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Fitch, Moody's and S&P's Sovereign Ratings and EMBI Global Spreads: Lessons from 1993-2007

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ABSTRACT

This paper analyzes the interactions between J.P. Morgan EMBIG spreads and Fitch, Moody's and S&P's sovereign ratings for December 1993-February 2007 to show that the alleged procyclical role of ratings is not ascertained. Focusing on the specific relationship between the market and each agency, I get the following results. First, an unbalanced panel data estimation assesses that, beyond the obvious negative relationship between spreads and ratings, Moody's has more often disagreed with the market whereas Fitch ratings have diverged more rarely. Second, although Moody's ratings have adjusted less often than S&P's and Fitch to stick to markets spreads, the ratings of the three agencies are particularly stable. Third, for the three agencies, there is an asymmetric adjustment of ratings: they are more prone to downgrade following excessive high spreads and spread increases than upgrade following excessive low spreads and spread decreases. Fourth, reactions of spreads to rating changes disclose that S&P's downgrades and Moody's upgrades have the most significant impact on spread movements.

Keywords: sovereign ratings, J.P. Morgan EMBI Global spreads, unbalanced panel.

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I Introduction

The past years have seen a remarkable growth of the sovereign bond debt issued by emerging countries. The total amount of their debt securities rose by more than 300%, from $110.1 billion in 1993 to $449.4 billion in 2005 (Borensztein et alii 2006). This evolution was accompanied by the extensive use of the J.P. Morgan Emerging Markets Bond Index (EMBI) among investors. The EMBI, a total-return index that tracks the traded market for U.S. dollar-denominated Brady and other similar sovereign restructured bonds, was successively transformed into the EMBI$^+$ and the EMBI Global (EMBIG) in order to include U.S. dollar local markets instruments, performing loans, Eurobonds and investment-grade issuers (J.P. Morgan 1995 and 1999).

These indices have provided investors with a well-defined performance benchmark and a vehicle for the analysis of sovereign risk and returns. As a result, it is relevant to compare them with foreign currency (FC) ratings assigned by the three major agencies, Fitch, Moody's and S&P's. Such a comparison is made by this paper which deepens the correlation between J.P. Morgan EMBIG spreads and Fitch, Moody's and S&P's sovereign ratings for December 1993-February 2007 and assesses the impact of spreads on ratings and *vice versa*.

The analysis of the perception of sovereign risk by the market, on the one hand, and by rating agencies, on the other hand, should be all the more instructive as the period under study covers both sub-periods of very high spreads (Tequila crisis in December 1994-March 1995, Russian crisis in July-September 1998, the default risk of Brazil in June 2002-March 2003) and very low spreads since 2005 (driven by high levels of liquidity, strong commodity prices, and a rapid pace of economic growth).

This paper is organized as follows. Section II presents a review of the literature relative to sovereign ratings and sovereign market spreads. The correlation between EMBIG spreads and Fitch, Moody's and S&P's ratings is studied in Section III. Section IV focuses on the way ratings adjust to market spreads. Section V analyzes the reaction of market spreads to upgrades and downgrades. Section VI concludes.

II Review of the literature

A first relevant piece of literature concerns the analysis of the determinants of sovereign spreads. Using primary yields as a measure of credit risk, Eichengreen & Mody (1998) find that changes in macroeconomic fundamentals explain only a fraction of the spread compression observed between 1991 and 1996. Ferrucci (2003) and Rowland & Torres (2004) investigate the determinants of EMBIG secondary market spreads. Ferrucci states that markets take into account macroeconomic fundamentals when pricing sovereign risk but he also insists on the role of external factors such as global liquidity conditions and US equity prices. Rowland & Torres list six key variables: GDP growth rate, total external debt to GDP ratio, total external debt to exports ratio, foreign reserves to GDP, exports to GDP ratio and debt service to GDP ratio.

The literature dealing with sovereign ratings can be divided into three main categories.

A first set of papers investigates the determinants of S&P's and Moody's sovereign ratings. In a seminal paper, Cantor & Packer (1996) show that five variables (GDP per capita, the indicator for economic development, the indicator for sovereign default, inflation and external debt) explain 90% of ratings issued by S&P's and Moody's in 1995. Afonso (2003) updates Cantor & Packer's study and finds very similar results.

A second line of research concerns the alleged procyclicality of sovereign ratings during financial crises. For Ferri et alii (1999), Moody's and S&P's failed to predict the Asian crisis and even exacerbated it downgrading Asian countries more than their fundamentals justified. Kräussl (2000) disagrees and states that massive downgrades do not necessarily intensify the crisis (e.g. South Korea in 1997).

A third series of papers, much more in line with my research, studies the relationships between spreads and sovereign ratings. Cantor & Packer (1996) look at 1987-1994 and assess that the impact of a rating action on spreads is greater if the change is made by Moody's or if it is related to speculative-grade countries. Larrain et alii (1997) find a significant impact of reviews for negative outlook decided by Moody's and S&P's in 1987-1996. They conclude that rating agencies have the potential to attenuate boom-bust spread cycles. Analysing Fitch, Moody's and S&P's rating and outlook changes occurred in 1989-1997, Reisen & Von Maltzan (1999) show that downgrades have a significant impact on spreads, contrary to upgrades, which are anticipated by the market. Sy (2001) underlines that the strong negative relationship between ratings and $EMBI^{+}$ spreads declines during periods of market turbulence (e.g. 1997-1998). Besides, he finds evidence of asymmetric adjustments of spreads and ratings following disagreements between the market and rating agencies.

III Correlations between EMBIG spreads and Fitch, Moody's and S&P's ratings

Data Description

To be integrated in my database, countries must be assigned a foreign currency (FC) rating by at least one of the three big agencies (Fitch, Moody's and S&P's) and included in the EMBIG benchmark as of January 31, 2006. This results in selecting thirty-two sovereigns: Argentina, Brazil, Bulgaria, Chile, China, Colombia, Dominican Republic, Ecuador, Egypt, El Salvador, Hungary, Indonesia, Lebanon, Malaysia, Mexico, Morocco, Nigeria, Pakistan, Panama, Peru, Philippines, Poland, Russia, Serbia, South Africa, Thailand, Tunisia, Turkey, Ukraine, Uruguay, Venezuela, and Vietnam.

I use EMBIG monthly stripped spreads from December 1993 to February 2007 for each country. Fitch, Moody's and S&P's FC ratings are the ratings at the end of each month from December 1993 to February 2007. They are transformed into numerical values using a linear scale (Table 1). Each agency has its own numerical scale because each one has a specific rating scale (twenty-four rating categories for Fitch, twenty-one for Moody's and twenty-three for S&P's). Higher ratings correspond to higher values. Starting points of the series differ across countries, indices and rating agencies. As a result, I have three samples of unbalanced panel data for Fitch, Moody's and S&P's respectively (Table 2).

A Univariate Model of Spreads

A univariate model of EMBIG spreads is developed to determine differences between the market and the three agencies. I use an unbalanced panel data estimation of log spreads on Fitch, Moody's and S&P's ratings. The relationship between spreads and ratings can be expressed as follows:

$$Log(EMBIG)_{it} = \alpha_i + \beta\, RAT_{it} + \varepsilon_{it}$$

for countries i = 1, 2, 3,…, 32 and periods t = 1, 2, 3,… 159. The dependent variable Log(EMBIG) is the log of EMBIG spreads and the independent variable RAT is the rating issued individually by Fitch, Moody's and S&P's.

Two series of regressions are run: the first one with a common intercept ($\alpha_i = \alpha$) and the second one with fixed effects (the model specification α_i)[1].

Results with a common intercept are presented in Table 3. Not surprisingly, there is a robust negative correlation between sovereign spreads and Fitch, Moody's and S&P's ratings. It is worth noting that Moody's ratings are slightly less correlated to spreads than other two agencies'.

Results with fixed effects (Table 4) show a stronger negative correlation between spreads and ratings. Constant terms must be interpreted carefully. Sovereigns with the highest intercepts are either countries that remained in default for a long time (Argentina and Russia) or countries with high risk premia (Brazil, Colombia and Philippines). Indonesia, Serbia, Vietnam and Nigeria, lately integrated in the samples (May 2004, July 2005, November 2005 and January 2006 respectively), have benefited from a low risk aversion and thus have had the lowest intercepts.

[1] All regressions are run with TSP 4.5.

IV Agreements/disagreements between rating agencies and the market and adjustments of ratings to market spreads

This section investigates the way Fitch, Moody's and S&P's adjusted their ratings to excessively high/low spreads and strong increases/decreases in spreads.

