NEWS SPILLOVERS IN THE SOVEREIGN DEBT MARKET

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ABSTRACT

We examine the extent of cross-border financial market linkages by focusing on the transmission of news events (specifically sovereign credit rating changes) concerning one country, to sovereign bonds of other countries. Our sample consists of a multi-country panel of dollar denominated sovereign debt covering the period 1991 through 2000. We document the existence of asymmetric spillovers: positive ratings events abroad have no discernable impact on sovereign spreads, whereas negative ratings events are associated with an increase in spreads. On average, a one-notch downgrade of a sovereign bond is associated with a 12 basis point increase in spreads of sovereign bonds of other countries. We also find the response to be non-linear. That is, the magnitude of spillovers following a negative ratings change is amplified by recent ratings changes in other countries. Conceptually, we distinguish between *common information* and *competitive* components of spillovers. While common information events imply that sovereign spreads move in tandem, competitive spillovers are expected to result in a differential effect of ratings events across countries. We find that competitive spillovers exist among countries with highly negatively correlated capital flows or trade flows (vis-à-vis' the U.S.). That is, spreads in these countries generally fall (relative to other countries) in response to a downgrade of a country with highly negatively correlated capital or trade flows. Finally, we find that these results do not seem to depend on cultural or institutional linkages (e.g., common language, formal trade blocs, common-law legal systems), physical proximity (distance, or adjacency), or on rule of law traditions across countries.

1. Introduction

During the 1990s a fundamental shift occurred in the nature of cross-country linkages. While the trend toward trade liberalization continued, many observers have noted that financial flows are now the dominant vehicle of interdependence. Indeed, capital flows have been central in the crises of the Exchange Rate Mechanism (ERM) in 1992, the Tequila crisis in 1994-95, the Asian crisis, and the Ruble crises of the latter half of the 1990s. Moreover, it has been widely documented that, at least during crisis periods, cross-country transmission contributed to financial market turmoil beyond individual country borders.

The purpose of this study is to examine the nature cross-border financial market linkages more generally. Using a daily data set consisting of all publicly traded U.S. dollar denominated sovereign debt, we ask several related questions about observed cross-border spillovers. Empirically, we focus on the transmission of news concerning sovereign credit ratings, to sovereign bonds issued by other countries.

In particular, we would like to know the size of spillovers – i.e., how much do sovereign spreads react to announcements concerning *other* sovereigns. Second, can we characterize these spillovers economically? In particular, do historical financial and trade linkages increase or reduce the size of the spillover? Are spillovers greater between 'similar' countries? We also explicitly consider whether a sequence of events in separate countries reinforce each other. In studies of currency crises, Eichengreen, Rose and Wyploz (1996), and, Kaminsky and Reinhart (1999) find that susceptibility to contagion is highly nonlinear, i.e., the probability of a crisis rises sharply if a sufficient number of other countries are already affected. Our results support this finding. We also explicitly study the impact of cultural or institutional linkages (e.g., common language, formal trade blocs, common-law legal systems), physical proximity (distance, or adjacency), and rule of law

traditions across countries. Finally, we ask whether there are asymmetries – i.e., do negative announcements have a quantitatively different impact than positive announcements.

In this paper we make a conceptual distinction between *competitive* and *common information* spillovers.[1] In principle, spillovers between two countries may be positive or negative. For example, a positive ratings event, such as an explicit upgrade of the credit rating or an improvement in the credit outlook of a country, may signal a widespread common trend, thus leading to a general lowering of interest rate spreads for all other countries. We refer to this as the common information effect. Alternatively, such good news may reveal that the event country has enhanced its attractiveness at the cost of all other countries, resulting in an increase in interest rate spreads in other countries.[2] We refer to the latter as the competitive effect. Moreover, any given ratings event may contain both common information, and competitive, effects. In these cases, we refer to the net impact. Finally, spillovers may predominately reflect common information, and yet have competitive aspects for some countries only. We explicitly test for these differential effects in our empirical analysis.

More formally, we hypothesize that positive (negative) events decrease (increase) sovereign spreads abroad, if the common information effect dominates the competitive effect. Similarly, if the competitive effect (of positive events) dominates the common information effect, spreads will increase. Additionally we formally link estimated spillovers to measures of observed capital and trade flows in order to better gauge their economic basis.

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[1] In their study of bankruptcy announcement spillovers, Lang and Stulz (1992) characterize spillovers as due either to contagion or to competitive effects. In their context, contagion effects are declines in share prices of other (i.e., non-announcing) firms in the industry, while competitive effects convey information about how the announcement impacts the bankrupt firm's competitors. We adopt this conceptual characterization – though in a modified form, since 'contagion', in current usage, typically refers to a post-event increase in correlations (see e.g., Forbes and Rigobon, 2002). Additionally, Bittlingmayer and Hazlett (2000) examine industry spillovers resulting from government anti-trust actions against Microsoft.

[2] For example, as a result of a rebalancing of global portfolios toward the upgraded country and away from all other countries with similar risk weightings within the portfolio. Such a rebalancing might leave the overall risk position of a

We focus on the sovereign bond market for several reasons. First, sovereign debt serves as the benchmark for all other domestic interest rates, thus developments in this market have wider implications for credit conditions in general. Moreover sovereign spreads directly reflect the pure default risk for borrowing countries. Spillovers quantify external influences on this risk. Additionally, the information provided by credit ratings agencies is explicitly designed to facilitate comparison of sovereign risk across countries. Thus, changes in sovereign ratings are significant events, closely watched by market participants. Our primary focus in this study is on the cross-market spillovers of these ratings changes. In particular, we concentrate on the spillover of a change in the sovereign debt rating or the credit outlook of one country (labeled as an event country), to interest rate spreads (vis-à-vis the interest rate of a U.S. Treasury bond of comparable maturity) on sovereign debt for all *other* countries (labeled as home countries).

Typically studies of spillovers examine co-movements of market returns. In the context of contagion, these studies test whether market correlations increase during contagious episodes. Forbes and Rigobon (2002) present a useful summary of theoretical models of cross-country spillovers, as well as a sharper empirical test methodology. Our study is closer in spirit to those of Eichengreen, Rose and Wyploz (1996), Baig and Goldfajn (1998), and Kaminski and Schmukler (1999). These studies attempt to identify how news events in one country affect other countries. Eichengreen et al. test whether speculative attacks in one country raise the probability of an attack in another. Using daily data for one year during the Asian crisis, Baig and Goldfajn (1998) attempt to categorize all news events in the five Asian economies they study as either 'Good News' or 'Bad News'. They then estimate the own-country and spillover effects associated with these dummy variables. Our study differs from these in that we estimate the impact to home-country sovereign spreads of specific ratings change events abroad.

