The Agencies on Junk Sovereign Debt: The Impact of Credit Rating Agencies on Junk Sovereign Debt

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I. Introduction

In the wake of the major financial crises of the last eight years, there has been brewing controversy over the role of the three major credit rating agencies: (CRAs) Standard and Poor's (S&P), Moody's and the Fitch Group. These CRAs have been accused of assuring the public that toxic securities, such as subprime mortgage bundles, were secure investments, and panicking the public by dropping the credit rating of debt stricken European countries' bonds. Despite this, much of the existing literature argues that credit rating agencies have a very limited impact on the success of well-established financial instruments because they are so widely analyzed by other private and public institutions. In other words, by the time CRAs have announced a credit rating change, the vast majority of the participants in the financial industry have already adjusted to the announcement. This raises a question: if CRAs have limited impact in the economic trends of established and stronger issuers' financial instruments, do they have an effect on weaker issuers' instruments, where the news is likely less influential?

To answer this question, I will study the credit events of countries that have junk-status sovereign debt bonds to establish whether credit rating events have an impact on their expected yields. To carry out this research, I will use a stationarity Phillips-Perron test on a fixed number of countries and their credit events. I hypothesize that credit rating events, especially upgrades, will have a statistically significant impact on the expected yield of debt bonds.

II. Literature Review

Substantial research has been done on how CRAs' bond rating changes impact the value of financial instruments. The majority of this literature is focused on highly desired debt instruments, such as the sovereign debt of AAA rated countries, or on the mechanisms that CRAs use to determine credit ratings in the first place. As a result, there is a paucity of research on the valuation changes created by bonds moving from junk status to non-junk status or moving within the junk status rating. One major theme emerges from the existing literature—it is difficult to date and assign market jumps to credit rating events, and this creates conflicting and inconclusive results.

The first major area of study focuses on how CRAs make their decisions regardless of the creditworthiness of a financial instrument. Archer, Biglaiser and DeRouen, used a series of panel data of fifty countries to assess how CRAs determined their creditworthiness. They concluded that while political institutions play little to no role in the outcome of the credit rating, "The effects of bond default, inflation, and trade tend to be associated with big events that can have large effects on bond rating."[1] This makes it difficult to determine when CRAs have incorrectly rated a bond, because differentiating the macroeconomic indicators that led credit rating agencies to trigger a credit event and the change in indictors caused by the event itself is difficult. This

does suggest that there are likely to be at least two market movements for any instrument subject to a credit rating event, one when the change in economic conditions happens and another when the instrument is graded.

The second major area of study is how to measure credit events. As Archer, Biglaiser, and DeRouen explain, credit ratings have two tendencies, "First, ratings tend toward being static since the agencies are trying to assess trends instead of discrete events. The second effect is that ratings may have trouble predicting crises."[2] They explain that because of these factors, credit events often come after the start of an upward or downward trend, making it difficult for event studies to isolate the actual impact of credit events from the noise surrounding them. This is the largest problem with attempting to date market distortions from credit rating events.

To avoid this problem the 2006 article by Dallocchio et al used a stationarity test, as an alternative mechanism for event series studies, for the purpose of studying the impact of credit rating upgrades and downgrades on the French Bond market. They explain that, "Stationarity tests provide an alternative – although complementary – event study methodology to the abnormal returns method… The abnormal returns methods isolate the effect of a rating announcement on the spread of bonds or on the price of stocks."[3] They justify this methodology as a result of the a small number of events in their sample (French bond credit events) and used the Phillips-Perron test.[4] This paper will use the methodology used in Dallocchio et al paper to study the stationarity of credit rating changes.

Finally, while the literature is vast there are quite a few conflicting results. While the majority of studies find that stable and trustworthy financial instruments see little to no change from credit events, the deviations from that norm present the primary research question of this paper. Analysis organized by the Croatian Central Bank best articulates the problem with credit events, "The autonomous impact of credit rating announcements…has been of a limited economic importance. It seems that rating agencies do not provide financial market participants with any significant information in addition to that already contained in macroeconomic fundamentals."[5] In other words, when it comes to prominent bonds, CRAs are not providing any meaningful new information. Dalloccio et al also reach similar conclusions with the exception of unexpected credit events. They explain that "financial markets were insensitive to any upgrading or downgrading of financial or corporate firms, except for two downgradings of significant magnitude and which, undoubtedly, took investors by surprise."[6] This poses a question: what does it take to surprise investors?

