Global spread, calculated by J. P. Morgan. My set of controls includes the following variables:

—the characteristics of the bond issues: the collective action clauses, lead managers variables, number of bonds issued by country, rating at launch, years to maturity, and value of proceeds, available from the Dealogic database;

—solvency ratios: average maturity of the external debt, short-term debt over total debt, interests of the public external debt over exports, interests of short-term debt over GDP, external debt services over reserves, the total debt over reserves, total external debt over GDP, and public debt over GDP, available from the World Bank's Global Development Finance Online database;

—macroeconomic data: GDP growth, exchange rate depreciation, inflation rate, and current account variables, available from *International Finance Statistics,* obtained online from the International Monetary Fund (IMF);

13. The number of bonds issued by year from 1993 to 2006 is (the first is 1993 and last is 2006): 14, 7, 10, 19, 30, 34, 56, 55, 48, 27, 35, 42, 37 and 22. Regarding currency denomination, 67 percent of these issues are denominated in U.S. dollars, 27 percent are denominated in euros, and the rest are denominated in yen.

14. There is a vast research literature that uses market share as proxy for reputation (Megginson and Weiss 1991; Livingston and Miller 2000; Hua Fang 2005). For the case of capital markets, see Bloomberg (2006).

TABLE 1. Description of Sovereign Bonds Used in Sample, 1993–2006[a]
Units as indicated

Country	Number of bonds	Maturity average (years)	Total amount issued (U.S.$ millions)	Amount issued (average U.S.$ millions)	Total fee (U.S.$ millions)	Underwriting fee (average percent of amount issued)	Primary bond spread (average basis points)
Argentina	53	9.2	36,233.6	710.5	344.2	1.21	449
Brazil	44	12.4	36,205.3	842.0	217.3	0.63	459
Bulgaria	3	9.7	220.8	220.8	8.1	0.55	340
Chile	5	7.7	3,964.2	792.8	23.9	0.30	159
China	18	14.7	10,634.9	590.8	34.7	0.48	104
Colombia	32	13.8	17,733.6	554.2	81.4	0.66	446
Dominican Republic	1	5.0	500.0	500.0	2.5	0.50	569
Ecuador	1	5.0	497.9	497.9	2.5	0.70	470
Egypt	2	7.5	2,993.9	1,497.0	7.0	0.45	305
El Salvador	4	19.0	1,703.9	426.0	7.7	0.51	339
Hungary	13	7.7	11,582.6	891.0	28.3	0.36	59
Indonesia	4	15.1	4,359.3	1,089.8	6.5	0.28	278
Lebanon	27	6.0	15,722.1	582.3	48.5	0.50	387
Malaysia	5	8.6	7,135.3	1,427.1	17.1	0.44	220
Mexico	30	11.3	34,453.9	1,188.1	170.1	0.57	263
Morocco	2	5.0	611.6	305.8	2.2	0.50	142
Pakistan	2	5.0	649.5	324.8	2.6	0.50	378
Panama	14	18.1	6,529.3	502.3	33.0	0.55	348
Peru	8	17.4	3,922.1	490.3	10.9	0.28	432
Philippines	37	12.1	29,169.2	767.6	61.4	0.38	397
Poland	20	11.4	20,825.3	1,041.3	34.2	0.30	76
Russia	6	9.4	4,627.8	1,156.9	103.7	0.96	597
South Africa	11	9.0	6,956.1	632.4	32.5	0.52	231
Thailand	4	5.7	1,597.5	399.4	5.6	0.45	51
Turkey	55	8.8	40,971.3	744.9	195.8	0.61	482
Ukraine	4	6.4	1,803.3	450.8	9.5	0.65	528
Uruguay	18	11.3	4,321.1	240.1	22.2	0.59	263
Venezuela	12	10.6	5,182.5	471.1	30.2	0.70	525
Vietnam	1	10.2	736.7	736.7	4.9	0.65	256
Total[b]	436	10.1	311,844.7	692.2	1,548.3	0.54	329

Source: Author's calculations based on Dealogic database.

a. The amount issued corresponds to the deal value of the proceeds.

b. For the total sample, the maturity, amount issued, underwriting fee, and bond spreads are calculated as the simple average (average of countries in the sample). The total fee (that is, income received by underwriting banks) is calculated as the product of the deal value of the issue and the underwriting fee.

TABLE 2. Market Share for Top Ten Investment Banks, 1993–2006[a]
Percent

Investment bank	*Africa*	*Asia*	*Europe*	*Latin America*	*Middle East*	*Total*
JP Morgan	10.0 (2)	19.6 (29)	18.9 (34)	22.4 (65)	2.0 (2)	19.5 (132)
Citigroup	9.4 (1)	13.9 (16)	15.6 (25)	12.4 (43)	2.4 (1)	12.9 (86)
Morgan Stanley	8.3 (2)	9.1 (14)	15.7 (22)	11.9 (36)	7.3 (6)	12.1 (80)
Deutsche Bank	5.0 (2)	12.1 (21)	9.1 (18)	8.9 (36)	6.9 (3)	9.3 (80)
Merrill Lynch	19.6 (5)	6.8 (10)	2.5 (7)	9.8 (32)	13.9 (8)	7.8 (62)
Credit Suisse	3.5 (1)	9.9 (14)	5.6 (11)	4.8 (26)	24.0 (11)	6.9 (63)
Goldman Sachs	10.0 (2)	4.6 (5)	2.3 (3)	10.8 (28)	0 (0)	6.9 (38)
UBS	7.0 (2)	12.2 (16)	6.3 (11)	5.2 (19)	1.3 (1)	6.5 (49)
BNP Paribas	3.0 (1)	1.1 (2)	4.9 (7)	2.7 (11)	30.7 (7)	4.5 (28)
Dresdner K. W.	9.4 (1)	0 (0)	6.4 (7)	2.1 (8)	0 (0)	2.9 (16)

Source: Author's calculations based on Dealogic database.

a. The market share is calculated from the deal value of the proceeds. In the case of multiple book runners for an issue, the deal value of the proceeds is divided by the number of book runners in the operation. The number of issues underwritten is in parentheses.

—political variables: index of freedom status and years of presidential elections, available online from Freedom House and the World Bank's Database of Political Institutions, respectively; and

—external variables: U.S. Treasury bill rate and VIX index, obtained from Thomson Datastream.[15]

In order to analyze the relevance of the information received by investors from investment banks concerning the primary bond market, I also examined for the period July 1997 through December 2007 the publications of thirteen investment banks that are active in trading and issuing emerging countries' sovereign debt.[16] In these publications, investment banks state their views for each emerging country, providing input for their clients—namely, the "buy side" of the market (such as portfolio asset managers, mutual funds, hedge funds, and pension funds).

15. See Freedom House, "Freedom in the World" (www.freedomhouse.org/template.cfm?page=15).

16. The name of the publications used are *Emerging Markets Fortnightly* (ABN AMRO), *LatAm Drivers Fortnightly* (Barclays Capital), *Global Emerging Markets Monthly* (Bear Stearns), *Economics/Strategy* (Citigroup), *Debt Trading Monthly* (Credit Suisse), *Emerging Markets Monthly* (Deutsche Bank), *EM Strategist* (Dresdner Kleinwort Wasserstein), *Global Interest Rate Strategy* (Goldman Sachs), *Emerging Markets Outlook and Strategy* (J. P. Morgan), *Emerging Markets Compass* (Lehman Brothers), *Emerging Markets Debt Monthly* (Merrill Lynch), *EMD Perspectives Quarterly* (Morgan Stanley), and *Emerging Markets Debt Strategy Perspectives* (UBS).

Typology

As there is no consensus on the definition of a sovereign debt crisis (see Pescatori and Sy 2007; Panizza, Sturzenegger, and Zettelmeyer 2009), I apply the definition that is commonly used in the literature on the "early warning models" (see Manasse, Roubini, and Schimmelpfennig 2003; Manasse and Roubini 2005; Ciarlone and Trebeschi 2005; Fioramanti 2006). According to this definition, a country is in a debt crisis if it is classified as being in default by Standard & Poor's (S&P) or it receives a large nonconcessional IMF loan defined in excess of 100 percent of quota.

