On Emerging Economy Sovereign Spreads and Ratings

by

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Abstract[1]

This paper analyzes alternative models for emerging sovereign ratings. Although a small number of economic fundamentals explain ratings reasonably well, variations in those economic fundamentals are themselves explained by a small number of world factors. On the other hand, global financial variables associated with risk aversion are additionally required in order to explain the significant spread compression at the end of 2006. To determine whether ratings matter for spreads, the paper compares results across different methodologies, in particular exploiting differences in opinion between rating agencies. The evidence from this and previous methodologies is that ratings do matter. Finally, the paper finds that global indicators of risk aversion have become less important for emerging market spreads and that the effect of sub-prime news is less than the effect of "average news" on emerging economy credit default swap (CDS) spreads.

JEL Codes: F37, G14, G15, C23
Keywords: Ratings, Spreads, Panel Data

1. Introduction

In December 2006, emerging country sovereign spreads were close to record lows of around 170 basis points. The ratings of the two agencies considered in this paper indicate marked improvements in the credit quality of emerging sovereigns from the depths of the post-Russia crisis of 1998-1999. Interestingly, while spreads rose from April 2007—and especially in July 2007—ratings from the agencies considered in this paper overall continued to improve in the first half of 2007. Figure 1 plots the cumulative upgrades for emerging countries and the EMBI global spread.[2]

Figure 1. Cumulative Ratings Changes and Spreads: Emerging Countries

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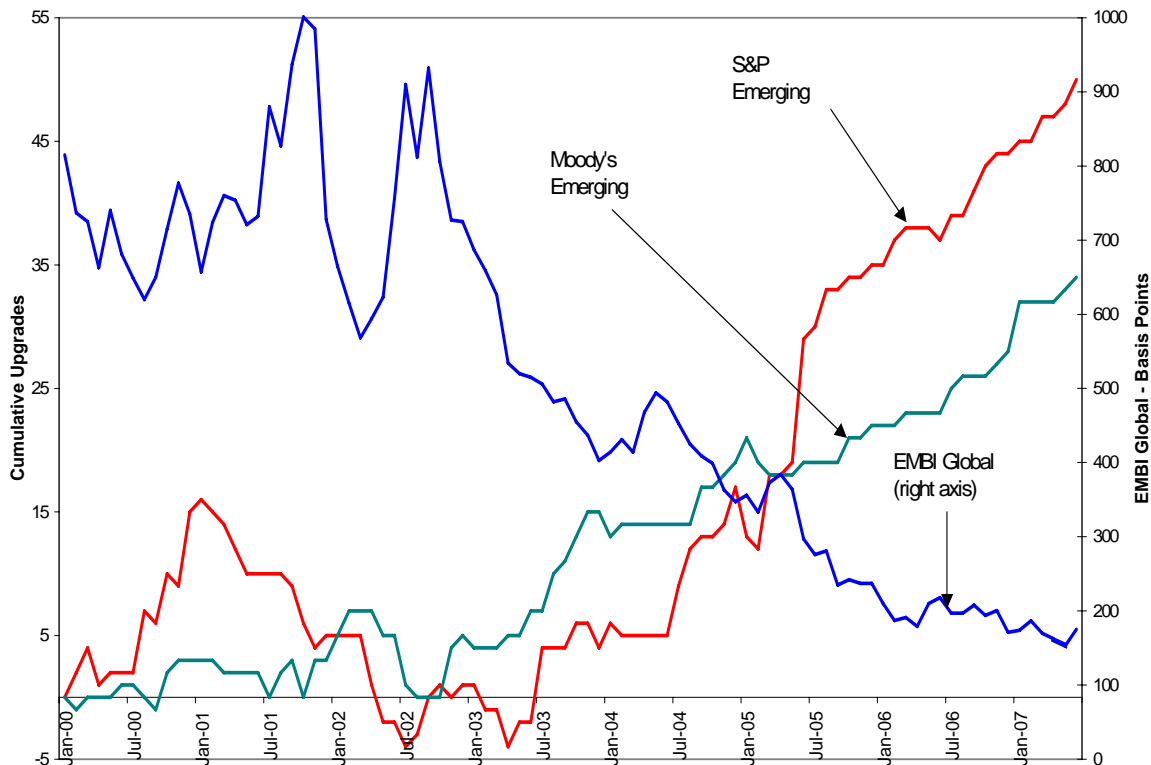
[2] The cumulative upgrade series starts arbitrarily at zero in Jan 2000 and then a +1 is given to each one notch upgrade, +2 to each two notch upgrade, a –1 for each one notch downgrade and a –2 to each 2 notch downgrade, etc. All upgrades and downgrades are summed for each period and the graph plots the sum over time of that aggregate. The graph runs from January 2000 to June 2007.

There is a growing literature on modeling ratings. We replicate recent results but we have doubts regarding the inclusion of particular variables. We also discuss the inclusion of different measures of debt. Interestingly, a model limited to a more limited number of harder economic variables explains a reasonable percentage of the time variation of ratings. This is perhaps not so surprising, as we also find that just two global factors explain more than 70 percent of the variation in ratings and almost 70 percent of the variation in economic fundamentals and ratings.

We also analyze movements in spreads for those countries that are in JP Morgan's EMBI global index, a group of systemically important emerging countries. The cost of finance for this group is clearly an important question for the public and private sector alike in those countries and also for the stability of the international financial system. Our results suggest that fundamentals do not explain the whole reduction in spreads to the end of 2006 but that, if we include global financial variables, then we can explain much of the decrease in spreads. In general we suggest that without the improvement in the global financial environment, spreads would have been some 150 to 170 basis points higher on average for emerging economies at the end of 2006.

We also consider whether ratings matter for spreads. This is not a new question, but when defined properly it is not easily answered. In this paper we again replicate methodologies found in the literature and obtain similar results to previous authors. However, we also consider an innovative method to consider the question; namely, we exploit the differences in opinions between rating agencies. The two agencies considered in this paper do not always agree. Indeed roughly 50 percent of country-rating observations suggest disagreements. Our results using a type of difference-in-difference method suggests that these "opinions" do appear to matter.

We find that global factors matter less for determining emerging sovereign spreads than for earlier in the sample. We also consider recent daily data on 12-month Credit Default Swap (CDS) spreads. Since these spreads are available for fewer countries and for a shorter time series we prefer to use bond spreads for the work with ratings. However, using this more recent data we find a highly significant effect for global financial factors. Interestingly, when we interact the indicator of risk in global markets with an event dummy representing news on the sub-prime crisis, we find that movements in global risk caused for this motive are less important than "average" news. We consider the implications of this result in the conclusions.

The paper is organized as follows. In the next section we discuss models of ratings. We then turn to models of spreads in Section 3. In Section 4 we discuss whether ratings matter. In Section 5 we consider whether the effect of world financial factors has diminished and the effect of the sub-prime crisis on emerging economy asset prices. Section 6 concludes.

2. Models of Ratings

There is a small but growing literature on modeling sovereign ratings. In this section we consider traditional models of ratings and then we consider a principal components analysis for ratings and for the economic fundamentals that we find drive ratings in the traditional models.

2.1 On Traditional Models of Ratings

Cantor and Packer (1996) is a standard starting point while Afonso et al. (2007) includes an excellent review and a comprehensive treatment of alternative models. Moody's (2004a) on local ratings and Moody's (2004b) on long-term foreign currency ratings are interesting examples of work from the rating agencies themselves.

Models of ratings tend to include variables reflecting a) economic progress (growth, GDP per capita, etc.), b) debt and the external sector, including reserves; c) variables that attempt to capture political or institutional characteristics (especially Government Effectiveness); and d) dummy variables that capture debt payment history. Models with a surprisingly small set of variables are quite successful in capturing the cross-sectional variation in ratings and, albeit to a lesser extent, ratings' movements over time. However, there are several issues that are worthy of discussion related to these models.

Models of ratings have been conducted using panel data. These regressions can be run simply with OLS, with random effects or fixed effects or within the context of a dynamic model, perhaps employing GMM techniques such as the Arellano-Bond or Blundell-Bond estimators. We leave for now the possibility of a dynamic model for ratings as a topic for future research. In Afonso et al. (2007), a case is made for random effects and for including the time averages of variables in the regression. The idea is that the time averages then capture the cross-sectional variations and the time-varying variables capture movements over time; the authors obtain appealing results. However, our interest here is to model rating movements to see if movements in ratings can account for spread reductions. Moreover, our interpretation of the statistical tests

reported, and our own tests below, is that they support the use of a fixed-effects model, although in the end the models are similar.[3]

A second issue regarding estimation technique is how to express the dependent variable, which is the rating. Ratings are generally expressed according to a non-numerical scale and hence an argument can be made that a non-cardinal approach, such as an ordered probit, may be most appropriate. Afonso et al. (2007) suggest that an ordinal approach may have some advantages. However, in some cases the estimated distances between rating grades do not reject equality—thus implying that converting the ratings to a numerical scale with an equal distance between each rating is a fairly good approximation—and the differences in the models taking each approach are fairly small. Again, in part as our interest is not ratings per se, we will take the approach of using a numerical scale for ratings. When we model spreads we will use both a numerical (log) scale and, as an alternative, an approach that does control for differences between rating-grades as being unequal.

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[3] We also tested for the presence of time effects. In our preferred specification the time effects were not significant.