The literature suggests that investors are most surprised when the financial instrument in question crosses the junk-non-junk threshold. Davidson, Glasbock, and Henderson came to this conclusion after examining Moody's ratings in the equity market to determine when credit events were most influential. They found that there is a statistically significant reaction to the

credit rating events when the instruments crossed the junk-non-junk threshold.[7] When Moody's amended a credit rating to cross the junk threshold, the market had a statistically significant reaction. The implication of this should extend to sovereign debt, as a similar phenomenon was identified in other academic works. In Goh and Ederington's 2007 article, they found no statistically significant factor to explain why some corporate bonds saw an effect after a credit event, while others did not. They concluded that, "Rating changes cannot be treated as homogeneous."[8] As a result, I will dedicate time to exploring the qualitative side of credit events, in addition to the quantitative analysis.

III.   Methodology and Data

Given that the aim of this paper is to evaluate the impact of credit events on the borrowing power of a sovereign debt, this paper will use an event series model. Specifically, this paper will evaluate the impact of credit events where the bond in question is moving near the line between investment and junk status based on S&P ratings. This measure contains long term sovereign bond (ten year bonds) that moved between BBB+ and BB- ratings since the twenty-first century. This data will be taken from S&P's published ratings to find possible case studies, with the limiting factor being available data on their bond yields, which will be collected from Bloomberg L.P.

To attempt to limit contagion from general market trends, the ten-year bond yields made into a spread with a primary and then a secondary economic power. The spreads were determined using Ilzetzki, Reinhart, and Rogoff's classifications of countries official and unofficial exchange rate regimes to identify the primary and secondary major economies linked to that country.[9] In cases where the exchange regime was linked to the Eurozone, the German ten-year sovereign bonds were used as intermediary variable, and in cases where the currency was floating or otherwise not linked to a major economic power they were tested first against the United States then against Germany as a secondary.[10] Using this metric, I found twenty case studies, which yielded thirty-four different spreads.

Country	Date of Event	Previous Rating[11]	Future Rating[12]	Direction of Event	Primary Spread	Secondary Spread
Brazil	4/30/08	BB+	BBB-	Upgrade	US	Germany
Brazil	9/9/15	BBB-	BB+	Downgrade	US	Germany
Bulgaria	12/12/14	BBB-	BB+	Downgrade	Germany	US
Colombia	3/16/11	BB+	BBB-	Upgrade	US	N/A
Croatia	12/14/12	BBB-	BB+	Downgrade	Germany	US
Cyprus	1/13/12	BBB	BB+	Downgrade	Germany	US
Greece	4/27/10	BBB+	BB+	Downgrade	Germany	US
Hungary	12/21/11	BBB-	BB+	Downgrade	Germany	US
Hungary	9/16/16	BB+	BBB-	Upgrade	Germany	US
India	1/30/07	BB+	BBB-	Upgrade	US	N/A
Latvia	2/24/09	BBB-	BB+	Downgrade	Germany	US
Mexico	2/7/02	BB+	BBB-	Upgrade	US	Germany
Panama	6/25/10	BB+	BBB-	Upgrade	US	N/A
Peru	7/14/08	BB+	BBB-	Upgrade	US	N/A
Romania	9/6/05	BB+	BBB-	Upgrade	Germany	US
Romania	10/27/08	BBB-	BB+	Downgrade	Germany	US
Romania	5/16/14	BB+	BBB-	Upgrade	Germany	US
Russia	1/31/05	BB+	BBB-	Upgrade	US	N/A
Russia	1/26/15	BBB-	BB+	Downgrade	US	N/A
South Africa	2/25/00	BB+	BBB-	Upgrade	US	Germany

The questions posed by the data are two-fold. First, does the market show any change around the time of the credit event change? Second if it does, can the change be isolated to a date post-credit event change?

To evaluate the impact of the credit event changes, I recreated the event study of Dallocchio et al to measure the stationarity of the bond spreads. The stationarity test is preferable to alternative methods of measuring abnormal results because it examines the data chronologically and thus can help discern the moment of discontinuity, or break point, better. To do this, I will use the Phillips-Perron test and apply to a 141-day window with 70 days on each side of the credit event change. As with Dallocchio et al, we used the Phillips-Perron test with a constant and no trend:

$$\Delta y_t = \alpha + \beta \bullet y_{t-1} + \varepsilon_t$$

The test has the following hypotheses:

$$H_0: \beta = 0$$
$$H_1: \beta < 0$$

The null hypothesis suggests the presence of a non-stationarity trend, while rejection of the null hypothesis implies a stationarity series. This study uses the 5% statistical significance level due to the observational size of each case study.