Concerning the first part of the definition, there is heterogeneity in the types of default included in the S&P definition (see appendix B). Debt restructurings may have either followed a sovereign default or been undertaken preemptively in an effort to avoid default.[17] The latter can be associated with cases in which liquidity problems, possibly driven by external shocks, triggered the debt restructuring. These cases differ from the "post default" cases in which solvency problems were more likely to be the main driver of the crisis. On the basis of these considerations, I divide countries classified as in default by S&P into two groups, depending on the restructuring case: preemptive and post default.[18]

The second part of the definition considers countries that would have defaulted without the intervention of the IMF, and these countries also are divided into two groups, depending on the level of their external public debt before the crisis. (I use a debt risk index that depends on four external debt indicators; see appendix C). Countries with high levels of external public debt are referred to here as countries with "public bonds vulnerabilities."

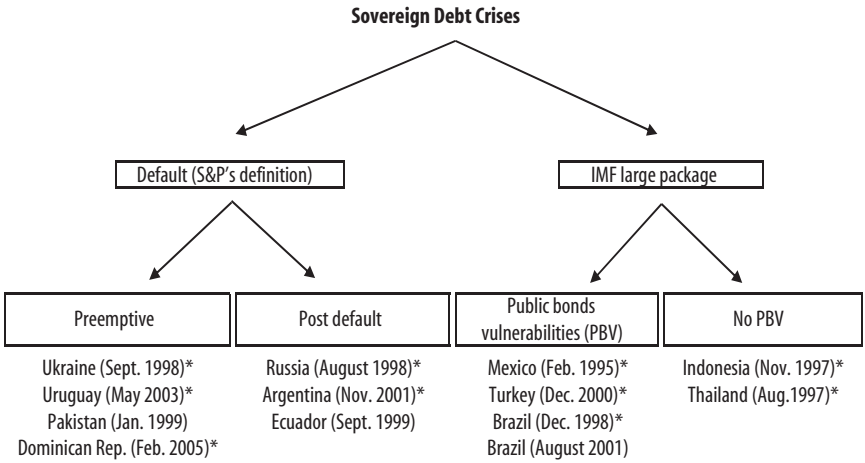
Figure 4 shows the different types of sovereign debt crises studied in this paper and also highlights countries that suffered twin (currency and debt) crises.[19]

17. For the case of Moody's, Argentina (2001) and Russia (1998) were the only default countries in the contemporaneous era.

18. Duration and intensity of default also vary considerably among countries. For instance, the Argentinean default lasted four years (from 2001 until 2005) while the Dominican Republic (2005) and Uruguayan (2003) defaults lasted only one year. Additionally, the recovery rates of these defaults are also different. Concerning the reduction of the principal of the debt restructured and according to IMF (2006), Argentina obtained a reduction of 56 percent, in contrast to the Dominican Republic (0.0 percent), Ukraine (0.0 percent), or Uruguay (1 percent).

19. In order to determine which of the sovereign debt crises are combined with a currency crisis, I construct an index of currency market turbulence, in the spirit of Eichengreen, Rose, and Wyplosz (1996). See Nieto-Parra (2008) for a detailed description of the construction of this index and the connection between currency crises and sovereign debt crises.

FIGURE 4. Typology of Sovereign Debt Crises[a]



Source: Author's calculations based on S&P (2006, 2007), the World Bank's Global Development Finance, *International Financial Statistics* (IMF). *The Economist*, Organization for Economic Cooperation and Development economic surveys, and CRS Reports for Congress.

a. *Asterisk* denotes countries that also experienced a currency crisis in the twelve months before and after the sovereign debt crisis. See Nieto-Parra (2008) for the definition of currency crises and the combination of both crises (currency and sovereign debt crises).

The sovereign debt crises shown in Figure 4 can be reclassified into two groups, depending on the fragility of the public sector or the capacity of governments to repay public debt. The first group, which includes post-default restructuring countries and countries with public bonds vulnerabilities, consists of high-risk countries, which are labeled sovereign default risk (SDR) countries. I assume that in the second group, sovereign debt crises are triggered by liquidity or banking problems; this group is referred to as no-SDR countries. It includes preemptive default countries and countries that received large IMF packages but have moderate levels of external public debt. SDR countries exhibited higher default risk than the average emerging market country (see appendix A).

From the sample of 436 bond issues studied for this paper, 184 bonds are issued during the eleven-year window around sovereign debt crises (from year 5 before to year 5 after the onset of the crisis). Table 3 shows the distribution of bond issues by crisis countries around their crises.

Most of the bonds are issued between three years before the crisis (T – 3) and the onset of the crisis (T). Postcrisis (from T + 1 to T + 3), the number of issues drops, before rising again for some default countries (from T + 4 to T + 5). The

TABLE 3. Number of Bond Issues around Crises[a]

Country	*T−5*	*T−4*	*T−3*	*T−2*	*T−1*	*T*	*T+1*	*T+2*	*T+3*	*T+4*	*T+5*	*Total*
Argentina	3	4	10	15	13	1						46
Brazil			4	2	13	6	3	1	2	8	4	43
Dominican Rep.			1									1
Ecuador				1								1
Indonesia					1							1
Mexico					1		4	2		1	3	11
Pakistan		1									1	2
Russia					2	4						6
Thailand						1					3	4
Turkey	1	1	3	5	7	9	6	5	6	6	3	52
Ukraine											3	3
Uruguay	2	3		3	3				3			14
Total	6	9	18	26	40	21	13	8	11	15	17	184

Source: Author's calculations based on Dealogic database.

a. T is the onset of the crisis, and it is constructed on an annual basis. T − 1, one year before onset of crisis; T + 1, one year after onset of crisis.

table also shows considerable differences regarding the number of bond issues in crisis countries. Robustness checks are performed to deal with the heterogeneity of the number of bonds issued by crisis countries in the sample.

Results and Robustness Checks

This section provides the econometric results and the robustness checks based on the models described in equations 1 and 2.

Results

Table 4 summarizes the ordinary least squares (OLS) results (excluding country and time fixed effects) for some variants of equation 1. Column 1 shows a positive and statistically significant relationship between fees and primary sovereign bond spreads (SBS), with a point estimate of approximately 0.05 percentage points. With fees averaging 0.6 percent, this is equivalent to 8 percent of the average fee. Assuming that the fixed component of the fee is 0.4 percent (the constant coefficient in the regression), the variable component of the fee is 0.2 percent, and the impact of bond spreads on the variable component of the fee is 25 percent (0.05/0.2). Column 2 shows that the introduction of the dummy variables that track sovereign debt crises does not change the significance of the primary bond spread. The crisis dummies

TABLE 4. Fee, Primary Sovereign Bond Spread, and Debt Crises: OLS Regression Model[a]

Explanatory variable	*SBS*	*Total crisis SC*	*Twin crisis SC and CC*	*SDR crisis*	*No-SDR crisis*
SBS	0.047***	0.027**	0.029***	0.020*	0.048***
	(3.92)	(2.55)	(2.74)	(1.90)	(3.97)
T – 5		0.345**	0.345**	0.328*	0.302
		(2.18)	(2.20)	(1.73)	(0.91)
T – 4		0.341***	0.345**	0.413**	0.130
		(2.61)	(2.53)	(2.43)	(0.48)
T – 3		0.961***	1.038***	1.037***	–0.218
		(9.13)	(9.62)	(9.73)	(0.47)
T – 2		0.531***	0.543***	0.596***	0.036
		(6.46)	(6.55)	(6.92)	(0.14)
T – 1		0.614***	0.612***	0.699***	–0.041
		(8.38)	(8.44)	(9.13)	(0.18)
T		0.272***	0.269***	0.283***	0.162
		(2.64)	(2.63)	(2.70)	(0.35)
T + 1		–0.083	–0.088	–0.068	—
		(0.55)	(0.59)	(0.46)	
T + 2		0.004	–0.001	0.016	—
		(0.03)	(0.00)	(0.11)	
T + 3		–0.239*	–0.243*	–0.232	–0.335
		(1.80)	(1.85)	(1.46)	(1.25)
T + 4		–0.208	–0.209	–0.202	–0.381
		(1.42)	(1.43)	(1.30)	(0.82)
T + 5		–0.104	–0.056	–0.102	–0.059
		(0.70)	(0.38)	(0.66)	(0.11)
Constant	0.449***	0.399***	0.394***	0.427***	0.445***
	(9.23)	(9.61)	(9.56)	(10.45)	(8.88)
Summary statistic					
No. observations	419	419	419	419	419
R squared	0.04	0.35	0.36	0.38	0.04

*Statistically significant at the 10 percent level; ** statistically significant at the 5 percent level; *** statistically significant at the 1 percent level.

a. Dependent variable is the underwriting fee as a percentage of the amount issued. Absolute value of *t* statistics shown in parentheses. Abbreviations: SBS, primary sovereign bond spread; SC, sovereign debt crises; CC, currency crises; SDR crisis, countries with sovereign default risk.

are positive and statistically significant between five years before the crisis (T – 5) and the onset of the crisis (T). Similar results are obtained in column 3 for the twin crises (sovereign debt crises and currency crises). Columns 4 and 5 differentiate between sovereign default risk (SDR) countries and no-SDR countries. For SDR countries, there is a positive and significant difference between fees in tranquil periods and fees in crisis periods (from T – 4 to T) with the sovereign bond spread only weakly significant. For no-SDR countries, only sovereign bond spreads are statistically significant, implying that this kind of crisis does not impact fees.