Adjustments of ratings to excessively high/low spreads

Spreads are considered excessively high (low), i.e. are outliers, when they are higher (lower) than rating-based spreads, i.e. fitted spreads, by more than one standard deviation. The fitted spreads are obtained through the unbalanced panel data estimation with fixed effects (Section III). The percentage of outliers (4.6%, 7.5% and 5.5% for Fitch, Moody's and S&P's respectively) shows that Moody's has disagreed with the market more often than other two agencies. On the contrary, Fitch ratings tend to stick the market.

For the three agencies, I assess whether there was an upgrade, a downgrade or no rating change within the month and the three months following excessively low and high spreads. Tables 5a, 5b and 5c present these rating adjustments for the three agencies. As Sy (2001), I consider that ratings are expected to be upgraded (downgraded) when spreads turn out to be excessively low (high). My results require many comments.

First, the overall stability of ratings is striking: 87% and 77% of ratings (average of the three agencies) remained unchanged one month and three months respectively after excessively high and low spreads.

Second, Moody's ratings are the most stable: 85% and 95.5% of unchanged ratings following excessively high and low spreads (average of one-month and three-month terms for the two percentages), vs. 77% and 94.5% for Fitch, vs. 79% and 84.5% for S&P's. Such results are consistent with Table 7 showing that S&P's rating changes are the most numerous whereas Moody's rating movements are much fewer.

Third, the few rating changes are asymmetric. The three agencies are more reluctant to upgrade when spreads are excessively low than downgrade when spreads are excessively high. This trend is particularly strong for Fitch and Moody's: the percentage of downgrades following excessively high spreads is on average three times the percentage of upgrades following excessively low spreads. This asymmetric adjustment is slightly weaker for S&P's, which upgrades countries with excessively low spreads three times as often as Fitch and Moody's.

Fourth, Fitch and S&P's never adjusted their ratings against the market's view, downgrading (upgrading) countries with excessively low (high) spreads. Moody's did so twice[2].

Fifth, the percentage of outliers by year and rating agency (Charts 1a, 1b and 1c) shows that major disagreements between agencies and the market occurred in 1994-1995, 1998 and 2006, i.e. during periods of historically high and low spreads. Charts 2a, 2b and 2c demonstrate that the risk aversion was much higher among investors than among agencies' analysts at the peak of the Russian crisis in August 1998[3]. By contrast, spreads have been

[2] Upgrades of Pakistan in February 2002 and Argentina in June 2005 following excessively high spreads, but at a moment when the latter began to plummet.

[3] This is the month with the highest spreads for the period under study.

excessively low since 2005 when they are compared to rating-based spreads: this lower risk aversion of the market is reflected in Charts 3a, 3b and 3c.

Sixth, the divergence in assessing sovereign creditworthiness is impressive when Moody's rating-based spreads are taken into account for the historically low spreads of 2006 (more than 20% of outliers, Chart 1b) and early 2007 (Chart 3b), which may lead to consider that Moody's rating policy is more conservative than Fitch and S&P's (see the rating gap for the Philippines and Venezuela).

To sum up, my findings are consistent with Sy's results for January 1994-April 2001 concluding that the relationship between ratings and market spreads is weaker in times of market turbulence. They also show that sovereign ratings were not as pro-cyclical as the literature states (Ferri et alii 1999; Reisen and Von Maltzan 1999). Indeed, the three agencies downgraded only 26% of the countries included my sample between July 1997 (beginning of the Asian crisis) and December 1998 (four months after the Russia default). In the same way, they have tended to moderate the market euphoria since 2005: 38% of the countries in my sample were upgraded between June 2005 (the month when the EMBI Global Composite fell below the psychological 300 basis points for the first time ever) and April 2007[4]. Not surprisingly, S&P's was more prone to upgrade (47%) than Fitch (37%) and Moody's (30%) in particular.

Adjustments of ratings to "strong" increase/decrease in spreads

Increases (decreases) in spreads are considered "strong" when they rise (fall) by at least 25% within a month[5]. For each "strong" increase or decrease in spreads occurred the month m, I assess whether there was an upgrade, a downgrade or no rating change the month m-1, the same month m, the month m+1 and during the period m+1-m+3.

My results (Tables 6a, 6b and 6c)[6] confirm the previous conclusions: overall stability of ratings and asymmetry of rating changes (more downgrades than upgrades). Interestingly, for more than 12% of "strong" increases in spreads, there is a downgrade by Fitch the previous month or the same month. This percentage reaches 10.4% for S&P's but only 7.6% for Moody's. This may prove that Fitch partly anticipates spread increases by downgrading early whereas S&P's and Moody's adjust their ratings later (12% of downgrades for Fitch between months m+1 and m+3, vs. 16% and 18% for Moody's and S&P's respectively).

The study of the upgrades preceding and following "strong" decreases in spreads discloses that S&P's is slightly quicker to anticipate the declining risk aversion by upgrading the month m-1 or the month m. By contrast, Moody's ratings are much less sensitive to "strong" decreases in spreads since the total number of upgrades equals and the total number of downgrades for the period from m-1 to m+1 (Table 6b). Once again, these findings corroborate the fact that Moody's sovereign risk assessment yields the most divergent ratings.

[4] Author's calculations. The two percentages are the weighted averages based on Fitch, Moodys and S&P's downgrades and upgrades respectively.
[5] I go on using monthly stripped spreads.
[6] As previously, I consider that ratings are expected to be upgraded (downgraded) when spreads are excessively low (high).

V Reaction of market spreads to rating changes

This section aims at measuring the impact of rating changes on EMBIG spreads. Daily spreads are now used for the period December 31, 1993 - February 28, 2007. As Cantor and Packer (1996), I look at spreads at the end of the day after each upgrade and downgrade to capture the immediate effect of rating changes on spreads.

I list all upgrades and downgrades for each agency for the same sample of thirty-two emerging countries between December 31, 1993 and February 28, 2007 (Table 7). The day of the rating change is day 0. All spreads take the value 100 the day prior to the rating change (day -1). Then I compute the average evolution of spreads for the 30 days preceding and the 30 days following Fitch, Moody's and S&P's upgrades and downgrades (Charts 4a, 4b, 4c, 5a, 5b and 5c).

Not surprisingly, Fitch, Moody's and S&P's downgrades (upgrades) are preceded and followed by an increase (decrease) in spreads. More precisely, the curve related to Moody's upgrades (Chart 4b) presents a spread overshooting immediately after the upgrade, but beyond day +10, the curve unexpectedly rises. This move in the "wrong" direction may disclose a very short-term but real impact of Moody's upgrades. Chart 5b shows that Moody's downgrades occurred in times of extreme stress: spreads increased by 60% between day -30 day +30 (the percentage only reaches 47% for Fitch downgrades and 31% for S&P's downgrades)[7].

It is also important to highlight the regularity of the fall and the rise of the curve related to Fitch upgrades and downgrades respectively (Charts 4a and 5a). This may support what I explained in Section IV: Fitch ratings seem to be more in line with the market. This assumption is also checked for the spread curve before and after S&P's upgrades (Chart 4c). The slope of the spread curve for S&P's downgrades (Chart 5c) is particularly sharp for the two-day period following the downgrade, which contrasts with the flat curve from day -30 to day -15 and from day +15 to day +30. This may suggest a high immediate impact of S&P's downgrades on spreads.

To assess empirically the immediate impact of rating actions on spreads, I run a series of regressions of the change in spreads (in percentage) between the end of the day -1 and the end of the day +1 (i.e. the evolution of spreads for [day -1; day 1][8]) against a set of explanatory variables (Table 8) including all rating changes, rating changes by each agency, the evolution of spreads (in percentage) during the 60 days and 30 days preceding all rating changes, and preceding rating changes by each agency (from days -60 and -30 through day -1), and several dummies taking into account the investment grade/speculative grade cut-off.

Regression results (Table 9) show that when all rating changes are tested, they are significant and have the expected sign (regressions [1] and [2]). This immediate and expected impact on spreads turns out to be stronger than the change in spreads from days -60 and -30 to day -1. It is worth noting that neither the investment grade status (regressions [3] and [4]), nor the upgrade from speculative grade to investment grade (regressions [5] and [6]) turn out to have an impact. However, the downgrade from investment grade to speculative grade (regressions [7] and [8]) is significant, which can be partly explained by the fact that three out of the eight observations concern Uruguay whose downgrade by the three agencies occurred in the aftermath of the Argentina default, in times of market stress.

