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Organisation for Economic Co-operation and Development **13-Nov-2008**

English - Or. English

DEVELOPMENT CENTRE

DEV/DOC(2008)10
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WORKING PAPER No. 274

WHO SAW SOVEREIGN DEBT CRISES COMING?

By Sebastián Nieto Parra

JT03255129

English - Or. English

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS

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Financial support from Chaire Finances Internationales, SciencesPo Paris, is gratefully acknowledged for the interviews carried out in New York with investment banks and investors. The author is especially grateful to Marc Flandreau for illuminating and useful comments on previous versions of this paper. He also wishes to thank Thomas Dickinson for excellent research assistance provided during interviews in New York in 2007 with market participants in the primary sovereign bond market (institutional investors as well as origination departments of investment banks) and established within the context of the Master "Economics of International Development" SciencesPo Paris. The author is grateful to Jeff Dayton-Johnson, Ugo Panizza, Helmut Reisen and Javier Santiso for valuable feedback. Comments and suggestions from seminar participants at the 15th World Congress of the International Economic Association in Istanbul in June 2008 are acknowledged. Errors, shortcomings and views remain the responsibility of the author.

PREFACE

The causes and consequences of sovereign debt crises have been widely studied in research literature as important items in the stability and credibility of economic policies in emerging countries.

Following a series of capital-market crises starting in the mid-1990s (Mexico 1994-95, Asia 1997, Russia 1998 and Argentina 2001), researchers, policy makers and capital market actors have explored determinants and more precisely "early warning indicators" of these crises.

This paper makes a useful and illuminating contribution to this literature by analysing recent sovereign debt crises through the structure of primary bond markets. It analyses the connection between investment banks (based in OECD countries) and emerging countries (most of them non-OECD countries) through the arenas sovereign bond market.

Having constructed the annual fee paid by governments to investment banks in order to issue sovereign bonds in international capital markets, the author finds that this commission is high before debt crises with respect to the average fee paid by issuers during the sample time period. Moreover, the ratio fee/sovereign bond spreads increases considerably before a crisis suggesting that investment banks hold an information advantage over investors.

The relevant information obtained from primary bond markets calls for increased monitoring of the fee paid by governments to investment banks during sovereign bond issues by policy makers as well as by capital market actors.

Javier Santiso
Director, OECD Development Centre
Chair, OECD Emerging Markets Network (EmNet)

RÉSUMÉ

Cet article a pour objectif d'analyser les crises de dette souveraine pendant la période 1993-2006 à partir du marché primaire souverain. Deux principales conclusions ressortent de cette étude. Premièrement, les banques d'investissement évaluent les risques de défaut bien avant les crises et avant même que les investisseurs ne les anticipent. Un à trois ans avant le début de la crise, les pays qui présentent un risque de défaut souverain élevé commencent à verser, en moyenne, 1.10 pourcent des montants qu'ils émettent aux banques d'investissement, soit près du double du montant moyen que versent l'ensemble des pays émergents pendant la période de l'étude (0.56 pourcent). En revanche, ils bénéficient, avant le début des crises, des primes de risque qui ne sont que légèrement supérieures à celles du reste des pays émergents (385 contre 319 points de base). Ce résultat suggère que les banques d'investissement ont un avantage d'information par rapport aux investisseurs et qu'elles sont les seules à tirer profit du risque de crise de dette souveraine. Deuxièmement, le comportement des banques d'investissement diffère selon le type de crise. Avant les crises, elles prennent une commission de souscription plus élevée pour les pays qui présentent des difficultés en matière de finances publiques que pour le reste des pays qui ont connu une crise de dette souveraine. La robustesse de ces résultats est vérifiée à partir d'une analyse de données de panel. Ces résultats sont étonnants en ce qu'ils indiquent que les investisseurs n'utilisent pas l'information utile et publique à leur disposition pour améliorer l'allocation de leurs actifs en titres émis par les pays émergents.

Mots clés: Information, Marché Primaire Souverain, Crises de Dette Souveraine, Commission de Souscription

Classification JEL: F34, G11, G14, G15, G24

ABSTRACT

This paper studies sovereign debt crises during the period 1993-2006 through the prism of the primary sovereign bond market. Two conclusions emerge. First, investment banks price sovereign default risk well before crises occur and before investors detect default risk. Between three and one years prior to the onset of a crisis, sovereign default risk countries paid to investment banks on average 1.10 per cent of the amount issued, close to double the average paid by emerging countries overall in the same period (0.56 per cent). In contrast, the level of sovereign bond spreads prior to crises is on average only slightly higher than for emerging countries (385 vs. 319 basis points), suggesting that investment banks have an information advantage with respect to investors and are the only parties compensated for the risk of sovereign debt crises. Second, investment banks' behaviour differs depending on the type of sovereign debt crisis. Before crises, investment banks charged on average a higher underwriting fee to countries presenting public finances difficulties than to other sovereign debt crisis countries. The robustness of these results is verified through panel data analysis. The results are puzzling in that they indicate that valuable, publicly available information is not tracked by investors to help improve allocation of their emerging market fixed income assets.

Keywords: Information, Primary Bond Market, Sovereign Debt Crises, Underwriter Spread

JEL Classification: F34, G11, G14, G15, G24

I. INTRODUCTION

This paper studies recent sovereign debt crises through the structure of the primary bond market. The evidence generated by viewing debt crises from this perspective reveals the possibility that investment banks have an informational advantage with respect to investors.

We examine the behaviour and interactions between the three principal actors in the sovereign bond market -- governments, investment banks/lead managers[1] and investors) -- prior to and following a sovereign debt crisis. To this end we analyse important sources of information related to price formation in the primary market for sovereign bonds, information that is nevertheless generally overlooked in the research literature. Chief among these variables is the fee governments pay investment banks to place bonds (i.e. the underwriting spread), and the primary price at which investors purchase these bonds.

The empirical evidence that we present in this paper suggests that we cannot reject the hypothesis that investment banks were better informed than investors prior to the above-mentioned crises, and in particular in crises in which sovereign default risk was high. In other words, investment banks detect "bad" countries well before investors do and between one and three years prior to the onset of crises. We analyse investors' perception of risk (i.e. bond spreads on the primary and secondary market), which remained relatively stable before the crises, in relation to the fee investment banks required from governments in order to place the bonds, which was high over the same pre-crisis period[2]. This is a puzzle because it appears that investors are not using potentially useful (and public) information in order to allocate efficiently their portfolios of emerging fixed income assets.

The remainder of this article is organised as follows. In Section II, we provide a review of the literature. Section III describes the datasets used. Section IV discusses the definition and timing of sovereign debt crises. Section V, the core of the paper, analyses the efficiency of the sovereign bond market: we compare the underwriting fee paid by governments to lead managers to the price of the sovereign bonds paid by investors on the primary market and prior to sovereign debt crises. Section VI provides an overview on the information available to investors concerning the primary bond market. Finally, Section VII provides concluding remarks and sketches the major policy implication that follows from this research.

1. Cf. section V. Lead Managers are investment banks in the sovereign bond market. In this paper we use the term Lead Manager to refer to agents who place bonds in the market. We do not differentiate between Underwriters, Lead Managers or Book Runners and we assume that these three agents have the same responsibility with respect to the issue during a sovereign bond issue.

2. We address these questions through studying the interaction between governments, investments banks and investors. We take investors as a single group (e.g. no account is made for differences that might stem from foreign vs. domestic, individual vs. institutional or international vs. local). Differences in investor behaviour have been researched, notably by Calvo (1999), Borensztein and Gelos (2000) and Santiso (2003).

II. REVIEW OF THE LITERATURE

Empirical literature on the structure of the primary sovereign bond market is fairly scarce[3]. This is particularly true for research concerning potential information problems in emerging markets as evidenced in the primary market. Available results are nevertheless useful and reveal the presence of information problems between investment banks, acting as underwriters and investors.

Information asymmetries between investment banks and investors are not new; the problem is clearly illustrated by the "Baring crisis" case of 1890. According to Flores (2007), Baring investment bank, which had a close and successful relationship with Argentina, was the main source of information reaching investors on that country at the time. When Argentina's situation deteriorated, investors gave more credence to Baring's continuing positive signals than to other, publicly available signs of a downturn. Concerning the Latin American sovereign bond market today, Nieto Parra and Santiso (2007) find that when an investment bank is acting as lead manager, 90 per cent of its recommendations are positive.

More precisely, studies of this conflict of interest during recent sovereign debt crises are largely limited to anecdotal evidence. Analysing the Mexican crisis of 1994, Edwards (1997) addresses a number of questions regarding the predictability of the crisis and asymmetric information problems between Wall Street analysts and their clients. Blustein (2003), describing the Argentina crisis of 2001, similarly points to the conflict of interest facing investment banks. Calomiris (2003), referring to emerging crises, notes the possible "cooperation" between research departments and origination departments whose task is to issue new debt offerings in emerging economies[4]. Although these are important points, they are not accompanied by a systematic analysis of the structure of the primary bond market. The purpose of this paper is to fill this gap, by studying the interaction between investors and investment banks around sovereign debt crises and through primary bond market.

The scant research literature on the primary sovereign bond market stands in contrast to the plentiful studies detailing the primary corporate market. In particular, there is a useful and rich literature on the determinants of the fee (i.e. underwriting spread) paid by issuers to lead

3. Analyses concerning the structure of the primary sovereign bond market in emerging countries are rare and they are concentrated on the access of emerging countries to the international bond market (Grigorian, 2003; Gelos, Sahay and Sandleris, 2004; Fostel and Kaminsky, 2007) or descriptive aspects related to the primary market (see Zervos, 2004 for the case of Brazil, Chile and Mexico).

4. Moreover, Beim and Calomiris (2001) note that "how to monitor the monitors" is an important concern and one that must be carefully taken into account by international organizations and policy-makers in assessing the transparency of investment banks' analysis.

managers in that market. These analyses take into account variables related to the characteristics of the issue (e.g. maturity, amount, underwriters, regulation and currency denomination), of the issuer (e.g. credit risk measured in most cases by the credit rating, size of the firm, profitability indicators and activity sector group) and finally exogenous variables (e.g. secondary market conditions and volatility of the prices) as factors potentially determining the behaviour of underwriting spreads. A relevant finding of the corporate literature for this research concerns the relationship between the underwriting fee and credit risk. These studies generally find an inverse relationship between the quality of the issuer and the level of underwriting fees (West, 1967; Higgins and Moore, 1980; Rogowski and Sorensen, 1985; Lee *et al.*, 1996; Livingston and Miller, 2000; Kollo and Sharpe, 2002; Melnik and Nissim, 2003; Hua Fang, 2005). This is interpreted as a consequence of the greater effort required from intermediaries when they act as underwriters of lower quality issues (see Altinkihc and Hansen, 2000).

III. DESCRIPTION OF THE DATA

The period analysed in this paper is from 1993 to 2006 and the frequency of observations is annual. The 29 emerging economies included in this study correspond first to economies that are included in the EMBI Global index and second to countries for which we have information on underwriting fees[5].

The most important piece of information presented in this paper concerns the structure of the primary sovereign bond market. For that purpose we employ the Dealogic database DCM Analytics[6], tracking emerging sovereign bond issues from 1993 to the present. We reduce the number of sovereign bond issues in our analysis dataset according to specific criteria, which allows us to use only standard issues in the analysis: *i)* We take into account only sovereign bond issues for which we have the ISIN (International Securities Identifying Number) reference of the issues as well as the value of both the underwriting fee and the primary bond spread. *ii)* We exclude issues with floating coupon rates which alter the true value of the bond spread[7]. *iii)* We exclude issues denominated in currencies other than EUR, JPY and USD, which are in any case the most commonly used currencies in the sovereign bond market[8]. *iv)* We exclude issues partially or totally guaranteed by international organisations, such as the World Bank or regional development banks.

The Dealogic database contains 919 sovereign bond issues corresponding to the EMBI global countries presented above. We restrict the number of sovereign bond issues employed in this study to 436 issues[9]. From this sample, 149 bonds are issued during the 11-year window around sovereign debt crises (from year 5 prior to the onset of the crises to the year 5 after the

5. The 29 emerging economies covered in this paper are: Argentina, Brazil, Bulgaria, Chile, China, Colombia, Dominican Republic, Ecuador, Egypt, El Salvador, Hungary, Indonesia, Lebanon, Malaysia, Mexico, Morocco, Pakistan, Panama, Peru, Philippines, Poland, Russia, South Africa, Thailand, Turkey, Ukraine, Uruguay, Venezuela and Vietnam.
6. For more information see http://www.dealogic.com/
7. For this kind of issues the primary sovereign bond spread reported is the basis points added to the benchmark rate used to determine the coupon rate. For instance, the Brazilian Global Bond 21/06/04 (ISIN number US105756BC32) has a coupon rate 3 months Libor + 575 basis points. Consequently the primary sovereign bond spread reported is 575 basis points.
8. We exclude issues denominated in other international currencies (e.g. DEM, FFR, LIT, SFR and STG) and local currency issues in order to avoid the additional cost to issue in currencies that are not common in the sovereign bond market.
9. 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. In particular, we note a large number of bonds issued in 1999 (56) and 2000 (55). This is due in a large part to Argentina which was an active player in the international bond market (17 and 12 bonds were issued by Argentina during these two years respectively).

onset of the crises, centred on the onset of crises). From these issues we calculate the annual average of the fee[10] as well as the primary sovereign bond spread of emerging countries[11].

Table 1 presents a description by country of the sovereign bonds used in the sample[12]. The total amount of sovereign bonds used in this sample is higher than USD 300 billion and the average amount issued by country and per issue is close to USD 700 million. In this sample, the total income received by underwriting banks is over USD 1.5 billion (on average close to USD 3.5 million per issue)[13]. The averages of the fee and of the sovereign bond spread in the sample are respectively 0.54 per cent of the amount issued and 329 basis points (bp).

10. For the remainder of this paper, we use the term "fee" to refer to the remuneration paid by issuers to underwriting banks in the primary market. Other terms are used in the research literature or in the financial jargon (e.g. underwriting spread, underwriting fee, gross spread and underwriting discount).

11. The primary sovereign bond spread is determined from the price defined during the book-building process. More precisely, in order to introduce the sovereign bonds to the market, lead managers realize the so-called "book-building" process, in which they build-up a list of "orders" at a specified price.