The regressions of table 4 do not fully control for common factors that may have affected the evolution of the sovereign debt market over the period 1993–2006. High fees before the onset of crises could be explained by the reemergence of this market in the 1990s. Similarly, low levels of fees in tranquil periods could be explained by the fact that the market is becoming more mature. To deal with this problem, table 5 reports results of an OLS estimation that includes year fixed effects (equation 1 without country fixed effect). As in table 4, the elasticity of fees with respect to bond spreads is positive and significant (column 1), and the elasticity of fees with respect to bond spreads

TABLE 5. OLS Time Fixed-Effect Regression Model[a]

Explanatory variable	*SBS*	*Total crisis SC*	*Twin crisis SC and CC*	*SDR crisis*	*No-SDR crisis*
SBS	0.036***	0.029***	0.031***	0.025**	0.035***
	(3.47)	(2.88)	(3.05)	(2.37)	(3.23)
T – 5		0.078	0.084	0.06	–0.123
		(0.53)	(0.57)	(0.33)	(0.46)
T – 4		0.056	0.065	0.098	–0.190
		(0.46)	(0.52)	(0.61)	(0.86)
T – 3		0.739***	0.816***	0.826***	–0.053
		(7.09)	(7.54)	(7.75)	(0.14)
T – 2		0.306***	0.337***	0.378***	–0.042
		(3.90)	(4.25)	(4.50)	(0.19)
T – 1		0.403***	0.406***	0.475***	0.028
		(5.87)	(5.97)	(6.50)	(0.15)
T		0.082	0.087	0.114	–0.335
		(0.85)	(0.91)	(1.16)	(0.88)
T + 1		–0.079	–0.097	–0.108	—
		(0.57)	(0.71)	(0.80)	
T + 2		–0.01	–0.012	–0.013	—
		(0.07)	(0.09)	(0.09)	
T + 3		–0.036	–0.039	–0.039	–0.003
		(0.29)	(0.32)	(0.26)	(0.01)
T + 4		–0.023	–0.019	–0.016	–0.035
		(0.17)	(0.14)	(0.11)	(0.09)
T + 5		–0.112	–0.101	–0.099	0.121
		(0.84)	(0.77)	(0.71)	(0.26)
Constant	0.622***	0.646***	0.649***	0.649***	0.635***
	(4.39)	(4.89)	(4.99)	(5.08)	(4.14)
Summary statistic					
No. observations	419	419	419	419	419
R squared	0.40	0.51	0.52	0.53	0.40

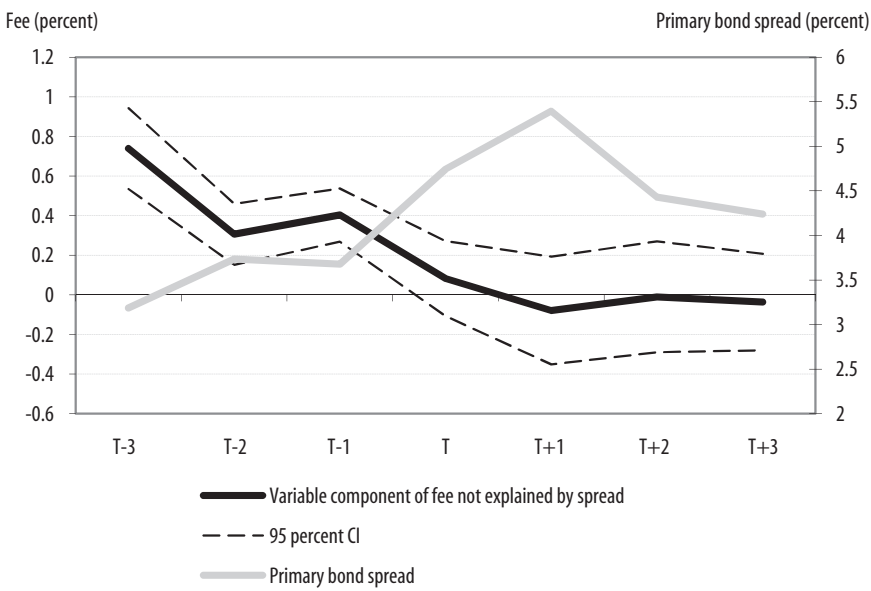
*Statistically significant at the 10 percent level; ** statistically significant at the 5 percent level; *** statistically significant at the 1 percent level.

a Dependent variable is the underwriting fee as a percentage of the amount issued. Absolute value of *t* statistics shown in parentheses. For abbreviations, see table 4.

in tranquil periods is positive and significant (column 2). The crisis dummies are positive and statistically significant between three (T – 3) and one (T – 1) year before the onset of a debt crisis, indicating that there is a positive difference between fees in tranquil periods and precrisis periods, after controlling for spreads (column 2 of table 5). This result contrasts with those reported in table 4, where fees were significant between five years before the crisis (T – 5) and the onset (T) of the crisis. The same holds for the comparison of twin crises (column 3) and SDR countries (column 4) in tables 4 and 5. High fees in the precrisis periods with respect to fees in tranquil periods are significant between three (T – 3) and one (T – 1) year before the onset of a crisis. Column 5 focuses on no-SDR countries, and for this group, there still is no difference between underwriting fees in tranquil and precrisis periods.

Figure 5 plots results obtained in table 5, column 2, and the average primary sovereign bond spread around crises. Between three and one year before a crisis, the component of the fee not explained by the spread is high and statistically

FIGURE 5. Fee and Primary Sovereign Bond Spread around Sovereign Debt Crises, Annual Basis[a]



Source: Authors' calculations.

a. CI refers to confidence interval. T is the onset of a crisis, and it is constructed on an annual basis. T – 1, one year before onset of crisis; T + 1, one year afer onset of crisis.

significant, meaning that crisis governments pay investment banks more before a crisis (for example, 0.7 percent of the amount issued three years before the crisis). At the onset of the crisis (time T) and thereafter, the variable component of the fee is instead fully driven by other factors. This result confirms that as crisis countries approach the onset of a crisis, the "information value" of the fees with respect to sovereign bond spreads decreases considerably and then completely disappears when the crisis actually takes place.

Next, I include country fixed effects to check whether my results are robust to controlling for a host of other time-invariant country-specific factors that can affect underwriting fees (such as country credit risk or specific factors of markets in which investors and investment banks are trading). Table 6 includes time and country fixed effects (equation 1) and shows that sovereign bond spreads are not statistically significant (column 1), meaning that other factors can explain fees better than sovereign bond spreads. The introduction of the crisis dummies confirms the results of table 5. Between three (T – 3) and one (T – 1) year before the onset of a crisis, the dummy variables for sovereign debt crisis, twin crises, and SDR crisis are positive and significantly correlated with underwriting fees (from column 2 to column 4). The results of table 5 for crisis dummy variables of no-SDR countries (column 5) are robust to controlling for country fixed effects (crisis dummies are not significant for this type of crisis).

The results show that underwriting fees between three and one year before the crisis are significantly higher than in tranquil periods, after controlling for bond spreads, time effects, and country effects (equation 1). I also check the robustness of this result by estimating several variants of my baseline model and by experimenting with the lag structure. I find the best fit when I use as dummy variable the set of periods between three years and one year before a crisis (an R squared of 0.53 and a t statistic for the crisis dummy variables close to 4.0).[20]

Table 7 summarizes the results of the benchmark model (equation 2), determined with the best lag structure found in previous regressions. The results of table 6 are robust to this new specification. The coefficient of the

20. For each $X \in [1,5]$, a regression is estimated according to the following model:

$$FEE_{it} = \alpha_1 + \alpha_2 \cdot SBS_{it} + \alpha_3 \cdot CRISIS\left(T - X, \ldots, T - 1\right)_{it} + \tau_t + \upsilon_i + \varepsilon_{it},$$

where $CRISIS(T - X, \ldots, T - 1)$ is a dummy variable that takes the value of 1 between the X years before crisis and 1 year before the crisis, and 0 in all other periods. Results are provided upon request.