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specific fund unchanged, but could result in an increase in interest rate spreads (i.e., relative to a common benchmark

We also note that our study differs from other studies of the impact of ratings changes on *own* country spreads, e.g., Cantor and Packer (1996), and Reisen and von Maltzan (1999). One potential limitation of studying own country effects is that the 'event-window' may be contaminated by other events, i.e., ratings changes in other countries. The importance of considering events in other countries is highlighted by Kaminski and Reinhart (1999), among others. Indeed, in our data more than two-thirds of the ratings events occur within 30 days of each other – the typical window length for studies that examine own country spreads. If spillovers exist, the measured own-country effect will be a function of these other events within the window.

In their study, Cantor and Packer (1996) demonstrate the high information content of sovereign credit rankings. They show, for example, that ratings have considerable explanatory power for yields (adjusted R^2 of 0.92 of a cross-sectional regression at a point in time in late 1995). Moreover, once macroeconomic explanatory variables (e.g., per capita income, GDP growth, inflation, and the government's fiscal balance) were included in the regression, in addition to the credit ratings, none of the macroeconomic variables were statistically significant, suggesting that ratings subsume information contained in many country specific economic variables.

Despite this high explanatory power, the ratings industry has recently been criticized for missing the major crises in the late 1990s. For example, in discussing the Asian crisis, Radelet and Sachs (1998), and Ferri et al. (1998), note that the ratings agencies did not signal increased risk until after the onset of the crisis (indeed some countries were upgraded just prior to the crisis). Moreover, the authors commented that once the agencies did downgrade the affected countries, the interest rate responses may have actually exacerbated the crisis. Reisen and von Maltzan (1999) find some support for this 'follow-the-market' behavior by ratings agencies in their study. However, simultaneous or nearby (temporally) ratings changes make it difficult to isolate the magnitude of the

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interest rate) in other countries.

effect of a rating change. As noted above, less than one-third of the ratings events in our data set were *not* preceded by a rating change in another country within a 30 day window. This may explain why Reisen and Maltzan find that neither ratings changes nor interest rate spreads uniquely Granger cause the other.

Another concern is that focusing on implemented ratings changes may be too restrictive. Ratings agencies typically issue secondary announcements that may qualify a country's stated grade. For example, Standard & Poors frequently puts sovereigns on its 'credit outlook' a few months prior to an actual downgrade. Hence focusing on the explicit ratings alone (represented by the letter-grade D thru AAA) may miss important information. Following Gande and Puri (2001), we incorporate this additional information into an 'implicit' credit rating that combines the information in the explicit sovereign credit rating and the information on the credit outlook. Consequently, we define ratings changes (events) more generally to include changes in either the credit rating or the credit outlook.

Our primary findings can briefly be summarized. First, we document the existence of asymmetric spillovers: positive ratings events abroad have no discernable impact on the spreads, whereas, negative ratings events are associated with an increase in spreads. On average, a one-notch downgrade of a sovereign bond is associated with a 12 basis point increase in spreads of sovereign bonds of other countries, assuming a 6% yield on a U.S. Treasury of comparable maturity. Despite the predominance of common information spillovers, we also find evidence of competitive spillovers – for countries with highly negatively correlated trade or capital flows (vis-à-vis' the United States). That is, compared to a typical country experiencing a ratings downgrade, we find a *decrease* of approximately 15 basis points and 13 basis points in the sovereign spreads of similarly downgraded countries having highly negatively correlated capital or trade flows with the U.S.. For negative ratings events, our results support Kaminski and Reinhart's (1999) assertion that

susceptibility to crises is 'highly nonlinear' more generally. In particular, we find that negative spillovers are amplified by recent ratings change activity.

In the next section we describe our data set. In section 3 we discuss our framework for analyzing spillovers in terms of common information versus competitive effects. Section 3 also outlines the testable hypotheses and presents our empirical results. Section 4 concludes.

2. Data

The primary data set we examine consists of daily market-closing observations of the spread over the closest (maturity) matched U.S. government bond for all countries with (currently) publicly traded U.S. dollar denominated sovereign debt. The data cover the period from January 1, 1991 to December 31, 2000, and was compiled from Bloomberg. The only criterion for inclusion in our data set was the existence of publicly traded U.S. dollar denominated sovereign debt as of March 2001. The thirty-four countries meeting this criterion are: Argentina, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, Denmark, Finland, Greece, Hungary, Iceland, Indonesia, Ireland, Israel, Italy, Korea, Lebanon, Malaysia, Mexico, New Zealand, Panama, Philippines, Poland, South Africa, Spain, Sweden, Thailand, Tunisia, Turkey, U.K., Uruguay, and Venezuela.

The time series data on ratings changes for these countries were obtained from the Standard & Poors (S&P) website. We also examine lower frequency economic data for these countries. First, we obtain data on bilateral gross capital flows between each country in our sample and the United States. The U.S. Treasury's web site at http://www.treas.gov/tic/ posts bilateral monthly data on flows (purchases and sales) of private and public debt between the U.S. and other countries. For our purposes, we focus on the aggregate bilateral numbers, i.e., sales plus purchases of all short term public plus private debt. Additionally, we examine data on bilateral trade flows between each country and the United States. Monthly data are available from the Census Department at: http://www.census.gov/foreign-trade/balance/index.html#A.

We also examine a host of time-invariant country specific data characterizing various cultural, legal, and institutional features of the countries in the sample. First, trade bloc definitions were taken from Frankel (1997). We focus specifically on membership in four primary trade blocs: the North American Free Trade Agreement (Nafta), the Mercado Comun del Sur (Mercosur), the European Union (EU), and the Association of South East Asian Nations (Asean). The legal tradition of each country in our sample is classified by its origin – common law or civil law, and the rule of law tradition. La Porta, Lopez-de-Silanes, Shliefer, and Vishny (1998) compile and tabulate these variables. In the few instances where our countries were not included in their study we collected these data from the original sources (Reynolds, and Flores 1989, and the International Country Risk Guide at http://www.prsgroup.com).