To date the change in market trends, the Phillips-Perron test would first be applied to the full 141-day window in each case study. If the null hypothesis is rejected in the initial test, this would imply that there were no abnormal changes to the market around the date of the credit rating event. However, if the initial null hypothesis could not be rejected, it would imply that there was an abnormal change to the market within the window. When this was the case, the Phillips-Perron test will be applied to an incrementally decreasing window [-70,+70] then [-70,+69] and so forth until the null hypothesis was be rejected, if possible.

IV.   Primary Results[13]

The hypothesis for this paper is that credit events changes, especially upgrades, will have a statistically significant impact on the expected yield of debt bonds. Of the twenty case studies and thirty-four relevant spreads, eight were stationary in the 141-day window, eight were stationary between the credit rating event the next seventy days, and eighteen were non-stationary at and before the date of the event. This would suggest that on the whole, there is no substantial evidence that credit rating events have an effect on sovereign debt moving between junk and investment status at large. This seems to largely hold with the general consensus on sovereign ratings. Given that most sovereigns voluntarily put out large amounts of information about themselves, it is generally accepted that markets have a significant amount of information on sovereign debt bonds without the help of credit rating agencies.[14] This means that investors see ratings as secondary information pools, rather than primary ones, and are less likely to react to the announcement itself.

Country	Date of Event	Primary Spread	Moment of Stationarity	Phillip-Perron Value	Secondary Spread	Moment of Stationarity	Phillip-Perron Value
Brazil	4/30/08	US	Non-Stationarity at 0		Germany	Non-Stationarity at 0	
Brazil	9/9/15	US	Non-Stationarity at 0		Germany	Non-Stationarity at 0	
Bulgaria	12/12/14	Germany	+70 (2/20/15)	-3.529714	US	+65 (2/15/15)	-2.962279
Colombia	3/16/11	US	+70 (5/26/11)	-5.474632	N/A	N/A	N/A
Croatia	12/14/12	Germany	+34 (1/17/13)	-2.932319	US	+23 (1/6/13)	-3.122912
Cyprus	1/13/12	Germany	Non-Stationarity at 0		US	Non-Stationarity at 0	
Greece	4/27/10	Germany	+70 (7/6/10)	-10.77809	US	+70 (7/6/10)	-10.72208
Hungary	12/21/11	Germany	Non-Stationarity at 0		US	Non-Stationarity at 0	
Hungary	9/16/16	Germany	+61 (11/16/16)	-2.946235	US	+70 (11/25/16)	-3.804157
India	1/30/07	US	+14 (2/13/08)	-3.047289	N/A	N/A	
Latvia	2/24/09	Germany	Non-Stationarity at 0		US	+70 (5/5/09)	-9.274787
Mexico	2/7/02	US	Non-Stationarity at 0		Germany	Non-Stationarity at 0	
Panama	6/25/10	US	Non-Stationarity at 0		N/A	N/A	
Peru	7/14/08	US	Non-Stationarity at 0		N/A	N/A	
Romania	9/6/05	Germany	Non-Stationarity at 0		US	+5 (9/11/05)	-3.228378
Romania	10/27/08	Germany	Non-Stationarity at 0		US	Non-Stationarity at 0	
Romania	5/16/14	Germany	+25 (6/10/14)	-2.969279	US	+25 (6/10/14)	-2.999121
Russia	1/31/05	US	Non-Stationarity at 0		N/A	N/A	
Russia	1/26/15	US	Non-Stationarity at 0		N/A	N/A	
South Africa	2/25/00	US	+70 (5/5/00)	-4.62217	Germany	+70 (5/5/00)	-4.542517

Moreover, there does not seem to be a dramatic difference between upgrades and downgrades. Among the case studies, there are an equal number of upgrades and downgrades that are stationary at the 141-day window, and only two event differences when split between stationarity before and after the credit event.

	Upgrades	Downgrades	Total
Stationary at the 141-day window	4	4	8
Stationary between the credit rating event and +70	5	3	8
Stationary between the credit rating event and -70	8	10	18
Total	17	17	34

Similarly, when divided into primary and secondary spreads, there is a consistent number of spreads that were stationary at the 141-day window and between the credit rating event and the following seventy days. However, there were twice as many observations that were found to be stationary between the credit rating event and the seventy days prior. This might suggest that the sovereigns who are most closely related to the United States' economy are the most highly observed, as the only spreads that did not have a secondary spread were those linked to the United States. Though when broken up by the economic power the spreads were measured against there was no substantial difference between the United States and Germany, which suggests that had all 20 case studies been run through both spread possibilities the previous table would have been even as well. Overall, there is not enough data or clear trends to suggest the primary hypothesis that these credit rating events were more likely than not to influence market trends; instead the results suggest that the markets are likely to respond to other events prior to the credit events.