Table 6. OLS Time and Country Fixed-Effects Regression Model[a]

Explanatory variable	*SBS*	*Total crisis SC*	*Twin crisis SC and CC*	*SDR crisis*	*No-SDR crisis*
SBS	−0.013	−0.002	−0.002	−0.004	−0.015
	(0.86)	(0.14)	(0.14)	(0.26)	(0.92)
T − 5		−0.001	−0.003	−0.039	−0.243
		(0.01)	(0.02)	(0.19)	(0.77)
T − 4		0.006	0.001	0.003	−0.256
		(0.04)	(0.00)	(0.01)	(0.91)
T − 3		0.651***	0.649***	0.713***	0.248
		(4.63)	(4.53)	(4.93)	(0.50)
T − 2		0.251**	0.250**	0.339***	−0.197
		(2.32)	(2.25)	(2.83)	(0.70)
T − 1		0.365***	0.364***	0.449***	−0.093
		(3.97)	(3.88)	(4.45)	(0.39)
T		0.186	0.185	0.251*	−0.217
		(1.44)	(1.42)	(1.84)	(0.43)
T + 1		0.013	0.012	0.034	—
		(0.08)	(0.08)	(0.22)	
T + 2		0.062	0.061	0.083	—
		(0.40)	(0.39)	(0.52)	
T + 3		0.087	0.085	0.121	−0.078
		(0.59)	(0.57)	(0.68)	(0.28)
T + 4		0.008	0.007	0.033	−0.102
		(0.05)	(0.04)	(0.20)	(0.25)
T + 5		−0.113	−0.114	−0.079	0.275
		(0.79)	(0.78)	(0.52)	(0.46)
Constant	0.489	0.095	0.586	0.246	0.465
	(1.27)	(0.24)	(1.56)	(0.65)	(1.19)
Summary statistic					
No. observations	419	419	419	419	419
R squared	0.51	0.56	0.56	0.57	0.51

*Statistically significant at the 10 percent level; ** statistically significant at the 5 percent level; *** statistically significant at the 1 percent level.

a. Dependent variable is the underwriting fee as a percentage of the amount issued. Absolute value of *t* statistics in parentheses. For abbreviations, see table 4.

crisis dummy for three, two, and one year before a crisis is high and significant at 1 percent (column 1).[21] The elasticity of fees with respect to sovereign bond spreads in tranquil periods is negative but always statistically insignificant, confirming hypothesis 1. Before the onset of sovereign debt crises, investment banks charge an additional fee to risky countries in comparison to nonrisky countries (0.23 percent of the amount issued), whereas investors do not price this risk before the onset of crises.

21. When I cluster the standard errors by year in the benchmark model, *t* statistic of the crisis is significant at 5 percent.

TABLE 7. OLS Time and Country Fixed-Effects Regression Model with Interactive Dummies Variables[a]

Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
SBS	–0.010	0.002	–0.004	0.001	–0.013	0.004	–0.014	–0.014
	(0.68)	(0.13)	(0.29)	(0.09)	(0.86)	(0.25)	(0.87)	(0.88)
Total crisis SC	0.228***	0.460***						
	(3.74)	(3.16)						
Interactive total SC		–0.539*						
		(1.75)						
Twin crisis SC-CC			0.334***	0.462***				
			(5.32)	(3.10)				
Interactive twin crisis SC-CC				–0.024				
				(0.95)				
SDR crisis					0.274***	0.672***		
					(4.15)	(4.05)		
Interactive SDR crisis						–0.868***		
						(2.61)		
No-SDR crisis							–0.024	–0.064
							(0.14)	(0.20)
Interactive no-SDR crisis								0.016
								(0.14)
Constant	0.299	0.287	0.536	0.521	0.267	0.239	0.490	0.491
	(0.79)	(0.75)	(1.44)	(1.40)	(0.70)	(0.63)	(1.27)	(1.27)
Summary statistic								
No. observations	419	419	419	419	419	419	419	419
R squared	0.53	0.53	0.55	0.55	0.53	0.54	0.51	0.51

*Statistically significant at the 10 percent level; ** statistically significant at the 5 percent level; *** statistically significant at the 1 percent level.

a. Dependent variable is the underwriting fee as a percentage of the amount issued. Absolute value of *t* statistics in parentheses. For abbreviations, see table 4.

Column 2 tests the robustness of the results of column 1 by interacting the crisis dummy with sovereign bond spreads. The interaction term is negative but only weakly significant, indicating there is almost no difference in elasticity between crisis and noncrisis periods. Moreover, the elasticity of the fee before crisis with respect to tranquil periods is high and significant (0.46 percent). The same holds for columns 3 and 4 that analyze the case of twin crises. Therefore crisis countries pay an extra fee between three and one year before crises in comparison to tranquil periods.

Again, I split sovereign debt crises into two groups (SDR and no-SDR countries) and test whether the predictive power of fees is higher in SDR countries (hypothesis 2). Column 5 focuses on SDR countries and shows results similar to those of table 6 (column 4) and thus confirms hypothesis 2. The fee charged to SDR crisis countries is significantly higher than in tranquil periods and well above that charged for total debt crisis (0.27 versus 0.23 percent of the amount issued, reported in columns 5 and 1, respectively). Column 6 introduces the interaction term, and the robustness test of column 5 is confirmed, validating hypothesis 2. Investment banks charge a high and significant fee with respect to tranquil periods, and well above that charged for the total of debt crisis (0.67 versus 0.46 percent of the amount issued, reported in columns 6 and 2, respectively). Finally, columns 7 and 8 summarize the results for no-SDR countries. As before, they show that no-SDR countries do not pay an additional fee before a crisis with respect to tranquil periods.

To sum up, investment banks' behavior differs depending on the type of crisis. They charge high fees to countries with bad fundamentals. In contrast, countries that enter into a crisis because of liquidity or banking crises pay a fee comparable to that of tranquil periods.

Robustness Checks

Table 8 tests the robustness of my results by including additional control variables. I consider the following characteristics of the issue: amount issued (value proceeds), the maturity of the bond (maturity bond), a dummy variable indicating whether the top underwriter placed the bond (top 1 banks dummy), the median of the market share of investment banks (market share banks), a dummy variable indicating whether the bond issued is investment grade (rating), the number of times that the lead investment bank acted as underwriter with a given issuer (stability bank issuer). I also employ the following standard macroeconomic variables: ratio of short-term debt over total external debt (short-term debt/total debt), ratio of external public debt over GDP (public

TABLE 8. OLS Time and Country Fixed-Effects Regression Model with Interactive Dummies Variables and Control Variables[a]

Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
SBS	−7.22E-03	9.53E-03	−1.70E-03	5.08E-03	−1.38E-02	7.79E-03	−1.25E-02	−1.25E-02
	(0.36)	(0.44)	(0.09)	(0.24)	(0.69)	(0.37)	(0.60)	(0.60)
Total SC	0.291***	0.579***						
	(3.54)	(3.50)						
Interactive SC		−0.069**						
		(2.00)						
Twin crisis SC-CC			0.410***	0.557***				
			(5.14)	(3.35)				
Interactive twin crisis SC-CC				−0.037				
				(1.01)				
SDR crisis					0.347***	0.842***		
					(3.86)	(4.33)		
Interactive SDR crisis						−0.108***		
						(2.86)		
No-SDR crisis							0.01	0.031
							(0.05)	(0.09)
Interactive no-SDR crisis								−0.009
								(0.07)
Value proceeds	−7.75E-11	−7.61E-11	−6.70E-11	−6.69E-11	−7.55E-11	−7.37E-11	−9.38E-11*	−9.36E-11*
	(1.64)	(1.62)	(1.44)	(1.44)	(1.60)	(1.58)	(1.95)	(1.94)
Maturity bond	0.005**	0.006**	0.006**	0.006**	0.005**	0.006**	0.006**	0.006**
	(2.14)	(2.31)	(2.33)	(2.38)	(2.18)	(2.47)	(2.40)	(2.40)
Top 1 banks dummy	−0.117**	−0.119**	−0.129**	−0.128**	−0.122**	−0.126**	−0.113**	−0.113**
	(2.15)	(2.18)	(2.41)	(2.39)	(2.23)	(2.34)	(2.02)	(2.02)
Market share banks (median)	−0.005	−0.006	−0.006	−0.006	−0.004	−0.005	−0.006	−0.006
	(0.62)	(0.67)	(0.72)	(0.73)	(0.50)	(0.58)	(0.72)	(0.71)