Classification of countries into emerging/developed is obtained from www.securities.com (a Euromoney web site), the International Finance Corporation's Emerging Markets Factbook 1996, and the S&P Emerging Markets Factbook (2001). The S&P uses an additional classification "Frontier" – these are also counted as emerging. The country is defined as emerging if it is listed as emerging in at least one of these 3 sources. Additionally, we include bilateral dummy variables for sharing a common language and adjacency. The language dummy takes the value 1 if the country pair shares a common language (either official or primary business language), and zero otherwise. The data was taken from the *CIA World Factbook* (http://www.cia.gov/cia/publications/factbook/indexgeo.html). We also include an explicit measure of physical distance between countries – computed as the greater-circle distance between countries' capital cities. The latitude and longitude information is available at http://www.un.org/Depts/unsd/demog/392.htm.

Finally, we explicitly control for crisis episodes. Our sample spans the Mexican, Asian, Russian, and Brazilian crises. Collectively, there were 53 ratings events during these crises out of a total of 150 ratings events we consider.

3 Empirical Results

3.1 Preliminary Analysis

The starting point for our analysis is the definition of a rating event (which is often referred to simply as a rating change). For our purposes, these rating events comprise changes to both a country's explicit credit rating (i.e., the letter rating assigned by the agency), and changes to the credit outlook of the sovereign. Events can be positive, such as an upgrade of the explicit credit rating (i.e., letter rating) or an upward revision in the credit outlook of the sovereign, or they can be negative, such as a downgrade of the explicit credit rating or a downward revision in the credit outlook of the sovereign. We combine the information in the explicit credit ratings and the credit outlook into an implicit credit rating (ICR).

We numerically code the letter ratings on a scale from 0 (lowest) thru 16 (highest). Similarly, we code the credit outlook on a scale between -1 to +1. Thus each country's bonds have a rating for each time period; our interest is any nonzero change in the aggregate implicit credit rating of a sovereign. Appendix 1 explicitly tabulates the construction of our implicit credit rating.

In Table 1, we present some data on individual rating change events. There were 150 events between January 1, 1991 and December 31, 2000. According to the table, ratings changes are most commonly announced individually, i.e., for one country at a time, though multiple event days occur for 15% of the cases. Table 1 also splits the sample into positive and negative events. Note that there are approximately equal numbers of positive (78) and negative events (77). During this time period, there were only five days where positive *and* negative ratings announcements were made on

the same day. For these five days we focus on the net ratings change; this overlap reduces the number of ratings changes to 150 (= 78 + 77 -5).

In addition to multiple event days, events may be clustered in time. One way to quantify this is the duration between rating changes. Figure 1 presents the time duration between rating change events graphically. From the figure it is apparent that many ratings announcements have been preceded by other ratings announcements. For example, 49 events, or about one-third of the events came within two-weeks of another ratings announcement. Similarly, fully one-half of the events followed other events by three-weeks or less.

This temporal association suggests that ratings changes may have different impacts, depending on other ratings change activity. Moreover, failing to account for such clustering may seriously bias the estimated effects of ratings changes – even in studies focusing on own-country effects – since the 'event-window' may be contaminated by spillover effects of ratings changes in other countries. Alternatively, if ratings changes are regarded (by market participants) in the context of recent changes, or if the effects persist beyond a day, part of today's change in spreads will be influenced by prior ratings changes. Figure 2 presents another view of this clustering graphically for both positive and negative events separately. Clearly, there are both 'calm' and 'active' spells in the data; it is an empirical question whether this intensity matters for the reaction of sovereign spreads to these news events.

3.2 Empirical Specification and Benchmark Results

The variable of interest in verifying the existence of spillovers is the interest rate response in country j ($\neq i$) to an event in country i ($\neq j$). We begin by considering changes in the sovereign credit rating and credit outlook, summarized into our composite ICR measure described above. Initially, we measure the interest rate response as the change in the percentage spread, i.e., the interest rate differential over a U.S. Treasury bond of comparable maturity, as a percentage of the relevant U.S.

Treasury interest rate. For robustness, we also examine the basis point spread, measured as the interest rate differential in basis points (i.e., $1/100^{th}$ of a percentage point) over a U.S. Treasury of comparable maturity. When we have multiple sovereign bonds issued by the same country, e.g., of different maturities, issued at different times, we choose one representative bond with the most time-series observations, to insure greater consistency throughout the sample. We refer to the interest rate response generically as the (change in) spread. We use a standard two-day window [0,1] to incorporate the effects of time-zone differences between the location of the exchange where the sovereign bonds are traded (i.e., London or Luxembourg) and the countries in our sample.[3]

For estimation, we pool the data for all countries (*j*) excluding the event country (*i*), at each event time (t) into two sub-samples, one for positive events, and another for negative events. Overall, our data set has a panel structure: 150 events and 34 countries. Thus, we have a maximum (positive + negative) of 33 x 150 = 4950 data points. However, given that not all countries had data for all 150 events in the sample, the maximum number of observations in our regressions is 2122 (1114 for positive events, and 1008 for negative events).[4] For ease of interpretation, we force the sign of $Event_{i,t}$ to be the same for both negative and positive regressions. That is, $Event_{i,t}$ is defined as the absolute value of the aggregate change in implicit credit ratings across all countries, *i*. Specifically, we estimate the following regression for both negative and positive events separately.

$$\Delta Spread_{j,t} = \hat{a} + \hat{a}_1 Event_{i,t} + \sum_k \hat{a}_k X_k + \mathring{a}_{ij,t}, \forall j \neq i. \quad (1)$$

Initially, the matrix X_k contains controls for the maturity of the bond, the initial level of the home and event country implicit credit ratings, and full sets of year, and country dummies (34 event,

[3] That is, while spillovers due to an event (day 0) in the later part of the day in a Western country of our sample, such as Venezuela, will be recorded on day 1 in London/Luxembourg, spillovers due to an event (day 0) in the earlier part of the day in an Eastern country in our sample, such as New Zealand, will be recorded the same day in London/Luxembourg.
[4] For example, a few of our sovereign bonds in our sample were issued as late as in 1998, making it impossible for us to measure the spillover effects on these bonds of events prior to their issuance, i.e., pre-1998.

plus 34 home). Subsequently, we consider additional explanatory variables X_k, as well as different definitions of the dependent variable.