[7] Author's calculations.
[8] I suppose that all rating changes (day 0) occurred before the end of the trading day.

When rating actions are tested for each agency individually (Table 10), they are all significant, except Fitch rating changes when tested with the change in spreads from day -60 to day -1. The variable capturing the evolution of spreads during the 30/60 days preceding the rating announcement is significant only once (regression [6]). These findings are particularly relevant since they prove that the increase/decrease in spreads within the two days (day 0 and day +1) following a Fitch, Moody's or S&P's downgrade/upgrade is more impacted by the rating change itself than by the evolution of spreads between day -60 or -30 and day -1.

The next step consists in assessing which agency has the most impacting upgrades and downgrades taking into account the number of rating actions for each agency[9]. Consequently, I run regressions of all spread changes for [day -1; day +1] (i.e. spread changes following all rating actions: downgrades + upgrades by Fitch + Moody's + S&P's) against Fitch upgrades, then Fitch downgrades, Moody's upgrades, Moody's downgrades, S&P's upgrades, S&P's downgrades, separately. I use a dummy taking the value 1 for the group tested and 0 otherwise. For instance, when Fitch upgrades are tested, the value for Fitch upgrades is 1, whereas Fitch downgrades and all Moody's and S&P's rating actions take the value 0. Results are presented in Table 11.

First, both Fitch upgrades and downgrades do not seem to have a clear immediate impact on spreads (regressions [1] to [4]). This strengthens our previous results, when all rating actions by each agency and changes in spreads between day -60/-30 and day -1 are tested simultaneously.

Second, I find that Moody's upgrades and S&P's downgrades have the highest impact on spreads (regressions [5], [6], [11] and [12]). It is worth noting that downgrades by S&P's have the most obvious impact overall but the very low R-squared in all regressions means that investors are also influenced by issues other than rating actions to make their decisions.

Third, the impact power of ratings is not exclusively a function of the number of rating actions: Moody's upgrades have the strongest impact whereas they are fewer than Fitch and S&P's upgrades (Table 7). This fact emphasizes the importance of the timing of rating changes.

Fourth, my findings diverge from both Cantor & Packer's (1996) and Reisen & Von Maltzan's results (1999) since I demonstrate that both downgrades and upgrades by Moody's and S&P's have a significant impact on spreads. This is not surprising considering that these papers focused on different periods (1987-1994 and 1989-1997 respectively) and included both emerging and developed countries.

[9] This choice is motivated by the fact that the number of rating changes differs across agencies (Table 7) and one could raise doubts about the influence of an agency whose upgrades and downgrades have an impact on spreads but are very few.

VI Conclusion

This paper measures the interactions between J.P. Morgan EMBIG spreads and Fitch, Moody's and S&P's ratings for December 1993-February 2007. The conclusions I can draw from my statistical analysis and my empirical tests are numerous.

The market and rating agencies have a close perception of sovereign risk when considering the whole period. By contrast, their perception tends to differ in times of very high risk aversion (1998) and in times of very low risk aversion (2006-February 2007). This divergence in the way they assess sovereign creditworthiness is essentially due to the late reaction of ratings to stick to the market's view when EMBIG spreads are excessively high or low. This also explains the overreaction of ratings during the Asian and the Russian crises in 1997 and 1998.

Nevertheless, ratings cannot be considered systematically procyclical because they adjusted few times to excessively high/low spreads and strong increases/decreases in spreads. As a matter of fact, the alleged procyclicality of ratings is partially true for 1997-1998 but it is ascertained neither in 1994-1995 (Tequila crisis), nor in 2002 when investors feared that Brazil might default. Moreover, ratings have moderated the market euphoria since 2005, considering the majority of emerging countries whose ratings remained unchanged during the last two years. These findings remind that ratings reflect an analysis through the cycle: this explains the relative small number of downgrades and upgrades for 1993-2007 (see Moody's ratings in particular). My overall results tend to cast doubt upon Ferri et alii's analysis (1999), which highlighted the procyclical and negative influence of sovereign ratings during the Asian crisis.

My last prominent conclusion concerns the impact of ratings on spreads. Moody's upgrades and S&P's downgrades have the strongest impact but rating changes are usually preceded by an evolution of spreads in the expected direction. Such results prove that ratings and spreads are interdependent but their movements are far to be synchronized.

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Table 1: Linear transformation of ratings

Fitch		Moody's		S&P's	
Ratings	Numerical transformation	Ratings	Numerical transformation	Ratings	Numerical transformation
AAA	23	Aaa	20	AAA	22
AA+	22	Aa1	19	AA+	21
AA	21	Aa2	18	AA	20
AA-	20	Aa3	17	AA-	19
A+	19	A1	16	A+	18
A	18	A2	15	A	17
A-	17	A3	14	A-	16
BBB+	16	Baa1	13	BBB+	15
BBB	15	Baa2	12	BBB	14
BBB-	14	Baa3	11	BBB-	13
BB+	13	Ba1	10	BB+	12
BB	12	Ba2	9	BB	11
BB-	11	Ba3	8	BB-	10
B+	10	B1	7	B+	9
B	9	B2	6	B	8
B-	8	B3	5	B-	7
CCC+	7	Caa1	4	CCC+	6
CCC	6	Caa2	3	CCC	5
CCC-	5	Caa3	2	CCC-	4
CC	4	Ca	1	CC	3
C	3	C	0	C	2
DDD	2			SD	1
DD	1			D	0
D	0				

Table 2: Description of the three samples

	Fitch ratings	Moody's ratings	S&P's ratings
Argentina	1997:05-2007:02	1993:12-2007:02	1993:12-2007:02
Brazil	1994:12-2007:02	1994:04-2007:02	1994:12-2007:02
Bulgaria	1998:04-2007:02	1996:09-2007:02	1998:11-2007:02
Chile	1999:05-2007:02	1999:05-2007:02	1999:05-2007:02
China	1997:12-2007:02	1994:03-2007:02	1994:03-2007:02
Colombia	1994:12-2007:02	1997:02-2007:02	1997:02-2007:02
Dominican Republic	2000:08-2007:02	2001:11-2007:02	2001:11-2007:02
Ecuador	2002:11-2007:02	1997:07-2007:02	2000:07-2007:02
Egypt	2001:07-2007:02	2001:07-2007:02	2001:07-2007:02
El Salvador	2002:04-2007:02	2002:04-2007:02	2002:04-2007:02
Hungary	1999:01-2007:02	1999:02-2007:02	1999:01-2007:02
Indonesia	2004:05-2007:02	2004:05-2007:02	2004:05-2007:02
Lebanon	1998:04-2007:02	1998:04-2007:02	1998:04-2007:02
Malaysia	1998:08-2007:02	1996:10-2007:02	1996:10-2007:02
Mexico	1996:12-2007:02	1993:12-2007:02	1993:12-2007:02
Morocco	NR	1999:07-2006:11	1998:03-2006:11
Nigeria	2006:01-2007:02	NR	2006:02-2007:02
Pakistan	NR	2001:06-2007:02	2001:06-2007:02
Panama	1998:09-2007:02	1997:01-2007:02	1997:01-2007:02
Peru	1999:10-2007:02	1999:07-2007:02	1997:12-2007:02
Philippines	1999:07-2007:02	1997:12-2007:02	1997:12-2007:02
Poland	1996:12-2007:02	1995:06-2007:02	1995:06-2007:02
Russia	1997:12-2007:02	1997:12-2007:02	1997:12-2007:02
Serbia	2005:07-2007:02	NR	2005:07-2007:02
South Africa	1994:12-2007:02	1994:12-2007:02	1994:12-2007:02
Thailand	1998:05-2006:03	1997:05-2006:03	1997:05-2006:03
Tunisia	2002:05-2007:02	2002:05-2007:02	2002:05-2007:02
Turkey	1996:12-2007:02	1996:06-2007:02	1996:06-2007:02
Ukraine	2001:06-2007:02	2001:12-2007:02	2001:12-2007:02
Uruguay	2001:05-2007:02	2001:05-2007:02	2001:05-2007:02
Venezuela	1997:09-2007:02	1993:12-2007:02	1993:12-2007:02
Vietnam	2005:11-2007:02	2005:11-2007:02	2005:11-2007:02

Table 3: Unbalanced Panel Estimation Results, Pooling

	Dependent variable: log(EMBIG spreads)		
	[1]	[2]	[3]
Fitch Ratings	-0.229	/	/
	(61.778)	/	/
Moody's ratings	/	-0.231	/
	/	(65.910)	/
S&P's ratings	/	/	-0.233
	/	/	(68.424)
Constant	8.471	7.867	8.297
	(179.755)	(229.476)	(210.685)
Adjusted R-squared	0.596	0.582	0.600
Number of observations	2585	3124	3123

Absolute t-statistics are in parentheses. All results are significant at the 5% level.