	Primary Spread	Secondary Spread	Total
Stationary at the 141-day window	4	4	8
Stationary between the credit rating event and +70	4	4	8
Stationary between the credit rating event and -70	12	6	18
Total	20	14	34

	United States	Germany	Total
Stationary at the 141-day window	5	3	8
Stationary between the credit rating event and +70	5	3	8
Stationary between the credit rating event and -70	10	8	18
Total	20	14	34

V.   Secondary Results

Despite the lack of connection between the credit rating events and changes to the market when looking at the case studies broadly, the results reveal a variety of interesting trends: in regional stability, economic linkage, the impact of recent financial crises, and the method of study. Beginning with regional stability, there appears to be a noticeable trend when the observations are categorized by country.[15] Specifically, European countries seem to be most impacted by credit rating events given that more than 30% of the observations within Europe were effected between the credit rating event and seventy days afterwards. Moreover, since all but one of the observations in South and North American show results that would indicate that the market responded to the changing conditions of the nation before the credit rating event was announced, this would suggest that neither region was affected strongly by the credit rating event. This would suggest that European sovereign debt markets are more responsive to credit rating events, while South and North American markets are the less responsive to such events.

	S. America	N. America	Europe	Asia/ Africa	Total
Stationary at the 141-day window	1	0	5	2	8
Stationary between the credit rating event and +70	0	0	7	1	8
Stationary between the credit rating event and -70	5	3	10	0	18
Total	6	3	22	3	34

A similar pattern emerges when further parsing regional and economic differences .[16] The data suggests that countries within the European Union (EU) are far less likely to be affected before a credit event rating than those outside the EU (37.5% of the cases studies inside the EU were affect before the credit rating event compared with 66.6% outside the EU). This implies further that the countries within Europe and more specifically the European Union are much less responsive to market pressures outside credit rating events than countries in other regions.

	Inside the EU	Outside the EU	Total
Stationary at the 141-day window	3	5	8
Stationary between the credit rating event and +70	3	5	8
Stationary between the credit rating event and -70	12	6	18
Total	18	16	34

Additionally, a clearer link between credit rating events and market responses can be attributed to exchange rate regime. Out of the twenty cases that happened to countries that use the Euro as their primary currency or whose currencies are linked to the Euro in preparation to adopt it, more than a third had market changes within the seventy days after a credit event. This is compared with none of the countries with floating currencies (either freely floating or a managed float) having reaction within the seventy day window and only a sixth of the cases with links to the United States' dollar (USD).[17] This is further evidence to suggest that European markets are the most responsive to credit events. Additionally, it would suggest that countries with either a floating currency or a currency linked to the USD are more closely observed given that markets are more likely to react to before the credit rating event in both categories. On the whole, this would suggest that there is significant variation in impact of credit rating events by region and by currency regime.

	Float	Eurozone	Links to USD[18]	Total
Stationary at the 141-day window	2	5	1	8
Stationary between the credit rating event and +70	0	7	1	8
Stationary between the credit rating event and -70	6	8	4	18
Total	8	20	6	34

Another source of variation in the results comes from examining the different between market reactions before and after recent financial crises. Before the 2008 financial crisis and global recession, 72.7% of the observed cases reacted to the sovereign's change before the credit rating event compared with 43.5% after the 2008 crisis. A similar result is found when looking at the observations before and after the Eurozone Debt Crisis of 2010, where 60% of the observed cases reacted to the sovereign's change before the credit rating event compared with 47.3% after the Eurozone Crisis. This would suggest that markets become more sensitive to credit rating events after major economic crises. This may be related to the credit rating agencies choice to go forward with major sovereign debt downgrades during the 2010 Eurozone Debt Crisis, which left investors very wary of European debt and the credit rating agencies with leverage to get more unpublished information from the sovereigns.[19] Though these results are not conclusive they do suggest interesting trends for future research.