Results from estimating equation 1 are summarized in Table 2. Immediately apparent in the table is the contrast between the results for positive events and those for negative events. For negative ratings events, the estimated sign of $\hat{a}_1$ is consistent with the presence of common information effects. That is, negative news for one country translates into increased spreads for all dollar-denominated sovereign debt. However, positive events do not appear to induce statistically significant spillover effects.

One possible explanation for such a direction-specific impact is that positive events are likely to be anticipated (e.g., a local government may have an incentive to leak or preannounce the likelihood of a positive ratings change soon after any favorable discussions with a rating agency), whereas negative events tend to have a larger surprise component due to the absence of similar incentives. Another possible explanation may be a tendency of the rating agencies to maintain the ratings at a higher level, and, consequently they may display reluctance to lowering the sovereign credit rating or the credit outlook. This may arise from fears of losing continued access to critical information, such as the level of foreign currency reserves, etc., which may be privately observed by the foreign governments.[5]

To summarize, the results in Table 2 indicate that negative rating changes are more informative than positive events. In particular, the estimated coefficient on $\hat{a}_1$ (for negative announcements), indicates that a one-notch cumulative drop in the implicit credit rating during a

[5] Such a bias has been well documented in the literature on equity analysts. For example, Womack (1996) documents that "… new buy recommendations occur seven times more often than sell recommendations, suggesting that brokers are reluctant to issue sell recommendations".

two-week period is associated with a 12 basis point increase in yields of other country bonds, assuming a 6% yield on a U.S. Treasury bond of comparable maturity.[6]

Next, we explicitly consider whether the relationship is non-linear. Non-linearity, in the sense used by Kaminsky and Reinhart (1999), implies that events in other countries can cumulate; hence an announcement in isolation will have a different impact than one announced in the context of other ratings changes. Empirically, we wish to allow for the cumulative impact of a sequence of time-clustered events, and for the possibility of multiple or offsetting events. We examine this by introducing an additional term into the above specification. This variable measures the net rating change (excluding those in the event country) during the preceding two weeks.[7] For robustness, we also consider one- and three-week windows.

These results – summarized in Table 2 – confirm the nonlinear nature of the relationship. In particular, in the negative events regression, we reject (at the 1% level) the null hypothesis that recent ratings activity does not matter. Moreover, once we control for the context of the ratings change, the estimate of spillovers increases. According to this specification, a negative rating announcement abroad increases spreads by an average of 14 basis points in non-event countries. However, adding these recent ratings events to the positive events regression has no impact on the evidence that positive events are not associated with any spillovers.

To summarize, most sovereign ratings changes are announced singly, however, most sovereign ratings changes are not announced in isolation – indeed, one-third of all announcements occur within two weeks of another announcement. Moreover, this announcement intensity varies through time. We confirm the importance of this intensity for negative ratings changes – that is,

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[6] With unchanged U.S. interest rates (e.g., 6%), 12 basis points ≈ 6%* the change in percentage spreads (1.96 = $\hat{\delta}_1$)

[7] For a particular country, ratings changes are not typically revised in quick succession. There were however three events that were revised within the two-week window. Since our focus is on spillovers, we exclude own-country events within the window.

both the announcement and recent prior announcements have explanatory power for the response of sovereign spreads to ratings announcements. Our results also support the hypothesis that there is an asymmetry between the information conveyed by positive events versus negative events. In particular, negative events, such as downgrades and downward revisions in credit outlook appear to be highly informative, while positive events, such as upgrades and upward revisions in credit outlook have no discernable impact on spreads. Finally, the evidence suggests that negative news concerning one country is interpreted broadly as negative news in general – i.e., as common information.

3.3 Economic Basis of Spillovers

Despite the prevalence of common information spillovers, there may be cases where the interest rate response can be opposite in sign – e.g., bad news abroad could lower domestic spreads – perhaps due to a rebalancing of global portfolios. Alternatively, a negative announcement could raise spreads in some countries *relative* to other countries. We attempt to isolate these differential effects by explicitly accounting for linkages among capital and trade flows.

We begin by considering the time-series correlation of gross capital flows (inflows plus outflows vis-à-vis' the U.S.) between each country-pair in our sample. For each event, we partition the cross-section into two groups: those country pairs with high positive correlation and those with high negative correlation. Specifically, we use a dummy variable approach to identify countries with highly correlated capital flows. For those countries with highly correlated capital flows (i.e., the top quartile of the empirical distribution) we assign a value of one to the dummy; all other observations are assigned a zero value. We contrast these country pairs with those having high negative correlation (i.e., the bottom quartile of the empirical distribution). Both dummies are included in the regression. Finally, to allow for changing economic fundamentals in, and perceptions of, each foreign country, this correlation is recomputed at every event date using a moving window of capital

(and separately, trade) flow data. That is, for each ratings event, we use only the most recent six months to compute the correlation of capital (and trade) flows. Formally, we expect common information spillovers to dominate for countries with highly positively correlated capital (trade) flows and competitive information effects to exist between countries with highly negatively correlated capital (trade) flows.

The results from incorporating these new variables are presented in Table 3. We first present results considering capital and trade flows individually – subsequently we include all four dummy variables simultaneously. First, we find that, as hypothesized, home country spreads decrease (relative to the average) in response to a negative event abroad when capital flows are negatively correlated. The coefficient estimate of -2.55 is, statistically significant at the 1% level. That is, compared to a typical country experiencing a ratings downgrade, we find a *decrease* of approximately 15 basis points in the sovereign spreads of similarly downgraded countries having highly negatively correlated capital or trade flows with the U.S.[8] However, we find no such effect for positive events, which is not surprising since we found no evidence of spillovers for positive events in Table 2.

Moreover, we find that home country spreads decrease (relative to the average) in response to a negative event abroad for countries with highly negatively correlated trade flows. The coefficient estimate of -2.12 is statistically significant at the 5% level, and implies a 13 basis point decrease in home country spreads in response to a one-notch downgrade in the event country.[9] As with capital flows, we find no such effects for positive events.