Table 4: Unbalanced Panel Estimation Results, Fixed Effects

	Dependent variable: log(EMBIG spreads)		
	[1]	[2]	[3]
Fitch ratings	-0.228	/	/
	(34.943)	/	/
Moody's ratings	/	-0.268	/
	/	(38.173)	/
S&P's ratings	/	/	-0.236
	/	/	(44.693)
Fixed effects			
Argentina	8.571	8.500	8.758
Brazil	8.825	8.325	8.736
Bulgaria	8.395	7.813	8.201
Chile	8.737	8.335	8.683
China	8.449	8.373	7.998
Colombia	8.813	8.570	8.762
Dominican Republic	8.010	7.972	7.921
Ecuador	8.380	8.074	8.312
Egypt	7.978	7.652	7.843
El Salvador	8.529	8.515	8.404
Hungary	7.841	8.028	7.748
Indonesia	7.967	7.201	7.648
Lebanon	7.945	7.516	7.786
Malaysia	8.636	8.538	8.645
Mexico	8.709	8.687	8.751
Morocco	NR	8.233	8.337
Nigeria	7.612	NR	7.411
Pakistan	NR	7.284	7.725
Panama	8.812	8.512	8.545
Peru	8.602	8.117	8.552
Philippines	8.872	8.506	8.720
Poland	8.501	8.495	8.340
Russia	8.820	8.519	8.358
Serbia	7.889	NR	7.746
South Africa	8.367	8.391	8.339
Thailand	8.022	7.888	8.059
Tunisia	8.265	8.012	8.156
Turkey	8.363	7.979	8.056
Ukraine	8.117	7.498	7.822
Uruguay	8.395	7.831	8.165
Venezuela	8.808	8.451	8.600
Vietnam	7.492	7.129	7.438
Adjusted R-squared	0.704	0.707	0.733
Number of observations	2585	3124	3123

Absolute t-statistics are in parentheses. All results are significant at the 5% level.

Table 5a: Fitch rating adjustments to excessively low/high spreads[§]

Excessively low spreads			
Ratings	Expected upgrade	Unexpected downgrade	No change
1 month later	4.5%	0%	95.5%
3 months later	6.2%	0%	93.8%
Excessively high spreads			
Ratings	Expected downgrade	Unexpected upgrade	No change
1 month later	16.7%	0%	83.3%
3 months later	28.9%	0%	71.1%

Table 5b: Moody's rating adjustments to excessively low/high spreads[§]

Excessively low spreads			
Ratings	Expected upgrade	Unexpected downgrade	No change
1 month later	2.6%	0%	97.4%
3 months later	6.1%	0%	93.9%
Excessively high spreads			
Ratings	Expected downgrade	Unexpected upgrade	No change
1 month later	9.9%	0.8%	89.3%
3 months later	17.4%	1.6%	81.0%

Table 5c: S&P's rating adjustments to excessively low/high spreads[§]

Excessively low spreads			
Ratings	Expected upgrade	Unexpected downgrade	No change
1 month later	9.6%	0%	90.4%
3 months later	21.3%	0%	78.7%
Excessively high spreads			
Ratings	Expected downgrade	Unexpected upgrade	No change
1 month later	15.4%	0%	84.6%
3 months later	26.9%	0%	73.1%

[§]Author's computations for the three tables.

Table 6a: Fitch rating changes to strong decrease/increase in spreads[§]

At least a 25% decrease in spreads within a month			
Ratings	Expected upgrade	Unexpected downgrade	No change
1 month before	0%	0%	100%
Same month	1.6%	1.6%	96.8%
1 month later	3.2%	0%	96.8%
3 months later	8.3%	1.6%	90.1%
At least a 25% increase in spreads within a month			
Ratings	Expected downgrade	Unexpected upgrade	No change
1 month before	4.1%	0%	95.9%
Same month	8.1%	2.4%	89.5%
1 month later	8.1%	0.8%	91.1%
3 months later	12.2%	2.4%	85.4%

Table 6b: Moody's rating changes to strong decrease/increase in spreads[§]

At least a 25% decrease in spreads within a month			
Ratings	Expected upgrade	Unexpected downgrade	No change
1 month before	0%	1.4%	98.6%
Same month	4.3%	4.3%	91.4%
1 month later	2.9%	1.4%	95.7%
3 months later	7.2%	1.4%	91.4%
At least a 25% increase in spreads within a month			
Ratings	Expected downgrade	Unexpected upgrade	No change
1 month before	2.9%	0.0%	97.1%
Same month	4.7%	1.7%	93.6%
1 month later	8.1%	0.6%	91.3%
3 months later	16.3%	1.7%	82.0%

Table 6c: S&P's rating changes to strong decrease/increase in spreads[§]

At least a 25% decrease in spreads within a month			
Ratings	Expected upgrade	Unexpected downgrade	No change
1 month before	1.4%	1.4%	97.2%
Same month	5.6%	0%	94.4%
1 month later	1.4%	0%	98.6%
3 months later	6.9%	1.4%	91.7%
At least a 25% increase in spreads within a month			
Ratings	Expected downgrade	Unexpected upgrade	No change
1 month before	1.7%	0%	98.3%
Same month	8.7%	0%	91.3%
1 month later	9.8%	0.6%	89.6%
3 months later	17.9%	2.9%	79.2%

[§]Author's computations for the three tables.

Table 7: Rating Changes by Agency for December 31, 1993 - February 28, 2007[§]

	Upgrades	Downgrades	Total rating changes
Fitch	58	43	101
Moody's	49	41	90
S&P's	73	60	133
Total three agencies	180	144	324

[§]Author's computations.

Table 8: List of explanatory variables

ALLRAT is the number of upward/downward notches resulting from all rating actions (i.e. Fitch upgrades, Fitch downgrades, Moody's upgrades, Moody's downgrades, S&P's upgrades and S&P's downgrades). For example: -2 for a two-notch downgrade and +1 for a one-notch upgrade)
ALLSPR60 is the evolution of spreads (in percentage) during the 60 days preceding all rating actions (from day -60 through day -1)
ALLSPR30 is the evolution of spreads (in percentage) during the 30 days preceding all rating actions (from day -30 through day -1)
INV is a dummy taking the value 1 if the initial rating is in investment grade and 0 otherwise
GOINV is a dummy taking the value 1 if the initial rating is upgraded from speculative grade to investment grade and 0 otherwise
GOSPEC is a dummy taking the value 1 if the initial rating is downgraded from investment grade to speculative grade and 0 otherwise
ALLFI is the number of upward/downward notches resulting from all Fitch rating actions (i.e. Fitch upgrades and Fitch downgrades)
FISPR60 is the evolution of spreads (in percentage) during the 60 days preceding all Fitch rating actions (from day -60 through day -1)
FISPR30 is the evolution of spreads (in percentage) during the 30 days preceding all Fitch rating actions (from day -30 through day -1)
ALLMO is the number of upward/downward notches resulting from all Moody's rating actions (i.e. Moody's upgrades and Moody's downgrades)
MOSPR60 is the evolution of spreads (in percentage) during the 60 days preceding all Moody's rating actions (from day -60 through day -1)
MOSPR30 is the evolution of spreads (in percentage) during the 30 days preceding all Moody's rating actions (from day -30 through day -1)
ALLSP is the number of upward/downward notches resulting from all S&P's rating actions (i.e. S&P's upgrades and S&P's downgrades)
SPSPR60 is the evolution of spreads (in percentage) during the 60 days preceding all S&P's rating actions (from day -60 through day -1)
SPSPR30 is the evolution of spreads (in percentage) during the 30 days preceding all S&P's rating actions (from day -30 through day -1)
FIUP is a dummy taking the value 1 for Fitch upgrades and 0 for all other rating changes (i.e. Fitch downgrades, Moody's upgrades, Moody's downgrades, S&P's upgrades and S&P's downgrades)
FIDOWN is a dummy taking the value 1 for Fitch downgrades and 0 for all other rating changes
MOUP is a dummy taking the value 1 for Moody's upgrades and 0 for all other rating changes
MODOWN is a dummy taking the value 1 for Moody's downgrades and 0 for all other rating changes
SPUP is a dummy taking the value 1 for S&P's upgrades and 0 for all other rating changes
SPDOWN is a dummy taking the value 1 for S&P's downgrades and 0 for all other rating changes