12. 67 per cent of these issues are denominated in USD, 27 per cent of are denominated in EUR and the rest are denominated in JPY.

13. The total fee is calculated by the product of the deal value of the issue (face value) and the fee.

Table 1. **Description of the sovereign bonds used in the sample (1993 - 2006)**

Country	Number of bonds	Maturity (average; years)	Total amount issued (US$ millions)	Amount issued (average; US$ millions)	Total fee (US$ millions)	Underwriting spread (average; % of amount issued)	Bond spread (average; bp)
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 Rep.	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	**436**	**10.1**	**311.844.7**	**692.2**	**1.548.3**	**0.54**	**329**

Notes: The amount issued corresponds to the deal value of the proceeds.
For the total sample, the average of the maturity, the average of the amount issued, the fee as well as the bond spreads are calculated as the simple average (average of countries in the sample).

Source: Author's calculations based on Dealogic database.

Table 2 shows the investment bank market share for the top ten book-runners of the emerging sovereign bonds used in the sample. These banks represent the most prestigious actors in the emerging sovereign bond market as the reputation of investment banks is measured in the research literature as well as in the capital markets by the market share[14]. The number of lead-managers in the emerging sovereign bond market is small. Similarly to the US corporate bond market (Livingston and Miller, 2000; Hua Fang, 2005), approximately 90 per cent of the issues

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

were realized by the top ten book-runners and more than 75 per cent by the seven most important book-runners.

Table 2. **Market Share for Top Ten Investment Banks (1993 - 2006)**

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 (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 (0)	6.4 (7)	2.1 (8)	0.0 (0)	**2.9 (16)**

Notes: 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 for sovereign bond issues is in parentheses.

Source: Author's calculations based on Dealogic database.

Concerning the secondary market, the annual sovereign bond spread employed is the Emerging Markets Bond Index Global (EMBI Global) spread, calculated by JPMorgan[15] and considered an important indicator of credit risk in emerging markets.

Finally, in order to analyse the relevance of the information received by investors from investment banks concerning the primary bond market, we collected from July 1997[16] the publications of 13 important investment banks in emerging countries[17]. In weekly, monthly or quarterly reports, investment banks publish their views for each emerging country, providing input for their clients, namely the "buy side": portfolio asset managers, mutual funds, hedge funds, pension funds, etc.

15. For more information see JPMorgan (2004).

16. No reports before this date are available, neither in the websites nor investment banks' databases. For the period July 1997 - December 1999, we only have information from Citigroup.

17. 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* (JPMorgan), *Emerging Markets Compass* (Lehman Brothers), *Emerging Markets Debt Monthly* (Merrill Lynch), *EMD Perspectives Quarterly* (Morgan Stanley) and *Emerging Markets Debt Strategy Perspectives* (UBS).

IV. THE SOVEREIGN DEBT CRISES

There is no consensus on the definition of sovereign debt crises (see Pescatori *et al.*, 2007 for a review of the literature defining debt crises). We first take into account a definition largely used and cited in the literature on the "early warning models" (in particular see Manasse *et al.*, 2003; Manasse *et al.*, 2005; Ciarlone *et al.*, 2005 and Fioramanti, 2006). A country is defined as being in a debt crisis if *i)* it is classified as being in default by Standard & Poor's (S&P's) or *ii)* it receives a large non-concessional IMF loan defined in excess of 100 per cent of quota.

Concerning the first part of the definition, Standard & Poor's rates sovereign issuers in default if a government fails to meet principal or interest payments on external obligations on the due date. There is a large heterogeneity in the types of default included in S&P's definition (see Annex 1). As noted by the IMF (2006), there are different cases of debt restructuring. Debt restructurings may have either followed a sovereign default or been undertaken pre-emptively in an effort to avoid default[18]. Consequently, given the heterogeneity of restructuring debts, we divide countries in default by S&P's into two groups depending on the restructuring case (pre-emptive and post default)[19].

A potential problem with the first part of the debt crisis definition is that it may not capture near-defaults or coercive debt restructurings that were only prevented through an adjustment programme and/or a large financial package from the IMF. Taking this into account, the second part of the definition considers countries that would have defaulted without this exogenous factor[20]. Large IMF loans are often granted to countries with balance of payment problems, which could be related to financial difficulties of the private sector. Consequently, we divide countries with large IMF packages into two groups. This classification depends on the countries' vulnerabilities to the external public bonds. In order to differentiate among countries, we calculate a debt index that depends on four external debt indicators presented in the literature and developed by GDF (Global Development Finance)[21]. Results are presented in Annex 2.

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

19. Duration and intensity of default vary considerably also among countries. For instance, the Argentinean default lasts four years (from 2001 until 2005) while the Dominican Republic (2005) and Uruguayan (2003) defaults last 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 per cent, in contrast to the Dominican Republic (0.0 per cent), Ukraine (0.0 per cent) or Uruguay (1 per cent).

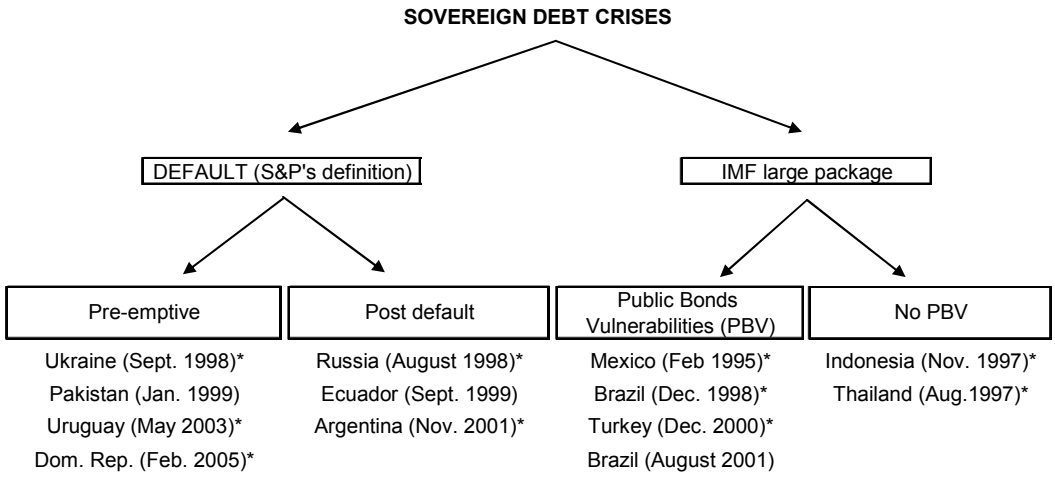
20. By using data from the IFS (International Financial Statistics)provided by the IMF and from the GDF (Global Development Finance) provided by the World Bank, we calculate the ratio non-concessional loans over IMF quota.

21. These indicators are: Debt Service over Exports of Good and Services, Interest Payments over Exports of Good and Services, Debt over Exports of Good and Services, International Reserves over Debt, Debt over Gross National Product (GNP) and Interest payments over GNP. The construction of this index is simple. First, for the case of Reserves over Debt we used the inverse of this

Table 3 presents the typology of sovereign debt crises studied in this paper. This table is constructed by taking into account three considerations: first, the data available for this paper (primary sovereign bond market since 1993) covers countries that, above all, are active on the sovereign bond market; second, the standard definition of sovereign debt crises employed in the early warning models literature; finally, the different types of crises according to the criteria presented above.

A final concern is the connection between sovereign debt crises and currency crises (denoted with an asterisk in Table 3). In order to determine which of the sovereign debt crises are combined with a currency crisis, we construct an index of currency market turbulence, in the spirit of Eichengreen *et al.* (1995)[22]. We find that 10 of the 13 sovereign debt crises also involved currency crises during the 12 months prior to or following the debt crises[23]. In particular, in 64 per cent of the cases, a sovereign debt crisis precedes a currency crisis in the 12 months prior to the onset of the currency crisis (Annex 4 examines how sovereign debt and currency crises are linked).

Table 3. **Typology of Sovereign Debt Crises**



Note: * denotes countries that experienced also a currency crisis in the 12 months prior and following the sovereign debt crisis. See Annexes 4 and 5 respectively for the definition of currency crises and the combination of both crises (currency and sovereign debt crises).

Source: Author's calculations based on S&P's, GDF - Global Development Finance - (World Bank database), IFS -*International Financial Statistics* - (IMF database), *The Economist* (various editions), *OECD Economic Surveys* and *CRS Reports for Congress*, 2007.

The sovereign debt crises in Table 3 can be reclassified in two groups, depending on the fragility of the public sector or the capacity of governments to repay public debt. The first group consists of all countries exhibits both of these characteristics: that is, post-default restructuring

indicator. Second, we give the same weight to each indicator according to its evolution for Middle Income countries during the period 1995-2002 (the period that encloses the entire crises sample) and to its value.

22. See Annex 3 for a detailed description of the construction and results of the index.

23. These crises are Argentina (2001), Brazil (1998), Dominican Republic (2005), Indonesia (1997), S. Korea (1997), Mexico (1995), Russia (1998), Thailand (1997), Turkey (2000), Ukraine (1998) and Uruguay (2003).

type as well as countries inside the IMF package type with public bonds vulnerabilities. For the remainder of this paper, we classify these countries as "sovereign default risk countries" or "public finances difficulties" (PFD) countries. In the second group ("no PFD countries"), sovereign debt crises are caused above all by liquidity, banking and/or balance-of-payment problems. The countries involved in the second group are pre-emptive default countries as well as no public bonds vulnerabilities countries receiving a large IMF package.

From public information we can derive the high risk of default of the international public debt (and in particular of the international public bonds) of PFD countries prior to crises. Annex 5 presents the structural debt state of crisis countries prior to the crisis itself. Standard debt indicators constructed from (at least ex-post) publicly available information show that between one and three years prior to the onset of a crisis, PFD countries presented characteristics of higher credit risk than those of other middle-income countries[24].

In that context, good knowledge of the public sector and in particular of the credit risk of governments to pay international debt issued in the capital markets provide sufficient information for determining the probability of default of the public debt of emerging countries. The next section argues that given the strong connection between investment banks and governments in the sovereign bond market, investment banks were better informed than investors about sovereign debt crises and in particular in crises that originated in what we have called PFD countries.

24. For middle-income countries we take the average of the period 1995-2002. The result is practically the same if we use the crisis date (see Annex 2).

V. THE PRIMARY BOND MARKET IN SOVEREIGN DEBT CRISES

In this section, we test the efficiency of the sovereign bond market through the structure of the primary bond market and during sovereign debt crises. In perfectly competitive markets, it is assumed that prices are publicly known and all agents are price takers. In that context, it is supposed that each agent knows characteristics of utility functions and consequently outcomes for all agents present in the market. One of the implicit assumptions is that all goods are perfectly observable to all market participants. It follows that market inefficiencies arise when information is asymmetrically available to market participants. This inefficiency commonly takes place in cases of adverse selection (Akerlof, 1970). In this event, the principal (buyer) does not perfectly know all the characteristics of the good offered by the agent (seller).

In the case of the bond market (see Tirole, 2006 for an in-depth review of the literature), information asymmetries could be present in the event in which final buyers (investors) do not have all existing information concerning the quality of the sovereign bonds sold by issuers (governments). It also arises when there is asymmetric information among investors as well as between issuers and underwriters (see Amaro de Matos, 2001 for a review of the theoretical literature).

In this paper, we analyse market inefficiencies in the sovereign bond market through the informational advantage that investment banks, acting as underwriters, may have over investors. To do this we use the primary bond market, where we have information regarding both the price paid by investors for sovereign bonds as well as the fee paid by governments to investment banks to place the bonds. More precisely, during the issue of a sovereign bond (similar to that of equity or corporate debt issuance); governments pay a fee (i.e. the underwriting spread or underwriting fee) to investment banks to place the bonds in the market.

We use the sovereign bond spread as a proxy of the price paid by investors. In this way, we may infer the sentiment of investors regarding the economic and financial situation of emerging countries. Furthermore, the fee may contain important information about investment banks' perception of sovereign risk. Acting as underwriters, investment banks are faced with important risks in the event of government default. These risks are related to the banks' reputation and the transaction itself.

Investment banks could incur a loss of reputation in the event of government default. Viewing the sovereign bond market historically, Flandreau and Flores (2007) show the role of underwriters' reputations in guiding investors' portfolio allocations. Concerning the corporate market, Michel and Shaked (1990) argue that prestigious underwriters may charge higher fees to compensate for the potential damage to their reputation in case the issuer defaults. Similarly, by

controlling for the endogenous match between issuers and underwriters[25], Hua Fang (2005) finds that reputable banks charge higher fees, which can be interpreted as economic rents on reputation[26].

With regard to the transaction, investment banks are exposed to the issuer's liquidity problems. Indeed, even in a "best effort" (financial intermediaries pledge to help find customers to purchase as many bonds as possible, but do not have to acquire a single bond if there are no buyers) distribution system, investment banks can incur some risks. Firstly, they have to buy the issue before selling it on to the investor and are faced with a "settlement risk"[27]. Secondly, they 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. As written in the bond prospectus, although the underwriter bank is not mandated to make a secondary market for the bonds, it plans to make one[28]. According to interviews in origination departments of investment banks, "market making" activities on the secondary market can even extend until the maturity of the bond[29].

A simple version of the structure of the sovereign bond market is summarised in Figure 1, which illustrates the interactions among actors in the sovereign bond market throughout the execution of financial transaction. The participation of investors on the primary market and/or their participation on the secondary market (by buying or selling securities) are all done via investment banks. Most of investment banks' income is derived from these transactions[30]. In particular, the fee is deducted to governments by investment banks from the price offered to investors in the primary market and it is fixed between investment banks and governments prior to the determination of the price of the bond in the primary market[31].

25. This research is critical towards Livingston and Miller (2000) and James (1992), in the context in which it takes into account that reputable banks may have chosen (self-selected) to underwrite higher quality issues precisely out of reputation concerns. Thus, this article argues that "failing to control for this type of self-selection could lead to incorrect conclusions".

26. 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.

27. Interviews with market participants suggested that "best efforts" is the distribution system used in the emerging sovereign bond market. However, in some interviews, it appears that some issues are partially back-stopped and consequently it could produce a loss of capital for investment banks. Interviews were achieved to the Origination departments of the following investment banks in Wall Street: Bear Stearns, Citibank, Deutsche Bank, Goldman Sachs, JP Morgan, Lehman Brothers, Merrill Lynch and Morgan Stanley.