Table 1. Explaining Standard and Poor's Ratings

	(1)	(2)	(3)	(4)	(5)	(6)
GDP PC (%)	3.519	5.888	7.531	4.997	6.354	5.232
	(5.15)***	(3.54)***	(3.84)***	(3.97)***	(4.74)***	(1.87)*
Growth (%)	-1.576	-2.580	1.187	-0.387	-0.213	7.323
	(0.71)	(1.15)	(0.48)	(0.12)	(0.08)	(2.96)**
Unemployment (%)	0.007	0.026	0.013	-0.040	-0.018	-0.052
	(0.19)	(0.66)	(0.27)	(0.90)	(0.43)	(0.60)
Inflation (%)	-0.612	-0.755	-0.124	-0.083	-0.107	-0.068
	(0.53)	(0.61)	(3.99)***	(4.29)***	(4.41)***	(2.48)**
Gross Central Government Debt Over GDP (%)	-0.046	-0.040				
	(4.01)***	(3.17)***				
Fiscal Balance over GDP (%)	4.853	3.885	6.514	6.630	5.421	5.210
	(2.27)**	(2.00)*	(2.36)**	(1.85)*	(1.63)	(1.65)
Government Effectiveness (-2.5 - 2.5)	0.988	0.950				
	(2.68)***	(2.76)***				
Foreign Debt to Exports (%)	-0.318	-0.408	-0.634	-0.175	-0.226	0.210
	(1.49)	(1.52)	(1.77)*	(0.45)	(0.57)	(0.28)
Current Account Balance (%)	-5.743	-5.209				
	(2.65)***	(2.41)**				
Reserves to GDP (%)	1.986	1.980	-1.592	-2.353	-1.669	-10.468
	(1.53)	(1.50)	(0.60)	(0.82)	(0.55)	(1.68)
Tax Revenue to Total Debt (%)			0.564	0.622	0.584	0.596
			(2.54)**	(2.60)**	(2.46)**	(3.19)***
Original Sin 3 (%)				-0.809	-0.954	
				(1.22)	(1.26)	
Volatility of Real Exchange Rate (%)				-0.076	-0.058	-0.030
				(2.30)**	(1.81)*	(1.08)
Foreign Currency Public Debt (% Total)						-5.294
						(2.47)**
In Default (0,1)	-3.498	-3.525	-5.481	-5.877	-5.760	-5.442
	(4.87)***	(5.09)***	(14.06)***	(11.28)***	(11.36)***	(7.85)***
Default since 1970 (0,1)	-0.765					
	(1.42)					
EU Enter Dummy (0,1)	0.637	0.356	0.969	0.906	0.844	
	(3.13)***	(1.17)	(2.33)**	(3.19)***	(2.78)***	
EU Step Dummy (0,1)	0.786	0.538	0.947	0.670	0.459	
	(2.53)**	(1.37)	(1.89)*	(1.65)	(1.02)	
LAC Dummy (0,1)	-0.735					
	(1.75)*					
US Treasury Yield (10 Years, %)					1.292	
					(2.25)**	
US High Yield (10 Years, %)					0.168	
					(0.40)	
VIX Index (%)					-0.012	
					(0.43)	
Constant	11.641	6.658	7.096	7.204	3.423	7.669
	(11.64)***	(3.16)***	(4.10)***	(3.89)***	(1.44)	(2.80)**
Effects	Random	Fixed	Fixed	Fixed	Fixed	Fixed
Time Effects	No	Yes	Yes	No	No	No
Observations	356	356	422	368	368	148
Number of group(wbcode)	41	41	41	38	38	14
Rsq-Overall	0.87	0.35	0.20	0.29	0.25	0.06
Rsq-Within	0.71	0.73	0.59	0.53	0.55	0.60
Rsq-Between	0.91	0.40	0.30	0.36	0.34	0.02

Robust z statistics in parentheses

In column 1: variable time-averages, a LAC and an industrialized country dummy are included but not shown

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

Table 2. Explaining Moody's Ratings

	(1)	(2)	(3)	(4)	(5)	(6)
GDP PC (%)	3.745	8.367	6.222	4.254	5.411	3.003
	(4.19)***	(3.57)***	(3.41)***	(2.67)**	(2.95)***	(1.03)
Growth (%)	-1.320	-2.700	1.890	-1.136	-0.909	7.566
	(0.42)	(0.87)	(0.72)	(0.31)	(0.26)	(2.91)**
Unemployment (%)	-0.025	0.028	-0.010	-0.072	-0.055	0.008
	(0.46)	(0.42)	(0.16)	(1.44)	(1.12)	(0.10)
Inflation (%)	0.896	0.007	-0.073	-0.012	-0.016	0.028
	(0.91)	(0.01)	(2.45)**	(0.61)	(0.65)	(0.92)
Gross Central Government Debt Over GDP (%)	-0.029	-0.014				
	(2.22)**	(1.07)				
Fiscal Balance (%)	0.987	0.840	-0.962	0.358	0.044	1.242
	(0.28)	(0.27)	(0.32)	(0.09)	(0.01)	(0.41)
Government Effectiveness (-2.5 - 2.5)	1.192	0.956				
	(2.65)***	(2.08)**				
Foreign Debt to Exports (%)	-0.302	-0.485	-0.718	-0.350	-0.398	-0.454
	(0.77)	(1.10)	(1.57)	(0.82)	(0.91)	(0.45)
Current Account Balance (%)	-8.228	-6.890				
	(2.85)***	(2.47)**				
Reserves to GDP (%)	2.539	3.564	1.842	-0.671	-0.020	-5.481
	(1.25)	(1.76)*	(0.74)	(0.24)	(0.01)	(1.04)
Tax Revenue to Total Debt (%)			0.540	0.636	0.599	0.744
			(2.36)**	(2.77)***	(2.69)**	(6.99)***
Original Sin 3 (%)				-0.396	-0.417	
				(0.60)	(0.58)	
Volatility of Real Exchange Rate (%)				-0.089	-0.075	-0.021
				(3.26)***	(2.87)***	(0.95)
Foreign Currency Public Debt (% Total)						-6.769
						(3.44)***
In Default (0,1)	-0.544	-0.580	-1.662	-2.101	-1.988	-2.492
	(0.70)	(0.77)	(3.26)***	(2.88)***	(2.96)***	(1.83)*
Default since 1970 (0,1)	-1.423					
	(1.87)*					
EU Enter Dummy (0,1)	2.159	1.666	2.113	2.267	2.210	
	(7.75)***	(5.36)***	(7.30)***	(7.13)***	(6.00)***	
EU Step Dummy (0,1)	1.558	1.380	1.991	1.468	1.374	
	(4.10)***	(2.82)***	(4.79)***	(3.77)***	(2.97)***	
LAC Dummy (0,1)	-1.388					
	(2.26)**					
US Treasury Yield (10 Years, %)					1.219	
					(1.68)	
US High Yield (10 Years, %)					-0.304	
					(0.55)	
VIX Index (%)					0.010	
					(0.38)	
Constant	10.728	2.532	7.836	7.737	4.921	9.650
	(8.32)***	(0.87)	(4.71)***	(3.63)***	(1.78)*	(2.71)**
Effects	Random	Fixed	Fixed	Fixed	Fixed	Fixed
Time Effects	No	Yes	Yes	No	No	No
Observations	353	353	424	367	367	140
Number of group(wbcode)	43	43	43	40	40	14
Rsq-Overall	0.78	0.28	0.19	0.30	0.27	0.14
Rsq-Within	0.49	0.56	0.41	0.41	0.42	0.54
Rsq-Between	0.85	0.35	0.34	0.41	0.38	0.13

Robust z statistics in parentheses

In column 1: variable time-averages, a LAC and an industrialized country dummy are included but not shown

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

The first column of both Table 1 (for Standard and Poor's) and Table 2 (for Moody's) below replicate the preferred model of Afonso et al. (2007), but for developing countries only—our interest in this paper. This model is estimated with random effects and includes not only the variables listed but also the means of each variable (not shown).[4] The variables that are significant include GDP per capita, Gross Government Debt divided by GDP, Fiscal Balance, Government Effectiveness and the Current Account deficit. We also include an EU-entry dummy (1 if a country enters the EU for the year of its entry) and an EU membership step-dummy (1 for each observation the country is a member of the EU). The dummy variable for in-default takes a value of 1 if the country is in default according to that rating agency and zero otherwise. As can be seen, the fit of the model is excellent, with an R-Squared of 0.87 overall for the case of Standard and Poor's ratings and 0.78 for Moody's ratings.[5]

However, this specification includes a number of variables that merit discussion. First, note that the current account deficit has the "wrong sign." When the current account is more positive, the rating is worse rather than better. This is a general result in models that include this variable and is not limited to this specification. It seems likely that this is not a good explanation of the rating but rather reflects a reverse causality whereby countries with better ratings can afford to larger current account deficits, the United States being a good example.

A second aspect is the role played by Government Effectiveness. As can be seen in the tables above, this variable is highly significant. However, it might be described as a summary of surveys, the majority of which are perceptions of aspects of government behavior.[6] There is therefore a potential concern that the opinion of the rating agency is derived from another opinion or set of opinions and it is difficult to believe that the latter is totally independent from the former. Moreover, Government Effectiveness is just one indicator that might be included. Table 3 below shows a selection of such potential indicators and illustrates that they are all highly correlated and each is highly correlated with the ratings of Moody's and Standard and Poor's.

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[4] As discussed, the authors suggest this is a way of incorporating long-term effects (the variable means) and also dynamics (the actual variable), controlling for unobservable variables with the random effects.
[5] These values are slightly lower than those reported in Afonso et al. (2007), but our sample is only developing countries.
[6] See Kaufman et al. (2006) for a description of the methodology.

A third comment is regarding statistics on debt. Debt is measured in different ways and, depending on theoretical considerations, one definition may be more relevant than others.[7] Debt may be defined according to a variety of criteria: the issuer (central government, or a wider definition of the public sector, or the private sector); gross or net of certain assets held; and foreign or domestic according to three different definitions (a) currency of denomination, b) residence, or c) where the debt was issued (i.e., legislation). Finally debt may be normalized by different variables. Popular choices are GDP and tax revenues and, for foreign debt, exports or other elements of the balance of payments.

These different dimensions allow a wide variety of debt variables to be chosen. In our view, a logical choice is to specify three debt variables as follows: a) the ratio of Tax Revenues to total Government (Sovereign) Debt as a measure of the Government's ability to tax relative to its liabilities; b) Total (Private plus Public) External Debt to Exports as a measure of a country's need to obtain resources from the rest of the world to pay creditors from the rest of the world; and c) a ratio of debt in foreign currency to total debt as a measure of the riskiness of debt composition. However, we realize that this is certainly not a unique choice.

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[7] It is assumed here that the model is to explain the rating on long-term foreign currency debt issued in a foreign jurisdiction.

Table 3. Overrated?

	Source (*)	Voice and Accountability	Control of Corruption	Government Effectiveness	Political Stability	Rule of Law	Regulatory Quality	Growth Competitive Index Ranking (t)	Growth Competitive Index Score	Business Competitive Index Ranking	Company operations and strategy ranking	Quality of the national business environment ranking	Growth Competitive Index Ranking (t-1)	Real GDP per Capita	Rating Standard and Poor's	Rating Moody's
Voice and Accountability	1	1.00														
Control of Corruption	2	0.82	1.00													
Government Effectiveness	3	0.80	0.97	1.00												
Political Stability	4	0.81	0.89	0.88	1.00											
Rule of Law	5	0.84	0.98	0.98	0.91	1.00										
Regulatory Quality	6	0.82	0.92	0.92	0.89	0.93	1.00									
Growth Competitive Index Ranking (t)	7	-0.74	-0.92	-0.95	-0.81	-0.93	-0.86	1.00								
Growth Competitive Index Score	8	0.74	0.92	0.95	0.81	0.93	0.86	-1.00	1.00							
Business Competitive Index Ranking	9	-0.71	-0.88	-0.93	-0.74	-0.89	-0.81	0.94	-0.94	1.00						
Company operations and strategy ranking	10	-0.68	-0.80	-0.84	-0.65	-0.82	-0.73	0.87	-0.87	0.95	1.00					
Quality of the national business environment ranking	11	-0.71	-0.89	-0.93	-0.75	-0.90	-0.82	0.95	-0.95	1.00	0.93	1.00				
Growth Competitive Index Ranking (t-1)	12	-0.74	-0.93	-0.95	-0.83	-0.94	-0.87	0.98	-0.98	0.94	0.86	0.94	1.00			
Real GDP per Capita	13	0.32	0.32	0.39	0.29	0.34	0.34	-0.40	0.40	-0.42	-0.44	-0.42	-0.38	1.00		
Rating Standard and Poor's	14	0.76	0.91	0.93	0.81	0.92	0.87	-0.92	0.92	-0.89	-0.82	-0.90	-0.92	0.36	1.00	
Rating Moody's	15	0.75	0.89	0.91	0.81	0.91	0.86	-0.92	0.92	-0.90	-0.83	-0.90	-0.91	0.38	0.98	1.00

(*) Source: Own calculations, based on World Bank (1 to 6, year 2004), World Economic Forum (7 to 12, year 2005), WEO (12, year 2004), S&P (13, year 2004) and Moody's (14, year 2004). Based on a total of 98 countries.