Rating at launch	0.05	0.056	0.051	0.054	0.07	0.075	0.045	0.046
	(0.43)	(0.48)	(0.45)	(0.47)	(0.60)	(0.65)	(0.37)	(0.38)
Stability bank issuer	0.010*	0.012**	0.011**	0.011**	0.011**	0.013**	0.011*	0.011*
	(1.93)	(2.15)	(2.07)	(2.18)	(2.01)	(2.48)	(1.96)	(1.95)
Short-term debt/total debt	0.006	0.006	0.004	0.004	0.006	0.006	0.006	0.006
	(1.04)	(1.03)	(0.68)	(0.72)	(1.08)	(1.10)	(1.05)	(1.05)
Public debt/GDP	0.008	0.007	0.007	0.006	0.01	0.008	0.005	0.005
	(1.32)	(1.08)	(1.15)	(1.07)	(1.60)	(1.25)	(0.85)	(0.85)
Exchange rate	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(0.46)	(0.66)	(0.28)	(0.38)	(0.12)	(0.19)	(0.46)	(0.46)
GDP growth	0.006	0.006	0.01	0.009	0.003	0.002	−0.002	−0.002
	(0.65)	(0.66)	(1.12)	(1.03)	(0.33)	(0.27)	(0.19)	(0.20)
Interests/exports	−0.020**	−0.018*	−0.013	−0.013	−0.021**	−0.018*	−0.006	−0.006
	(1.97)	(1.73)	(1.42)	(1.43)	(2.09)	(1.78)	(0.58)	(0.59)
Ext. public debt outstanding	6.66E-12	6.68E-12	7.88E-12	7.82E-12	6.05E-12	5.76E-12	5.48E-12	5.47E-12
	(1.20)	(1.21)	(1.44)	(1.43)	(1.09)	(1.05)	(0.96)	(0.96)
Average maturity	0.012	0.013	0.013*	0.013	0.01	0.01	0.009	0.009
	(1.49)	(1.55)	(1.65)	(1.60)	(1.26)	(1.28)	(1.11)	(1.10)
Number of bonds	−0.002	−0.002	−0.004	−0.004	−0.002	−0.002	−0.003	−0.003
	(0.94)	(1.03)	(1.59)	(1.53)	(0.95)	(1.03)	(1.12)	(1.12)
Constant	−0.217	−0.184	0.097	0.106	−0.289	−0.227	0.064	0.059
	(0.40)	(0.34)	(0.18)	(0.20)	(0.53)	(0.42)	(0.12)	(0.11)
Summary statistic								
No. observations	365	365	365	365	365	365	365	365
R squared	0.58	0.58	0.60	0.60	0.58	0.59	0.56	0.56

*Statistically significant at the 10 percent level; ** statistically significant at the 5 percent level; *** statistically significant at the 1 percent level.

a. Dependent variable is the underwriting fee as a percentage of the amount issued. Absolute value of *t* statistics in parentheses. For abbreviations, see table 4.

debt/GDP), annual exchange rate depreciation (exchange rate), GDP growth rate (GDP growth), ratio of interests of external public debt over exports (interests/exports), the external public debt outstanding (ext. public debt outstanding), the average maturity of the external public debt (average maturity), and the number of bonds placed in the past in international markets (number of bonds).[22]

I find that the crisis dummy is statistically significant at 1 percent (column 1), confirming that fees are higher before a crisis than they are during tranquil periods and after controlling for the augmented set of control variables. The additional fee paid is close to 0.3 percent, equivalent to 50 percent of the average fee in the sovereign bond market for the period 1993–2006. Only three control variables are significant and positive: the maturity of the bond, the ratio of interests of external public debt over exports, and the dummy variable of the top investment bank (that is, 1 if J. P. Morgan and 0 otherwise). This last variable was coded using both market share—see table 2—and interviews with institutional investors on Wall Street.[23] Column 2 confirms the results of table 7. The "precrisis" dummy variable is significant, and in addition to the significant variables of column 1, the stability bank issuer variable and the interaction term are also significant. In columns 3 and 4, I focus on twin crises and again find that the results are similar to those of table 7 (columns 3 and 4). There is a positive and significant difference between the fee before a crisis versus one in tranquil periods, and the interaction term is not significant. The years to maturity of the bond, the top 1 bank dummy variable, and the stability bank issuer are significant. Columns 5 and 6 show the results for the SDR crisis and confirm the main result of table 7. The underwriting fee before the SDR crisis is higher than during tranquil periods, after controlling for a set of variables. Results of columns 7 and 8 of table 7 (no-SDR crisis) are also robust to this new specification, indicating that fees charged to no-SDR countries are not statistically different with respect to the fees in tranquil periods.

Table 8 therefore confirms both hypotheses. First, investment banks charge a high and significant fee before a crisis. Second, this result is driven by SDR countries. The extra fee is 0.84 percent of the amount issued (column 6),

22. I checked for the presence of multicollinearity of the control variables introduced by computing the variance inflation factors. The tolerance for all control variables included in the model was close to 1, confirming the absence of collinearity between regressors.

23. The question asked was, "Which investment banks have the best reputation as underwriters?"

higher than that paid during the total of sovereign crisis (0.58 percent according to column 2).[24]

A potential problem of the bond-level regressions presented above is that results might be driven by countries that issued a large number of bonds before a crisis (such as Argentina, Brazil, and Turkey). As a consequence, I reestimated my benchmark model by using countries as a unit of observation. Column 1 of table 9, panel A, focuses on simple OLS (that is, equation 2 without fixed effects) and shows that the elasticity of underwriting fees with respect to sovereign bond spreads is positive and significant. A Hausman test shows that the fixed-effects model is preferable to a random-effect model.[25] Column 2 of panel A reports the fixed-effects model. The results of table 7 (column 1) are robust to this new specification. There is a statistically significant difference between the fees charged in precrisis periods versus those in tranquil periods. The elasticity of underwriting fees with respect to bond spreads is negative but not significant in the fixed-effects model. Column 3 of panel A reports fixed effects with year dummy variables. Again, I find a positive and significant difference between the fee during precrisis periods and that during tranquil periods, after controlling for sovereign bond spreads (confirming hypothesis 1). The same holds for twin crises—sovereign debt crisis and currency crisis—from columns 4 to 6 of panel A. Crisis governments pay to investment banks an additional fee before crisis in comparison to other countries and tranquil periods.

Next, I differentiate between types of crises (panel B, from column 1 to column 3 for SDR countries, and from column 4 to column 6 for no-SDR countries) to test whether the predictive power of fees is higher for SDR countries (hypothesis 2). All specifications for SDR countries confirm hypothesis 2. In particular, a fixed-effects model with year dummies (column 3 of panel B) shows that the additional fee that SDR countries have to pay before a crisis is significant and higher than for total sovereign debt crises (0.26 percent versus 0.18 percent in column 3 of panel A). Again, the results of table 7 are confirmed regarding no-SDR countries. The additional fee paid before a crisis by these countries is not significant in all specifications (see columns 4 to 6 of panel B).

24. When I include a dummy variable for issues incorporating collective action clauses (CAC dummy), hypotheses 1 and 2 are also confirmed. Results are provided upon request. The CAC dummy variable is measured from 1993 to 2002 by a dummy variable that takes the value of 1 for issues underwritten under the U.K. governing law and 0 otherwise (Drage and Hovaguimian 2004).

25. Results are provided upon request.

TABLE 9. Panel Data for Fee, Primary Sovereign Bond Spread, and Debt Crises[a]

	Total SC			*Twin crisis SC-CC*		
Explanatory variable	*OLS*	*FE*	*FE with time effect*	*OLS*	*FE*	*FE with time effect*
Panel A						
SBS	0.024**	–0.023	–0.006	0.025**	–0.023	–0.006
	(1.99)	(1.29)	(0.42)	(2.06)	(1.29)	(0.42)
Total SC	0.374***	0.338***	0.181***			
	(5.44)	(4.31)	(3.23)			
Twin SC-CC				0.386***	0.338***	0.181***
				(5.49)	(4.31)	(3.23)
Constant	0.443***	0.596***	0.884***	0.441***	0.598***	0.885***
	(10.08)	(9.77)	(9.63)	(10.06)	(9.82)	(9.65)
Summary statistic						
No. observations	169	169	169	169	169	169
R squared	0.18	0.13	0.64	0.18	0.13	0.64
	SDR countries			*No-SDR countries*		
	OLS	*FE*	*FE with time effect*	*OLS*	*FE*	*FE with time effect*
Panel B						
SBS	0.020*	–0.021	–0.007	0.327**	–0.026	–0.013
	(1.69)	(1.20)	(0.47)	(2.52)	(1.40)	(0.83)
SDR crisis	0.463***	0.448***	0.260***			
	(6.15)	(5.06)	(4.10)			
No-SDR crisis				0.015	0.007	–0.048
				(0.09)	(0.04)	(0.42)
Constant	0.456***	0.588***	0.700***	0.456***	0.645***	0.725***
	(10.62)	(9.84)	(8.95)	(9.53)	(10.10)	(8.73)
Summary statistic						
No. observations	169	169	169	169	169	169
R squared	0.22	0.17	0.66	0.04	0.01	0.62

*Statistically significant at the 10 percent level; ** statistically significant at the 5 percent level; *** statistically significant at the 1 percent level.

a. Dependent variable is the underwriting fee as a percentage of the amount issued. OLS, FE (fixed effects), and FE with time-effect regression models. Absolute value of *t* statistics in parentheses. For abbreviations, see table 4.