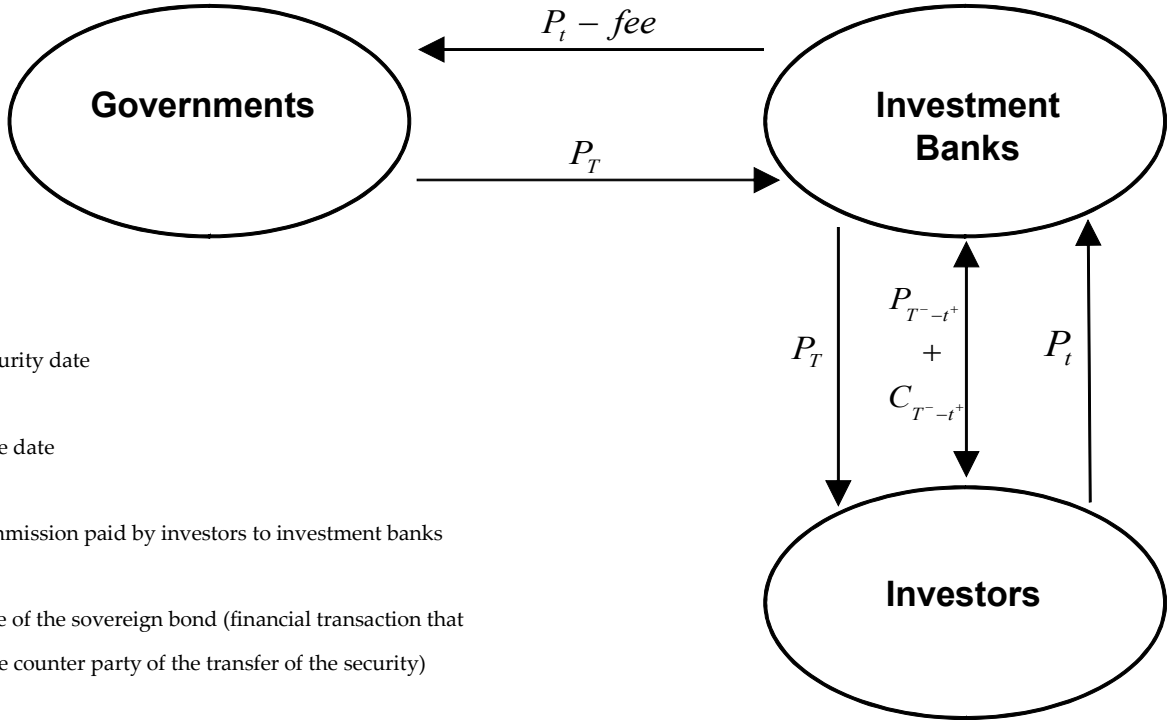
28. For instance, see the Prospectus supplement of US$750,000,000. Federative Republic of Brazil. 10.5 per cent Global Bonds Due 2014. July 7, 2004: "Brazil (the issuer) has been advised by the underwriters that the underwriters intend to make a market in the global bonds but are not obligated to do so and may discontinue market making at any time without notice. No assurance can be given as to the liquidity of the trading market for the global bonds."

29. The question asked to origination departments of investment banks was "How long does a lead manager make a market in the secondary?". For more than a half of the managers interviewed the market making activities can remain for all the duration of the bond.

30. More precisely, investment banks' income is derived from "underwriting" activities (fee) as well as from trading activities in the secondary market (commissions charged to investors between the issue date and the maturity date).

31. For instance, in the Global bond issued by the Republic of Turkey on 12 July 2006 (91/2 per cent Notes due January 15, 2014), the public offering price was 108.62 per cent of the amount issued, the fee was 0.125 per cent of the amount issued and consequently the proceeds to the Republic of Turkey was 108.495 per cent. For more information about the prospectus of sovereign bonds see http://www.secinfo.com

Figure 1. **Structure of the Prices in the Sovereign Bond Market**



Where:

T : Maturity date

t : Issue date

C : Commission paid by investors to investment banks

P : Price of the sovereign bond (financial transaction that is the counter party of the transfer of the security)

fee : Underwriting spread paid by governments to investment banks

Aside from the role of intermediaries between issuers and investors, one of the most important responsibilities of investment banks, acting as underwriters, concerns the transmission of information to capital markets. Before the bond is introduced to the market, lead-managers play an essential role in publicising a bond, promoting activities such as presentations, conference calls and publications[32]. This information given to investors is crucial to achieve a successful issue in the eyes of governments, which assume a high primary price with respect to the intrinsic risk.

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

32. Presentations are prepared for investors in major financial places and they concentrate on the macroeconomic situation of the country and the main characteristics of the bond. These presentations, known in the jargon as "road shows", are not formally required.

country confers a privileged vantage point over both economic aspects as well as the behavioural patterns of the government that manages it[33].

One could therefore argue that investors do not hold all information concerning risks attributed to securities issued by governments. More precisely, we could assume that investment banks could have an informational advantage over investors concerning the risks of the sovereign bonds issued by emerging countries given the direct and strict link they have with issuers[34].

In particular, this information problem can arise when the credit risk of the issuer is considerable. This is the case of PFD 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 (Annex 5), investment banks may be better informed than investors about these risks. This can be explained by the strict and close connection between investment banks and governments through the sovereign bond market and by weak incentives for international investors to learn about individual countries (for this last point, see Calvo, 1998).

In order to test the efficiency of the sovereign bond market, we analyse the behaviour of market participants prior to stress testing scenarios. Indeed, by studying prices before sovereign debt crises, we observe the perception of investment banks and investors concerning the quality of "bad" countries. Empirically, this is related above all to "bad" countries in which public finance difficulties of the issuers could be observed prior to crises[35]. This empirical analysis is restricted to "bad" countries that were active in the international primary bond market prior to sovereign debt crises.

In order to test market inefficiency in the emerging sovereign bond market, the null hypotheses used in this paper are the following:

Hypothesis 1: Prior to sovereign debt crises, investors are not perfectly informed regarding the quality of the sovereign bonds issued by risky countries. By contrast, investment banks observe this risk prior to the onset of crises. (H1).

Hypothesis 2: This information problem is above all present in PFD countries (i.e. sovereign default risk countries) (H2).

Both hypotheses are conditional to risky countries being active in the primary market prior to debt crises (i.e. issuing sovereign debt).

33. One of the investment banks interviewed pointed out that: "the information you get from underwriting is very important – not insider information, but a lot of knowledge on what a sovereign tends to do".

34. Note that this event contrasts with the standard framework for explaining the *raison d'être* of banks. As monitors and performers of screenings of the borrowers, banks reduce information problems between depositors and borrowers prior to the selection of borrower (adverse selection problem) and during the loan (moral hazard problem). See Freixas and Rochet, 1997 for a large review of the microeconomics of banking.

35. Empirically, this is present to countries belonging to post-default events (by contrast to pre-emptive events in which liquidity risk is considerable) as well as to the large IMF package given to public finances difficulties countries.

The hypotheses mentioned above are validated when prior to sovereign bond crises the fee of "bad" countries is higher than it would have been by analysing only sovereign bond spreads (hypothesis 1). Moreover, by differentiating among sovereign debt crises, we note this effect is above all present in countries that present sovereign risk difficulties (hypothesis 2).

These hypotheses argue that there is valuable information provided by the cost paid by sovereign debtors to investment banks and that sovereign bond spreads do not capture all this information[36]. By contrast, under perfectly competitive markets (i.e. alternative hypothesis), sovereign bond spreads of "bad" countries can explain the behaviour of the fee prior to crises. Indeed, in that event, investors as well as investment banks observe perfectly "bad" countries and we are in an efficient market context.

Stylised Facts

In order to analyse the behaviour of investors and investment banks during sovereign bond crises, we proceed as follows. First, we analyse the path of the fee and sovereign bond spreads prior to and after the onset of crises. Second, we compare the crisis countries' fee (prior to the onset of the sovereign debt crises) with respect to those observed for other countries during the period 1993-2006.

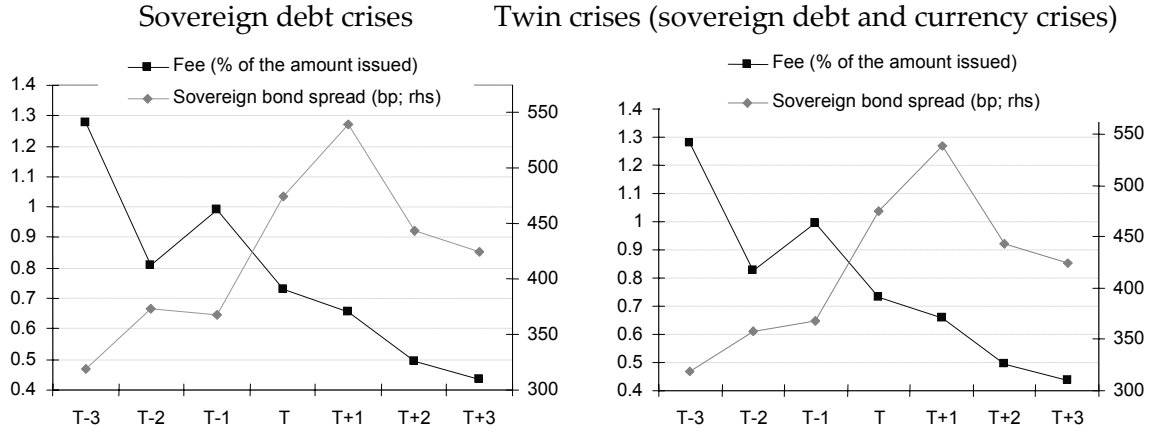
In Figure 2, we present annual data tracking the evolution of the fees and the sovereign bond spreads around the sovereign debt crises and the combination of both sovereign debt crises and currency crises (twin crises in the figure). Prior to the onset of sovereign debt crisis (T<0 in the figure), fees are very high. Indeed, the compensation for default risk goes directly to investment banks because at the same time the perception of the risk of investors increases relatively little. In this respect the perception of risk of investment banks differs from that of investors. Investment banks continue to act as lead manager, placing the public bonds of risky countries, but they also demand a much higher compensation for their services. On the other side of the market, however, investors continue to price these securities at a relatively low level of risk.

In contrast, when a crisis begins (T in the figure), sovereign bond spreads shoot up due to a dramatic reduction in demand for these bonds. Indeed, as we approach the crisis entry point, the spread increases considerably while investment banks' remuneration declines. During the crisis (T+1), primary bond spreads continue to increase, as the few issues coming to market have

36. In that context, investors' losses occurred at default date are higher than in an efficient market. By contrast, due to market inefficiency investment banks are likely to obtain higher profits than in perfectly competitive markets. They collect high compensations through the primary bond (i.e. the fee) and the secondary market (i.e. commissions given the large number of transactions taken place through investment banks before the onset of the debt crisis). Moreover the existence of market inefficiency is likely full of trade-offs for issuers and consequently for the emerging economy. First, given inefficiencies it is probable that issuers pay a higher fee and by contrast they offer a "bad" bond at a higher price than in a perfectly competitive market. Second, there is a crucial indirect effect related to the default/crisis. Given market inefficiency, crises could be avoided given uncertainty of a large amount of investors concerning "bad" countries. Investors continue to buy bonds issued by "bad" countries and several crises could be avoided. In a perfectly competitive environment, self-fulfilling effects can trigger crises and subsequently considerable reductions in the output. However, we could argue that market inefficiency could induce governments to increase debt outstanding and postpone crises with a higher debt burden and more important fundamental problems. In this case market inefficiency could aggravate the debt crisis.

a fee lower than in T<0. Indeed, default countries practically disappear from the primary bond market after a crisis erupts, given the highly increased risk perception of investors. Finally, as we move away from the onset of the crises, the spread on sovereign bonds decreases again but remains at a higher level than prior to the crisis.

Figure 2. **Fee and primary sovereign bond spread around sovereign debt and currency crises (annual basis)**



Note: T is the onset of the crisis. Non-overlapping crises episodes are used. Statistical analysis is reported in Annex 6.

Source: Author's calculations.

This has interesting implications. Lead managers seem to anticipate crises and then demand a high fee from governments in order to place the bonds (publicity, book-building construction and participation in the secondary market). In contrast the considerable risk of these underwriting banks does not seem to be apparent to investors early on, who continue to buy bonds at a relatively high price. The informational advantage of investment banks increases their income thanks both to the fee paid by governments and the financial transactions undertaken with investors. Finally, as we approach the onset of the crisis, the difference between fees and sovereign bond spreads decreases given the decreased informational advantage among investors and investment banks. Information concerning the proximity of the crisis is largely known in the market and consequently payment of the risk premium is not restricted to financial intermediaries.

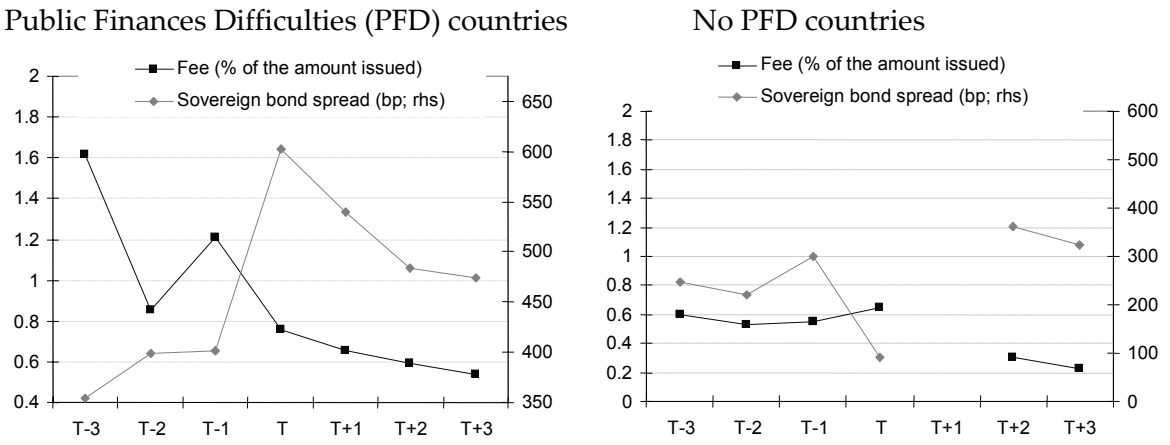
In order to confirm the results presented in Figure 2, we independently regress fees and primary sovereign bond spreads against annual dummies for the 11-year window (from year 5

prior to the onset of the crises to year 5 after the onset of the crises) centred on the onset of crises (date T). These results are presented in Annex 6[37].