Unfortunately, even for these fairly simple ratios standard sources are not ideal. The IMF's International Financial Statistics is not particularly homogeneous in its definition of debt across countries.[8] The World Bank's Global Development Finance database has only external debt, by a residence criterion. The BIS has a comprehensive database on international securities and a separate one on banking. These sources have information on currency composition but are not comprehensive measures of debt as they miss domestic debt. The joint IMF, World Bank, BIS, OECD database attempts to combine various sources, but each with its own definitions,

These issues are discussed in Inter-American Development Bank (2006) and Cowan et al. (2006). The associated database attempts to homogenize statistics across a group of countries including domestic and foreign debt. These data are focused on Latin America, although some comparator countries are also included. Moreover, for total (central) Government a still wider selection of countries is available. We use that measure of debt here to construct the variable tax revenues to total debt. There is also a new database produced by IMF economists with much the same objective; see Jeanne and Guiscina (2006). This database has debt composition (foreign currency versus domestic currency) for a wider selection of systemic emerging countries. We also use this ratio to test if debt composition matters for ratings.

Moreover, Calvo et al. (2004), Hausmann (2006) and Hausmann and Panizaa (2003) stress the currency composition of liabilities as a significant problem for developing countries. The first paper cited shows that countries with more severe balance sheet currency mismatches are more likely to suffer from a Sudden Stop in capital flows. We use two different measures of currency composition. First, we use debt issued in foreign currency divided by total debt. This is available in the Jeanne and Guiscina (2006) database for the widest number of countries. Second, we use the Hausmann and Panizza variable Original Sin 3 that captures the use of a country's currency as an international unit of account. Original Sin 3 is calculated using the BIS securities' database and is the total debt issued in the currency of the country divided by the external debt issued by that country. The idea is that this captures the ability of a country to issue debt in its own currency.

Hausmann (2006) and García and Rigobón (2004) stress the interaction of currency composition and exchange rate dynamics in developing countries. This suggests that the

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[8] In particular, some countries report net debt, others gross.

volatility of the real exchange rate is also a relevant variable to determine the riskiness of emerging country sovereign debt.

In the tables above we present a set of columns where we experiment by taking out the Current Account deficit and Government Effectiveness and including different specifications of the debt variables and the volatility of the real exchange. The second column of the tables simply replaces the time averages with fixed effects and includes time effects as well. As can be seen by the statistics of the regression, there is a slight improvement in the R-Squared for the time (within) variation, and the Hausmann statistic suggests that fixed effects are preferred.[9] While we understand the desire to provide a complete explanation of ratings, our interest in this paper is to explain the time variation, and we think that this is best achieved using regressions with fixed effects and, where necessary, time effects.

The third column shows the results with fixed effects but takes out Government Effectiveness and the current account deficit. We also switch the debt ratio from debt to GDP to tax revenues to total debt, which we consider a better measure of the size of debt from a risk standpoint. As expected, the R-Squareds fall due to the exclusion of Government Effectiveness. This specification explains about 59 percent (Standard and Poor's) and 41 percent (Moody's) of the within variation.

In column 4 we add the real exchange rate volatility and Original Sin 3 (OSIN3). However, the OSIN3 variable is not significant. There is some evidence, however, that higher real exchange rate volatility leads to a poorer rating. We also lose some observations and, probably due to this, the R-Squared falls slightly for Standard and Poor's, though not for Moody's.

In column 5 we analyze whether global variables such as the US Treasury yield or the VIX or High Yield US corporate index affect credit ratings. Surprisingly, if anything we find that increases in US interest rates are associated with better credit ratings. The fall in spreads over the recent period certainly cannot be explained by changes in US interest rates. We also find no evidence that the High Yield or the VIX index affects ratings. This suggests that there is no feedback from higher liquidity or lower risk aversion to better ratings. We will come back to this point below when we model spreads.

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[9] This test is 31.45 (probability measure of 0.0029) for Standard and Poor's and 68.45 (probability measure 0.0000) for Moody's, suggesting that fixed effects are preferred.

In column 6, we use the percentage of total debt issued in foreign currency from the Jeanne and Guiscina (2006) database. Unfortunately, this is only available for a limited number of countries ,but for this reduced sample we do indeed find that it is significant. This result reinforces the view that debt composition is an important variable and that initiatives to get better data on currency composition of debt are worthwhile exercises. Comparing the models for Moody's and Standard and Poor's reveals differences. We return to consider these differences between the agencies in Section 4 below.

Table 4. Actual and Fitted Ratings For Last Observation of the Sample, December 2006

Country	Actual S&P	Fitted S&P	Actual Moody's	Fitted Moody's
Argentina	B+	BB-	B3	**B1**
Brazil	BB-	BB-	Ba3	B1
Chile	A	**AA-**	Baa1	**A2**
Colombia	BB	BB+	Ba2	Ba1
Mexico	BBB	BBB-	Baa1	**Baa3**
Peru	BB	BB	Ba3	Ba2
Venezuela	B+	B+	B2	B1

Source: S&P, Moody's and Own Calculations (our model, 2005)
(*)Legend: Fitted 2 notches below = Green, 2 notches above=Red

Table 4 compares the predicted values for our preferred models for both Standard and Poor's and Moody's versus the actual ratings for selected countries in Latin America for the last observations (December 2006). The model includes fixed effects and hence by definition the time averages of the predicted values are equal to the actual values. However, we note several differences in the actual and the fitted for the last observation. Here we comment on those cases where there is a difference of at least two notches between the actual and the fitted. Argentina appears to have too low a rating given its fundamentals in the case of Moody's, Chile has too low a rating given its fundamentals for both agencies, and Mexico has a Moody's rating higher than predicted by the model.[10] In terms of one-notch differences there is also some evidence that Colombia and Peru have higher predicted than actual ratings for at least one agency and Brazil has a rating one notch higher than predicted by the model in the case of Moody's.

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[10] The model does not include a "NAFTA dummy."

2.2 Factor Models of Ratings and of Economic Fundamentals

In this section we present results conducting a factor analysis regarding ratings changes. It turns out that the changes in ratings of emerging economies can be represented by a small number of (global) factors. In Table 5 we present the results of the analysis. Just two factors can explain some 81 percent of the movement in ratings of all emerging economies, and three factors can explain almost 90 percent of the movement. As we have established in the previous section that economic fundamentals appear to drive ratings rather than, say, global liquidity or risk aversion, we can be fairly confident that these global factors are real rather than financial in nature.

Indeed, and perhaps more surprisingly, we also find that we can explain the changes in economic fundamentals, which explain a large proportion of ratings changes, by just a few (global) factors. In particular, two factors explain almost 56 percent of the variation in seven economic fundamentals across all emerging economies in the EMBI, and three factors explain almost 69 percent. Finally we find that two factors explain 68 percent of the variation in the economic fundamentals and the ratings changes of Standard and Poor's and Moody's, and three factors explain almost 80 percent of the variation in these 9 series across the different emerging economies. These results suggest in particular that recent improvements in ratings, or underlying credit quality, are due in large part to a rather small number of global (real) factors.

Table 5. Principal Component Analysis
of Credit Ratings and Economic Fundamentals

Component	Credit Ratings							
	Both Agencies: S&P and Moody's							
	Unrotated Components				Rotated Components (orthogonal varimax)			
	Eigenvalue	Difference	Proportion	Cumulative	Eigenvalue	Difference	Proportion	Cumulative
1	27.74	19.80	63.1%	63.1%	20.33	9.58	46.2%	46.2%
2	7.94	4.12	18.1%	81.1%	10.75	2.31	24.4%	70.6%
3	3.82	1.70	8.7%	89.8%	8.43	6.32	19.2%	89.8%
	S&P Agency				Moody's			
	Unrotated Components							
1	12.12	6.72	50.5%	50.5%	12.21	9.33	61.1%	61.1%
2	5.40	3.42	22.5%	73.0%	2.88	1.14	14.4%	75.5%
3	1.98	0.63	8.3%	81.3%	1.74	0.79	8.7%	84.2%
	Rotated Components (orthogonal varimax)							
1	10.33	3.14	43.1%	43.1%	12.08	9.07	60.4%	60.4%
2	7.19	5.21	30.0%	73.0%	3.01	1.27	15.1%	75.5%
3	1.98	0.63	8.3%	81.3%	1.74	0.79	8.7%	84.2%
	Economic Fundamentals (*)				Credit Ratings + Economic Fundamentals			
	Unrotated Components							
1	73.01	35.96	37.1%	37.1%	113.72	63.19	47.2%	47.2%
2	37.05	11.77	18.8%	55.9%	50.53	23.51	21.0%	68.2%
3	25.28	10.87	12.8%	68.7%	27.02	3.72	11.2%	79.4%
	Rotated Components (orthogonal varimax)							
1	65.78	21.51	33.4%	33.4%	91.93	19.62	38.2%	38.2%
2	44.27	19.00	22.5%	55.9%	72.31	45.29	30.0%	68.2%
3	25.28	10.87	12.8%	68.7%	27.02	3.72	11.2%	79.4%

Source: Own calculations for EM economies, based on: S&P, Moody's (Sovereign Credit Rating foreign currency long term) ; Economic Fundamentals (*): WEO (Growth (%), Inflation (%), Fiscal Balance (% of GDP), Tax revenues over Total Debt (%), Reserves (% GDP), Exchange Rate Volatility (%)), World Bank (Total Debt to exports (%)).

3. Models of Spreads

In this section we discuss models for spreads. Our interest is twofold. First, we wish to see how much of the reduction in spreads can be accounted for by country fundamentals and how much by other, including financial, factors. In this regard it is often useful to use the rating as a convenient summary of information regarding credit quality. A second question we wish to consider is whether the ratings matter. This turns out to be a somewhat difficult question to answer if the question is posed correctly.

First, we regress the spread on ratings and then on ratings and global financial variables, such as US Treasury yields, US High Yield spreads and the VIX index, as a test of whether the current level of spreads is justified by fundamentals or whether global factors are important.[11] There is some discussion in the literature as to the appropriate way to do this, as once again the rating is not a cardinal variable. One way is simply to regress the spread or the log of the spread on dummies for each rating grade. In an appendix to this paper we present the results of such an analysis. However, a simpler method is to regress the log of the spread on the log of the rating. We find that this simplification does not change the main results. As our regressions include fixed effects we are again focusing on ratings changes rather than explaining the cross-sectional variation in spreads and ratings.