	Pre-2008 Crisis	Post-2008 Crisis	Total
Stationary at the 141-day window	2	6	8
Stationary between the credit rating event and +70	1	7	8
Stationary between the credit rating event and -70	8	10	18
Total	11	23	34

	Pre-Eurozone Crisis	Post-Eurozone Crisis	Total
Stationary at the 141-day window	3	5	8
Stationary between the credit rating event and +70	3	5	8
Stationary between the credit rating event and -70	9	9	18
Total	15	19	34

Finally, despite uncertainty about the impact credit rating events have on sovereign debt bonds passing between junk and investment status, the results are very clear on the effectiveness of the research methodology. Of the twenty case studies, only four presented a different result between the primary and secondary spread. Moreover, there is no clear trend between upgrades and downgrades when it comes to both tests returning similar results. This suggests two things. First, it suggests that there is not a major difference between the economic trends presented by the United States and Germany, which means that future research does not need to be built on different spreads. Second, it suggests that there is little to no contamination from other market factors such as economic growth, domestic stability, or other market turbulence. Overall, it indicates that the test is a viable method for potential research.

	Upgrade	Downgrade	Total
Both Primary and Secondary Same Results	4	6	10
Both Primary and Secondary Different Results	2	2	4
Only a Primary Result	5	1	6
Total	11	9	20

VI.   Conclusion

In conclusion, no strong evidence was found to suggest that credit rating events have an impact on the markets for long-term sovereign debt moving between junk and investment status. In fact, there is evidence to suggest that markets are more likely to react to a potential change in credit rating before the credit rating event is announced. However, there is some evidence that countries within Europe, the European Union, and the Eurozone are more sensitive to credit rating events. Moreover, there is evidence to suggest that markets have become more sensitive to such credit rating events since the economic crises of the twenty-first century. All of these areas would benefit from further research to explore questions of what precisely makes European markets more responsive to credit rating events.

Furthermore, for future research into the field the stationarity event tests appear to be strong metrics of time-series events. However, given that this paper lacked the resources necessary to retest the case studies with the alternative mechanism of time-series evaluation, that would be another possible avenue of research. Either way, it is clear that current research around credit rating agencies is insufficient given the portion of responsibility they are credited with in terms of evaluating market risk, and more should be invested in if they are going to remain a vital part of the economic system.

VII.   References

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VIII.   Appendix I

Country	Date of Event	Event Direction	Regional Peg Primary	Regional Peg Secondary	Reinhart Rogoff Rating[20]
Brazil	4/30/08	Upgrade	US	Germany	Managed Float
Brazil	9/9/15	Downgrade	US	Germany	Managed Float
Bulgaria	12/12/14	Downgrade	Germany	US	Pegged to Euro
Colombia	3/16/11	Upgrade	US	N/A	Defacto band to USD
Croatia	12/14/12	Downgrade	Germany	US	Defacto band to Euro
Cyprus	1/13/12	Downgrade	Germany	US	Euro
Greece	4/27/10	Downgrade	Germany	US	Euro
Hungary	12/21/11	Downgrade	Germany	US	Euro
Hungary	9/16/16	Upgrade	Germany	US	Euro
India	1/30/07	Upgrade	US	N/A	Defacto Crawl to USD
Latvia	2/24/09	Downgrade	Germany	US	Euro
Mexico	2/7/02	Upgrade	US	Germany	Managed Float
Panama	6/25/10	Upgrade	US	N/A	USD
Peru	7/14/08	Upgrade	US	N/A	Defacto Crawl to USD
Romania	9/6/05	Upgrade	Germany	US	Defacto band to Euro
Romania	10/27/08	Downgrade	Germany	US	Defacto band to Euro
Romania	5/16/14	Upgrade	Germany	US	Defacto band to Euro
Russia	1/31/05	Upgrade	US	N/A	Defacto crawling band to US
Russia	1/26/15	Downgrade	US	N/A	Defacto crawling band to US
South Africa	2/25/00	Upgrade	US	Germany	Freely floating