Concerning the fee, only the three, two and one year dummies prior to crises are positive and significant at 1 per cent. Indeed, what it is reflected in the fees surrounding crises is above all the high remuneration paid by governments to investment banks prior to crises. By contrast, the sovereign bond spread reacts to crises after the fee. The reaction of the sovereign bond spread is large and significant at 10 per cent during and one year after the onset of crises.

It is useful to differentiate market reaction to the different kinds of crises. As mentioned above, sovereign bond crises may be classified into four different types. Countries which defaulted followed by post-default restructuring group as well as those where IMF packages and public bonds vulnerabilities are present (i.e. PFD countries or sovereign default risk countries) would have had to pay a large amount of money to underwriting banks prior to crises to compensate for a higher default probability. This result contrasts to the experience of the second group of countries, which have undertaken pre-emptive debt restructurings in order to avoid default or countries without public bond difficulties and which obtain large package loans from the IMF (see Figure 3).

Figure 3. **Fee and primary sovereign bond spread around different types of sovereign debt crises (annual basis)**



Note: *T* is the onset of the crisis. Non-overlapping crises episodes are used. Statistical analysis is reported in Annex 7.

Source: Author's calculations.

Two conclusions may be drawn from this. Firstly, in the case of PFD countries, investment banks demand a high fee prior to crises, which decreases once the crisis is underway.

37. We calculate the annual average of the fee and primary sovereign bond spread from the total sample (436 issues). Both variables are regressed independently against the time dummy variables. For that purpose we use 149 issues realized by "bad" countries during the 11-year window around crises.

At the same time, sovereign bond spreads remain stable. Secondly, for the countries in which there are no public finances vulnerabilities, results differ to those above. The fee remains stable prior to and at the onset of the crisis.

Investment banks' and investors' behaviour differ depending on the type of crisis. Investment banks demand a high fee from countries that exhibit a considerable risk of sovereign default. The decrease of the fee at the onset of the crisis could be explained by the fact that investment banks no longer hold a monopoly of information and other players in the market must be compensated for the risk of crisis, through a reduction in the price of the bonds.

In contrast, countries that demonstrate only liquidity or banking-balance of payment risks have to pay a small and stable fee prior to the onset of crisis. This is the case of two contagion countries (Ukraine 1998 and Uruguay 2003) that suffered economic and financial crisis after Russian and Argentinean defaults respectively, as well as Indonesia and Thailand with balance of payments crises[38].

Results presented in Figure 3 are confirmed statistically and reported in Annex 7. Using the same methodology presented above for the case of all sovereign debt crises, we note that for the case of countries that exhibit considerable sovereign default risk, the fee is high and statistically significant at 1 per cent between one and three years prior to crises. Sovereign bond spreads react to crises after the fee: this effect is high and significant at 1 per cent during the onset of crises.

By contrast, for countries that exhibit only liquidity or banking-balance of payment risks, fees as well as sovereign bond spreads are not statistically significant for any of the 11-year window dummy variables.

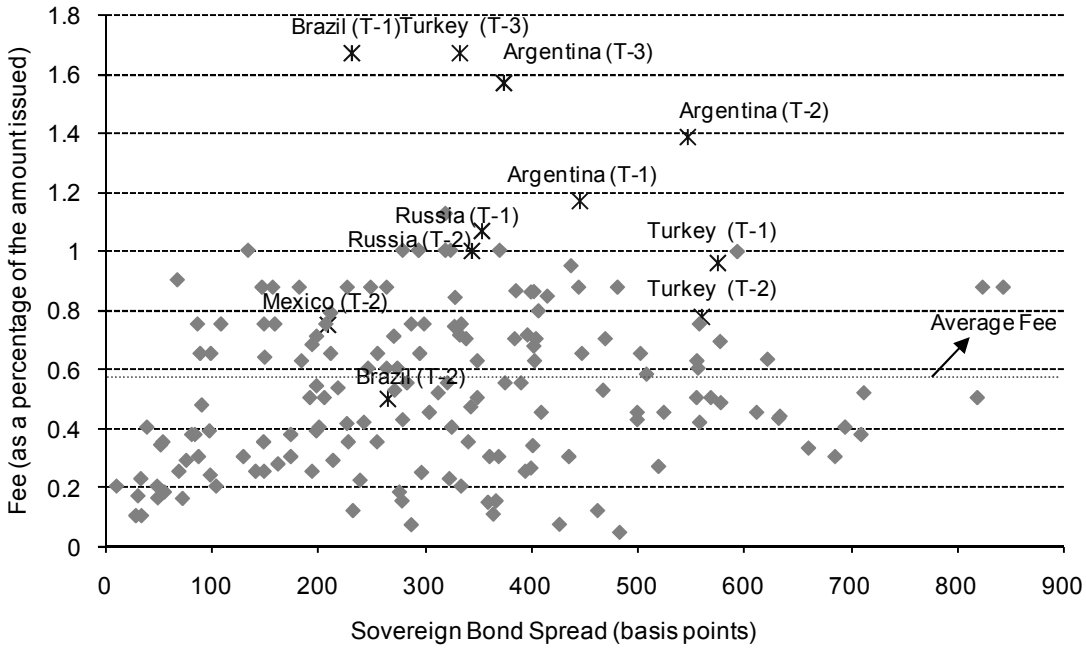
When we analyse the subset of countries that present public financing difficulties and currency crises (Annex 7), the outcome is the same as in the case of only PFD countries. Investment banks demand a high fee three, two and one years prior to crises. This result is significant at 1 per cent. This occurs in most cases of sovereign debt crises due to public finances difficulties followed by currency crises in the last years (Argentina 2001, Brazil 1998, Mexico 1995 and Russia 1998). We note that for countries with sovereign default risk, sovereign bond spreads increase considerably at the onset of crises and this result is significant at 1 per cent. Indeed, investors react only at the onset of crises.

Finally, we compare fees with sovereign bond spreads during the period 1993-2006 for the total EMBI global countries, by differentiating between countries that encounter public financing difficulties and those that do not. More precisely, we compare fees and sovereign bond spreads prior to crises compared to those for other events.

38. In some of the "No PFD countries" (in particular Asian countries), first-generation and second-generation crisis models fail to explain these crises given the financial vulnerability of these countries (see Reisen, 1998). This result contrasts with the role of fiscal policy and credible economic policies in the first and second generation models (Braga de Macedo and Reisen, 2003) that could explain (at least ex-post) most of the crises in "PFD countries". For a review of the literature on crises in emerging countries and in particular on the "generations of crisis models", see Krugman (2003).

Figure 4 shows the average annual fee and primary sovereign bond spreads. Blue squares indicate the fee/bond spread between T-3 and T-1 prior at the onset of crisis[39]. As we can observe from this figure, fees are substantially higher (given the bond spread) for PFD countries relative to other emerging countries. On average, sovereign default risk countries had to pay 1.10 per cent of the amount issued to investment banks between one and three years prior to the onset of crisis, almost twice the emerging countries' average during the sample period (0.56 per cent). By contrast, when we compare the level of primary sovereign bond spreads between one and three years prior to crisis with respect to the total for emerging countries, we find that the former is on average only slightly higher than the latter (385 bp vs. 319 bp) and well lower than the primary sovereign spread at the onset of this crisis (603 bp).

Figure 4. Fees and primary sovereign bond spreads (1993-2006, annual basis)



Note: The fee and sovereign-bond spread for countries between one and three years prior to sovereign debt crises (date *T*) are highlighted in bleu. The Argentinean crisis was in 2001, the Brazilian in 1998, the Mexican in 1995, the Russian in 1998 and the Turkish in 2000.

Source: Author's calculations based on Dealogic, 2007.

Econometric Analysis

In order to test hypotheses H1 and H2 presented above, we build a simple cross-sectional time series analysis. The study covers the period starting in 1993 and ending in 2006 and the countries are those included in the EMBI Global index. We begin with a standard OLS estimation

39. More precisely, in this figure we expose by red squares, countries that presented public finances difficulties and currency crisis.

using fees, primary bond spreads and a set of dummy variables to differentiate between countries that do or do not encounter sovereign debt crises during the years around crises. Consequently, the following panel data regression model is used:

$$fee_{it} = \alpha_1 + \alpha_2 \cdot SBS_{it} + \sum_{K=-5}^{5} \beta_K (T+K)_{it} + \varepsilon_{it}$$

where fee_{it} corresponds to the underwriting spread received by investment banks from country *i* in period *t* and is denoted in percentage of the amount issued; SBS_{it} represents the primary sovereign bond spread, $T+K_{it}$ is a dummy variable that takes the value of 1 for countries placed at the year *K* with respect to the onset of crisis (*T*) and 0 otherwise.

In order to test the first hypothesis, we observe if prior to sovereign debt crises the fee of "bad" countries is higher than it would have been by analysing only sovereign bond spreads. In the equation presented above this hypothesis is validated when some (or all) of the dummy variable coefficients prior to crises (from beta -5 to beta -1) are positive and statistically significant. Depending on which coefficients are significant, we can first conclude if this hypothesis is validated and second determine how long prior to the onset of crisis investment banks observe "bad" countries. The alternative hypothesis is that coefficient alpha 2 is significant and dummy variable coefficients prior to crises (from beta -5 to beta -1) are not significant. In that event, investment banks observe "bad" countries at the same time investors do.

We use the same procedure to test the second hypothesis. We only differentiate among sovereign debt crises in order to test that the information advantage of investment banks over investors is present above all in PFD countries. To that end, the set of dummy variables are differentiated by type of crisis: *i)* Sovereign debt crises that are not caused by public finances difficulties (pre-emptive defaults and IMF package in order to avoid balance of payment crises). *ii)* Sovereign debt crises that are caused by public finances difficulties (debt restructuring following default and IMF large package for countries with public debt vulnerabilities). *iii)* Sovereign debt crises that are caused by public finances difficulties and accompanied by currency crises as well.

Results are presented in Annex 8. The most important findings are as follows. First, as expected, there is a positive relationship between fee and primary sovereign bond spread. However the impact of primary sovereign bond spread on fee is limited. An increase of 100 bp of the bond spread implies an increase of only 0.03 per cent of the fee.

Second, by including the $T+K_{it}$ dummy variables, hypothesis 1 is validated. Prior to crises, investment banks charge a high fee to "bad" countries and this is not captured by investors. More precisely, three, two and one year dummy variables prior to the onset of sovereign debt crises ($T-3$, $T-2$ and $T-1$) are high, significant at 1 per cent and improve the fit of the regression. For instance, one year prior to crises, "bad" countries paid 0.47 per cent of extra fee and this result is statistically significant at 1 per cent. We obtain similar results by analysing twin crises (sovereign debt and currency crises). Between one and three years prior to

the onset of sovereign debt crises, investment banks charge a high fee. For these years, dummy variables are also significant at 1 per cent.

Finally, by differentiating among sovereign debt crises, hypothesis 2 is validated. When we divide the sovereign debt crises into two groups that depend if countries present sovereign default risk or not the results differ considerably. Indeed, when we study no PFD countries, we find that dummy variables prior to crises are not statistically significant and the values of the coefficients are small. By contrast, when we take into account only PFD countries, the fixed cost paid to investment banks prior to crises is high. Investment banks begin charging high fees to "bad" countries three years prior to crises. Dummy variables for three, two and one year prior to crises ($T-3$, $T-2$ and $T-1$) are high and significant at 1 per cent. Moreover, when we restrict the analysis to countries where sovereign default risk is associated with currency crises, the additional cost of the fee is high and again significant at 1 per cent one, two and three years prior to sovereign debt crises and improves the fit of the regression considerably. For instance, one year prior to the onset of debt crises, banks charge a fixed cost of 0.68 per cent of the amount issued to "bad" countries.

From the results presented above we can conclude firstly, that investment banks are informed about sovereign debt crises before investors and between one and three years prior to crises (between $T-3$ and $T-1$). Secondly, this result is particularly evident for crises presenting sovereign default risk.

In order to verify the robustness of these results and in particular the hypotheses H1 and H2, first we check the time effect by constructing a fixed time effects model that investigates how time affects the intercept using time dummy variables. Second, we introduce an interactive dummy variable with the purpose of testing whether the slope of the dummy crisis variable (which takes the value of 1 for "bad" countries between $T-3$ and $T-1$ year prior to a sovereign debt crisis and 0 otherwise) is equal to that of the sovereign bond spread of the total emerging countries[40].

We introduce this interactive dummy variable in order to determine the impact of both the intercept and interactive effect in the regressions. In this context, if shifts in the regression are attributable only to the interactive dummy variable, then the fee for "bad" countries can be totally explained by the sovereign bond spread. In the opposite case (i.e. only the intercept is significant), it signifies that "bad" countries have to pay an additional fixed cost to underwriting banks (this cost is of course not explained by sovereign bond spreads).

40. More precisely, the following panel data regression model is used:

$$fee_{it} = \alpha_1 + \alpha_2 \cdot SBS_{it} + \alpha_3 \cdot crisis_{it} + \alpha_4 \cdot SBScrisis_{it} + \alpha_5 \cdot TD_i + \varepsilon_{it}$$

where fee_{it} corresponds to the underwriting spread received by investment banks from country *i* in period t and is denoted in percentage of the amount issued, SBS_{it} represents the sovereign bond spread, $crisis_{it}$ is a dummy variable that takes the value of 1 for countries placed prior to the onset of a sovereign debt crisis (between T-3 and T-1) and 0 otherwise. $SBScrisis_{it}$ is defined as the product of SBS_{it} and $crisis_{it}$ and finally TD_i is a time dummy variable for each year (from 1993 to 2006).

Results are presented as follows. First, we analyse the relationship between fees and sovereign bond spreads by using just the sovereign bond spread as an explanatory variable and by introducing time dummy variables for each year (from 1993 to 2006).

Second, we include time dummy variables in order analyse the behaviour of investment banks and investors prior to sovereign debt crises.

Third, in order to test if the crisis dummy variable that we have introduced into the regression model is for shifts in the intercept of the regression, we introduce the slope of this dummy variable (i.e. interactive dummy variable between crisis and sovereign bond spreads).