Table 9: Immediate impact of ratings on EMBIG spreads

	Dependent variable: evolution of EMBIG spreads for [day -1; day 1]							
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
ALLRAT	-1.227	-1.281	-1.266	-1.314	-1.170	-1.218	-1.135	-1.167
	(3.684)	(3.882)	(3.796)	(3.986)	(3.508)	(3.684)	(3.398)	(3.520)
ALLSPR60	0.023	/	0.023	/	0.022	/	0.023	/
	(2.558)	/	(2.531)	/	(2.446)	/	(2.622)	/
ALLSPR30	/	0.027	/	0.028	/	0.026	/	0.029
	/	(2.166)	/	(2.214)	/	(2.077)	/	(2.350)
INV	/	/	1.738	1.925	/	/	/	/
	/	/	(1.480)	(1.637)	/	/	/	/
GOINV	/	/	/	/	-4.372	-4.474	/	/
	/	/	/	/	(1.752)	(1.791)	/	/
GOSPEC	/	/	/	/	/	/	6.999	7.465
	/	/	/	/	/	/	(2.153)	(2.288)
Constant	0.763	0.793	0.344	0.318	0.965	0.995	0.568	0.566
	(1.418)	(1.480)	(0.566)	(0.523)	(1.760)	(1.823)	(1.047)	(1.046)
Adjusted R-squared	0.093	0.086	0.096	0.090	0.099	0.092	0.103	0.098
Number of observations†	320	322	320	322	320	322	320	322

Absolute t-statistics are in parentheses. All results are significant at the 5% level.
†Due to the lack of EMBIG spread data for several countries 60 and 30 days before a rating change, the number of observations varies across regressions.

Table 10: Immediate impact of ratings on EMBIG spreads by agency

	Dependent variable: evolution of EMBIG spreads for [day –1; day 1]					
	[1]	[2]	[3]	[4]	[5]	[6]
ALLFI	-0.922 (1.654)	-1.197 (2.133)	/ /	/ /	/ /	/ /
FISPR60	0.023 (1.523)	/ /	/ /	/ /	/ /	/ /
FISPR30	/ /	0.011 (0.507)	/ /	/ /	/ /	/ /
ALLMO	/ /	/ /	-1.688 (2.029)	-1.807 (2.304)	/ /	/ /
MOSPR60	/ /	/ /	0.016 (0.923)	/ /	/ /	/ /
MOSPR30	/ /	/ /	/ /	0.017 (0.710)	/ /	/ /
ALLSP	/ /	/ /	/ /	/ /	-1.248 (2.567)	-1.185 (2.449)
SPSPR60	/ /	/ /	/ /	/ /	0.028 (1.876)	/ /
SPSPR30	/ /	/ /	/ /	/ /	/ /	0.043 (2.134)
Constant	0.529 (0.646)	0.748 (0.892)	0.006 (0.005)	0.075 (0.071)	1.501 (1.647)	1.407 (1.567)
Adjusted R-squared	0.073	0.053	0.088	0.081	0.091	0.096
Number of observations†	100	100	89	90	131	132

Absolute t-statistics are in parentheses. All results are significant at the 5% level.
†Due to the lack of EMBIG spread data for several countries 60 and 30 days before a rating change, the number of observations varies across regressions.

Table 11: Immediate impact of ratings on EMBIG spreads by rating change

	Dependent variable: evolution of EMBIG spreads for [day -1; day 1]					
	[1]	[2]	[3]	[4]	[5]	[6]
ALLSPR60	0.036	/	0.036	/	0.033	/
	(4.200)	/	(4.277)	/	(3.978)	/
ALLSPR30	/	0.045	/	0.045	/	0.042
	/	(3.750)	/	(3.787)	/	(3.580)
FIUP	-1.158	-1.320	/	/	/	/
	(0.843)	(0.961)	/	/	/	/
FIDOWN	/	/	1.174	1.237	/	/
	/	/	(0.755)	(0.790)	/	/
MOUP	/	/	/	/	-3.430	-3.630
	/	/	/	/	(2.365)	(2.509)
MODOWN	/	/	/	/	/	/
	/	/	/	/	/	/
SPUP	/	/	/	/	/	/
	/	/	/	/	/	/
SPDOWN	/	/	/	/	/	/
	/	/	/	/	/	/
Constant	0.590	0.654	0.219	0.250	0.947	1.003
	(0.973)	(1.082)	(0.388)	(0.442)	(1.607)	(1.710)
Adjusted R-squared	0.056	0.045	0.056	0.044	0.070	0.061
Number of observations	320	322	320	322	320	322

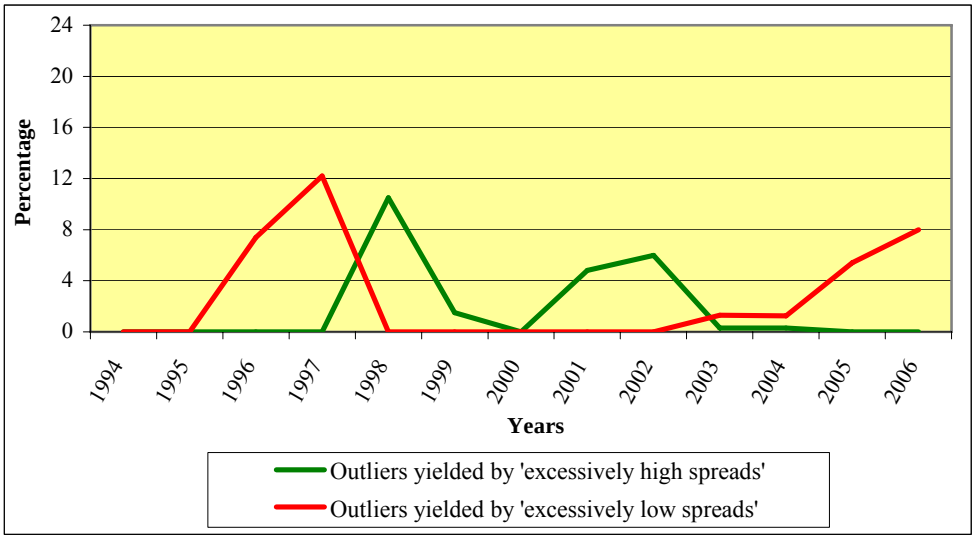
Absolute t-statistics are in parentheses. All results are significant at the 5% level.

Table 11: Immediate impact of ratings on EMBIG spreads by rating change (cont.)

	Dependent variable: evolution of EMBIG spreads for [day -1; day 1]					
	[7]	[8]	[9]	[10]	[11]	[12]
ALLSPR60	0.035	/	0.034	/	0.031	/
	(3.973)	/	(4.007)	/	(3.733)	/
ALLSPR30	/	0.043	/	0.042	/	0.039
	/	(3.579)	/	(3.564)	/	(3.372)
FIUP	/	/	/	/	/	/
	/	/	/	/	/	/
FIDOWN	/	/	/	/	/	/
	/	/	/	/	/	/
MOUP	/	/	/	/	/	/
	/	/	/	/	/	/
MODOWN	1.395	1.766	/	/	/	/
	(0.845)	(1.097)	/	/	/	/
SPUP	/	/	-2.032	-2.165	/	/
	/	/	(1.603)	(1.708)	/	/
SPDOWN	/	/	/	/	4.602	4.667
	/	/	/	/	(3.436)	(3.517)
Constant	0.221	0.208	0.866	0.928	-0.387	-0.386
	(0.395)	(0.371)	(1.389)	(1.493)	(0.680)	(0.675)
Adjusted R-squared	0.056	0.046	0.062	0.051	0.088	0.078
Number of observations	320	322	320	322	320	322

Absolute t-statistics are in parentheses. All results are significant at the 5% level.

Chart 1a: Outliers yielded by excessively high/low actual spreads when actual spreads are compared to Fitch rating-based spreads[¥]



[¥] None of the thirty-two countries in my sample was rated by Fitch as of December 31, 1993.