In Table 4, we add controls for emerging/developed country status, membership in a trade bloc, origin of legal systems, rule of law, adjacency, physical distance between countries, existence of

[8] With unchanged U.S. interest rates (e.g., 6%), 15 basis points ≈ 6%* the change in percentage spreads (-2.55).
[9] Again, 13 basis points ≈ 6%* the change in percentage spreads (1.20).

a common language, and for crisis periods. A trade bloc, signifying a formal agreement between countries, serves as a long-term commitment among its members to reduce trade barriers and formally commits its members to a path of increased economic integration within the bloc. An alternative explanation for the formation of trade blocs is that countries highly integrated are more likely to form a bloc. To the extent that member economies are more closely linked, common information spillovers are likely to predominate. Consequently, one would expect a decrease (increase) in spreads to be higher for positive (negative) events associated with countries from the same trade bloc relative to the in non-trade bloc countries. The sign of the coefficient on our trade bloc variable supports this interpretation, though the coefficient is never statistically different from zero.

This latter conclusion also applies to the additional controls for common language, common-law legal systems, physical proximity (distance, or adjacency), and rule of law traditions. That is, none of the coefficients are statistically different from zero for these variables. In general terms we introduce these additional variables in order to control for historical and time-invariant factors that might affect our conclusions about both the extent of spillovers, and their economic basis. In related studies, the importance of these variables has been documented in recent studies of goods market integration (e.g., Rose 2000, Rose and van Wincoop, 2001, and Parsley and Wei 2001), and in financial market integration (e.g., La Porta et al. 1998, and Van Rijckeghem and Weder 1999). Adding these additional variables leaves our previous conclusions unchanged. The adjusted R^2 rises in both the positive and negative regressions, however none of the additional variables is statistically significant.

Finally, we introduce a control for crisis periods. Since our data span four crisis periods, and fully one-third of our events occurred during these periods, we are concerned that the results may be driven by a sub-sample of events. The crisis dummy identifies the Mexican peso crisis, the Asian

financial crisis, the Russian crisis, and the Brazilian crisis. Again, adding this control to our regression equations (positive and negative) leaves our previous results unchanged. In particular, statistically significant spillovers exist only for negative rating events.

3.4 Robustness and extensions

Next we conduct several robustness checks. First, to address the concern that our results are sensitive to the manner in which we measure spreads, we use a variation of the dependent variable used in the literature, namely basis points spread. To conserve space, we present results only for our final specification including all variables. These results, shown in Table 5, are qualitatively unchanged.

In Table 6 we perform the analysis on a reduced set of countries. In principle, we would expect announcements in smaller countries to have less of a spillover impact. Thus, by focusing on larger countries we expect more economically significant spillovers. In particular, we drop the ten smallest countries (i.e., those with purchasing power parity adjusted (1997) GDP < $100 million)[10]. As expected, average spillovers are larger for the remaining countries, and trade and capital flow correlations are important for the size of these spillover effects. In particular, a negative event in one of these larger economies raises spreads by 17 basis points as compared to only 13 basis points in the similar regression in Table 4.

Finally, in Table 7 we consider recent ratings changes using a longer, i.e., three-week, window. Again, our results are essentially unaffected. In particular, the coefficient estimate for spillovers is virtually unchanged, and the estimate for recent ratings is only slightly smaller than that reported in Table 4. Perhaps this is because the three-week window reported here includes the ratings activity occurring through week two, and adds only marginal information.

[10] The source for this data was the World Bank publication "World Development Report, 1998-1999". The dropped countries are: Israel, Finland, Hungary, New Zealand, Panama, Ireland, Tunisia, Uruguay, Lebanon, and Iceland.

4. Conclusions

This paper examines the extent of cross-border financial market linkages by focusing on the transmission of news events (specifically sovereign credit rating changes) concerning one country on sovereign bonds of other countries. We document the existence of asymmetric spillovers: positive ratings events abroad have no discernable impact on the sovereign spreads, whereas, negative ratings events are associated with an economically meaningful and statistically significant increase in spreads. We present a framework characterizing these spillovers in terms of common information and competitive effects associated with a ratings change.

We also present evidence characterizing the spillovers in terms of whether (or not) the common information effect dominates the competitive effect associated with a ratings change. We find that home country spreads decrease (relative to the average response) in response to a negative event abroad when capital or trade flows are negatively correlated suggesting that the competitive effect dominates the common information effect for such countries.

We also confirm the importance of cumulative events, as posited by Kaminski and Reinhart (1999). In other words, ratings changes should not be viewed as isolated events, and it is appropriate to ask the context in which the change was announced – i.e., have there been other similar ratings changes in the past few days. Finally, we explicitly test whether our results are due to time-invariant historical, economic, institutional, cultural, or location-specific factors, or time-dependent crisis-specific factors. Our conclusions with regard to spillovers remain unaffected.

Our paper has numerous implications for future research. For example, the existence of asymmetric spillovers is consistent with a view that rating agencies may be biased in evaluating sovereigns, e.g., through their reluctance to issue low credit ratings (at initiation), or to lower a credit rating in a timely manner. To explore this issue further, one must examine the incentives of the rating agencies in divulging ratings changes in a timely manner. Additionally, to the extent that large

spillovers can be viewed as a precursor to a financial contagion, one can characterize (and possibly forecast) the vulnerability of an economic system to a financial contagion in terms of the aggregate spillovers.

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Table 1: Frequency of ratings events

The following table tabulates the number of events on a single day. The table also segments the sample into positive events and negative events.

Standard & Poors Ratings

Number of events On a Day	All Events Freq.	All Events Density	Positive Events Freq.	Positive Events Density	Negative Events Freq.	Negative Events Density
1	128	85.3%	66	84.6%	70	90.9%
2	16	10.7%	8	10.3%	7	9.1%
3	2	1.3%				
4	4	2.7%	4	5.1%		
Total[1]	150		78		77	

[1] For the five days having both positive and negative events, the event direction (positive or negative) is determined by the net ratings change. Hence, 150 = 78 +77 –5.