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[11] It is also tempting to include the general EMBI index. If included then the country in question should be excluded from the EMBI index – in other words in the panel for each country j it should be the general EMBI index excluding country j on the right hand side. However, even then, if country i affects country j, there is an issue of endogeneity. We prefer not to include the EMBI as we wish to consider global factors that are exogenous to emerging markets in general. We believe that employing variables such as the US Treasury, US corporate High Yield and VIX indices yield a cleaner test of the hypotheses that we wish to consider.

Table 6. Explaining Spreads with Ratings

Spread on Rating and Global Factors

	(1)	(2)	(3)	(4)
Credit Rating (logs)	-1.043	-2.169	-0.949	-1.784
	(10.96)***	(5.19)***	(8.76)***	(11.22)***
Us Treasury 10 years (%)			0.420	0.391
			(1.85)*	(1.64)
Vix Index (%)			1.001	0.991
			(8.94)***	(8.60)***
US High Yield (%)			0.029	0.018
			(1.69)	(0.80)
Constant	8.038	10.635	3.928	6.047
	(37.84)***	(11.19)***	(7.39)***	(12.91)***
Observations	2703	2646	2703	2646
Number of group(wbcode)	30	29	30	29
Rating from	S&P	Moody's	S&P	Moody's
Rsq-Overall	0.53	0.56	0.67	0.73
Rsq-Within	0.31	0.30	0.70	0.65
Rsq-Between	0.74	0.71	0.74	0.78
Robust t statistics in parentheses				

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

The results indicate that ratings are indeed highly significant for explaining spreads.[12] However, we cannot fully explain the movement in spreads with ratings alone;if financial variables such as the VIX, the US high yield and a US interest rate are added they are significant in explaining spreads.[13] Of particular interest is the in sample prediction of the model with and without the financial variables added. Figures 2a and 2b illustrates these for the cases of Argentina, Brazil, Chile and Mexico. It is clear that without the financial variables current spreads are not well-predicted and indeed, even with financial variables added, current spreads still appear low.

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[12] As discussed above, we leave for future research a dynamic version. Assuming both series are I(1) the above might be interpreted as the long run or cointegrating vector; see González Rozada and Levy-Yeyati (2006) for an analysis of the relation between spreads along these lines.

[13] This also holds for the model in the appendix with ratings dummies and hence is not a result of the log (ratings) variable being employed. We also tried including an interaction term between the ratings and the VIX index to test if the coefficient on the VIX varied with the rating. The interaction term was not significant, although we note that the model (being in logs) is already non-linear.

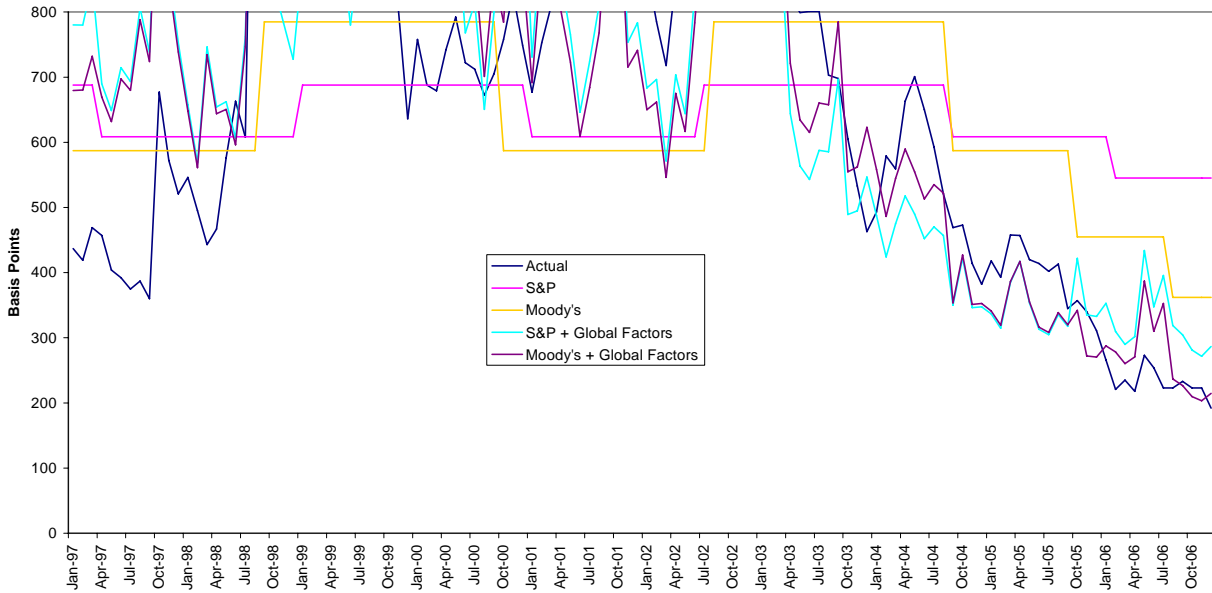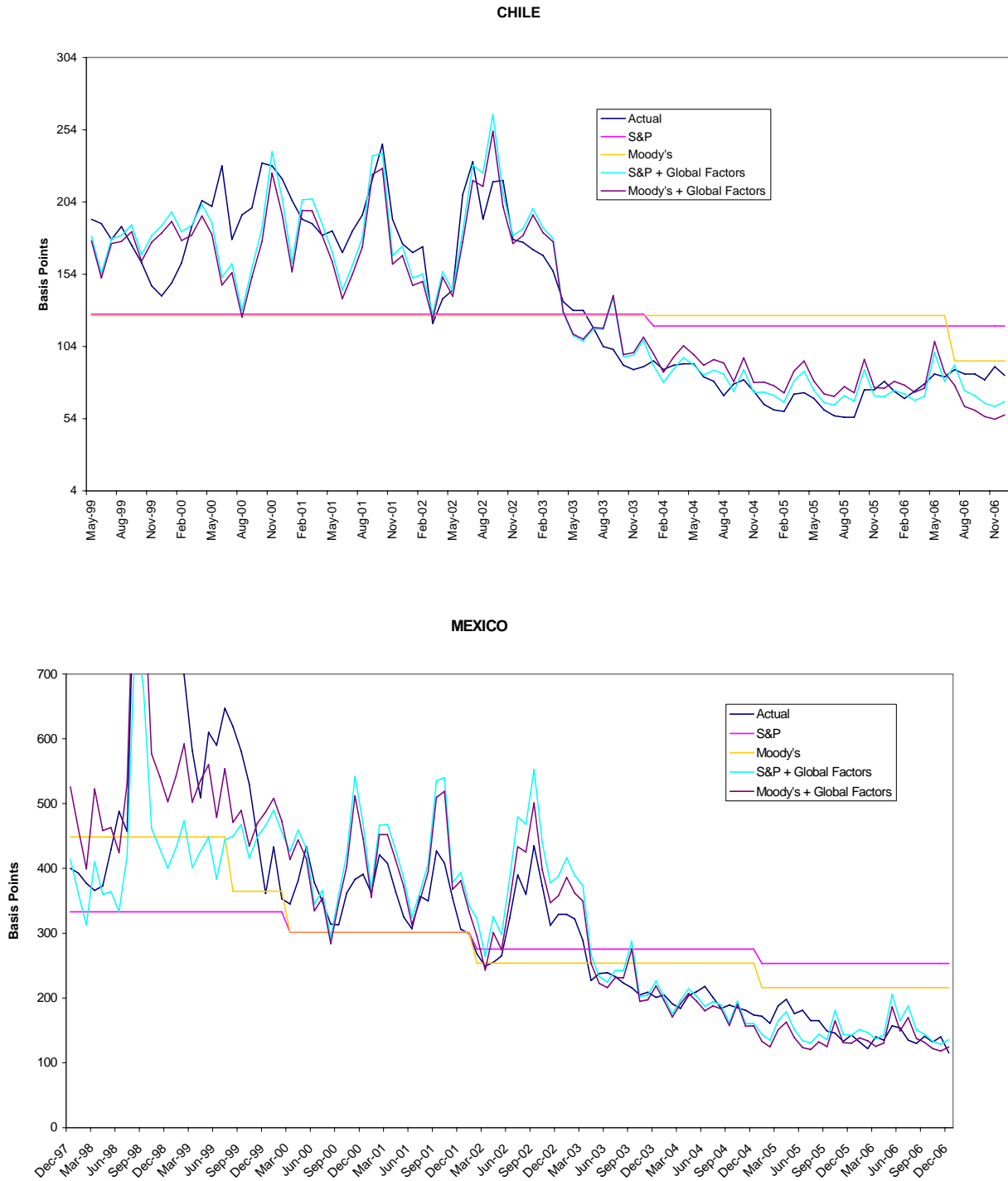# Figure 2a. Actual and Fitted Values for Spreads

ARGENTINA
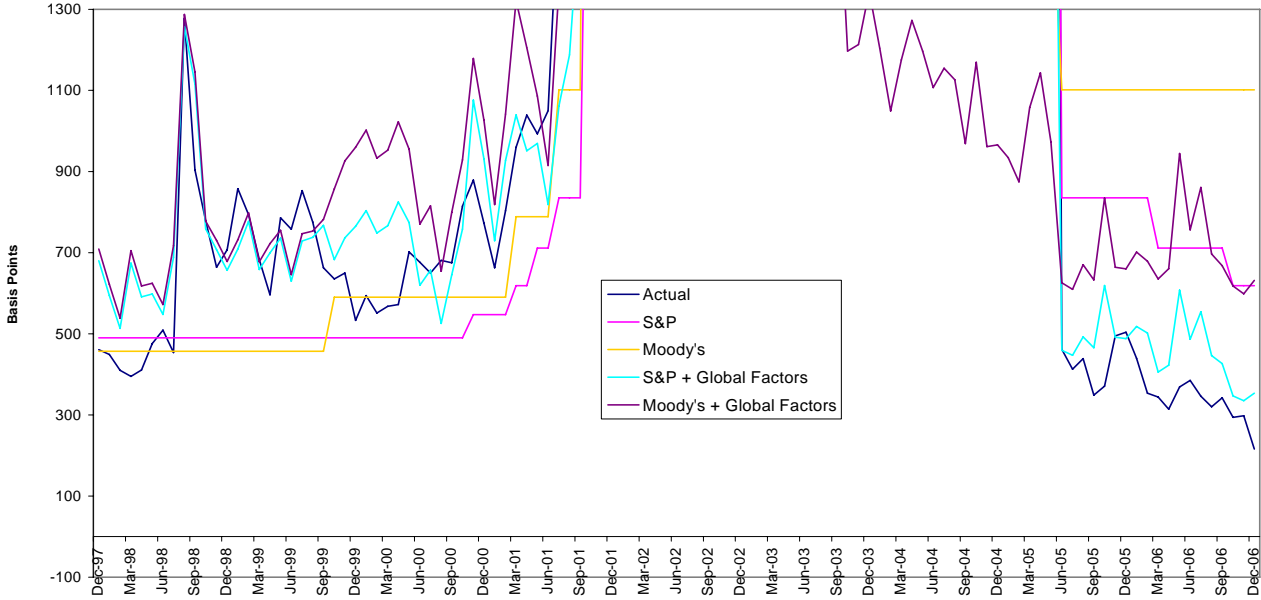
BRAZIL

Figure 2b. Actual and Fitted Values for Spreads

CHILE

MEXICO

Indeed, if we exclude the financial variables, the average error of the model in the last observation is between 153 (Standard and Poor's) and 176 (Moody's) basis points across all emerging economies. Including the financial variables the average error of the model across countries is some 22 (Standard and Poor's) or 41 (Moody's) basis points in the last observation.[14] More generally, if considering a variance decomposition we find that the global financial variables explain almost 20 percent of the variation in spreads, although spreads explain 40 percent (Moody's) and almost 60 percent (S and P). This is illustrated in Figure 3 below.