Chart 1b: Outliers yielded by excessively high/low actual spreads when actual spreads are compared to Moody's rating-based spreads

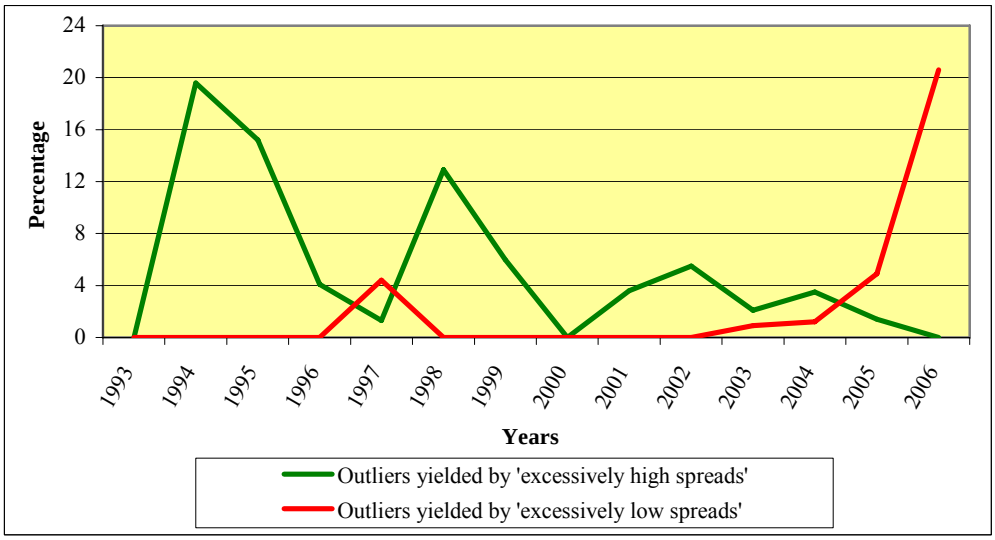


Chart 1c: Outliers yielded by excessively high/low actual spreads when actual spreads are compared to S&P's rating-based spreads