Finally, in order to test hypothesis 2, we replicate the analysis presented above by differentiating between the different types of sovereign debt crisis.

Results are presented in Annex 9. First, we find that the positive relationship between the fee and sovereign bond spread is limited. An increase of 100 bp of the sovereign bond spread amplifies the fee by only 0.041 per cent of the amount issued. Additionally, using a fixed time effects model considerably improves the fit of the regressions. Indeed, from 1999 to 2006, time dummy variables are statistically significant and the impact of time on the fee is negative and increases over time suggesting that during the last years the reduction of the fee has been noteworthy given the primary bond spread.

Second, by using a fixed time effects model we confirm the main results exposed above and we can validate hypothesis 1. In particular, prior to sovereign debt crises, "bad" countries paid a larger fee to investment banks than other emerging countries (0.18 per cent of the amount issued). When we add the interactive dummy variable to the fixed time model we cannot reject the hypothesis that the two regressions (with and without the interactive dummy variable) have the same slope. Indeed, the crisis dummy variable alone is responsible for shifts in the intercept of the regression (significant at 10 per cent however) and the fixed cost paid by ¨bad" countries to investment banks remains high prior to the onset of crises. We find the same results for the case of the twin crises (a combination of both sovereign debt and currency crises).

Finally, when we differentiate with respect to the types of crises and by using a fixed-time effects model, no PFD countries paid a fee similar than the rest of emerging countries (the t-statistic is not significant and the coefficient is close to zero). By contrast and as expected, for countries with sovereign default risk, the fixed cost to issue sovereign debt between one and three years prior to crisis is high (0.24 per cent of the amount issued) and is significant at 1 per cent. Including only countries exhibiting simultaneous sovereign default risk and currency crises, we obtain that its impact on fee is significant (t-statistic at 1 per cent) and considerable (0.28 per cent of the amount issued).

By including the interactive dummy variable for each of the sovereign debt crises events presented above, we find that it is not significant and consequently the impact of crises on the fee is only through the intercept (however for the case of countries with sovereign default risk, the differential slope is paradoxically negative and significant at 10 per cent). We confirm hypothesis 2: PFD countries have to pay a high fee to investment banks (0.54 per cent of the issue) and this result is significant at 1 per cent.

The most important results from this empirical study are as follows. First, investment banks are informed about sovereign debt crises well before investors (whose perceptions are measured through the sovereign bond spread), and between one and three years prior to these crises. Investment banks' behaviour stands in stark contrast to that of investors during crisis periods. Prior to the onset of a crisis, results suggest that investment banks have an information advantage, and are practically the only ones compensated to cover the risk of crisis (hypothesis 1).

Second, investment banks do not deal equally with all crisis countries. Indeed, by differentiating among the types of sovereign debt crises, we find that before crises investment banks charged on average a higher fee to PFD countries with respect to other sovereign debt crises countries (hypothesis 2).

VI. THE UNDERWRITING FEE AND FINANCIAL MARKETS ACTORS

As underlined in the previous section, the fee holds important information on investment banks' sentiments regarding the credit risk of issuers. In this section, we present preliminary results on investors' perceptions and investment banks' analysis concerning the "investment value" of the underwriting fee.

Fees can be consulted in capital markets information databases such as Bloomberg. These hold valuable information on primary bond markets, such as fee, name of lead managers (or book-runners), amount outstanding, the sovereign bond rating, and bonds' issue characteristics. Moreover, as noted before, there is also a database dedicated exclusively to the analysis of primary market issues (Dealogic's DCM Analytics).

Although investment banks have no obligation to submit deal information and consequently fees for issues, they have the incentive to provide this information as 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 alike, in a highly competitive field where the reputation of each investment bank is measured in market share[41].

Thus, while information on the fee is available, it is not accessible at pricing day or the day of the issue. In fact, there is a lag between an issue's announcement date and the day that financial databases release information on the fee. On average, this information is released a few days after the date of issue[42]. According to a team member of Dealogic at the end of 2007 "for about 80 per cent of large deals (more than USD 200 million equivalent) we should have the fee within 1 day. For the remaining 20 per cent would be on average within one week. For smaller deals (e.g., small MTNs, etc) it may take 2-3 weeks until we receive the pricing supplement".

Because market actors have access to fee information after the issue date, it could be convenient to study secondary market prices in order to determine the advantage of information that investment banks could have over investors.

To that end, we employ secondary sovereign bond spreads in order to determine investors' behaviour. More precisely, we replicate the analysis presented above and we use EMBI

41. For instance in Bloomberg (2006), there is a detailed analysis of the major investment banks in the primary markets, by comparing fees and market shares among investment banks.

42. For instance, for the Colombian Global Bond 09/08/06 (ISIN number XS0213272122), we obtained from Bloomberg the information concerning the fee 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 during the day of the issue.

Global spread 1 day (EMBI1) as well as 10 days average (EMBIAV10) after the sovereign bond issues used in the sample.

Results are presented in Annex 10 for the case of EMBI1 and in Annex 11 for the case of EMBIAV10. By using a fixed time effects model we confirm the main results presented above and we can validate hypothesis 1 for both secondary sovereign bond spreads (i.e. EMBI1 and EMBIAV10). In particular, we note that the dummy crisis variable (between $T-3$ and $T-1$ prior to the onset of crisis T) is positive and significant at 1 per cent. When we include the interactive dummy variable to the fixed time model, we find that the crisis dummy variable is again positive and significant at 1 per cent for EMBI1 and EMBIAV10[43]. The fixed cost paid by "bad" countries to investment banks remains high prior to the onset of crises (close to 0.60 per cent of the amount issued for both kind of secondary bond spreads).

When we differentiate with respect to the types of crises and by using a fixed-time effect model, t-statistic is not significant for countries that do not have sovereign default risk. By contrast, for the case of countries with sovereign default risk, the fixed cost to issue sovereign debt is high and is significant at 1 per cent. As we further restrict attention to countries simultaneously exhibiting PFD and currency crises, we obtain results similar to the case of PFD countries. By including the interactive dummy variable for each of the sovereign debt crises events presented above, the results differ with respect to the regression fee – primary sovereign bond spread. Indeed, for all sovereign debt crises (excluding no PFD countries), the t-statistics of the slope are significant at 1 per cent. The most important result is that the fixed cost related to the fee paid to investment banks for crises countries is even higher than in the previous regressions and is significant at 1 per cent. For instance, when we study EMBIAV10 spread, PFD countries paid a surplus in the fee prior to crises equivalent to 0.90 per cent of the amount issued. We confirm hypothesis 2. PFD countries have to pay a high fixed fee to investment banks.

A question remains: do investors make use of fees in determining portfolio allocations? This question can be answered by directly questioning investment management firms on the primary bond market. We undertook a survey that analysed institutional investors' perceptions of the structure of the primary sovereign bond market[44]. An aspect of the survey concerns the relevance of the fee to investors. Seven investors of the eight interviewed argue that underwriting fees are of no concern in investment decisions. In particular, most of the investors interviewed argue that because this variable is formed by the connection between investment banks and governments, investors do not have to pay attention to this. Indeed, they attribute importance above all to market variables in which investors play a crucial role (e.g. bond spreads, yield curves or CDS spreads). Finally, investors do not perceive fees as a good indicator of credit risk. Indeed, only one investor attributes any plausibility to that argument[45].

43. By contrast to the regression presented in annex 9 (primary bond spread and fee), the slope coefficient is significant at 5 per cent and paradoxically it is negative.

44. This project was financed by the Chaire Finances Internationales, SciencesPo Paris. This survey was carried out in New York during 2006 and the investment management firms interviewed were Alliance Bernstein, Alliance Capital, Fidelity, GE Asset Management, GMO, Goldman, Invesco and Western Asset.

45. More precisely, 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?"

According to these preliminary results, there appears to be a disconnection between investors' reaction to information available on the primary bond market, and the outcomes presented in the statistical analysis. This questionnaire suggests that investors do not take fee into account and are more attentive to the evolution of other variables. It would thus appear that underwriting fees are not used as a tool in determining portfolio allocations.

Also important for investor decision making are investment banks' publications on emerging sovereign bond markets. We consider more than 600 publications of thirteen investment banks[46] covering the period 1997-2007. This corresponds to research by the most important players in emerging bond markets as Lead Managers (see Table 2). During this period and for the investment banks analysed, the level of fees of sovereign bond issues is not a piece of information given by investment banks to institutional investors and consequently is not analysed in their reports. By contrast, these publications regularly present detailed information related to the primary bond market. In particular, a vast description of the structure of bonds issued (outstanding amount, coupon rate, maturity, primary bond spread, currency denomination,…) is presented, as well as forecasts concerning future public bond issues depending on the public financing needs of each emerging country (see Annex 12 for an example of these forecasts).

Why, therefore, do investors not pay attention to the evolution of fees? This is puzzling in that useful, publicly available information is not tracked by investors to help improve allocation of their emerging market fixed income assets.

A possible hypothesis is that the heterogeneity of information contained in the fees complicates their use as an early warning indicator for investors. Indeed, we have studied standard issues in order to analyze underwriting fees with respect to sovereign bond spreads around sovereign debt crises. It could be that there is a high fixed cost in order to "dissect" underwriting spreads that individual investors are unable or unwilling to incur.

In that context and for future research, it can be useful to determine whether other relevant variables could have an impact on fees. These variables may be associated with the characteristics of the bond issued (e.g. currency denomination, maturity, regulation of the bond), with the issuer (e.g. credit rating), to the investment bank acting as underwriter (e.g. reputation, recommendations given by the underwriter[47]) and/or with external financial conditions.

46. These banks are ABN AMRO, Barclays Capital, Bear Stearns, Citigroup - former Salomon Smith Barney -, Credit Suisse - former Credit Suisse First Boston -, Deutsche Bank, Dresdner Kleinwort Wasserstein, Goldman Sachs, JP Morgan, Lehman Brothers, Merrill Lynch, Morgan Stanley and UBS.

47. In the corporate market, there is a vast literature that studies possible conflict of interest problems between investment banking activities and information given by investment banks to investors. In particular, the relationship between the structure of the primary market and recommendations given by underwriters has been analysed for the corporate market by studying the impact of favourable recommendations on underwriting activities (see Lin and McNichols, 1998; Chen and Ritter, 2000; Ljungqvist *et al.*, 2006; Bradley *et al.*, 2003; Michaely and Womack, 1999).

VII. CONCLUSIONS

This paper has analysed information problems between investment banks and investors during sovereign debt crises, by studying the structure of the primary sovereign bond market.

The findings of this paper are the following. First, we cannot reject the hypothesis that investment banks price sovereign default risk well before crises emerge and even before investors do. This result suggests that investment banks hold an information advantage over investors, and are the only ones compensated to cover the risk of sovereign debt crises. On average, countries with public finances difficulties (PFD) had to pay on average 1.10 per cent of the amount issued to investment banks between one and three years prior to the onset of crisis, almost twice the emerging countries' average during the period 1993-2006 (0.56 per cent). In contrast, when we compare the level of primary sovereign bond spreads before the crisis with respect to the total for emerging countries, we find that the former on average is only slightly higher than the latter (385 bp vs. 319 bp) and well lower than the primary sovereign spread at the onset of a crisis (603 bp). The robustness of this result is verified through panel data analysis. We find that there is an additional fixed cost for crisis countries prior the onset of a sovereign debt crisis with respect to other events. On average, prior to a sovereign debt crisis, countries paid a surplus on the underwriting fee.

Second, investment banks' behaviour differs depending on the type of sovereign debt crisis. By differentiating among types of sovereign debt crises, we find that prior to crises investment banks charged on average higher fees to countries with public finances vulnerabilities compared to other sovereign debt crises countries.

Finally, there is a dichotomy between investors' perceptions concerning the "investment value" of the fee and the results presented above. This is a puzzle in that it appears that investors are not using potentially useful (and public) information in order to allocate efficiently their portfolios of emerging fixed incomes assets.

The major policy implication that follows from this research is that fees paid by governments to investment banks during sovereign bond issues should be closely followed by policy makers and actors in capital markets. This information has been neglected during past sovereign bond crises, while it may have served as an early warning market indicator of sovereign bond crisis, and one perhaps more relevant than standard indicators such as secondary sovereign bond spreads (Edwards, 1984; Grandes, 2002; Duffie and Singleton, 2003) or Credit Default Swap (CDS) spreads (Andritzky, 2003; Chan-Lau, 2003; Ciarlone *et al.*, 2005; Remolona *et al.*, 2007).

ANNEXES

ANNEX 1

Debt restructuring cases and recovery rates

Country	Default year (according to S&P's)	Debt restructuring year (according to IMF, 2006)	Average Trading Price (% of par)*	PV Ratio of Cash Flows** (%)	Nominal Principal Reduction*** (% debt restructured)	Haircut (according to Sturzenegger and Zettelmeyer, 2005)	Weight in the secondary market**** (% total Emerging Sovereign Debt)	Restructuring case (accoroding to IMF, 2006)
Argentina	2001	2005	33	30	56.0	64 -- 82	13.65	Post-default
Dominican Rep.	2005	2005	92	95	0.0	NA	0.39	Pre-emptive
Ecuador	1999	1999–2000	44	60	37.3	19 -- 47	1.32	Post-default
Pakistan	1999	1999	65	65	-1.0	29 --32	NA	Pre-emptive
Russia	1998	1998–2000	18	50	17.2	50 -- 75	6.32	Post-default
Ukraine	1998	1998–2000	69	60	0.0	22 -- 35	NA	Pre-emptive
Uruguay	2003	2003	66	85	1.0	5 -- 20	0.12	Pre-emptive

Notes:

* 30-day post-default price or pre-distressed exchange trading price (Moody's, 2006).

** Ratio of the present value of cash flows received as a result of the distressed exchange versus those initially promised, discounted using yield to maturity immediately prior to default (Bank of England, 2005).

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

**** It corresponds to the weight of each country one month prior to the onset of the crisis (according to the weight of the EMBI Global index calculated by JP Morgan).

Source: Bank of England (2005), IMF (2006), Moody's (2006), Standard and Poor's (2006) and Sturzenegger and Zettelmeyer (2005).