Table 2: Asymmetric Spillover Effects

This table presents the coefficient estimates from the following equation:

$\Delta Spread_{j,t} = \acute{a} + \hat{a}_1 Event_{i,t} + \hat{a}_2 Prior\ Event_{i,t} + \sum_k \hat{a}_k X_k + \mathring{a}_{ij,t}, \forall j \neq i.$ In the first specification we include only the $Event_{i,t}$,, in the second specification we include a measure of recent ratings change activity (*Prior* $Event_{i,t}$,) in the specification. The dependent variable is the cumulative two-day [0,1] change in the percentage spread. Percentage spreads are calculated as the interest rate differential over a U.S. Treasury bond of comparable maturity, as a percentage of the relevant U.S. Treasury interest rate. *Event* is defined as the change in the implicit credit rating. *Prior Event* is defined as the cumulative change in the implicit credit ratings of non-event country bonds during the two weeks preceding the event. The superscripts a, b, and c, imply statistical significance at the 1%, 2.5% and the 5% levels using robust standard errors in a two-tailed test.

	Positive rating events				Negative rating events			
	Coeff	T-stat	Coeff	T-stat	Coeff	T-stat	Coeff	T-stat
Constant	24.092	4.777[a]	24.470	4.852[a]	13.469	0.804	9.427	0.560
Maturity	-0.895	-4.990[a]	-0.909	-5.067[a]	-0.51	-0.894	-0.380	-0.665
Event	0.025	0.135	0.068	0.382	1.960	3.260[a]	2.286	3.512[a]
Prior Event			-0.179	-1.634			0.527	3.000[a]
Implicit Credit Rating (event country)	0.058	1.125	0.094	1.740	0.777	2.873[a]	0.880	3.118[a]
Implicit Credit Rating (non-event country)	-0.026	-0.125	-0.022	-0.107	-0.046	-0.100	-0.022	-0.047
Year Dummies	yes		yes		yes		yes	
Event country dummies	yes		yes		yes		yes	
Home country dummies	yes		yes		yes		yes	
Adjusted R^2	0.134		0.135		0.095		0.098	
Observations	1114		1114		1008		1008	

Table 3: Competitive and Common Information Spillovers - Capital and Trade Flows

This table presents the coefficient estimates from the following equation:

$\Delta Spread_{j,t} = \hat{a} + \hat{a}_1 Event_{i,t} + \hat{a}_2 Prior\ Event_{i,t} + \sum_k \hat{a}_k X_k + \hat{a}_{ij,t}$, $\forall j \neq i$. In this table we sequentially add variables for highly correlated capital flows, and for trade flows. The dependent variable is the cumulative two-day [0,1] change in the percentage spread. Percentage spreads are calculated as the interest rate differential over a U.S. Treasury bond of comparable maturity, as a percentage of the relevant U.S. Treasury interest rate. Event is defined as the change in the implicit credit rating. Prior Event is defined as the cumulative change in the implicit credit ratings of non-event country bonds during the two weeks preceding the event. The superscripts a, b, and c, imply statistical significance at the 1%, 2.5% and the 5% levels using robust standard errors in a two-tailed test.

	Positive rating events				Negative rating events			
	Coeff	T-stat	Coeff	T-stat	Coeff	T-stat	Coeff	T-stat
Constant	24.821	4.866[a]	23.706	4.871[a]	4.172	0.236	12.318	0.802
Maturity	-0.916	-5.080[a]	-0.880	-5.079[a]	-0.160	-0.263	-0.490	-0.947
Event	0.071	0.395	0.058	0.319	2.220	3.472[a]	2.402	3.663[a]
Prior Event	-0.180	-1.639	-0.176	-1.628	0.470	2.656[a]	0.496	2.854[a]
Capital flows – positive	0.257	0.957			-1.150	-1.694		
Capital flows – negative	-0.133	-0.562			-2.551	-2.591[a]		
Trade flows – positive			-0.324	-1.183			0.287	0.427
Trade flows - negative			-0.340	-1.434			-2.120	-2.136[c]
Implicit Credit Rating (event country)	0.092	1.681	0.084	1.571	0.784	3.055[c]	0.889	3.124[a]
Implicit Credit Rating (non-event country)	-0.025	-0.123	-0.030	-0.149	-0.087	-0.186	-0.020	-0.042
Year Dummies	yes		yes		yes		yes	
Event country dummies	yes		yes		yes		yes	
Home country dummies	yes		yes		yes		yes	
Adjusted R^2	0.135		0.136		0.105		0.103	
Observations	1114		1114		1008		1008	

Table 4: Competitive and Common Information Spillovers – Cultural, Legal, Institutional linkages, and Crisis Controls

This table presents the coefficient estimates from equation 1 in the text. In this table we simultaneously add variables for highly correlated trade and capital flows, membership in a trade bloc, home and event country status as emerging/developed, contiguity, distance, common language, origin of legal system, and rule of law. Specifically, we estimate: $\Delta Spread_{j,t} = \hat{a} + \hat{a}_1 Event_{i,t} + \hat{a}_2 Prior\ Event_{i,t} + \sum_k \hat{a}_k X_k + \hat{a}_{ij,t}, \forall j \neq i.$ The dependent variable is the cumulative two-day [0,1] change in the percentage spread. Percentage spreads are calculated as the interest rate differential over a U.S. Treasury bond of comparable maturity, as a percentage of the relevant U.S. Treasury interest rate. Event is defined as the change in the implicit credit rating. Prior Event is defined as the cumulative change in the implicit credit ratings of non-event country bonds during the two weeks preceding the event. The superscripts a, b, and c, imply statistical significance at the 1%, 2.5% and the 5% levels using robust standard errors in a two-tailed test.