IX.   Appendix II

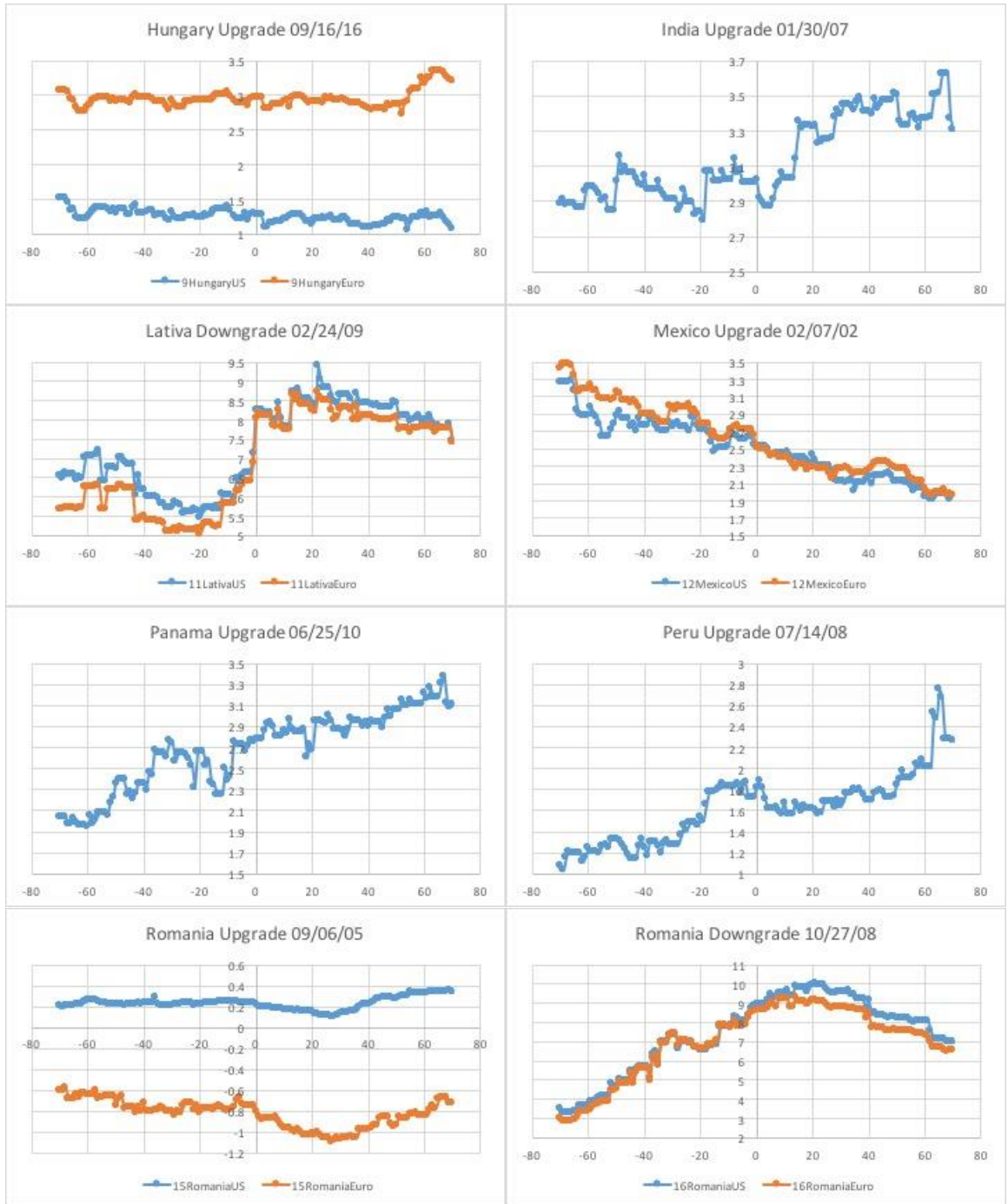| Country	Date of Event	Region	European Union	Exchange Classification	2008 Financial Crisis	2009 Eurozone Debt Crisis
Brazil	9/9/15	South America	No	Float	Post	Post
Brazil	4/30/08	South America	No	Float	Pre	Pre
Bulgaria	12/12/14	Europe	Yes	Eurozone	Post	Post
Colombia	3/16/11	South America	No	Defacto link to USD	Post	Post
Croatia	12/14/12	Europe	No	Eurozone	Post	Post
Cyprus	1/13/12	Europe	Yes	Eurozone	Post	Post
Greece	4/27/10	Europe	Yes	Eurozone	Post	Post
Hungary	12/21/11	Europe	Yes	Eurozone	Post	Post
Hungary	9/16/16	Europe	Yes	Eurozone	Post	Post
India	1/30/07	Asia	No	Defacto link to USD	Pre	Pre
Latvia	2/24/09	Europe	Yes	Eurozone	Post	Pre
Mexico	2/7/02	North America	No	Float	Pre	Pre
Panama	6/25/10	North America	No	Defacto link to USD	Post	Post
Peru	7/14/08	South America	No	Defacto link to USD	Pre	Pre
Romania	5/16/14	Europe	Yes	Eurozone	Post	Post
Romania	9/6/05	Europe	No	Eurozone	Pre	Pre
Romania	10/27/08	Europe	Yes	Eurozone	Post	Pre
Russia	1/26/15	Europe	No	Defacto link to USD	Post	Post
Russia	1/31/05	Europe	No	Defacto link to USD	Pre	Pre
South Africa	2/25/00	Africa	No	Float	Pre	Pre