Figure 3. Variance Decomposition of Country EMBI Spreads
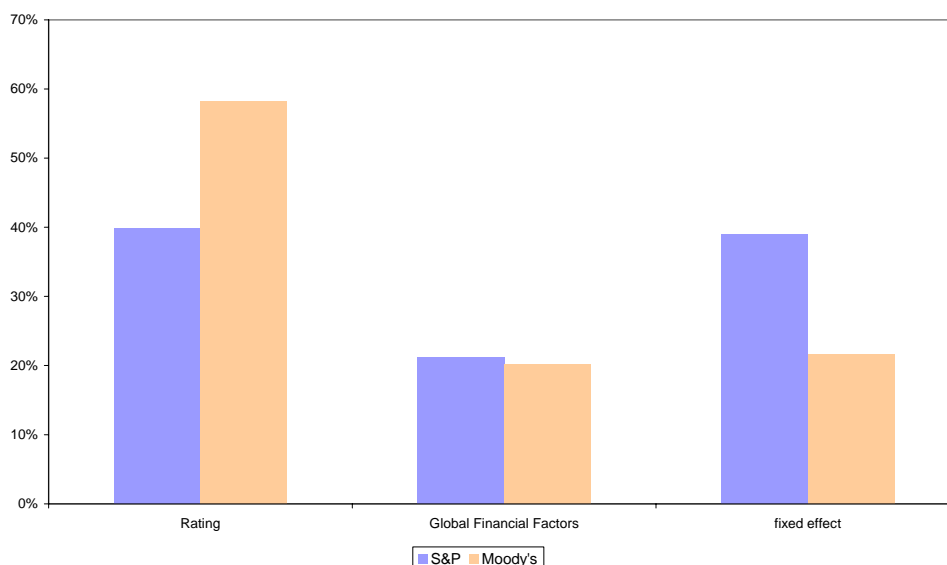
It is not clear which of the three financial variables (US Treasury, US High Yield or VIX index) should be included in the regression above, nor is it clear what these variables actually represent. Alternatives include a) the time value of money, b) liquidity, c) risk aversion, or d) some combination of these concepts.

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[14] We stress that these regressions have individual fixed effects and hence, by definition, the time average of the predicted spread is equal to the actual spread across the whole sample. Again, these results are not particularly sensitive to the use of dummies for each rating grade rather than the log of the rating. The last observation is December 2006.

Figure 4. Component Loading of Two Factors to Explain Global Financial Variables
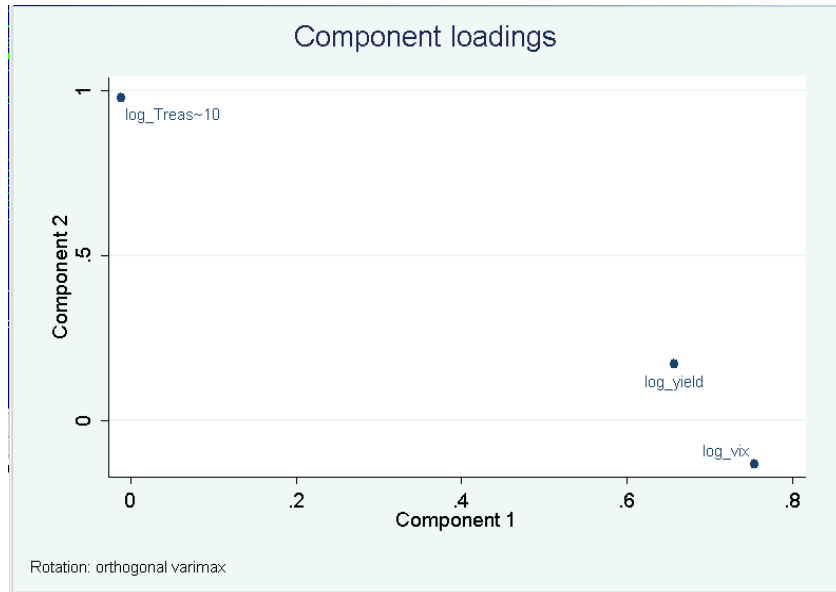
Hence, we also conduct a factor analysis of these three financial variables and find that two factors explain a very high proportion of the three. In Figure 4, we graph the loadings of these two factors. The figure suggests that Factor 1 is more akin to risk, as it captures the variation in the VIX and the US corporate High Yield spread, whereas Factor 2 appears to be more related to liquidity or the time value of money, as it appears to capture the US 10 year bond yield. We place these two factors in the regression. The results are displayed in Table 7, and what appears to matter for emerging economy spreads is the factor most associated with risk, the US high yield and the VIX index, and the least associated with the US treasury yield.

Table 7. Explaining Spreads with Ratings and Financial Factors

	(1)	(2)
Credit Rating (logs)	-0.938	-1.716
	(8.91)***	(10.57)***
Financial Vars Factor 1	0.280	0.265
	(15.59)***	(12.70)***
Financial Vars Factor 2	0.033	0.025
	(1.09)	(0.81)
Constant	7.797	9.598
	(33.20)***	(25.94)***
Rating Agency	S&P	Moody's
Observations	2476	2442
Number of group(wbcode)	30	29
Rsq-Overall	0.68	0.73
Rsq-Within	0.72	0.64
Rsq-Between	0.74	0.79
Robust t statistics in parentheses		
* significant at 10%; ** significant at 5%; *** significant at 1%		
All regressions include fixed effects		

4. Do Opinions Matter?

In the previous section we regressed spreads on ratings using ratings as a convenient summary of fundamentals. However, this does not answer the question, do ratings matter? The question that we pose here is, controlling for fundamentals, do ratings affect spreads? This question is, however, somewhat problematic to test, precisely because ratings to a large extent summarize fundamentals.

One technique is to regress ratings on fundamentals and then regress spreads on fundamentals but also include the residuals from the first regression. This was the technique employed in Eichengreen and Mody (1998). The residual of the regression of ratings might be interpreted as the opinion of the agency over and above the credit quality explained by the economic fundamentals. We conduct such an analysis and display the results in Table 8 below. We find that the residual is highly significant, suggesting that the opinions of rating agencies are important controlling for fundamentals. However, such a regression can be criticized. If the error term of the first regression is an opinion of the agency in question, then how can it can conform

to the appropriate statistical properties of an error to ensure that the regression is valid? In a sense it is simply a leap of faith to claim that the error here is the opinion of the agency plus the actual error of the regression, and we have no way of really telling which is which.

A second methodology is to estimate a system of equations with the rating and the spread as the two endogenous variables. We employ annual data and use the end of period spread. Given most economic variables are known before the end of the year—or at least there are generally reasonable forecasts thereof—we suggest that ratings affect spreads but do not allow that spreads affect ratings. We also exploit the fact that the global financial variables affect spreads but not ratings. Even with all the economic fundamentals included in the spreads regression, we find that ratings affect spreads. We then proceed to eliminate economic fundamentals from the spreads regression that do not appear as significant or have the wrong sign. We conclude with the regression again presented in Table 8.

Our main findings are that a) ratings appear to matter for spreads over and above fundamentals; b) that growth affects spreads over and above ratings; c) that the fiscal balance affects spreads over and above Moody's ratings (or perhaps Moody's weights the fiscal balance as less important than "the market"); and d) that EU membership appears to affect spreads over and above Standard and Poor's ratings (or perhaps that Standard and Poor's weights EU membership as less important than "the market").

However, once again such an analysis has its limitations. On the one hand we have imposed the restriction that the effect of spreads on ratings is zero, yet on the other hand we have eliminated fundamentals from the spreads regression in a somewhat ad hoc fashion.

Table 8. Do Opinions Matter?

Rating Agency	Employing Residuals of Rating Regression				Estimating a System			
	Rating	Spread	Rating	Spread	Rating	Spread	Rating	Spread
	S&P		Moody's		S&P		Moody's	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Credit Residual/Credit rating		-0.170		-0.135		-0.257		-0.358
		(5.16)***		(5.16)***		(12.14)***		(11.58)***
Growth (%)	4.997		4.254	-0.347	-4.241	-3.381	-4.488	-2.594
	(3.97)***		(2.67)**	(1.90)*	(2.35)**	(3.99)***	(2.20)**	(2.80)***
GDP PC (%)	-0.387	-2.118	-1.136	-2.069	9.250		8.730	
	(0.12)	(2.71)***	(0.31)	(2.36)**	(7.77)***		(7.07)***	
Unemployment (%)	-0.040	-0.005	-0.072	-0.009	0.055		0.003	
	(0.90)	(0.44)	(1.44)	(0.74)	(1.66)*		(0.10)	
Inflation (%)	-0.083	0.027	-0.012	0.009	-0.031	-0.004	0.038	0.008
	(4.29)***	(2.99)***	(0.61)	(0.57)	(0.74)	(0.23)	(1.01)	(0.52)
Fiscal Balance over GDP (%)	6.630	-2.267	0.358	-2.263	2.877	-1.040	-2.284	-3.274
	(1.85)*	(1.84)*	(0.09)	(1.80)*	(1.13)	(0.98)	(0.80)	(2.80)***
Foreign Debt to Exports (%)	-0.175	0.462	-0.350	0.457	0.060		-0.440	
	(0.45)	(6.39)***	(0.82)	(5.71)***	(0.33)		(2.50)**	
Tax Revenue to Total Debt (%)	0.622	-0.162	0.636	-0.187	0.588		-0.077	
	(2.60)**	(1.88)*	(2.77)***	(2.60)***	(3.00)***		(0.42)	
Reserves to GDP (%)	-2.353	-4.321	-0.671	-4.322	3.178		3.882	
	(0.82)	(7.75)***	(0.24)	(6.98)***	(1.98)**		(2.54)**	
Original Sin 3 (%)	-0.809	0.392	-0.396	0.300	0.336		0.607	
	(1.22)	(1.70)*	(0.60)	(1.26)	(0.53)		(1.00)	
Volatility of Real Exchange Rate (%)	-0.076	0.019	-0.089	0.017	-0.039		-0.033	
	(2.30)**	(2.78)***	(3.26)***	(2.13)**	(2.49)**		(2.19)**	
In Default (0,1)	-5.877	1.173	-2.101	1.174	-6.230		-3.181	
	(11.28)***	(6.36)***	(2.88)***	(4.78)***	(13.70)***		(7.30)***	
EU Enter Dummy (0,1)	0.906	-1.470	2.267	-1.376	-0.163	-0.442	1.125	-0.121
	(3.19)***	(5.41)***	(7.13)***	(4.98)***	(0.25)	(1.67)*	(1.53)	(0.39)
EU Step Dummy (0,1)	0.670	-1.147	1.468	-0.949	-0.687		0.305	
	(1.65)	(5.03)***	(3.77)***	(4.27)***	(1.37)		(0.64)	
Vix Index (%)		0.126		0.206		0.229		0.035
		(0.90)		(1.39)		(1.87)*		(0.29)
US High Yield (10 y %)		0.898		0.801		0.962		1.017
		(5.08)***		(4.61)***		(5.25)***		(5.72)***
US Treasury (10 y %)		0.071		0.119		0.245		-0.051
		(0.36)		(0.61)		(1.42)		(0.30)
Constant	7.204	5.458	7.737	5.948	-11.786	5.480	-9.129	7.000
	(3.89)***	(17.15)***	(3.63)***	(16.82)***	(4.30)***	(13.67)***	(3.29)***	(15.60)***
Type of Regression	S&P		Moody's		S&P		Moody's	
Observations	368	212	367	213	203	203	204	204
Number of group(wbcode)	38	26	40	26				
Rsq-Overall	0.29	0.65	0.30	0.65	0.9307	0.7886	0.9095	0.7597
Rsq-Within	0.53	0.68	0.41	0.67				
Rsq-Between	0.36	0.61	0.41	0.59				