	Positive rating events				Negative rating events			
	Coeff	T-stat	Coeff	T-stat	Coeff	T-stat	Coeff	T-stat
Constant	21.735	4.171[a]	20.697	3.989[a]	11.681	0.661	9.955	0.545
Maturity	-0.859	-5.004[a]	-0.806	-4.691[a]	-0.275	-0.497	-0.153	-0.251
Event	0.058	0.325	0.188	1.133	2.317	3.573[a]	2.207	3.376[a]
Prior Event	-0.149	-1.409	-0.085	-0.768	0.447	2.571[a]	0.485	2.824[a]
Emerging	1.073	1.134	0.510	0.515	-1.709	-0.251	-3.506	-0.504
Developed	-0.587	-0.636	-0.040	-0.040	-10.235	-2.272[b]	-8.477	-1.789
Capital flows – positive	0.311	1.188	0.287	1.094	-1.042	-1.596	-1.083	-1.641
Capital flows – negative	-0.117	-0.493	-0.101	-0.428	-2.617	-2.630[a]	-2.583	-2.653[a]
Trade flows – positive	-0.307	-1.128	-0.282	-1.023	0.154	0.222	0.188	0.267
Trade flows - negative	-0.368	-1.585	-0.380	-1.628	-2.056	-2.195[c]	-1.983	-2.181[c]
Adjacent	0.215	0.307	0.208	0.296	-3.208	-1.440	-3.099	-1.387
Distance	0.000	1.057	0.000	1.069	-0.000	-0.538	-0.000	-0.469
Language	-0.235	-0.977	-0.227	-0.946	0.789	0.940	0.767	0.904
Bloc	-0.526	-1.465	-0.521	-1.452	3.387	1.337	3.419	1.340
Common Law	0.393	1.538	0.385	1.514	0.660	0.567	0.714	0.603
Rule of Law	0.078	0.237	0.082	0.247	-0.472	-0.422	-0.424	-0.387
Crisis			0.749	1.563			-3.121	-1.514
Implicit Credit Rating (event country)	0.077	1.426	0.046	0.784	0.768	2.950[a]	0.715	2.775[a]
Implicit Credit Rating (non-event country)	-0.050	-0.246	-0.054	-0.263	-0.063	-0.137	-0.060	-0.129
Year Dummies	yes		yes		yes		yes	
Event country dummies	yes		yes		yes		yes	
Home country dummies	yes		yes		yes		yes	
Adjusted R^2	0.137		0.138		0.127		0.129	
Observations	1114		1114		1008		1008	

Table 5: Competitive and Common Information Spillovers
(Dependent variable measured in basis points)

This table presents the coefficient estimates from equation 1 in the text. In this table we simultaneously add variables for highly correlated trade and capital flows, membership in a trade bloc, home and event country status as emerging/developed, contiguity, distance, common language, origin of legal system, and rule of law. Specifically, we estimate: $\Delta Spread_{j,t} = \hat{\alpha} + \hat{a}_1 Event_{i,t} + \hat{a}_2 Prior\ Event_{i,t} + \sum_k \hat{a}_k X_k + \hat{\varepsilon}_{ij,t}, \forall j \neq i.$ The dependent variable is the cumulative two-day [0,1] change in the spread – measured in basis points. Spreads are calculated as the interest rate differential over a U.S. Treasury bond of comparable maturity. Event is defined as the change in the implicit credit rating. Prior Event is defined as the cumulative change in the implicit credit ratings of non-event country bonds during the two weeks preceding the event. The superscripts a, b, and c, imply statistical significance at the 1%, 2.5% and the 5% levels using robust standard errors in a two-tailed test.

	Positive rating events				Negative rating events			
	Coeff	T-stat	Coeff	T-stat	Coeff	T-stat	Coeff	T-stat
Constant	76.921	2.925[a]	70.412	2.681[a]	28.532	0.327	19.898	0.221
Maturity	-3.340	-3.840[a]	-3.008	-3.447[a]	-0.964	-0.363	-0.355	-0.121
Event	0.509	0.612	1.326	1.673	12.585	3.520[a]	12.038	3.344[a]
Prior Event	-0.660	-1.255	-0.260	-0.474	2.082	2.270[b]	2.271	2.502[b]
Emerging	5.576	1.122	2.039	0.398	1.279	0.038	-7.705	-0.223
Developed	-3.798	-0.796	-0.367	-0.072	-56.237	-2.392[b]	-47.441	-1.925
Capital flows – positive	1.962	1.349	1.812	1.245	-5.519	-1.669	-5.722	-1.714
Capital flows – negative	0.072	0.061	0.171	0.143	-12.570	-2.551[b]	-12.402	-2.569[a]
Trade flows – positive	-0.473	-0.323	-0.314	-0.212	1.164	0.342	1.333	0.387
Trade flows - negative	-1.631	-1.338	-1.707	-1.393	-9.032	-1.947	-8.666	-1.922
Adjacent	0.285	0.098	0.239	0.081	-16.641	-1.502	-16.094	-1.450
Distance	0.000	1.910	0.000	1.924	-0.000	-0.316	-0.000	-0.247
Language	-1.049	-0.842	-0.997	-0.803	4.261	1.014	4.148	0.977
Bloc	-0.847	-0.534	-0.813	-0.513	17.681	1.420	17.839	1.423
Common Law	1.635	1.185	0.385	1.514	2.167	0.375	2.438	0.415
Rule of Law	1.073	0.651	1.094	0.662	-1.898	-0.340	-1.659	-0.303
Crisis			4.701	1.822			-15.611	-1.554
Implicit Credit Rating (event country)	0.370	1.346	0.172	0.584	4.033	2.835[a]	3.767	2.661[a]
Implicit Credit Rating (non-event country)	0.104	0.087	0.082	0.069	-0.204	-0.087	-0.185	-0.079
Year Dummies	yes		yes		yes		yes	
Event country dummies	yes		yes		yes		yes	
Home country dummies	yes		yes		yes		yes	
Adjusted R^2	0.091		0.093		0.105		0.106	
Observations	1114		1114		1008		1008	

Table 6: Competitive and Common Information Spillovers (Larger Countries)

This table presents the coefficient estimates from equation 1 in the text for a reduced set of countries, (those with PPP adjusted 1997 GDP >= $100 million). In this table we simultaneously add variables for highly correlated trade and capital flows, membership in a trade bloc, home and event country status as emerging/developed, contiguity, distance, common language, origin of legal system, and rule of law. Specifically, we estimate: $\Delta Spread_{j,t} = \hat{a} + \hat{a}_1 Event_{i,t} + \hat{a}_2 Prior\ Event_{i,t} + \sum_k \hat{a}_k X_k + \mathring{a}_{ij,t}, \forall j \neq i$. The dependent variable is the cumulative two-day [0,1] change in the percentage spread. Percentage spreads are calculated as the interest rate differential over a U.S. Treasury bond of comparable maturity, as a percentage of the relevant U.S. Treasury interest rate. Event is defined as the change in the implicit credit rating. Prior Event is defined as the cumulative change in the implicit credit ratings of non-event country bonds during the two weeks preceding the event.. The superscripts a, b, and c, imply statistical significance at the 1%, 2.5% and the 5% levels using robust standard errors in a two-tailed test.