X.   Appendix III

Using the Ilzetzki, Reinhart, Rogoff classifications of regime type, the case studies were broken down into three categories to reflect countries broader classifications of exchange regimes. Countries with a de facto band to the Euro are placed within the Eurozone classification because the band is used in preparation for a currency switch into the Eurozone.
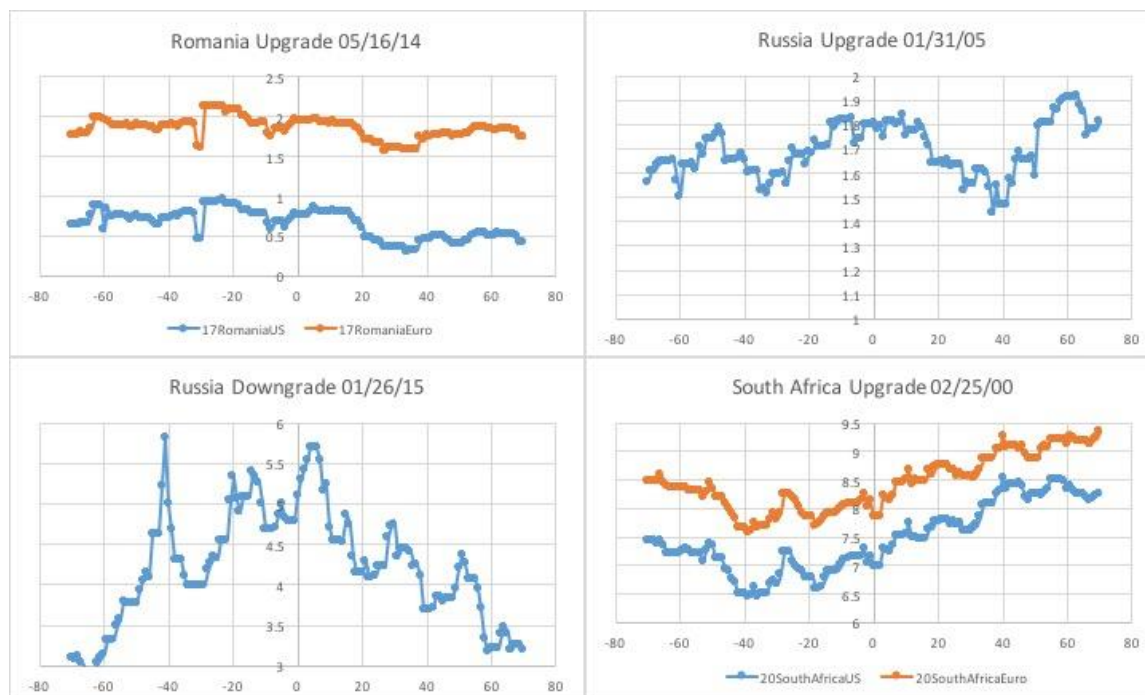
The Impact of Credit Rating Agencies on Junk Sovereign Debt