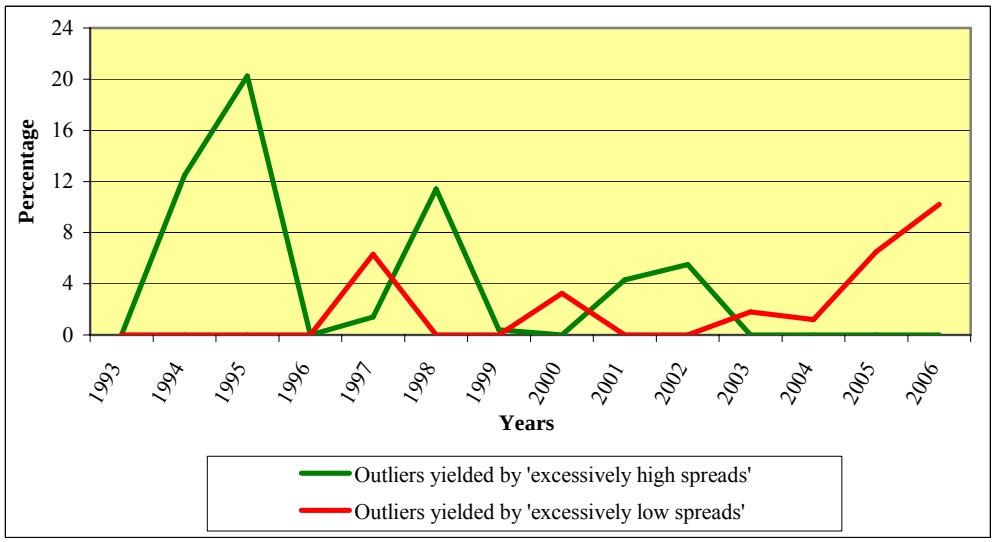


Chart 2a: Actual spreads vs. Fitch rating-based spreads – August 1998

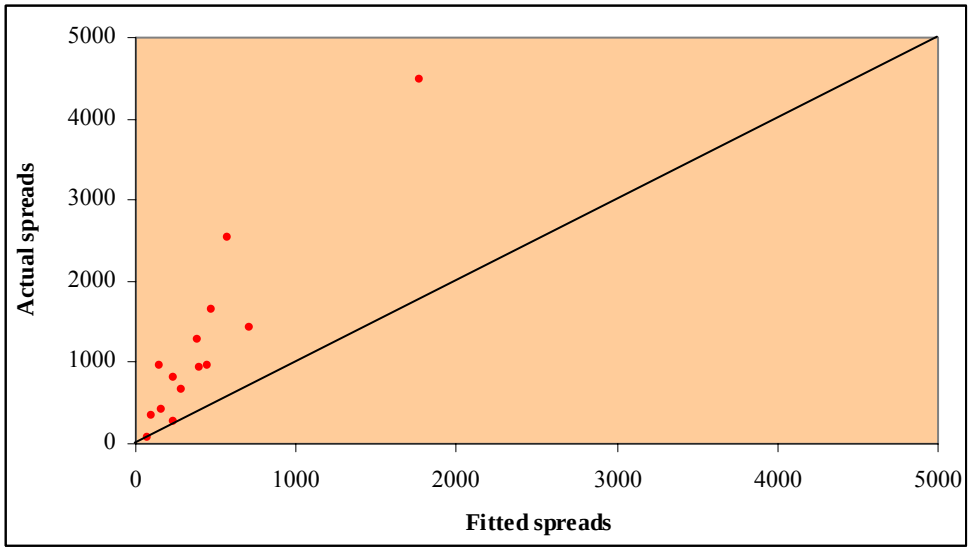


Chart 2b: Actual spreads vs. Moody's rating-based spreads – August 1998

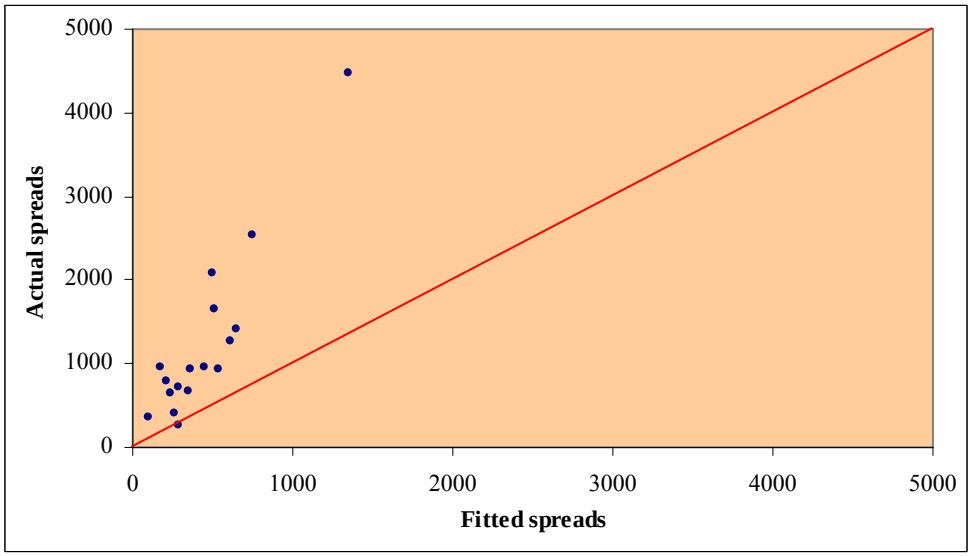


Chart 2c: Actual spreads vs. S&P's rating-based spreads – August 1998

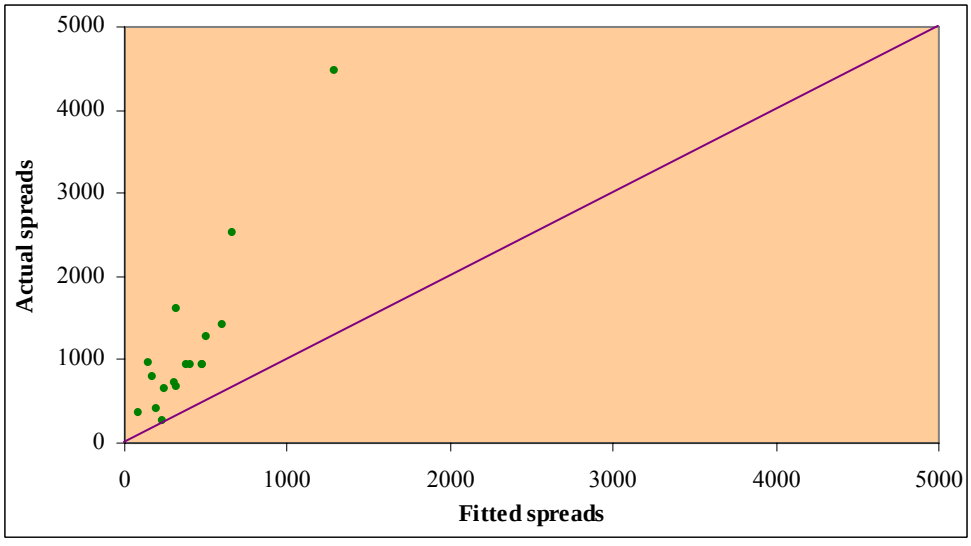


Chart 3a: Actual spreads vs. Fitch rating-based spreads – February 2007

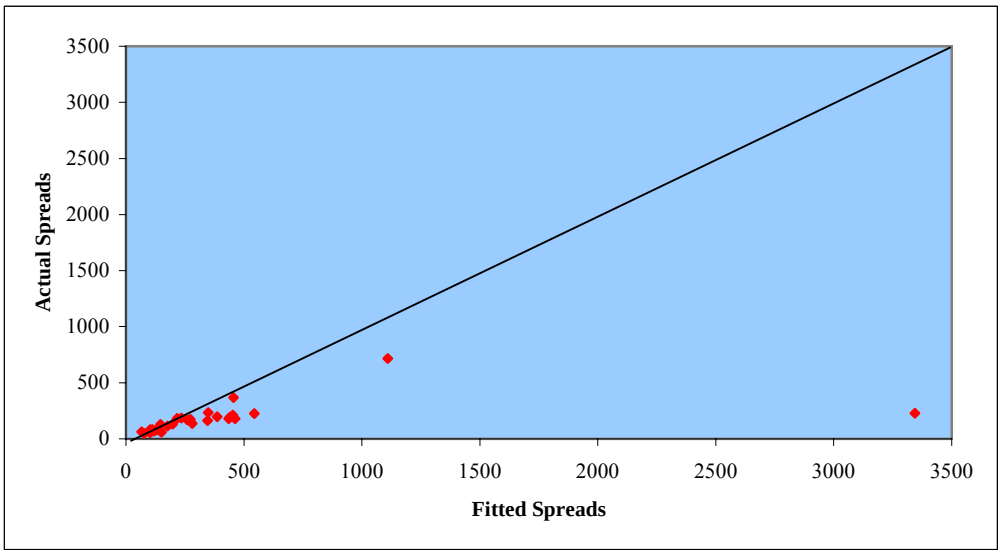


Chart 3b: Actual spreads vs. Moody's rating-based spreads – February 2007

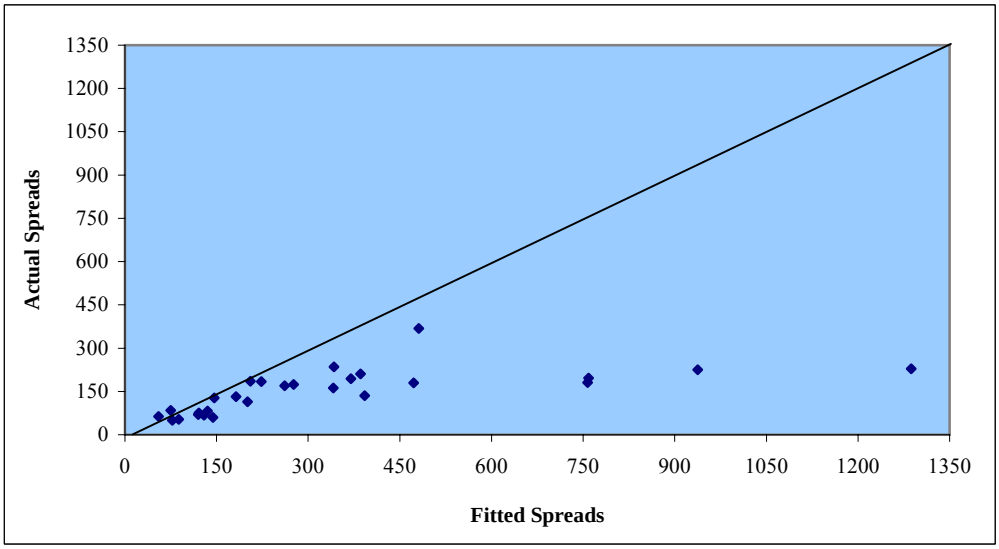