Finally, I test the out-of-sample properties of the model (table 10). First, I include underwriting fees in a model that estimates the probability of sovereign debt crises. If fees before onset of sovereign debt crises are high with respect to tranquil periods, the fee should be an early warning indicator of these crises. I estimate a logit model (1 if sovereign debt crisis and 0 otherwise) by including the lagged value of the underwriting fee and controlling for the lagged values of the macroeconomic and political variables employed

TABLE 10. Determinants of Sovereign Debt Crisis and High Increases of the EMBI Spread[a]

	Probability (crisis)		*Probability (high increases of EMBI)*	
Explanatory variable	*1*	*2*	*3*	*4*
Underwriting fee		2.786**		1.417**
		(1.96)		(2.02)
Total external debt/GDP	0.002	0.083**	−0.045	0.199*
	(0.13)	(2.04)	(1.31)	(1.81)
Total debt over reserves	0.005*	0.015*	0.003	−0.344***
	(1.87)	(1.65)	(0.66)	(2.76)
Internal short-term debt/GDP	0.965	−3.345	4.879	47.384***
	(0.72)	(1.21)	(1.39)	(2.60)
External debt services/reserves	0.008**	−0.001	−0.001	0.03
	(2.21)	(0.07)	(0.14)	(1.60)
Current account/GDP	−0.160	−0.601**	0.051	0.378
	(1.26)	(2.18)	(0.63)	(1.21)
Openness/GDP	−0.014	−0.011	−0.061**	−0.488**
	(1.51)	(0.68)	(2.47)	(2.53)
US Treasury bill rate	0.216	0.876	−0.196	−0.562
	(0.76)	(1.47)	(0.61)	(0.80)
GDP growth rate	−0.100	−0.369**	−0.013	0.578***
	(1.55)	(2.33)	(0.14)	(3.02)
Inflation volatility	0.214**	0.490***	0.217*	−0.196
	(2.25)	(2.92)	(1.68)	(0.90)
Dummy high inflation (> 50 percent)	0.620	0.243	2.700*	3.270*
	(0.60)	(0.23)	(1.84)	(1.94)
Presidential election	−0.057	—	1.949***	4.645***
	(0.06)		(2.82)	(3.08)
Index of freedom status	−0.256	−2.843**	0.643	0.137
	(0.61)	(2.20)	(0.64)	(0.29)
Constant	−5.219***	−12.588***	−0.472	−1.407
	(3.84)	(3.43)	(0.22)	(0.98)
Summary statistic				
No. observations	339	136	138	107
Pseudo–*R* squared	0.25	0.48	0.40	0.72

*Statistically significant at the 10 percent level; ** statistically significant at the 5 percent level; *** statistically significant at the 1 percent level.

a. Dependent variables are sovereign debt crisis (regressions 1 and 2) and high increases of the EMBI spread (regressions 3 and 4). Logit model with lagged regressors of one year. Robust *z* statistics in parentheses.

in previous work aimed at predicting debt crises (Manasse, Roubini, and Schimmelpfennig 2003).[26] I use a robust variance estimator (Huber-White sandwich estimator) with country-specific variances.

Column 1 of table 10 reports the results of the estimation for the set of macroeconomic and political variables. Excluding the dummy of presidential elections, all lagged regressors have the expected sign. In particular, there is a positive and significant impact of the external debt service over reserves and the volatility of the inflation rate on the probability of sovereign debt crises. The same holds for the ratio of total debt over reserves, but it is only weakly significant.

Column 2 of table 10 includes the lag of the underwriting fee in the estimation shown in column 1. An increase of the underwriting fee one year before the sovereign debt crises helps to predict these crises. The lag of this variable is positive and statistically significant, and its inclusion improves the fit of the model (the pseudo–R squared is close to 0.48 versus 0.25 in the regression of column 1). Moreover, while sovereign debt crises are endogenous to the standard variables presented above (that is, the increases and decreases of these variables around crises are the causes—and consequences—of crises), the underwriting fee is likely to be an exogenous variable. Finally, in this new specification, there is a positive impact on the lag of the total external debt over GDP and the lag of the volatility of inflation on the probability of crises. In contrast, there is a negative and significant impact of the lag of the current account over GDP, the lag of the GDP growth rate, and the lag of the freedom status on the probability of a crisis.

Is the fee a good predictor of high increases in the sovereign bond spread? To test this hypothesis, I define high increases of the EMBI Global spread when this index is above the eightieth percentile of the sample (that is, above 792 basis points) and build a dummy variable that takes a value of 1 when the EMBI spread crosses this threshold and 0 otherwise.[27] Column 3 reports the results of the logit model using the same explanatory variables used by Manasse, Roubini, and Schimmelpfennig (2003). A reduction of openness, a high level and volatility of inflation, and presidential elections are significant

26. These variables are total external debt over GDP, short-term debt over international reserves, external debt service over reserves, current account balance over GDP, openness, U.S. Treasury bill rate, real GDP growth, inflation volatility, the dummy for inflation higher than 50 percent, the dummy for presidential election, and an index of freedom status (for a description of these variables, see Manasse, Roubini, and Schimmelpfennig 2003).

27. If the EMBI spread is above the eightieth percentile in the four years following the initial increase of the spread, the dummy variable is 0.

variables to explain high increases of the sovereign bond spreads in the subsequent year.[28] Column 4 introduces the lag of the underwriting fee in the estimation and shows that its coefficient is positive and statistically significant. Summing up, the results presented in table 10 show the out-of-sample properties of the model. An increase in the fee one year before a crisis is a good early warning indicator of sovereign debt crises.

Underwriting Fees and Financial Markets Actors

Information on fees can easily be found in Bloomberg's databases or in Dealogic's DCM Analytics database.[29] There is, however, a lag of one to seven days between an issue's announcement date and the day that financial databases release information on the fee.[30]

Because market actors have access to information on the underwriting fee after the issue date, it is valuable to study secondary market prices to determine if investors track this information to price sovereign bonds issued by potential "crisis" countries. To that end, I replicate the analysis presented in table 8 for the benchmark model (equation 2), and I use the EMBI Global spread for one day (EMBI1) after the issue date, as well as the ten-day EMBI Global spread average (EMBIAV10) after the issue dates of the sovereign bonds used in the sample. Results are reported in tables 11 and 12, respectively.

Column 1 of table 11 uses the secondary sovereign bond spread one day after the issue (EMBI1). It confirms my main results as it shows that the

28. However, the high level and volatility of the inflation are only weakly significant at 10 percent.

29. Although investment banks have no obligation to submit deal information and consequently fees for issues, they have an incentive to provide this information because such databases compile rankings of primary bond market leaders ("league tables") through the deals investment banks make. This information is an important benchmark for market makers, issuers, analysts, and financial media where investment banks' reputation is measured in market share (see Bloomberg 2006).

30. According to a Dealogic employee in the United Kingdom at the end of 2007, "For about 80 percent of large deals (more than USD 200 million equivalent), we should have the fee within one day. For the remaining 20 percent, it would be, on average, within one week. For smaller deals [for example, small medium-term notes], it may take two to three weeks until we receive the pricing supplement." Regarding Bloomberg, for instance, for the Colombian Global Bond 09/08/06 (ISIN number XS0213272122), the information concerning the fee was obtained one week after the issue date. Moreover, this piece of information was neither disclosed by the Colombian government nor the investment banks in their external documents or websites on the day of the issue.