Robust t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

An alternative would be to conduct an event study where daily spreads are observed around ratings' changes. A potential problem with this latter methodology is that fundamentals are changing and hence it is not obvious whether any change in spread accompanied by a rating change is due to the change in rating or a change in the fundamentals. Moreover, while event studies in corporate finance normally focus on events that are arguably shocks (e.g., the announcement of a merger or stock split), rating agencies do their best to make rating changes predictable, announcing an outlook, a credit watch and even a list of credit drivers that are suggestive of when a rating change would come.[15] These actions by the agencies make the methodology of the event study problematic.

However, as noted above the rating agencies do *not* always agree! Considering the available rating history for Standard and Poor's and Moody's, they disagree about as much as they agree in the sense that roughly 50 percent of the observations regarding emerging economies suggest disagreement. Figure 5 illustrates these disagreements by country and over time. Each bar in the figure represents a disagreement, with those in the positive terrain indicating a better rating by Standard and Poor's and the negative bars indicating that Moody's gives a better rating.

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[15] For example, it might be announced that a constraint to an upgrade for Peru is tax administration and hence its overall tax revenue as a percentage of GDP or debt. Thus, if Peru's tax administration improves the market will start to predict an upgrade.

Figure 5. Rating Disagreements
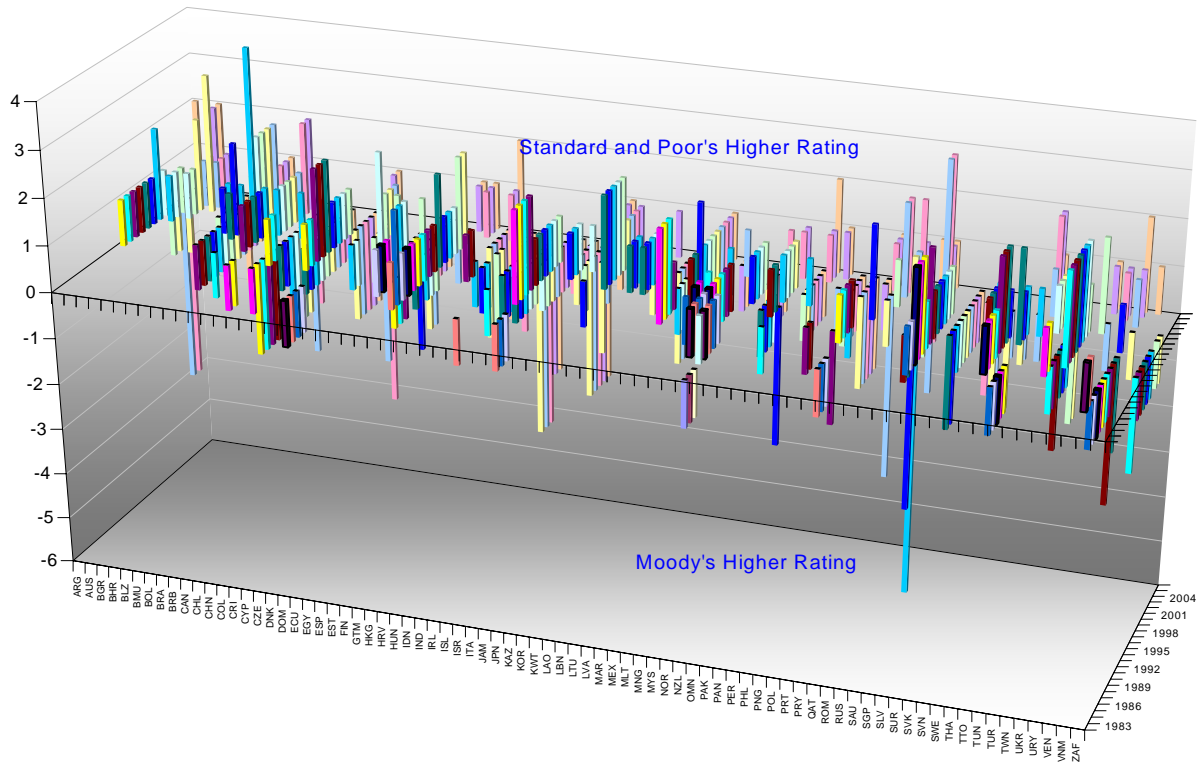
In order to investigate these disagreements further we conducted a regression of rating differences on the economic fundamentals that we found to be important in explaining ratings above. As we have many zero observations in the dependent variable we did this employing an ordered Probit and an ordered Logit. The results are highly consistent across the two methodologies and are reported in Table 9.

Table 9. Explaining Rating Differences
Dependent Variable is Moody Rating Minus S&P Rating

	(1)	(2)	(3)	(4)
Growth (%)	3.039	3.223	5.649	8.212
	(1.61)	(0.99)	(2.39)**	(2.04)**
Unemployment (%)	0.005	-0.003	0.015	0.016
	(0.38)	(0.13)	(0.99)	(0.50)
Inflation (%)	0.072	0.114	0.048	0.074
	(3.08)***	(4.28)***	(2.31)**	(3.05)***
Fiscal Balance over GDP (%)	-7.164	-13.676	-8.252	-15.847
	(3.66)***	(4.00)***	(3.27)***	(3.86)***
Debt to Exports (% GDF)	-0.198	-0.417	-0.206	-0.434
	(2.80)***	(3.48)***	(2.45)**	(3.00)***
Tax Revenue to Total Debt (%)	-0.112	-0.177	-0.156	-0.261
	(2.77)***	(2.45)**	(2.15)**	(1.70)*
Reserves to GDP (%)	-2.102	-3.838	-2.470	-4.511
	(4.12)***	(4.30)***	(3.60)***	(3.96)***
Original Sin 3 (%)	-0.445	-0.957	-0.506	-1.043
	(1.23)	(1.29)	(1.24)	(1.11)
Volatility of Real Exchange Rate (%)	0.020	0.021	0.035	0.049
	(1.24)	(0.68)	(2.10)**	(1.68)*
Regression type	Ordered Probit	Ordered Logit	Ordered Probit	Ordered Logit
Consider agreements	Yes	Yes	No	No
Observations	375	375	225	225

Robust z statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

We find many significant differences. For example higher fiscal surplus, higher tax revenue and higher reserves and lower inflation all imply higher Standard and Poor's ratings relative to Moody's. On the other hand, higher debt to exports implies a lower Moody's rating relative to Standard and Poor's. While the same variables may be relevant for the ratings of each agency, it appears that there are significant differences in how the agencies weight these different fundamentals.

These differences allow us to develop a new methodology to consider if these opinions matter. In the following regressions we regress spreads on the ratings of one agency (say Standard and Poor's) and a dummy which takes the value of one if the other agency (say Moody's) upgrades the country by one notch and the other agency does not. The dummy takes a value of 2 if the upgrade is two notches or –1 if there is a one-notch downgrade, etc. We conduct these regressions for both agencies. These regressions are then a test of whether an upgrade (or downgrade) by one agency matters if the other agency does not upgrade (downgrade). As we

also include fixed effects, it is then a type of difference-in-difference regression. The results are detailed in Table 10.

Table 10. Opinions Matter

	(1)	(2)
Credit Rating Agency 1 (logs)	-1.084	-1.656
	(11.25)***	(8.40)***
Upgrade/Downgrade Other Agency	-0.064	-0.180
	(1.84)*	(4.49)***
Us Treasury 10 years (%)	0.368	0.524
	(1.68)	(2.54)**
Vix Index (%)	0.975	0.948
	(8.60)***	(9.14)***
US High Yield (%)	0.031	0.024
	(1.69)	(1.23)
Constant	4.368	5.580
	(9.74)***	(9.77)***
Rating Agency 1	S&P	Moody's
Observations	2646	2646
Number of group(wbcode)	29	29
Rsq-Overall	0.72	0.75
Rsq-Within	0.71	0.72
Rsq-Between	0.81	0.79
Robust t statistics in parentheses		
* significant at 10%; ** significant at 5%; *** significant at 1%		
Regressions include fixed effects		

As shown in the table, we find that in both cases (taking either Standard and Poor's or Moody's as the base rating agency), the changes in the second agency matter even when there is no change in the first agency rating. This lends further support to the notion that ratings do matter.

5. Recent Impact of World Financial Variables on EM Asset Prices

An interesting question is whether the importance of global financial conditions has been stable or whether there is evidence of an increase or a decrease in the dependency of emerging country spreads on world financial markets. This may be considered a test of whether, as markets have globalized, emerging country assets are now influenced more or less by global financial conditions relative to economic fundamentals as indicated by ratings. One view, for example, might be that as markets have become more integrated, information improves and hence markets

may become more discriminatory. The opposite view however is that with integration comes greater diversification of individual investors and hence less incentive to become well-informed regarding particular investment opportunities. This latter view might suggest that world financial factors should become more important as markets integrate.[16]

We ran a moving panel regression of the log spread on the log rating and on the VIX. We used windows of 41 months with the last window being from January 2004 to June 2007 and the first from September 2000 to January 2004. Figure 6 plots the coefficient on the VIX for each of these regressions plus and minus two standard errors. Interestingly, at first there is a tendency for the coefficient to increase, although overall there appears to be some evidence that global financial conditions are now less important than before in explaining emerging asset returns. At the same time, however, it is not clear if this change is statistically significant.

Figure 6. Have Global Financial Conditions Increased in Importance for Emerging Country Asset Pricing?