Chart 3c: Actual spreads vs. S&P's rating-based spreads – February 2007

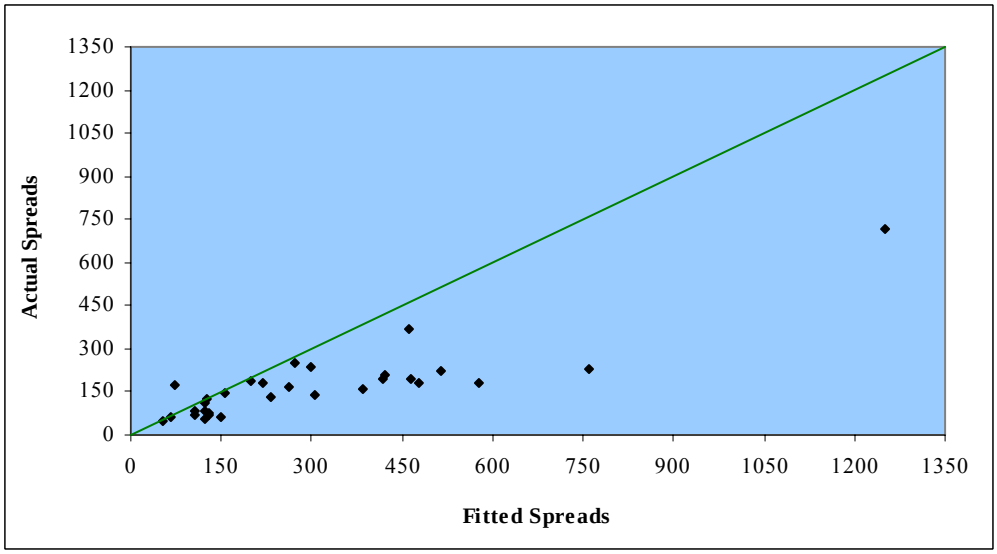


Chart 4a: 58 Fitch upgrades and EMBIG spreads

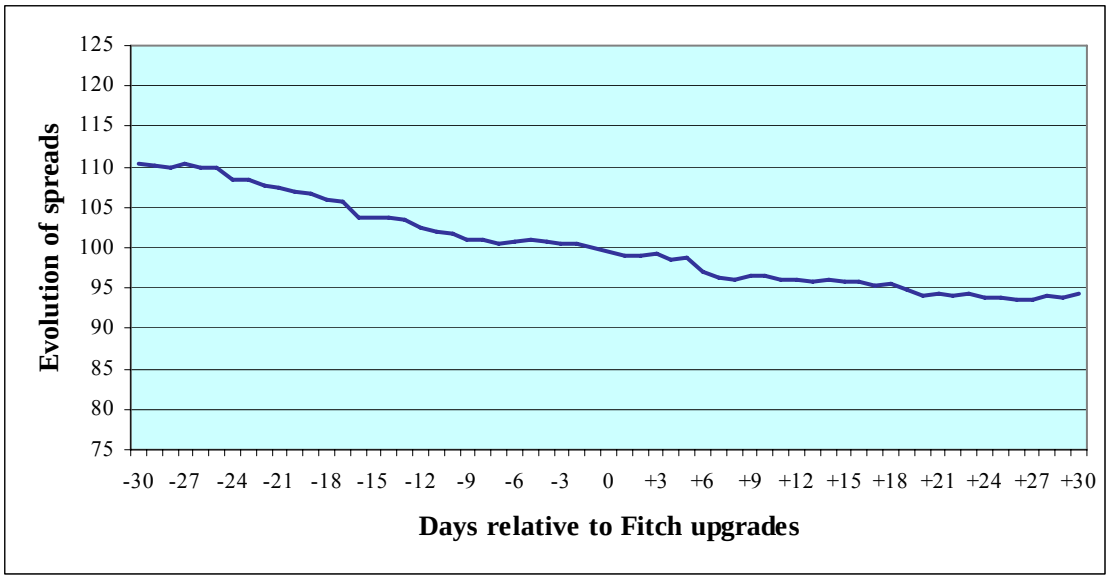


Chart 4b: 49 Moody's upgrades and EMBIG spreads

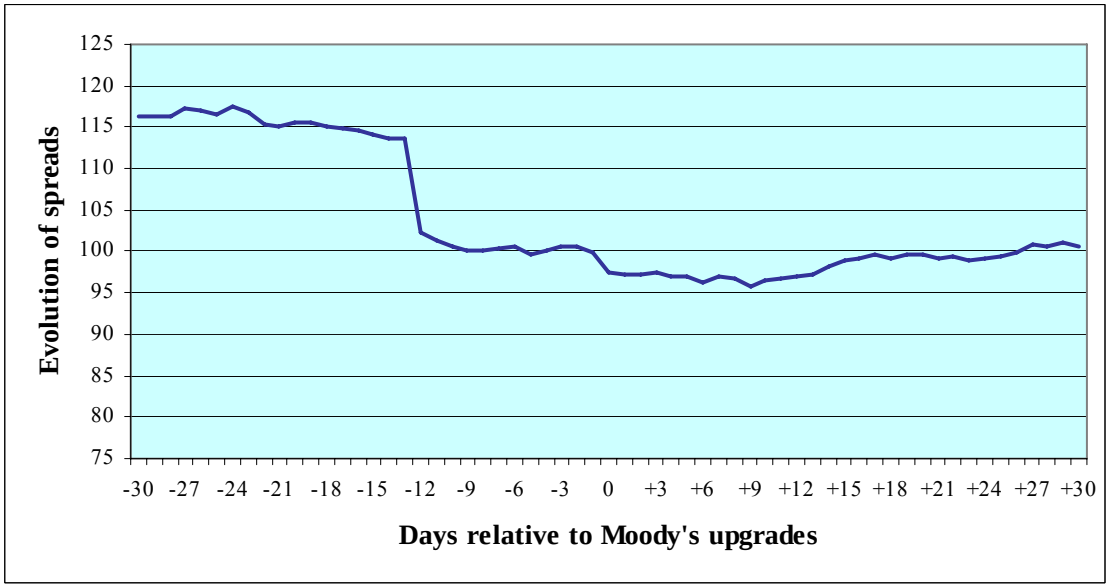


Chart 4c: 73 S&P's upgrades and EMBIG spreads

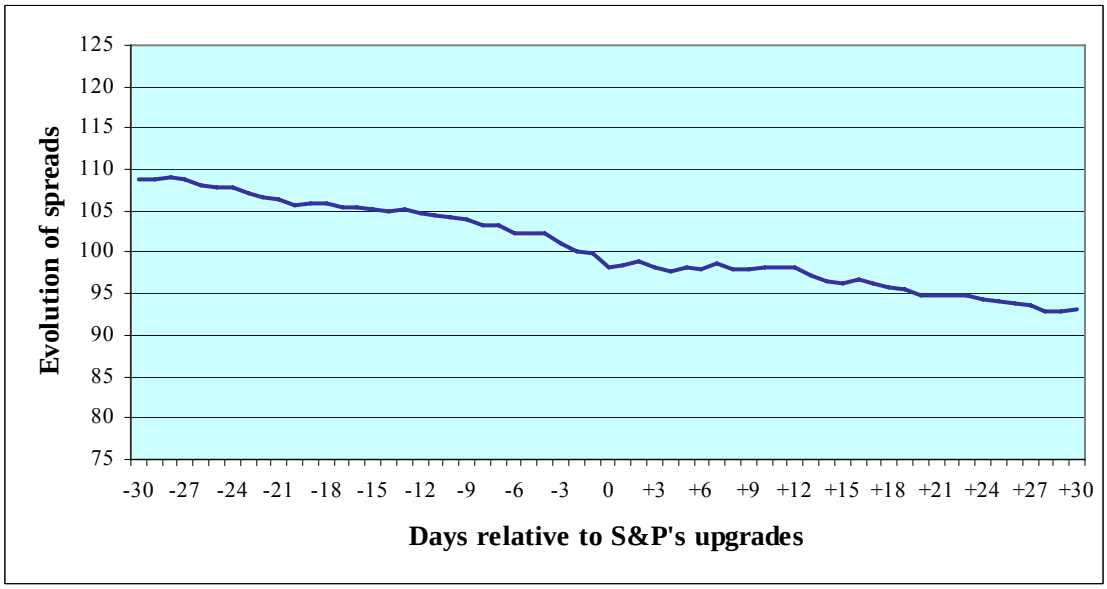


Chart 5a: 43 Fitch downgrades and EMBIG spreads

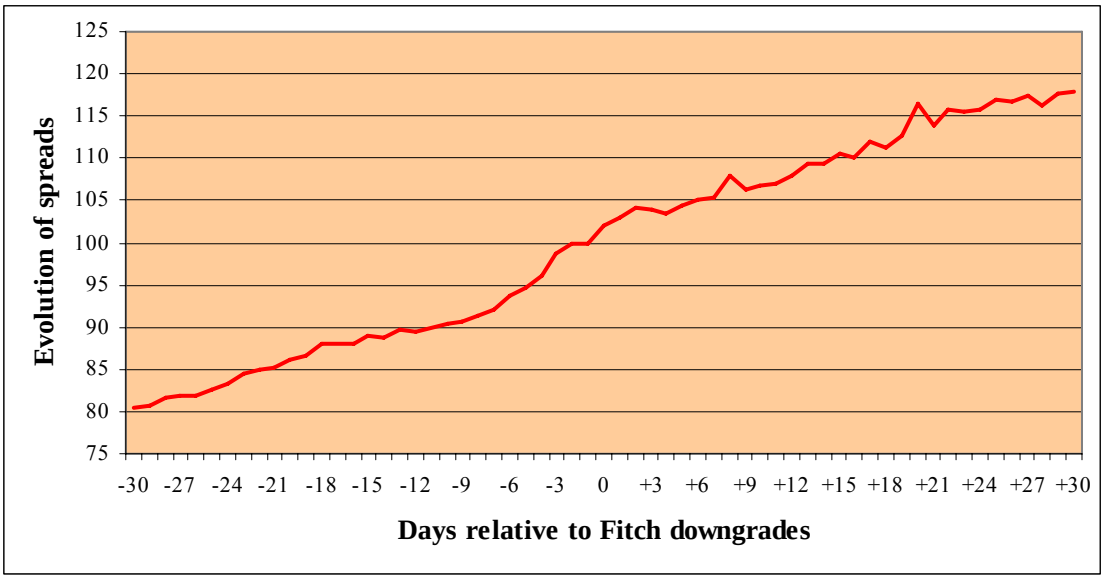


Chart 5b: 41 Moody's downgrades and EMBIG spreads

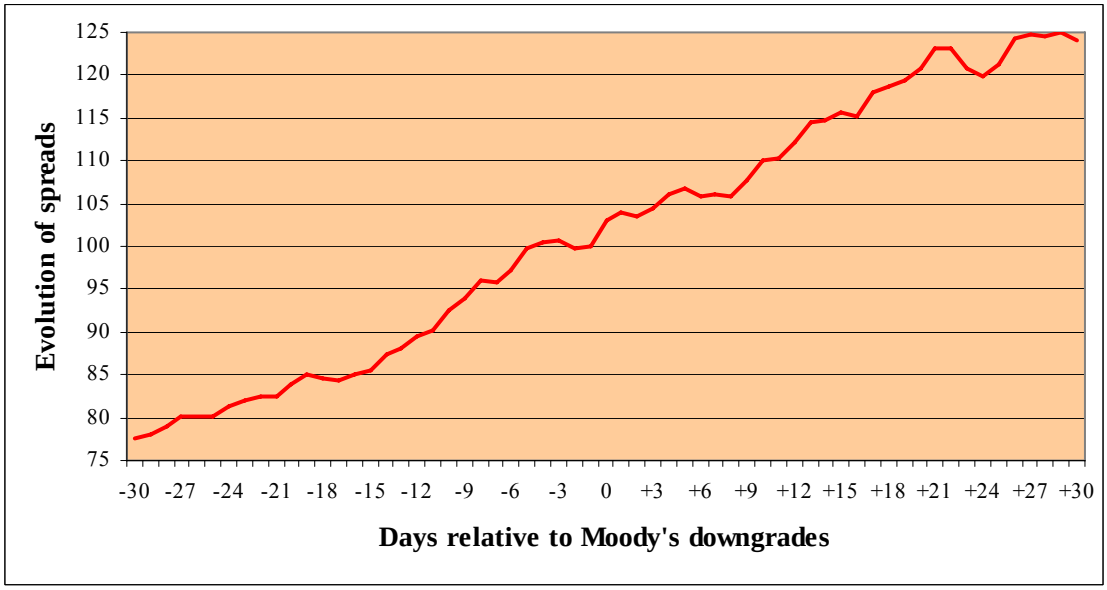


Chart 5c: 60 S&P's downgrades and EMBIG spreads