TABLE 11. Fee, Secondary Sovereign Bond Spread (EMBI1), and Debt Crises: OLS Time and Country Fixed-Effects Regression Model[a]

Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
EMBI1	–0.034**	–0.018	–0.028*	–0.021	–0.036**	–0.020	–0.036**	–0.036**
	(2.22)	(1.09)	(1.82)	(1.34)	(2.35)	(1.20)	(2.26)	(2.26)
Total crisis SC	0.238***	0.667***						
	(3.32)	(3.64)						
Interactive total SC		–0.077**						
		(2.54)						
Twin crisis SC-CC			0.364***	0.605***				
			(4.98)	(3.21)				
Interactive twin crisis SC-CC				–0.045				
				(1.39)				
SDR crisis					0.260***	0.762***		
					(3.52)	(4.00)		
Interactive SDR crisis						–0.088***		
						(2.85)		
No-SDR crisis							–0.064	–0.190
							(0.24)	(0.24)
Interactive no-SDR crisis								0.035
								(0.17)
Constant	0.764*	0.855**	0.926**	0.892**	0.774*	0.898**	0.992**	0.995**
	(1.76)	(1.97)	(2.20)	(2.11)	(1.79)	(2.08)	(2.26)	(2.27)
Summary statistic								
No. observations	379	379	379	379	379	379	379	379
R squared	0.56	0.57	0.58	0.58	0.56	0.57	0.54	0.54

*Statistically significant at the 10 percent level; ** statistically significant at the 5 percent level; *** statistically significant at the 1 percent level.

a. With interactive dummies variables. Dependent variable is the fee as a percentage of the amount issued. Absolute value of *t* statistics in parentheses. EMBI1 refers to the one-day EMBI Global spread one day after the issue date. For abbreviations, see table 4.

TABLE 12. Fee, Secondary Sovereign Bond Spread (EMBIAV10), and Debt Crises: OLS Time and Country Fixed-Effects Regression Model[a]

Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
EMBIAV10	−0.035**	−0.018	−0.028*	−0.021	−0.037**	−0.019	−0.037**	−0.037**
	(2.34)	(1.10)	(1.92)	(1.36)	(2.47)	(1.21)	(2.41)	(2.42)
Total crisis SC	0.236***	0.690***						
	(3.30)	(3.87)						
Interactive total SC		−0.081***						
		(2.78)						
Twin crisis SC-CC			0.362***	0.637***				
			(4.94)	(3.48)				
Interactive twin crisis SC-CC				−0.052				
				(1.64)				
SDR crisis					0.258***	0.785***		
					(3.50)	(4.25)		
Interactive SDR crisis						−0.092***		
						(3.10)		
No-SDR crisis							−0.068	−0.205
							(0.25)	(0.28)
Interactive no-SDR crisis								0.037
								(0.20)
Constant	0.771*	0.842**	0.930**	0.896**	0.778*	0.935**	1.003**	1.007**
	(1.79)	(1.98)	(2.23)	(2.15)	(1.82)	(2.42)	(2.32)	(2.32)
Summary statistic								
No. observations	379	379	379	379	379	379	379	379
R squared	0.56	0.57	0.58	0.58	0.56	0.57	0.55	0.55

*Statistically significant at the 10 percent level; ** statistically significant at the 5 percent level; *** statistically significant at the 1 percent level.

a. With interactive dummies variables. Dependent variable is the fee as a percentage of the amount issued. Absolute value of *t* statistics in parentheses. EMBIAV10 refers to the ten-day EMBI Global spread average after the issue date. For abbreviations, see table 4.

crisis dummy (which takes value 1 between T – 3 and T – 1 before the onset of crisis T) is positive and statistically significant. When I include the interactive dummy variable, the interaction term is negative and significant, and the crisis dummy is again positive and statistically significant. The fixed cost crisis countries paid to investment banks remains high before the onset of a crisis (higher than 0.60 percent of the amount issued). The main result holds for twin crises (columns 3–5).

When I split sovereign debt crises into two groups, I find that the fee is high and significant at 1 percent for SDR countries only (column 5). By including the interactive dummy variable (column 6), the *t* statistic of the slope is negative and significant at 1 percent. By contrast, for no-SDR countries, there is no significant difference between the fee paid before a crisis and in tranquil periods.

My results are robust to using the average of the EMBI spread ten days after the issue date (table 12). These results also hold—for both EMBI1 and EMBIAV10—when I control for the set of economic and financial variables of table 8.[31]

To sum up, my results suggest that investors do not make use of information on fees in pricing bonds in the secondary market. This finding was confirmed by a series of interviews with investment firms in which institutional investors were asked questions about their perceptions of the structure of the primary sovereign bond market.[32] Seven investors out of the eight interviewed said that underwriting fees play no role in their investment decisions.[33] Investors argued that because fees are formed by the connection between investment banks and governments, they are of no interest to them.

As investors appear to give some weight to the opinion expressed in investment banks' publications on emerging sovereign bond markets, I surveyed 600 publications issued by thirteen investment banks over the period 1997–2007.[34] These publications present detailed information related to the

31. Results available upon request.

32. The questions asked regarding the relevance of the fee for investors were: "Are underwriting fees of any relevance to an investor?" and "Is underwriting fee a good indicator of credit risk?"

33. The one institutional investor interested in fees is not directly linked to the impact of fees on credit risk analysis. According to that investor, fees can serve to indicate the effort the underwriters will put into the performance of the issue. ("Fees can tell me how the banker is biased about issuance performance.")

34. The investment banks are ABN AMRO, Barclays Capital, Bear Stearns, Citigroup (the former Salomon Smith Barney), Credit Suisse (the former Credit Suisse First Boston), Deutsche Bank, Dresdner Kleinwort Wasserstein, Goldman Sachs, J. P. Morgan, Lehman Brothers, Merrill Lynch, Morgan Stanley, and UBS.

primary bond market. In particular, a vast description of the structure of bonds issued (for example, outstanding amount, coupon rate, maturity, primary bond spread, and currency denomination) is presented, as well as forecasts concerning future public bond issues, depending on the public financing needs of each emerging country. However, no publication reports information on underwriting fees.

The survey and empirical results show that underwriting fees are not used as a tool in determining portfolio allocations. It is puzzling that useful, publicly available information is not tracked by investors. This is directly connected with the study of the efficiency of the sovereign bond market. Why do investors not pay attention to the evolution of fees? It is possible that the sort of market inefficiency documented in this paper is driven by the phenomenon of "herding behavior." Individual investors may not pay attention to useful public information because they are only concerned with the variables, which are considered "leading indicators" by the rest of the market.[35] This is just another example of Keynes's "beauty contest."[36]

Conclusions

This paper analyzes the behavior of investment banks and investors around sovereign debt crises, by studying the structure of the primary sovereign bond market over the period 1993–2006. It finds that one cannot reject the hypothesis that investment banks price sovereign default risk well before crises emerge, well before investors do. Investment banks charge a much higher underwriting fee between three years and one year before a crisis than they do during tranquil periods. This result is statistically significant after controlling for sovereign bond spreads and other variables. My results suggest that the additional fee paid by governments to investment banks before crisis (0.31 percent of the amount issued) is equivalent to 50 percent of the average fee in the sovereign bond market.

35. Moreover, this paper has used standard bond issues—fixed-coupon, denominated in the most important currencies (U.S. dollar, euro, and yen), and no international guarantee—to analyze underwriting fees. The determinants of fees in emerging markets could be more complex, making it more difficult to extract from them information that could usefully serve as an early warning indicator. At a first glance, individual investors may therefore have no incentive in incurring the fixed cost of analyzing fees.

36. In that context, see Lamont and Thaler (2003) for the case of mispricing in the tech stock market, even after the arbitrage opportunities in that market were made public (through the press).

Moreover, I find that investment banks' behavior differs depending on the type of debt crisis. When I split debt crises into two groups, based on the sovereign default risk (SDR) before crisis, I find that the additional fee paid by SDR crisis countries (0.39 percent of the amount issued) is significantly higher than they pay during tranquil periods and above that charged for total debt crisis.

Finally, I show that underwriting fees can be used as early warning indicators of debt crises, after controlling for standard economic variables, and that increases of the secondary sovereign bond spread could be explained by the underwriting fee as well.

These results show that underwriting fees provide valuable information. It is puzzling that investors do not use this potentially useful public information in order to allocate efficiently their portfolios of emerging market fixed-income assets. Should policymakers promote the dissemination of underwriting fees? If so, how can policymakers increase the use of this type of information by market participants?[37]

These questions do not have straightforward answers since they involve several trade-offs. Advertising the importance of underwriting fees and promoting their use may improve market efficiency, but it may also lead investment banks to adopt less transparent pricing schemes that would hide the information currently incorporated in the fees. Along similar lines, sovereign issuers with poor fundamentals would also have incentives to alter the fees in order not to be charged higher bond spreads.