ANNEX 2

Debt Risk index at the onset of crisis

Sample: Non-concessional IMF loans /quota > 100 per cent

	Mexico 1995	Indonesia 1997	Thailand 1997	Brazil 1998	Turkey 2000	Brazil 2001	Middle Inc. 1995-2002
Total Debt Outstanding	**10.6**	**10.9**	**7.2**	**17.0**	**10.2**	**18.1**	**6.7**
/ Middle Income countries (95-02)	1.6	1.6	1.1	2.6	1.5	2.7	1.0
/ Middle Income countries (crisis date)	1.6	1.7	1.1	2.4	1.5	2.7	
Public Debt	**8.6**	**6.2**	**2.0**	**7.0**	**6.7**	**8.4**	**4.7**
/ Middle Income countries (95-02)	1.9	1.3	0.4	1.5	1.4	1.8	1.0
/ Middle Income countries (crisis date)	1.6	1.3	0.4	1.5	1.5	2.0	
Public Bonds	**4.6**	**0.2**	**0.3**	**3.7**	**3.0**	**5.3**	**1.7**
/ Middle Income countries (95-02)	2.7	0.1	0.2	2.2	1.8	3.2	1.0
/ Middle Income countries (crisis date)	3.0	0.1	0.2	2.2	1.6	3.1	

Notes: 1. GDF only calculates these indicators for the Total Debt. We have adapted these definitions to the total outstanding debt, public debt and public bonds.

2. 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 Gross National Product (GNP) and Interest payments over GNP. In order to construct this index, we give the same weight to each indicator according to its value for Middle Income countries during the period 1995-2002 (the period that encloses the entire crises sample).

3. Middle Income countries are defined according to the World Bank (see Data and Statistics at http://www.worldbank.org/). All the countries studied in this paper are included inside this category.

Source: The author from Global Development Finance (GDF).

ANNEX 3

Exchange-Market Pressure Index

The "exchange-market pressure index" captures the three main defences a country has against a speculative balance of payment attack (devaluate its currency, raise interest rates or pay out reserves). Mathematically, the weighted index of exchange-market pressure (EMP) used in this article can be written as follows:

$$EMP_{nt} = \alpha \cdot \left[\frac{E_{nt} - E_{nt-1}}{E_{nt-1}} \right] + \beta \cdot \left[\left(i_{nt} - i_{Ut} \right) - \left(i_{nt-1} - i_{Ut-1} \right) \right] - \gamma \cdot \left[\left(\frac{R_{nt} - R_{nt-1}}{R_{nt-1}} \right) - \left(\frac{R_{Ut} - R_{Ut-1}}{R_{Ut-1}} \right) \right]$$

where $\frac{E_{nt} - E_{nt-1}}{E_{nt-1}}$ is the nominal exchange rate variation for country n's currency in US dollars between time *t* and *t-1* (the time period is in annual basis). i_{nt} and i_{Ut} are respectively the short-term interest rate for country *n* and for the US at time *t*. $\frac{R_{nt} - R_{nt-1}}{R_{nt-1}}$ and $\frac{R_{Ut} - R_{Ut-1}}{R_{Ut-1}}$ are respectively the variation of the international reserves of the country n and the US between time *t* and *t-1*.

Higher values of the index indicate greater levels of exchange-market pressure. Each component of the index is also weighted by the inverse of the standard deviation for each series (the α, β and γ) in order to equalize conditional volatilities and ensure that no single series dominates the index.

The period used to calculate this index starts in January 1990 and ends in August 2007. We use 15 countries, namely Argentina, Brazil, Dominican Republic, Ecuador, Indonesia, South Korea, Malaysia, Mexico, Pakistan, Philippines, Russia, Thailand, Turkey, Ukraine and Uruguay.

The data collected is from Datastream48 and compiled on a monthly basis. We exclude the cases in which countries present an annual rate of inflation (with CPI index data from Datastream) greater than 100 per cent. Indeed, as noted by Kaminsky and Reinhart (1999), "while a 100 per cent devaluation may be traumatic for a country with low-to-moderate inflation, a devaluation of that magnitude is commonplace during hyperinflations".

The final step is to indicate the critical value for the EMP index such that index values above this level qualify as a crisis. We use the criteria used by Eichengreen *et al.* (1995):

48. The exceptions are the exchange rate of Dominican Republic (the Dominican Central Bank is the source) and the International Reserves of Pakistan (the source is the International Institute of Finance -IIF-).

$$Crisis_{nt} = 1 \qquad if\ EMP_{nt} > \mu_{EMP} + 1.5\sigma_{EMP}$$

$$Crisis_{nt} = 0 \qquad otherwise \qquad i)$$

In order to realize a series of sensitivity tests, we change the definition of a crisis used in the equation above. More specifically, we use two more and one less stringent criteria for an event to qualify a crisis. We define a crisis as any month for any country in the sample where:

$$Crisis_{nt} = 1 \qquad if\ EMP_{nt} > \mu_{EMP} + 2.0\sigma_{EMP} \qquad ii)$$

$$Crisis_{nt} = 1 \qquad if\ EMP_{nt} > \mu_{EMP} + 1.0\sigma_{EMP} \qquad iii)$$

$$Crisis_{nt} = 1 \qquad if\ EMP_{nt} > \mu_{EMP} + 3.0\sigma_{EMP} \qquad iv)$$

The results are listed in the table below for the period starting in June 1994 to August 2007. Many of the one-month crisis periods are clearly a single crisis event (e.g. Malaysia 1997-1998, Russia 1998-99, Ukraine 1998-99, Argentina 2001-02). Therefore, we include any crisis-month that occurs within two years of a country's initial crisis as part of a single crisis event (i.e. a country can have at most one crisis every 24 months). By contrast, we exclude crises that are inferior to one month (this is case of Pakistan in October 1998).

Finally, in order to find the peak of the currency crises, we take the date in which we obtain the higher value of the index of exchange-market pressure during currency crises. Mathematically:

$$_{t-23}\overline{EMP}_{nt} \geq {}_{t-23}EMP_{nt} > \mu_{EMP} + 1.5\sigma_{EMP} \qquad v)$$

Where $_{t-23}\overline{EMP}_{nt}$ is the higher value of the EMP index of country *n* taken place during the crisis starting in the month t-23 and finishing in the month t.

The Currency Crisis Events

Country	Peak of the Crisis	$Crisis_{nt}=1 \quad if \ EMP_{nt} > \mu_{EMP}+1.5\sigma_{EMP}$	$Crisis_{nt}=1 \quad if \ EMP_{nt} > \mu_{EMP}+1.0\sigma_{EMP}$
Argentina	Apr-02	Jul-01, Nov-01, Dec-01, From Apr-02 to Sep-02	Jul-01, Aug-01, From Nov-01 to Feb-02, From Apr-02 to Oct-02
Brazil	Mar-99	From Jan-99 to Aug-99, Oct-99	From Jan-99 to Dec-99, From Oct-02 to Mar-03
Dom. Rep.	Feb-04	From Oct-90 to April-91, From Jun-03 to Mar-04	From Mar-90 to Jun-90, From Aug-90 to Jul-91, Dec-01, Feb-02, Mar-02, Sep-02, From Mar-03 to May-04
Ecuador			
Indonesia	Jun-98	From Dec-97 to Oct-98	Jan-01, From Mar-90 to May-90, From Dec-97 to Nov-98
S. Korea	Dec-97	Jan-90, Apr-90, From Nov-97 to Jun-98	From Jan-90 to Aug-90, From Jun-91 to Nov-91, Fom Nov-97 to Jul-98
Malaysia	Jun-98	From Nov-97 to Aug-98, Oct-98, Nov-98	From Oct-97 to Aug-98, Oct-98, Nov-98, Oct-01, Nov-01
Mexico	Mar-95, Sep-98	From Dec-94 to Dec-95, Sep-98, Oct-98	Mar-90, From Dec-94 to Dec-95, From Sep-98 to Jan-99
Pakistan	Apr-01	Nov-98, From Apr-01 to Sep-01	From May-98 to Jul-98, Oct-98, Aug-99, Sep-99, Jun-00, Nov-00, From Jan-01 to Sep-01
Philippines	Oct-97	Jul-97, From Oct-97 to Jun-98, Aug-98	Feb-94, Apr-94, From Jul-97 to Jun-98, Aug-98, Sep-98, From Oct-00 to Jan-01, Mar-01, Apr-01
Russia	Sep-98	From Sep-98 to Apr-99	From May-98 to Aug-99
Thailand	Jan-98	From Jul-97 to Jun-98	From Jul-97 to Jun-98
Turkey	Feb-01	Feb-94, Mar-94, Feb-01, Apr-01, From Jun-01 to Oct-01, Jan-02	From Jan-94 to Mar-94, Feb-98, Oct-98, Nov-98, Jan-99, From Apr-99 to Jul-99, Dec-00, From Feb-01 to Nov-01, Jan-02
Ukraine	Oct-98	From Aug-98 to Jun-99, Aug-99	From Jul-98 to Aug-99, Nov-99, Dec-99
Uruguay	Sep-02	From May-02 to Apr-03	From Jan-02 to Apr-03

Country	Peak of the Crisis	$Crisis_{nt}=1 \quad if \ EMP_{nt} > \mu_{EMP}+2\sigma_{EMP}$	$Crisis_{nt}=1 \quad if \ EMP_{nt} > \mu_{EMP}+3\sigma_{EMP}$
Argentina	Apr-02	Nov-01, From Apr-02 to Jun-02	
Brazil	Mar-99	Feb-99, Mar-99	
Dom. Rep.	Feb-04	Feb-91, Mar-91, From Jul-03 to Aug-03, Jan-04, Feb-04	
Ecuador			
Indonesia	Jun-98	From Jan-98 to Sep-98	From Jan-98 to Jul-98
S. Korea	Dec-97	From Dec-97 to May-98	From Dec-97 to Feb-98
Malaysia	Jun-98	From Dec-97 to Aug-98, Oct-98, Nov-98	Jan-98, Jun-98
Mexico	Mar-95, Sep-98	From Jan-95 to Dec-95	From Jan-95 to Jul-95, Oct-95, Nov-95
Pakistan	Apr-01	Apr-01, Jul-01	
Philippines	Oct-97	Oct-97, From Dec-97 to Apr-98, Jun-98	Oct-97
Russia	Sep-98	Sep-98, Oct-98, Dec-98, Jan-99, Mar-99, Apr-99	Sep-98, Oct-98
Thailand	Jan-98	From Aug-97 to Jun-98	From Oct-97 to Jun-98
Turkey	Feb-01	Feb-94, Mar-94, Feb-01, Apr-01, From Jul-01 to Oct-01	Mar-94, Feb-01
Ukraine	Oct-98	From Sep-98 to Nov-99, From Feb-99 to May-99, Aug-99	Sep-98, Oct-99, Mar-99
Uruguay	Sep-02	From May-02 to Jan-03	Jul-02, Sep-02

Source: Author's calculations based on Datastream

ANNEX 4

The connection between sovereign debt and currency crises

There is a significant link between balance of payment problems and sovereign debt crises, which has been studied in the empirical literature (e.g. Burnside *et al.*, 2003; Reinhart, 2002; Kaminsky, 2006; Herz *et al.*, 2007).

With the purpose of examining how the sovereign debt and currency crises are linked during the period 1994-2007, we calculate conditional probabilities of both crises[49]. The next table shows the results for the case in which we take into account the peak of currency crises:

Conditional Probability of Sovereign Debt Crisis

	Sovereign Debt Crises (t) = 0	Sovereign Debt Crises (t) = 1
Currency Crises (t-12,t) = 1	80%	**20%**
Currency Crises (t-12,t-1) = 1	87%	**13%**
Currency Crises (t-2,t) = 1	93%	**7%**
Currency Crises (t-2,t-1) = 1	100%	**0%**

Conditional Probability of Currency Crisis

	Currency Crises (t) = 0	Currency Crises (t) = 1
Sovereign Debt Crises (t-12,t) = 1	29%	**71%**
Sovereign Debt Crises (t-12,t-1) = 1	36%	**64%**
Sovereign Debt Crises (t-2,t) = 1	64%	**36%**
Sovereign Debt Crises (t-2,t-1) = 1	71%	**29%**

Note: Period: June 1994 – August 2007. Frequency (t): Monthly data. For instance, (t, t-12) represents the interval between the month t-12 and t. Countries: Argentina, Brazil, Dominican Rep., Ecuador, Indonesia, S. Korea, Malaysia, Mexico, Pakistan, Philippines, Russia, Thailand, Turkey, Ukraine and Uruguay.

Source: The author based on the index of currency market turbulence (Annex 3) and the definition of sovereign debt crises (Section IV).

The two main results are the following. First, in 64 per cent of the cases, sovereign debt crisis precedes currency crisis during the 12 months prior to the onset of the currency crisis. Countries presenting this event are Argentina 2001, Brazil 1998, Indonesia 1997, Mexico 1995, Russia 1998, Thailand 1997, Turkey 2000 and Ukraine 1998. By contrast, the probability that

49. We define a conditional probability of the event X conditional to the event Y as P(X/Y) = number of events in which Y precedes X / total number of events Y.

currency crisis occurs before sovereign debt crisis is reduced (13 per cent for an interval period of 12 months). Second, when we include crises taken place during the same month (t), we obtain that 71 per cent of currency crises occur at the same month or after sovereign debt crises (20 per cent for the inverse case).

We can interpret results presented above as the reaction of investors to external debt problems. When the risk of the external debt in an emerging country is considerable, investors decrease their asset positions in this economy by selling assets. The reduction of asset prices is accompanied by speculative attacks over the currency. Consequently, central banks are forced to abandon fixed or semi-fixed exchange rate regimes. This pattern was common in a large majority of sovereign debt crises combined by currency crises during the last years (Argentina 2001, Brazil 1998, Indonesia 1997, Mexico 1995, Russia 1998, Thailand 1997 and Ukraine 1998).

ANNEX 5

Debt Risk Index prior to the onset of a crisis

			Total Debt Outstand.	Over MI countries	Public Debt	Over MI countries	Public Bonds	Over MI countries
DEFAULT Pre-emptive	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**
	Dom 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**
DEFAULT Post-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**
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: The author based on Global Development Finance (GDF)

Notes:

MI refers to Middle Income Countries.

This index is constructed from the following indicators: 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 Gross National Product (GNP) and Interest payments over GNP.

In order to construct this index we give the same weight to each indicator according to its value for Middle Income countries during the period 1995-2002 (the period that encloses the entire crises sample).