XI.   Appendix IV

Hungary Upgrade 09/16/16

India Upgrade 01/30/07

Lativa Downgrade 02/24/09

Mexico Upgrade 02/07/02

Panama Upgrade 06/25/10

Peru Upgrade 07/14/08

Romania Upgrade 09/06/05

Romania Downgrade 10/27/08
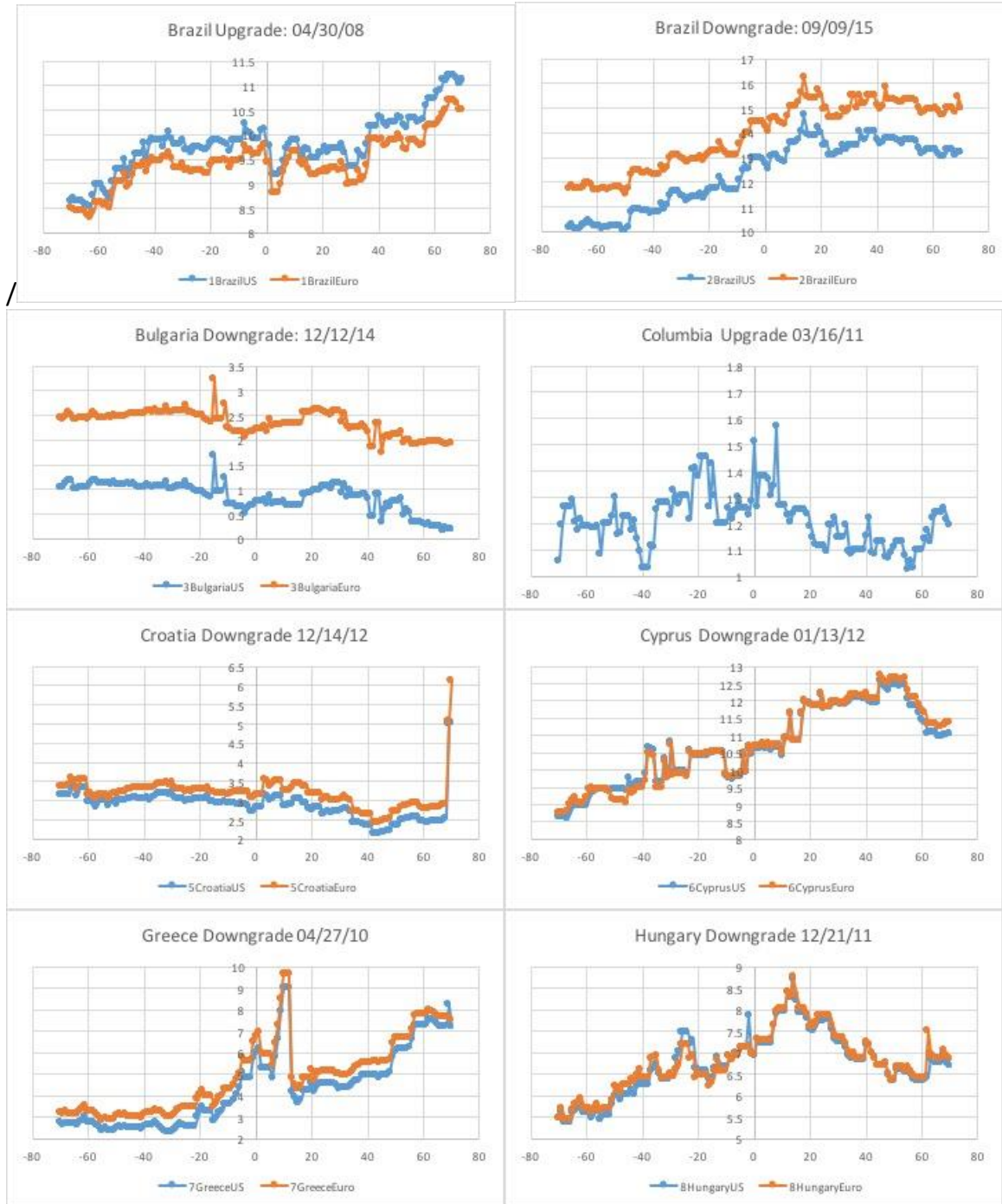
XII.   End Notes

[1] Archer, Candace C., Glen Biglaiser, and Karl Derouen, "Sovereign Bonds and the "Democratic Advantage," 359.

[2] Archer, Candace C., Glen Biglaiser, and Karl Derouen, "Sovereign Bonds and the "Democratic Advantage," 347.

[3] Dallocchio, Maurizio, et al., "Do Upgradings and Downgradings Convey Information? An Event Study of the French Bond Market," 296 – 7.

[4] Dallocchio, Maurizio, et al., "Do Upgradings and Downgradings Convey Information? An Event Study of the French Bond Market," 301.

[5] "Are sovereign credit ratings overrated?" 27.

[6] Dallocchio, Maurizio, et al., "Do Upgradings and Downgradings Convey Information? An Event Study of the French Bond Market," 315.

[7] Davidson, Wallace, John Glascock, and Glenn Henderson, "Announcement Effects of Moody's Bond Rating Changes on Equity Returns," 77.

[8] Goh, Jeremy C., and Louis H. Ederington. "Is a Bond Rating Downgrade Bad News, Good News, or No News for Stockholders?" 2007.

[9] Ilzetzki, Ethan, Carmen M Reinhart, and Kenneth S Rogoff. "The Country Chronologies and Background Material to Exchange Rate Arrangements into the 21st Century: Will the Anchor Currency Hold?"

[10] Appendix I

[11] Standard and Poor's. "Sovereigns Rating List."

[12] "Sovereigns Rating List."

[13] Appendix IV contains graphs of the individual case studies' spreads.

[14] "The Credit Rating Controversy." *Council on Foreign Relations*

[15] Appendix II

[16] Appendix II

[17] Appendix II and III

[18] Appendix III

[19] "The Credit Rating Controversy."

[20] Ilzetzki, Ethan, Carmen M Reinhart, and Kenneth S Rogoff. "The Country Chronologies and Background Material to Exchange Rate Arrangements into the 21st Century: Will the Anchor Currency Hold?"