37. Market inefficiency in the primary market has several consequences for the three main actors of the sovereign bond market: investors, investment banks, and governments. Investors' losses incurred upon default are higher than in an efficient market. In turn, due to market inefficiency, investment banks are likely to obtain higher profits (that is, higher fees in the primary market and higher commissions in the secondary market before the onset of a debt crisis). Moreover, it is uncertain whether market inefficiency is ultimately beneficial or harmful to risky issuers in this context. On the one hand, it is probable that, in exchange for a higher fee, issuers can sell a bond for a higher price than would be accepted in a perfectly competitive market. Second, given that in a perfectly competitive market, self-fulfilling effects can trigger crises, investors' lack of information may serve to sustain demand for the issues of a country with bad fundamentals, maintaining its access to financing through a risky period and perhaps helping to avert a crisis. Nevertheless, market inefficiency may also induce governments to increase outstanding debt beyond financial capacity. Thus a debt crisis may only be postponed, leaving a country with a higher debt burden and worse fundamentals than an efficient market would have allowed. In this case, market inefficiency may serve to aggravate a looming debt crisis.

Appendix A. Debt Risk Index before the Onset of a Crisis, Annual Basis[a]

		Total debt		*Public debt*		*Public bonds*	
Type of debt crisis and country	*Time*	*Outstanding index*	*Over MI countries*	*Index*	*Over MI countries*	*Index*	*Over MI countries*
Default preemptive							
Ukraine 1998	T – 3	5	0.8	1	0.7	5	1.1
	T – 2	4	0.6	1	0.5	4	0.8
	T – 1	4	0.6	1	0.4	4	0.8
Pakistan 1999	T – 3	17	2.5	15	3.2	0	0.1
	T – 2	15	2.2	13	2.8	0	0.2
	T – 1	16	2.4	14	3.0	0	0.2
Uruguay 2003	T – 3	9	1.3	4	2.5	8	1.7
	T – 2	10	1.4	5	3.1	9	1.9
	T – 1	16	2.4	8	4.9	15	3.1
Dominican Rep 2005	T – 3	7	1.0	2	1.1	6	1.3
	T – 2	12	1.9	4	2.6	12	2.6
	T – 1	7	1.0	2	1.4	7	1.4
Post–sovereign default							
Russia 1998	T – 3	6	0.9	0	0.1	6	1.3
	T – 2	7	1.0	0	0.1	6	1.4
	T – 1	7	1.0	0	0.2	7	1.4
Ecuador 1999	T – 3	12	1.9	6	3.6	12	2.6
	T – 2	13	1.9	6	3.5	13	2.7
	T – 1	15	2.3	8	4.6	15	3.2
Argentina 2001	T – 3	15	2.2	9	5.4	11	2.3
	T – 2	18	2.7	11	6.4	13	2.8
	T – 1	18	2.7	12	7.2	14	3.0
IMF package, public bonds vulnerabilities							
Mexico 1995	T – 3	9	1.4	8	1.7	4	2.6
	T – 2	9	1.3	6	1.4	3	2.0
	T – 1	13	1.9	10	2.2	6	3.6
Brazil 1998	T – 3	10	1.5	5	2.9	8	1.6
	T – 2	11	1.6	4	2.4	7	1.4
	T – 1	13	1.9	4	2.4	6	1.4
Turkey 2000	T – 3	8	1.2	2	1.3	6	1.3
	T – 2	9	1.3	2	1.4	6	1.3
	T – 1	10	1.5	3	1.5	6	1.4
Brazil 2001	T – 3	17	2.6	4	2.2	7	1.5
	T – 2	22	3.3	5	3.2	9	2.0
	T – 1	19	2.8	6	3.4	9	1.9

(*continued*)

(*Continued*)

Type of debt crisis and country	*Time*	*Total debt*		*Public debt*		*Public bonds*	
		Outstanding index	*Over MI countries*	*Index*	*Over MI countries*	*Index*	*Over MI countries*
IMF package, no public bonds vulnerabilities							
Indonesia 1997	T – 3	12	1.8	9	1.9	0	0.0
	T – 2	12	1.8	8	1.8	0	0.0
	T – 1	11	1.7	7	1.5	0	0.1
Thailand 1997	T – 3	5	0.7	2	0.4	0	0.1
	T – 2	5	0.8	2	0.4	0	0.1
	T – 1	6	0.8	2	0.3	0	0.1
Total MI countries	1995–2002	7	1.0	2	1.0	5	1.0

Source: Author's calculation based on the World Bank's Global Development Finance database.

a. GDF only calculates these indicators for the total debt. I have adapted these definitions to the public debt and public bonds. The indicators used to calculate this index are: debt service over exports of goods and services, interest payments over exports of goods and services, debt over exports of goods and services, international reserves over debt, debt over GNP, and interest payments over GNP. In order to construct this index, I give the same weight to each indicator according to its value for middle income (MI) countries during the period 1995–2002 (the period that encloses the entire crises sample). MI countries are defined according to the World Bank; see "Data and Statistics" (www.worldbank.org). All the countries studied in this paper are included inside this category.

Appendix B. Debt Restructuring Cases and Recovery Rates

Units as indicated

Country	Default year[a]	Debt restructuring year[b]	Average trading price (percent of par)[c]	PV ratio of cash flows (percent)[d]	Nominal principal reduction (percent debt restructured)[e]	Haircut (percent)[f]	Weight in the secondary market (percent total emerging sovereign debt)[g]	Restructuring case[b]
Argentina	2001	2005	33	30	56.0	64–82	13.65	Post default
Dominican Republic	2005	2005	92	95	0.0	n.a.	0.39	Preemptive
Ecuador	1999	1999–2000	44	60	37.3	19–47	1.32	Post default
Pakistan	1999	1999	65	65	–1.0	29–32	n.a.	Preemptive
Russia	1998	1998–2000	18	50	17.2	50–75	6.32	Post default
Ukraine	1998	1998–2000	69	60	0.0	22–35	n.a.	Preemptive
Uruguay	2003	2003	66	85	1.0	5–20	0.12	Preemptive

Sources: Bedford, Penalver and Salmon (2005), IMF (2006), Moody's (2006), Standard and Poor's (2006), and Sturzenegger and Zettelmeyer (2005).

a. According to Standard & Poor's (2006)

b. According to IMF (2006).

c. Thirty-day postdefault price or predistressed exchange trading price (Moody's 2006).

d. Ratio of the present value (PV) of cash flows received as a result of the distressed exchange versus those initially promised, discounted using yield to maturity immediately before default (Bedford, Penalver and Salmon 2005).

e. Negative numbers indicate an increase in principal (IMF 2006).

f. According to Sturzenegger and Zettelmeyer (2005).

g. Corresponds to the weight of each country one month before the onset of the crisis (according to the weight of the EMBI Global index calculated by J. P. Morgan).

Appendix C. Debt Risk Index at Onset of the Crisis[a]

Debt risk indexes	*Mexico* 1995	*Indonesia* 1997	*Thailand* 1997	*Brazil* 1998	*Turkey* 2000	*Brazil* 2001	*Middle income* 1995–2002
Total debt outstanding index	10.6	10.9	7.2	17.0	10.2	18.1	6.7
1995–2002[b]	1.6	1.6	1.1	2.6	1.5	2.7	1.0
Crisis date[c]	1.6	1.7	1.1	2.4	1.5	2.7	
Public debt index	8.6	6.2	2.0	7.0	6.7	8.4	4.7
1995–2002[b]	1.9	1.3	0.4	1.5	1.4	1.8	1.0
Crisis date[c]	1.6	1.3	0.4	1.5	1.5	2.0	
Public bonds index	4.6	0.2	0.3	3.7	3.0	5.3	1.7
1995–2002[b]	2.7	0.1	0.2	2.2	1.8	3.2	1.0
Crisis date[c]	3.0	0.1	0.2	2.2	1.6	3.1	

Source: Author's calculation based on the World Bank's Global Development Finance database.

a. Sample: nonconcessional IMF loans/quota > 100 percent. For details regarding the construction of the debt indexes, see appendix A.

b. Debt indicator of the crisis country divided by the average of the period 1995–2002 of the debt indicator for middle income countries.

c. Debt indicator of the crisis country divided by the debt indicator for middle income countries at the crisis year.