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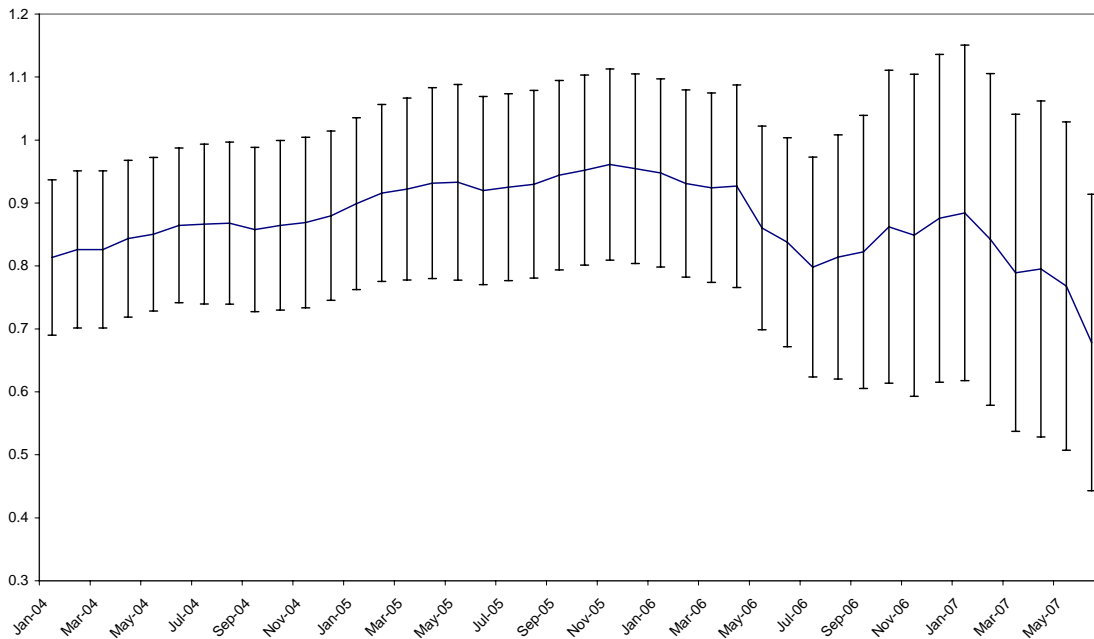
[16] See Calvo and Mendoza (2000) for an interesting account and theories of how information affects the dependence of emerging economy asset prices to external shocks.

In order to conduct a formal test we ran a regression as above for the whole period but introduced a dummy variable that is zero and then 1 after December 2000. We then interacted this dummy with our variables of interest (VIX and High Yield). The significance of the coefficient on this interaction between the dummy and the variable of interest is then a test of the stability of the coefficient on the relevant variable between the first half and the second half of our sample. We then tried different specifications using the ratings of each rating agency, Standard and Poor's and Moody's, and with the VIX and the High Yield and the US interest rate (the llatter was not significant). All specifications include fixed effects. The results are presented in Table 12.

Table 12. Test of Parameter Stability: Changing Dependence of Sovereign Spreads on World Financial Factors

Dependent Variable is EMBI Spread for Panel of Countries

	(1)	(2)	(3)	(4)	(5)	(6)
log_sprating	-0.980	-0.972	-0.999	-1.795	-1.791	-1.813
	(8.23)***	(8.28)***	(7.45)***	(11.27)***	(11.46)***	(12.13)***
log_treasury10	-0.136			-0.122		
	(0.63)			(0.58)		
dummy*treasury10						
(0 if year <2001)	0.354			0.169		
	(1.90)*			(0.76)		
log_vix	1.346	1.180		1.211	1.129	
	(12.03)***	(16.15)***		(11.19)***	(14.17)***	
dummy*vix						
(0 if year <2001)	-0.244	-0.067		-0.155	-0.066	
	(2.28)**	(2.72)**		(1.17)	(2.43)**	
log_hyield			1.800			1.681
			(15.66)***			(12.00)***
dummy*hyield						
(0 if year <2001)			-0.132			-0.127
			(4.37)***			(3.71)***
Constant	4.238	4.517	4.014	6.520	6.562	6.159
	(10.74)***	(11.32)***	(9.78)***	(13.27)***	(13.17)***	(11.25)***
Rating Agency	S&P	S&P	S&P	Moody's	Moody's	Moody's
Observations	2877	2877	2877	2814	2814	2814
Number of group(wbcode)	30	30	30	29	29	29
Rsq-Overall	0.69	0.68	0.67	0.73	0.73	0.71
Rsq-Within	0.71	0.71	0.67	0.65	0.65	0.61
Rsq-Between	0.76	0.75	0.76	0.80	0.80	0.79

Robust t statistics in parentheses, **all regressions have fixed effects**
* significant at 10%; ** significant at 5%; *** significant at 1%

In virtually all cases the coefficient on the interaction term between the dummy and the coefficient of interest (High Yield or VIX) is negative and is statistically significant. In only one specification is this not the case, but in that specification the US interest rate is included and is not significant. This suggests that there is some evidence that global financial factors were less important in the second part of the sample relative to the first part of the sample.[17] The conclusion is that as markets have become more integrated there is, if anything, less dependence on world financial factors.

To investigate in more detail the impact of global factors on emerging economy asset prices during the current market turmoil, we chose to also consider daily data on five-year Credit Default Swap (CDS) spreads.[18] This variable is arguably a cleaner measure of perceived default risk than the EMBI, which for an individual country is constructed as the spread of a super-bond made up of the payment structures of a series of individual bonds of different maturities and durations. The series for CDS spreads are not, however, available for the time periods nor for the same range of countries as the sovereign spreads used for the other analyses in this paper. We used the VIX and the High Yield indices as a global financial factor and indicator of global risk.[19] We regressed the CDS spread of a set of 20 emerging countries on the VIX index and fixed effects using daily data for a period of 458 working days—roughly the last two years ending August 2007—giving some 9,158 observations. The results are reported in Table 13 below indicate that the both the VIX or the High Yield are significant for determining the movements in CDS spreads.

To investigate further the transmission of shocks to global risk or risk aversion to emerging economy asset prices, we researched independent assessments of the most important news items emanating from the sub-prime crisis. There are various "timelines" published but the most suitable for our purposes appeared to be one from the BBC (included in the Appendix).[20]

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[17] Note that the first part of the sample does not include the Russian default but starts after that in September 2000.

[18] For primers on sovereign CDS's see BIS Quarterly Review 2003 Dec, "Sovereign Credit Default Swaps" that indicates substantial volumes at 5 year maturities available at http://www.bis.org/publ/qtrpdf/r_qt0312g.pdf and also see "Credit Derivatives in Emerging Economies," by Roman Ranciere, IMF Policy Discussion Paper, 2001 (Sep) available at www.imf.org

[19] The analysis could be done equally with the index of US high-yield bond spreads or the principal component that appears to summarize these two as suggested above.

[20] We did take out of the BBC timeline included the appendix and in the definition of the dummy, events that appeared to be particularly European in nature to focus attention on the US sub-prime crisis. The timeline reported also includes the Fed and ECB events. These are included in the Fed and ECB dummies and not in the sub-prime News Dummy.

This timeline appeared superior, as events were identified with more precision than other published timelines and the period of analysis covered was also more comprehensive. We used this timeline to create a dummy variable which we call News Dummy, and we interacted this with the VIX and High Yield indices.[21] Our interpretation of the coefficient on this interaction term is then the additional effect of changes in the VIX/High Yield on CDS spreads as a result of news regarding the sub-prime crisis. If the coefficient on the interaction term is positive, then news regarding the sub-prime crisis had a greater impact on emerging economy asset prices than other news that caused the VIX /High Yield to move while if the coefficient is negative, the opposite would be indicated.

Table 13. Explaining Credit Default Swap Spreads with Measures of Global Risk and Sub-Prime News

	(1)	(2)	(3)	(4)
VIX	2.568	3.034		
	(28.74)***	(28.23)***		
Interaction VIX * News Dummy		-0.588***		
		(6.90)		
High Yield			42.0	43.0
			(53.7)***	(53.33)***
Interaction HY*News Dummy				-0.758***
				(4.57)
Fed Dummy		-15.8***		-8.28***
		(3.60)		(3.08)
ECB Dummy		-18.6***		-10.3***
		(2.72)		(6.07)
Within R-Squared	0.019	0.098	0.260	0.262
Adj R-Squared	0.856	0.857	0.857	0.883
Nr Observations	8246	8246	8246	8246
All regressions include fixed effects				
t-statistics are in parenthesis				

The timeline also includes events where the Fed lowered the discount rate by 25 basis points and altered lending conditions to banks and the subsequently lowered the policy rate by 50 basis points. The timeline also includes the changes in ECB policy to inject liquidity into the European market. These events are summarized by a Fed dummy and an ECB dummy

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[21] In future work, we plan to test the robustness of the results with alternative timelines or adjustments to the BBC timeline.

respectively. The results of introducing these additional variables into the regression is also illustrated in Table 13. As can be seen, the changes in policies of the Fed and the ECB served to reduce emerging economy CDS spreads, as would be expected. The sub-prime News Dummy interacted with the VIX or interacted with the High Yield has a negative coefficient.

This means that on those days where there was an event related to the sub-prime crisis, the movement in the VIX actually had less effect on CDS spreads than on an average day. This result suggests first of all that all types of movements in the VIX are not equal in terms of their effects on emerging markets. Second, it suggests that over the period analyzed the sub-prime crisis was perhaps viewed as a US crisis and not one that would affect emerging economies more than other events that caused the VIX to move over this period—presumably changes in global risk or risk aversion not related to sub prime events. To summarize the results suggest that sub-prime events per se had a relatively subdued effect on emerging economy asset prices over the period analyzed.

6. Conclusions

In this paper we have investigated a number of issues related to emerging economy sovereign ratings and spreads. First, we find that a small number of economic fundamentals explains the ratings of the two leading rating agencies reasonably well. We find some evidence for the inclusion of debt currency composition although data limitations remain binding to enhance this analysis. We find that global financial variables do not help to explain ratings such that rating agencies decisions appear to be independent of changes in world financial conditions. However, we find that a very few global factors explain a large proportion of the variation in ratings and of the economic fundamentals that we find determine ratings. Our conclusion is that ratings' improvements have been driven by improvements in fundamentals, which in turn have been largely driven by a small set of global factors.

We also present models of spreads and investigate whether the reductions in spreads to the end of 2006 can be explained by the improvement in fundamentals. The answer is that it does so, but only partially. Spreads fell further than would be predicted from the improvement in ratings. However, we can explain spread reductions to the end of 2006 using both ratings and world financial factors. The overall result is that spreads were some 150 to 170 basis points lower than those predicted by the improvement in ratings alone.

We also consider whether, controlling for fundamentals, there is evidence that ratings matter. We find using methodologies previously employed in the literature that that they do. Moreover, we note that rating agencies do not always agree. In fact they disagree about 50 percent of the time, and we find that while in general the same economic variables tend to explain ratings, different agencies appear to weigh these factors differently. We then exploit these differences to test again, using a type of difference in difference technique, whether these opinions matter. The results suggest that indeed they do.

Finally, we investigate how the dependence of emerging economy asset prices to world financial conditions may have changed over time and how emerging asset prices have been affected by news on the sub-prime crisis. We find evidence that global financial factors have decreased in importance as a determinant of emerging economy spreads. One interpretation is that as markets have become more integrated, information has improved and markets have become more discriminating.[22] We also find that in the last two years, the sub-prime crisis does not appear to be the main channel whereby movements in the VIX affect emerging asset prices. Movements in the VIX emanating from sub-prime events had less effect on emerging economy CDS spreads than "average" movements in the VIX.