ANNEX 6

Stylised Facts. Statistical Analysis

	Sovereign debt crises		Sovereign debt and currency crises	
Year in window	FEE	BOND SPREAD	FEE	BOND SPREAD
-5	0.24843*	40.7731	0.26509	23.0073
	[1.78]	[0.45]	[1.65]	[0.22]
-4	0.20611	58.87307	0.20472	56.35728
	[1.48]	[0.64]	[1.47]	[0.62]
-3	0.77297***	20.0971	0.77157***	17.5814
	[4.83]	[0.19]	[4.80]	[0.17]
-2	0.30071***	75.16733	0.31705***	56.59224
	[2.83]	[1.08]	[2.76]	[0.75]
-1	0.48665***	69.46550	0.48525***	66.9497
	[4.25]	[0.92]	[4.22]	[0.89]
0	0.22412	175.93974*	0.22273	173.42394*
	[1.61]	[1.92]	[1.59]	[1.89]
1	0.15051	240.98142*	0.14912	238.46562*
	[0.77]	[1.88]	[0.76]	[1.86]
2	-0.01240	144.62307	-0.01380	142.10727
	[0.08]	[1.37]	[0.09]	[1.35]
3	-0.07101	125.66197	-0.07241	123.14617
	[0.44]	[1.19]	[0.45]	[1.17]
4	-0.09324	70.78807	-0.09463	68.27228
	[0.48]	[0.55]	[0.48]	[0.53]
5	-0.17574	-15.64360	-0.16213	-61.74273
	[1.10]	[0.15]	[0.83]	[0.48]
Constant	0.50574***	298.47693***	0.50713***	300.99272***
	[20.87]	[18.75]	[21.08]	[19.10]
Observations	169	169	169	169
R-squared	0.26	0.07	0.25	0.07

Absolute value of t statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Ordinary Least Squares

ANNEX 7

Stylised Facts. Statistical Analysis

Year in window	PFD countries		No PFD countries		PFD and currency crisis	
	FEE	BOND SPREAD	FEE	BOND SPREAD	FEE	BOND SPREAD
-5	0.297017	51.2003	0.13985	8.04407	0.29565	49.9873
	[1.61]	[0.41]	[0.63]	[0.06]	[1.60]	[0.40]
-4	0.34155*	24.98359	0.01068	70.46074	0.34018*	23.77059
	[1.85]	[0.20]	[0.05]	[0.54]	[1.85]	[0.19]
-3	1.11091***	5.51E+01	0.35679	-7.28E+01	1.10954***	53.9317
	[6.03]	[0.44]	[0.11]	[0.39]	[6.02]	[0.43]
-2	0.34481***	100.39634	-0.03099	-100.95593	0.37384***	85.05588
	[3.20]	[1.36]	[0.10]	[0.55]	[3.17]	[1.06]
-1	0.70643***	102.94723	-0.01432	-20.28926	0.70506***	101.73423
	[5.39]	[1.15]	[0.06]	[0.15]	[5.37]	[1.13]
0	0.24933	303.58915***	0.08568	-230.28926	0.24796	302.37614***
	[1.65]	[2.95]	[0.27]	[1.25]	[1.64]	[2.93]
1	0.14910	240.49194*	0.00000	0	0.14773	239.27893*
	[0.81]	[1.91]	[.]	[.]	[0.80]	[1.90]
2	0.08285	184.93359	-0.26432	41.21074	0.08148	183.72058
	[0.45]	[1.47]	[0.84]	[0.22]	[0.44]	[1.46]
3	0.03243	175.36694	-0.33932	3,).46074	0.03107	174.15393
	[0.18]	[1.40]	[1.08]	[0.02]	[0.17]	[1.38]
4	-0.09465	70.29859	0.00000	0	-0.09602	69 08559
	[0.51]	[0.56]	[.]	[.]	[0.52]	[0.55]
5	-0.16215	-59.71641	-0.26432	49.71074	-0.16352	-60.92942
	[0.88]	[0.48]	[0.84]	[0.27]	[0.89]	[0.48]
Constant	0.50715***	298.96640***	0.56432***	320.28926***	0.50852***	300.17941***
	[23.20]	[20.05]	[22.57]	[21.80]	[23.34]	[20.16]
Observations	169	169	169	169	169	169
R-squared	0.34	0.11	0.02	0.02	0.34	0.10

Absolute value of t statistics in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%
Ordinary Least Squares
PFD refers to "public finances difficulties" countries

ANNEX 8

Fee, primary sovereign bond spread and debt crises

OLS panel data regression model

(Dependent variable is the fee as a percentage of the amount issued)

	SBS	SDC	SDC and currency crises	No PFD countries	PFD countries	PFD and currency crises
SBS	3.26992e-04**	2.53999e-04**	2.63792e-04**	3.39593e-04**	1.96192e-04*	2.04565e-04*
	[2.52]	[2.11]	[2.19]	[2.56]	[1.69]	[1.76]
-5		0.23807*	0.25902	0.13711	0.28697	0.28542
		[1.73]	[1.63]	[0.63]	[1.57]	[1.56]
-4		0.19116	0.18985	-0.01325	0.33665*	0.33532*
		[1.39]	[1.37]	[0.06]	[1.84]	[1.83]
-3		0.76786***	0.76693***	0.0604	1.10009***	1.09851***
		[4.85]	[4.83]	[0.20]	[6.00]	[6.00]
-2		0.28161***	0.30212***	0.0033	0.32511***	0.35644***
		[2.67]	[2.66]	[0.01]	[3.01]	[3.04]
-1		0.46900***	0.46759***	-0.00743	0.68623***	0.68425***
		[4.13]	[4.11]	[0.03]	[5.24]	[5.23]
0		0.17944	0.17698	0.16388	0.18977	0.18611
		[1.29]	[1.27]	[0.53]	[1.23]	[1.21]
1		0.0893	0.08621	0	0.10192	0.09878
		[0.46]	[0.44]	[.]	[0.55]	[0.53]
2		-0.04914	-0.05129	-0.27832	0.04657	0.0439
		[0.31]	[0.32]	[0.90]	[0.25]	[0.24]
3		-0.10293	-0.1049	-0.3405	-0.00197	-0.00456
		[0.65]	[0.66]	[1.10]	[0.01]	[0.02]
4		-0.11122	-0.11264	0	-0.10844	-0.11015
		[0.57]	[0.58]	[.]	[0.59]	[0.60]
5		-0.17176	-0.14585	-0.2812	-0.15043	-0.15105
		[1.08]	[0.75]	[0.91]	[0.82]	[0.82]
Constant	0.45697***	0.42992***	0.42773***	0.45555***	0.44850***	0.44711***
	[9.63]	[9.97]	[9.87]	[9.28]	[10.94]	[10.90]
Observations	169	169	169	169	169	169
R-squared	0.04	0.28	0.27	0.06	0.35	0.35

Absolute value of t statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

SBS refers to the primary sovereign bond spread

SDC refers to sovereign debt crises

PFD refers to "public finances difficulties" countries

ANNEX 9

Fee, primary sovereign bond spread and debt crises

Fixed time effect model (with interactive dummies variables)
(Dependent variable is the fee as a percentage of the amount issued)

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
SBS	4.10646e-04***	3.66132e-04***	3.79361e-04***	3.69613e-04***	3.74448e-04***	4.10764e-04***	4.11962e-04***	3.36689e-04***	3.62281e-04***	3.38105e-04***	3.57677e-04***
	[4.50]	[4.14]	[4.16]	[4.25]	[4.18]	[4.47]	[4.45]	[3.81]	[4.07]	[3.92]	[4.11]
SDC		0.18477***	0.26294*								
		[3.73]	[1.93]								
Interactive SDC			-0.00020								
			[0.62]								
SDC-CC				0.21333***	0.24316*						
				[4.30]	[1.80]						
Interactive (SDC-CC)					-0.00008						
					[0.24]						
No PFD countries						0,00165	0,03032				
						[0.02]	[0.14]				
Interactive (No PFD)							-0.00011				
							[0.15]				
PFD								0.23700***	0.53846***		
								[4.27]	[2.98]		
Interactive (PFD)									-0.00073*		
									[1.75]		
PFD-CC										0.27532***	0.51316***
										[4.96]	[2.87]
Interactive (PFD-CC)											-0.00058
											[1.40]
Year 1993	-0.05608	-0.0802742	-0.08601	-0.084526	-0.08668	-0.05608	-0.05614	-0.08628	-0,109	-0.09183	-0.10953
	[0.49]	[0.72]	[0.77]	[0.77]	[0.79]	[0.48]	[0.48]	[0.79]	[0.99]	[0.85]	[1.01]
Year 1994	-0.149564	-0.14938	-0.14943	-0.14939	-0.14941	-0.14956	-0.14957	-0.14926	-0.14936	-0.14926	-0.14934
	[1.30]	[1.35]	[1.35]	[1.37]	[1.36]	[1.29]	[1.29]	[1.36]	[1.37]	[1.39]	[1.39]
Year 1995	0	0	0	0	0	0	0	0	0	0	0
	[.]	[.]	[.]	[.]	[.]	[.]	[.]	[.]	[.]	[.]	[.]
Year 1996	-0.09902	-0.14849	-0.15687	-0.15635	-0.15949	-0.09917	-0.10083	-0.14058	-0.15559	-0.14757	-0.15904
	[0.93]	[1.44]	[1.51]	[1.54]	[1.55]	[0.93]	[0.93]	[1.39]	[1.54]	[1.48]	[1.60]
Year 1997	0.07015	0.02146	0.01939	0.02802	0.02683	0.07015	0.07013	0.00792	-0.00545	0.01603	0.00378
	[0.69]	[0.22]	[0.20]	[0.29]	[0.28]	[0.69]	[0.68]	[0.08]	[0.06]	[0.17]	[0.04]
Year 1998	-0.1471	-0.18452*	-0.18386*	-0.19235*	-0.19195*	-0.14712	-0.14735	-0.19178*	-0.19111*	-0.20164**	-0.20026**
	[1.38]	[1.80]	[1.79]	[1.90]	[1.89]	[1.38]	[1.38]	[1.89]	[1.90]	[2.02]	[2.02]
Year 1999	-0.23994**	-0.27082***	-0.26504***	-0.27701***	-0.27467***	-0.23996**	-0.24012**	-0.27725***	-0.25849***	-0.28511***	-0.26948***
	[2.34]	[2.74]	[2.66]	[2.84]	[2.79]	[2.33]	[2.33]	[2.84]	[2.65]	[2.97]	[2.80]
Year 2000	-0.24021**	-0.27504***	-0.27463***	-0.28153***	-0.28127***	-0.24034**	-0.24062**	-0.26615***	-0.25879***	-0.27178***	-0.26543***
	[2.33]	[2.76]	[2.75]	[2.87]	[2.86]	[2.32]	[2.31]	[2.72]	[2.66]	[2.82]	[2.76]
Year 2001	-0.44552***	-0.44801***	-0.45168***	-0.44997***	-0.45133***	-0.44562***	-0.44606***	-0.43431***	-0.43819***	-0.43452***	-0.43749***
	[4.48]	[4.69]	[4.71]	[4.77]	[4.76]	[4.46]	[4.44]	[4.60]	[4.67]	[4.69]	[4.74]
Year 2002	-0.46715***	-0.47382***	-0.47440***	-0.47688***	-0.47702***	-0.46731***	-0.46547***	-0.45265***	-0.45766***	-0.45292***	-0.45676***
	[4.39]	[4.64]	[4.63]	[4.73]	[4.71]	[4.36]	[4.30]	[4.48]	[4.56]	[4.57]	[4.62]
Year 2003	-0.59237***	-0.58695***	-0.58856***	-0.58737***	-0.58796***	-0.59238***	-0.59253***	-0.58336***	-0.58648***	-0.58354***	-0.58592***
	[5.74]	[5.92]	[5.92]	[6.00]	[5.99]	[5.72]	[5.70]	[5.96]	[6.03]	[6.07]	[6.11]
Year 2004	-0.61257***	-0.60977***	-0.61060***	-0.60999***	-0.61029***	-0.61258***	-0.61265***	-0.60792***	-0.60953***	-0.60801***	-0.60924***
	[6.01]	[6.23]	[6.22]	[6.32]	[6.30]	[5.99]	[5.97]	[6.29]	[6.35]	[6.41]	[6.44]
Year 2005	-0.60753***	-0.60604***	-0.60648***	-0.60616***	-0.60632***	-0.60753***	-0.60757***	-0.60506***	-0.60591***	-0.60511***	-0.60576***
	[5.86]	[6.08]	[6.07]	[6.17]	[6.15]	[5.84]	[5.82]	[6.15]	[6.20]	[6.27]	[6.29]
Year 2006	-0.62986***	-0.63096***	-0.63063***	-0.63088***	-0.63076***	-0.62986***	-0.62983***	-0.63169***	-0.63106***	-0.63166***	-0.63117***
	[5.73]	[5.98]	[5.96]	[6.06]	[6.04]	[5.71]	[5.69]	[6.06]	[6.09]	[6.17]	[6.19]
Constant	0.76026***	0.77053***	0.76748***	0.76973***	0.76861***	0.76024***	0.75996***	0.77733***	0.77142***	0.77700***	0.77248***
	[8.39]	[8.85]	[8.78]	[8.96]	[8.91]	[8.36]	[8.33]	[9.04]	[9.02]	[9.20]	[9.17]
Observations	169	169	169	169	169	169	169	169	169	169	169
R-squared	0.62	0.66	0.66	0.66	0.66	0.62	0.62	0.66	0.67	0.68	0.68

Absolute value of t statistics in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%
SBS refers to the primary sovereign bond spread
SDC refers to sovereign debt crises
CC refers to currency crises
PFD refers to "public finances difficulties" countries

ANNEX 10

Fee, secondary sovereign bond spread (EMBI1) and debt crises

Fixed time effect model (with interactive dummies variables)
(Dependent variable is the fee as a percentage of the amount issued)