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[22] A second view, however, is that the second sub-period was one of abundant global liquidity, and in these conditions world financial factors may be less important for emerging economy asset prices.

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Appendix: Explaining Spreads with Ratings: A Non-Linear General Model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Credit Rating=1 Dummy (0,1)	-0.359		2.936		-0.357		2.322	
	(1.20)		(6.66)***		(1.18)		(5.31)***	
Credit Rating=2 Dummy (0,1)	-0.725	3.364	2.580	0.901	-0.723	0.903	1.963	0.900
	(3.99)***	(12.99)***	(8.05)***	(60.53)***	(4.00)***	(57.02)***	(6.37)***	(58.72)***
Credit Rating=4 Dummy (0,1)	-0.901	3.226	2.350	0.842	-0.898	0.769	1.729	0.843
	(4.81)***	(5.34)***	(6.58)***	(2.47)**	(4.64)***	(2.05)*	(4.92)***	(2.47)**
Credit Rating=5 Dummy (0,1)	-1.359	3.198	1.911	0.820	-1.367	0.735	1.289	0.817
	(10.09)***	(5.54)***	(6.29)***	(2.50)**	(10.22)***	(2.04)*	(4.39)***	(2.49)**
Credit Rating=6 Dummy (0,1)	-1.449	1.792	1.795	-0.654	-1.454	-0.668	1.178	-0.656
	(9.54)***	(10.25)***	(5.78)***	(3.04)***	(9.69)***	(3.23)***	(3.97)***	(3.04)***
Credit Rating=7 Dummy (0,1)	-1.802	2.125	1.477	-0.303	-1.802	-0.336	0.863	-0.305
	(13.77)***	(9.94)***	(4.79)***	(1.79)*	(14.10)***	(2.34)**	(3.02)***	(1.80)*
Credit Rating=8 Dummy (0,1)	-1.885	1.454	1.363	-0.995	-1.885	-1.003	0.751	-0.995
	(15.59)***	(6.75)***	(4.52)***	(5.40)***	(15.85)***	(5.70)***	(2.69)**	(5.41)***
Credit Rating=9 Dummy (0,1)	-2.191	1.144	1.050	-1.281	-2.187	-1.328	0.444	-1.289
	(18.84)***	(5.86)***	(3.57)***	(10.68)***	(19.19)***	(11.50)***	(1.62)	(10.66)***
Credit Rating=10 Dummy (0,1)	-2.353	1.186	0.938	-1.279	-2.321	-1.256	0.358	-1.275
	(25.84)***	(7.94)***	(3.33)***	(5.98)***	(25.42)***	(5.72)***	(1.37)	(5.99)***
Credit Rating=11 Dummy (0,1)	-2.640	1.025	0.653	-1.503	-2.616	-1.404	0.080	-1.490
	(21.80)***	(4.92)***	(2.04)*	(8.22)***	(22.47)***	(6.91)***	(0.28)	(7.96)***
Credit Rating=12 Dummy (0,1)	-2.688	0.723	0.586	-1.700	0.559	0.732	0.574	-1.757
	(22.67)***	(5.66)***	(2.29)**	(8.98)***	(2.48)**	(5.61)***	(2.24)**	(9.47)***
Credit Rating=13 Dummy (0,1)	-3.019	0.437	0.321	-1.972	0.261	0.453	0.352	-2.027
	(24.32)***	(4.02)***	(1.17)	(9.37)***	(1.01)	(4.14)***	(1.27)	(9.81)***
Credit Rating=14 Dummy (0,1)	-3.028	0.407	0.273	-1.998	0.236	0.410	0.285	-2.058
	(21.30)***	(4.22)***	(1.21)	(8.95)***	(1.14)	(4.24)***	(1.25)	(8.87)***
Credit Rating=15 Dummy (0,1)	-3.266	0.061	0.040	-2.397	-0.005	0.066	0.051	-2.457
	(13.09)***	(0.80)	(0.40)	(8.87)***	(0.04)	(0.85)	(0.48)	(8.80)***
Credit Rating=16 Dummy (0,1)	-3.257	0.112		-2.373		0.113		-2.435
	(11.83)***	(0.96)		(8.07)***		(0.96)		(7.95)***
Credit Rating=17 Dummy (0,1)				-2.435				-2.497
				(9.02)***				(8.79)***
Us Treasury 10 years (%)	0.449	0.329			0.402	0.327		
	(2.16)**	(1.73)*			(1.86)*	(1.71)*		
Vix Index (%)	0.927	0.910			0.895	0.906		
	(9.52)***	(8.10)***			(8.98)***	(8.11)***		
US High Yield (%)	0.028	0.030			0.031	0.029		
	(1.75)*	(1.66)			(1.92)*	(1.60)		
Scores for component 1			0.262	0.262			0.258	0.261
			(13.33)***	(11.92)***			(13.68)***	(11.60)***
Scores for component 2			0.039	0.020			0.033	0.020
			(1.38)	(0.84)			(1.14)	(0.84)
Investment grade Dummy (0,1)					-2.902	0.454		
					(9.48)***	(3.29)***		
Investment grade step Dummy (0,1)					-0.437	-0.610	-0.716	0.087
					(2.10)**	(3.67)***	(5.37)***	(0.74)
Constant	4.350	1.025	4.778	6.965	4.399	1.126	5.252	6.979
	(9.71)***	(3.04)***	(18.76)***	(47.27)***	(9.75)***	(3.35)***	(21.95)***	(47.80)***
Rating Agency	S&P	Moody's	S&P	Moody's	S&P	Moody's	S&P	Moody's
Observations	2703	2646	2476	2442	2703	2646	2476	2442
Number of group(wbcode)	30	29	30	29	30	29	30	29
Rsq-Overall	0.78	0.73	0.78	0.73	0.73	0.66	0.65	0.73
Rsq-Within	0.75	0.72	0.75	0.73	0.75	0.73	0.76	0.73
Rsq-Between	0.80	0.70	0.81	0.71	0.74	0.60	0.60	0.71

Robust t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
All regressions include fixed effects

Appendix : Sub-Prime Timeline (BBC)

Explanation for the motivation of the timeline from BBC website: "Global markets have been shaken up by fears of a credit crunch. Billions of dollars have been wiped off share prices, while the credit markets have been going through a period of re-pricing that prompted fears of a meltdown. But what triggered all the problems, and what were the main events?"

The Timeline…

12 March 2007
Shares in New Century Financial, one of the biggest sub-prime lenders in the US, are suspended amid fears it may be heading for bankruptcy.
16 March
US-based sub-prime firm Accredited Home Lenders Holding says it will pass on $2.7bn of money loaned - at a heavy discount - in order to generate some cash for its business.
2 April
New Century Financial files for Chapter 11 bankruptcy protection after it was forced by its backers to repurchase billions of dollars worth of bad loans.
The company says it will have to cut 3,200 jobs, more than half of its workforce, as a result of the move.
24 May
Shares in Bear Stearns come under pressure as questions are raised about the investment bank's exposure to the sub-prime market in the US.
14 June
Reports emerge that Bear Stearns is liquidating its assets in a hedge fund that made large bets on the US sub-prime market.
20 June
Merrill Lynch seizes and sells $800m (£400m) of bonds that are being used as collateral for loans made to Bear Stearns' hedge funds.
22 June
Bear Stearns says it will provide $3.2bn in loans to bail out one of its hedge funds, the High-Grade Structured Credit Strategies Fund.
The bailout of the fund would be the largest by a bank in almost a decade.
Analysts have also been questioning the position of another fund, the High-Grade Structured Credit Strategies Enhanced Leverage Fund.
25 June
Reports emerge that Bear Stearns will have to rescue a second hedge fund as rival banks refuse to help in bailing it out.
29 June
Bear Stearns hires a new head of asset management to find out what went wrong at its hedge funds.
13 July
US industrial firm General Electric decides to sell the WMC Mortgage sub-prime lending business that it bought in 2004.
"The mortgage industry has greatly changed since the purchase of WMC," says its chief Laurent Bossard.

18 July

Bear Stearns tells investors that they will get little, if any, money back from the two hedge funds that the lender has had to rescue.

20 July

Federal Reserve chairman Ben Bernanke warns that the crisis in the US sub-prime lending market could cost up to $100bn.

26 July

Bear Stearns seizes assets from one of its problem-hit hedge funds as it tries to stem losses.

27 July

Worries about the sub-prime crisis hammer global stock markets and the main US Dow Jones stock index loses 4.2% in five sessions, its worst weekly decline in almost five years.

31 July

Bear Stearns stops clients from withdrawing cash from a third fund, saying it has been overwhelmed by redemption requests.

The lender also files for bankruptcy protection for the two funds it had to bail out earlier.

3 August

US stock markets fall heavily, with the main Dow Jones Index ending the session 2.1% lower, amid fears about how many financial firms are exposed to problems in the sub-prime market.

A top Bear Stearns executive says credit markets are in the worst turmoil he has seen in 22 years. London's main FTSE 100 stock index closes down 1.2% at 6,224.3, with French and German markets also declining.

5 August

Bear Stearns co-president Warren Spector steps down, as the lender looks to restore investor confidence following the problems with its sub-prime exposure.

6 August

American Home Mortgage, one of the largest US independent home loan providers, files for bankruptcy after laying off the majority of its staff.

The company says it is a victim of the slump in the US housing market that has caught out many sub-prime borrowers and lenders.

9 August

French bank BNP Paribas suspends three investment funds worth 2bn euros (£1.4bn), citing problems in the US sub-prime mortgage sector.

BNP says that it cannot value the assets in the fund, because the market has disappeared.

Dutch bank NIBC announces losses of 137m euros from asset-backed securities in the first half of this year.

The European Central Bank (ECB) pumps 95bn euros into the eurozone banking market to allay fears about a sub-prime credit crunch.

The US Federal Reserve and the Bank of Japan take similar steps.

10 August

Global stock markets stay under intense pressure.

London's FTSE 100 index has its worst day in more than four years, closing 3.7% lower.

The ECB provides an extra 61bn euros of funds for banks.

The US Fed says it will provide as much money as is needed to combat the credit crunch.

13 August

Wall Street giant Goldman Sachs says it will pump $2bn into one of its funds to help shore up its value.

The ECB pumps 47.7bn euros into the money markets, its third cash injection in as many

14 August

Stock markets remain jittery as news continues to come out about the exposure of banks to the fallout from the sub-prime market.

Swiss bank UBS warns that the market turmoil is likely to hit its earnings in the July to September period.

Australian mortgage lender Rams Home says the "unprecedented disruptions" in credit markets may reduce its profit.

17 August

The US Federal Reserve cuts the interest rate at which it lends to banks by a quarter of a percentage point to help banks deal with credit problems.

26 August

The German regional bank SachsenLB is rapidly sold to Germany's biggest regional bank, Landesbank Baden-Wuerttemberg.

It came close to collapsing under its exposure to sub-prime debt.