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
EMBI1	1.78913e-04**	1,17E-04	2.07312e-04**	1.27724e-04*	2.13262e-04***	1.80355e-04**	2.52153e-04***	1.002e-04	1.86362e-04**	1.11292e-04***	1.94881e-04**
	[2.26]	[1.52]	[2.59]	[1.72]	[2.76]	[2.27]	[2.99]	[1.30]	[2.37]	[1.51]	[2.58]
SDC		0.23235***	0.64968***								
		[3.99]	[3.36]								
Interactive SDC			-0.00097**								
			[2.26]								
SDC-CC				0.27020***	0.63575***						
				[4.69]	[3.36]						
Interactive (SDC-CC)					-0.00084**						
					[1.99]						
No PFD countries						0,05849	0,1856				
						[0.39]	[0.45]				
Interactive (No PFD)							-0.00035				
							[0.33]				
PFD								0.26961***	0.89992***		
								[4.24]	[4.01]		
Interactive (PFD)									-0.00140***		
									[2.91]		
PFD-CC										0.31582***	0.88830***
										[5.03]	[4.07]
Interactive (PFD-CC)											-0.001267***
											[2.68]
Year 1993	0	0	0	0	0	0	0	0	0	0	0
	[.]	[.]	[.]	[.]	[.]	[.]	[.]	[.]	[.]	[.]	[.]
Year 1994	0	0	0	0	0	0	0	0	0	0	0
	[.]	[.]	[.]	[.]	[.]	[.]	[.]	[.]	[.]	[.]	[.]
Year 1995	0,17024	0,13005	0,23173	0,12138	0,23216	0,17009	0,23499	0,12428	0,23021	0,11391	0,23083
	[0.75]	[0.61]	[1.07]	[0.58]	[1.09]	[0.75]	[1.00]	[0.58]	[1.09]	[0.55]	[1.12]
Year 1996	0,13073	0,06844	0,0594	0,06365	0,0569	0,1311	0,14938	0,05675	0,0271	0,05034	0,02436
	[0.58]	[0.32]	[0.29]	[0.30]	[0.28]	[0.58]	[0.67]	[0.27]	[0.13]	[0.24]	[0.12]
Year 1997	0.40257*	0,3101	0,31837	0,32978	0.33550*	0.40310*	0.42940**	0,29284	0,28069	0,31463	0,3024
	[1.84]	[1.49]	[1.59]	[1.62]	[1.72]	[1.84]	[1.99]	[1.42]	[1.43]	[1.57]	[1.59]
Year 1998	0,21241	0,13469	0,15967	0,1269	0,14924	0,21275	0,22933	0,1207	0,13955	0,11066	0,12811
	[0.98]	[0.66]	[0.81]	[0.63]	[0.77]	[0.98]	[1.07]	[0.59]	[0.72]	[0.56]	[0.68]
Year 1999	0,11303	0,04931	0,10839	0,04235	0,09483	0,11326	0,142	0,03801	0,10355	0,02916	0,08877
	[0.53]	[0.24]	[0.55]	[0.21]	[0.49]	[0.53]	[0.67]	[0.19]	[0.54]	[0.15]	[0.47]
Year 2000	0,08578	0,03353	0,06967	0,03061	0,0633	0,08616	0,10523	0,02338	0,0599	0,01923	0,05321
	[0.40]	[0.16]	[0.35]	[0.15]	[0.33]	[0.40]	[0.49]	[0.12]	[0.31]	[0.10]	[0.28]
Year 2001	-0,11003	-0,13856	-0,13265	-0,13792	-0,13209	-0,11292	-0,10288	-0,12983	-0,11183	-0,12704	-0,10984
	[0.52]	[0.69]	[0.68]	[0.70]	[0.70]	[0.53]	[0.49]	[0.65]	[0.59]	[0.65]	[0.59]
Year 2002	-0,16391	-0,1911	-0,16386	-0,19237	-0,16714	-0,1682	-0,14016	-0,17572	-0,15338	-0,17405	-0,15154
	[0.76]	[0.94]	[0.83]	[0.97]	[0.87]	[0.78]	[0.65]	[0.87]	[0.80]	[0.88]	[0.81]
Year 2003	-0,2429	-0,26292	-0,24668	-0,25939	-0,2448	-0,24243	-0,23247	-0,26828	-0,25332	-0,26469	-0,25062
	[1.13]	[1.29]	[1.26]	[1.30]	[1.28]	[1.13]	[1.09]	[1.33]	[1.32]	[1.34]	[1.34]
Year 2004	-0,27587	-0,30061	-0,26742	-0,29625	-0,26503	-0,2753	-0,24946	-0,30722	-0,27581	-0,30279	-0,2724
	[1.28]	[1.47]	[1.36]	[1.48]	[1.38]	[1.27]	[1.17]	[1.52]	[1.43]	[1.53]	[1.45]
Year 2005	-0,31323	-0.33977*	-0,30607	-0.33509*	-0,30349	-0,31261	-0,28657	-0.34686*	-0,31519	-0.34211*	-0,31148
	[1.45]	[1.66]	[1.54]	[1.67]	[1.56]	[1.44]	[1.33]	[1.71]	[1.62]	[1.72]	[1.65]
Year 2006	-0,30223	-0,33368	-0,30803	-0,32814	-0,3051	-0,3015	-0,28596	-0,34209	-0,31834	-0.33646*	-0,31415
	[1.37]	[1.60]	[1.53]	[1.61]	[1.55]	[1.37]	[1.31]	[1.65]	[1.61]	[1.67]	[1.64]
Constant	0.50244**	0.54501***	0.48299**	0.53751***	0.47892**	0.50146**	0.45228**	0.55639***	0.49734**	0.54876***	0.49151***
	[2.36]	[2.70]	[2.47]	[2.72]	[2.51]	[2.34]	[2.14]	[2.77]	[2.60]	[2.80]	[2.64]
Observations	143	143	132	143	132	143	132	143	132	143	132
R-squared	0,59	0,64	0,68	0,65	0,69	0,59	0,62	0,64	0,69	0,66	0,71

Absolute value of t statistics in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%
EMBI1 referes to the 1 day EMBI Global spread after the issue date
SDC refers to sovereign debt crises
CC refers to currency crises
PFD refers to "public finances difficulties" countries

ANNEX 11

Fee, secondary sovereign bond spread (EMBIAV10) and debt crises

Fixed time effect model (with interactive dummies variables)
(Dependent variable is the fee as a percentage of the amount issued)

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
EMBIAV10	1.73319e-04**	1.18622e-04	2.03610e-04***	1.28549e-04*	2.09338e-04***	1.74633e-04**	2.39781e-04***	1.03811e-04	1.85259e-04**	1.1383e-04	1.93326e-04***
	[2.25]	[1.60]	[2.64]	[1.79]	[2.81]	[2.26]	[2.94]	[1.40]	[2.46]	[1.59]	[2.67]
SDC		0.23339***	0.65467***								
		[4.03]	[3.39]								
Interactive SDC			-9.72339e-04**								
			[2.27]								
SDC-CC				0.27125***	0.64054***						
				[4.72]	[3.39]						
Interactive (SDC-CC)					-8.44859e-04**						
					[2.00]						
No PFD countries						0,05764	0,18994				
						[0.38]	[0.46]				
Interactive (No PFD)							-3.64722e-04				
							[0.34]				
PFD								0.27029***	0.90602***		
								[4.28]	[4.04]		
Interactive (PFD)									-1.41032e-03***		
									[2.92]		
PFD-CC										0.31669***	0.89402***
										[5.06]	[4.11]
Interactive (PFD-CC)											-1.27393e-03***
											[2.69]
Year 1993	0	0	0	0	0	0	0	0	0	0	0
	[.]	[.]	[.]	[.]	[.]	[.]	[.]	[.]	[.]	[.]	[.]
Year 1994	0	0	0	0	0	0	0	0	0	0	0
	[.]	[.]	[.]	[.]	[.]	[.]	[.]	[.]	[.]	[.]	[.]
Year 1995	0,17899	0,13526	0,24293	0,12715	0,24366	0,17892	0,24759	0,12868	0,24056	0,11886	0,2416
	[0.79]	[0.63]	[1.12]	[0.61]	[1.15]	[0.79]	[1.05]	[0.61]	[1.14]	[0.57]	[1.17]
Year 1996	0,1406	0,07643	0,07088	0,07203	0,06879	0,14102	0,16185	0,06431	0,03796	0,05823	0,03571
	[0.62]	[0.35]	[0.34]	[0.34]	[0.34]	[0.62]	[0.72]	[0.30]	[0.19]	[0.28]	[0.18]
Year 1997	0.41297*	0,31899	0,33047	0.33911*	0.34837*	0.41355*	0.44209**	0,30143	0,29234	0,32357	0,31489
	[1.89]	[1.53]	[1.65]	[1.67]	[1.78]	[1.88]	[2.04]	[1.45]	[1.48]	[1.61]	[1.65]
Year 1998	0,217	0,13886	0,16473	0,13116	0,1546	0,21735	0,2346	0,12487	0,14459	0,11487	0,13341
	[1.00]	[0.68]	[0.83]	[0.65]	[0.80]	[1.00]	[1.10]	[0.61]	[0.75]	[0.58]	[0.71]
Year 1999	0,12345	0,05713	0,11978	0,05066	0,1067	0,12375	0,15481	0,04524	0,11435	0,03681	0,10008
	[0.57]	[0.28]	[0.61]	[0.25]	[0.55]	[0.57]	[0.73]	[0.22]	[0.59]	[0.19]	[0.53]
Year 2000	0,09368	0,04028	0,0792	0,03763	0,07317	0,0941	0,11494	0,02987	0,06914	0,02593	0,06283
	[0.43]	[0.20]	[0.40]	[0.19]	[0.38]	[0.44]	[0.54]	[0.15]	[0.36]	[0.13]	[0.34]
Year 2001	-0,10082	-0,13089	-0,12133	-0,12989	-0,12045	-0,10361	-0,09118	-0,12256	-0,10077	-0,11943	-0,09839
	[0.47]	[0.65]	[0.62]	[0.66]	[0.63]	[0.48]	[0.43]	[0.61]	[0.53]	[0.61]	[0.53]
Year 2002	-0,15371	-0,18335	-0,15229	-0,18414	-0,1552	-0,15787	-0,1276	-0,16856	-0,14207	-0,16642	-0,13983
	[0.72]	[0.90]	[0.77]	[0.93]	[0.80]	[0.73]	[0.59]	[0.84]	[0.74]	[0.85]	[0.75]
Year 2003	-0,23382	-0,25488	-0,23487	-0,25106	-0,23268	-0,23332	-0,2211	-0,26059	-0,24185	-0,25673	-0,23878
	[1.09]	[1.25]	[1.20]	[1.26]	[1.21]	[1.08]	[1.04]	[1.29]	[1.26]	[1.30]	[1.28]
Year 2004	-0,26839	-0,29323	-0,25757	-0,28872	-0,25496	-0,26779	-0,24107	-0,29996	-0,26595	-0,29541	-0,26227
	[1.24]	[1.44]	[1.31]	[1.44]	[1.32]	[1.24]	[1.12]	[1.48]	[1.38]	[1.49]	[1.40]
Year 2005	-0,3048	-0,33157	-0,29452	-0,32671	-0,29165	-0,30415	-0,27644	-0.33882*	-0,30369	-0.33392*	-0,29966
	[1.41]	[1.62]	[1.48]	[1.63]	[1.50]	[1.40]	[1.28]	[1.66]	[1.56]	[1.68]	[1.58]
Year 2006	-0,29403	-0,3252	-0,29685	-0,31954	-0,29366	-0,29329	-0,27674	-0,33364	-0,30705	-0,32793	-0,30256
	[1.33]	[1.56]	[1.47]	[1.56]	[1.49]	[1.32]	[1.26]	[1.61]	[1.55]	[1.62]	[1.57]
Constant	0.49518**	0.53615***	0.47250**	0.52872***	0.46821**	0.49420**	0.44540**	0.54725***	0.48624**	0.53974***	0.48020**
	[2.31]	[2.64]	[2.41]	[2.66]	[2.44]	[2.30]	[2.09]	[2.72]	[2.54]	[2.75]	[2.57]
Observations	143	143	132	143	132	143	132	143	132	143	132
R-squared	0,59	0,64	0,68	0,65	0,69	0,59	0,62	0,64	0,69	0,66	0,71

Absolute value of t statistics in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%
EMBIAV10 refers to the 10 days EMBI Global spread average after the issue date
SDC refers to sovereign debt crises
CC refers to currency crises
PFD refers to "public finances difficulties" countries

ANNEX 12

Forecasts of sovereign debt issuances

Table 1: 2008 Emerging Markets sovereign external debt issuance and index cashflow forecast

US$ millions	2008 Issuance Forecast	2008 Cashflow Forecast
Argentina	7,800	3,094
Belize	-	23
Brazil	2,500	5,485
Bulgaria	-	197
Chile	-	861
China	-	1,450
Colombia	1,000	1,881
Costa Rica	-	-
Cote d'Ivoire		62
Croatia		282
Czech Republic	1,400	163
Dominican Republic	-	57
Ecuador	-	392
Egypt	1,000	88
El Salvador	-	235
Estonia	-	-
Ghana	-	64
Guatemala	-	-
Hungary	2,800	633
Iraq		157
Indonesia	1,750	630
Israel	1,000	-
Jamaica	400	40
Kazakhstan	-	38
Kenya	500	-
Latvia	-	-
Lebanon	2,500	1,366
Lithuania	500	122
Malaysia	-	740
Mexico	-	7,323
Morocco	-	40
Nigeria	1,000	-
Pakistan		121
Panama	500	730
Peru	-	1,385
Philippines	1,250	2,520
Poland	4,200	1,304
Qatar	-	-
Romania	700	1,067
Russia	-	3,365
Serbia	-	41
Slovak Republic	1,400	245
Slovenia	-	-
South Africa	1,500	1,262
South Korea	3,000	3,820
Thailand	-	-
Trinidad and Tobago		45
Turkey	5,500	5,865
Tunisia	500	48
Ukraine	1,000	380
Uruguay	300	484
Venezuela	3,000	3,022
Vietnam		52
Asia	6,000	9,332
Emerging Europe	17,500	14,564
Latin America	15,500	24,153
Middle East and Africa	8,000	3,129
Total	47,000	51,178

Issuance forecast is based either on official sources and/or JPMorgan estimates.
Index cashflow forecast is based on bonds in the EMBI Global or EURO EMBI Global and those removed in the prior 12 months, as well as widely held bonds such as the Argentina US$ local law bonds.

Source: Emerging Markets Outlook and Strategy for 2008. December 6, 2007. JPMorgan

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