	Positive rating events				Negative rating events			
	Coeff	T-stat	Coeff	T-stat	Coeff	T-stat	Coeff	T-stat
Constant	14.497	1.871	14.497	1.856	-29.396	-1.574	-31.271	-1.630
Maturity	-0.667	-2.454[b]	-0.666	-2.390[b]	0.426	0.656	0.574	0.800
Event	0.306	0.887	0.306	0.888	3.162	3.336[a]	2.986	3.083[a]
Prior Event	0.218	1.365	0.218	1.325	0.769	3.132[a]	0.815	3.347[a]
Emerging	2.223	1.420	2.222	1.385	17.0372	2.756[a]	14.484	2.136
Developed	-2.021	-1.288	-2.021	-1.246	-13.740	-2.200[c]	-10.952	-1.589
Capital flows – positive	0.199	0.522	0.199	0.509	-1.637	-1.850	-1.588	-1.793
Capital flows – negative	0.087	0.262	0.087	0.261	-3.409	-2.654[a]	-3.300	-2.688[a]
Trade flows – positive	-0.388	-0.922	-0.388	-0.907	0.254	0.315	0.322	0.390
Trade flows - negative	-0.310	-0.875	-0.310	-0.866	-3.080	-2.183[c]	-2.968	-2.179[c]
Adjacent	-0.213	-0.192	-0.213	-0.192	-1.803	-0.775	-1.635	-0.698
Distance	0.000	0.492	0.000	0.492	0.000	1.484	0.000	1.599
Language	-0.313	-0.875	-0.313	-0.881	2.450	2.279[b]	2.497	2.255[b]
Bloc	-0.796	-1.268	-0.796	-1.268	4.444	1.267	4.469	1.262
Common Law	0.442	0.899	0.442	0.896	0.821	0.534	0.926	0.582
Rule of Law	0.493	0.778	0.494	0.779	-0.841	-0.522	-0.756	-0.483
Crisis			0.002	0.004			-4.051	-1.412
Implicit Credit Rating (event country)	0.127	1.497	0.127	1.446	1.070	2.980[a]	0.991	2.732[a]
Implicit Credit Rating (non-event country)	-0.267	-0.744	-0.267	-0.744	-0.009	-0.017	0.030	0.053
Year Dummies	yes		yes		yes		yes	
Event country dummies	yes		yes		yes		yes	
Home country dummies	yes		yes		yes		yes	
Adjusted R^2	0.281		0.280		0.109		0.111	
Observations	544		544		650		650	

Table 7: Competitive and Common Information Spillovers
(Prior Events during the previous three-weeks)

This table presents the coefficient estimates from equation 1 in the text. In this table we simultaneously add variables for highly correlated trade and capital flows, membership in a trade bloc, home and event country status as emerging/developed, contiguity, distance, common language, origin of legal system, and rule of law. Specifically, we estimate: $\Delta Spread_{j,t} = \hat{a} + \hat{a}_1 Event_{i,t} + \hat{a}_2 Prior\ Event_{i,t} + \sum_k \hat{a}_k X_k + \mathring{a}_{ij,t}, \forall j \neq i.$ The dependent variable is the cumulative two-day [0,1] change in the percentage spread. Percentage spreads are calculated as the interest rate differential over a U.S. Treasury bond of comparable maturity, as a percentage of the relevant U.S. Treasury interest rate. Event is defined as the change in the implicit credit rating. Prior Event is defined as the cumulative change in the implicit credit ratings of non-event country bonds during the three weeks preceding the event. The superscripts a, b, and c, imply statistical significance at the 1%, 2.5% and the 5% levels using robust standard errors in a two-tailed test.

	Positive rating events				Negative rating events			
	Coeff	T-stat	Coeff	T-stat	Coeff	T-stat	Coeff	T-stat
Constant	19.810	3.871[a]	19.451	3.784[a]	17.093	0.975	15.874	0.885
Maturity	-0.759	-4.494[a]	-0.743	-4.357[a]	-0.450	-0.818	-0.345	-0.573
Event	-0.063	-0.320	0.054	0.309	2.104	3.520[a]	1.978	3.279[a]
Prior Event	-0.304	-2.079[c]	-0.245	-1.785	0.349	1.829	0.398	1.940
Emerging	1.721	3.031[a]	1.515	2.690[a]	-1.271	-0.188	-3.008	-0.437
Developed	-1.193	-2.170[c]	-1.011	-1.790	-10.681	-2.378[b]	-8.983	-1.926
Capital flows – positive	0.306	1.171	0.290	1.104	-0.984	-1.511	-1.021	-1.549
Capital flows – negative	-0.133	-0.560	-0.120	-0.505	-2.767	-2.781[a]	-2.747	-2.805[a]
Trade flows – positive	-0.326	-1.207	-0.305	-1.121	0.043	0.064	0.059	0.088
Trade flows - negative	-0.369	-1.587	-0.376	-1.610	-2.021	-2.184[c]	-1.940	-2.166[c]
Adjacent	0.211	0.301	0.206	0.295	-3.223	-1.439	-3.113	-1.386
Distance	0.000	0.999	0.000	1.016	-0.000	-0.542	-0.000	-0.474
Language	-0.235	-0.978	-0.229	-0.954	0.814	0.968	0.795	0.935
Bloc	-0.560	-1.550	-0.548	-1.517	3.242	1.283	3.257	1.280
Common Law	0.393	1.550	0.386	1.528	0.636	0.545	0.690	0.582
Rule of Law	0.084	0.254	0.085	0.258	-0.469	-0.421	-0.419	-0.386
Crisis			0.521	1.291			-3.187	-1.469
Implicit Credit Rating (event country)	0.060	1.168	0.044	0.842	0.684	2.723[a]	0.623	2.516[b]
Implicit Credit Rating (non-event country)	-0.053	-0.259	-0.054	-0.266	-0.083	-0.177	-0.080	-0.172
Year Dummies	yes		yes		yes		yes	
Event country dummies	yes		yes		yes		yes	
Home country dummies	yes		yes		yes		yes	
Adjusted R^2	0.140		0.140		0.127		0.128	
Observations	1114		1114		1008		1008	

Appendix 1: Implicit Credit Rating Construction

The following appendix presents describes the construction of the implicit credit rating measure. We code the credit rating from 1 thru 16 as follows to obtain the explicit credit rating (ECR). We then add information on the credit outlook to obtain the implicit credit rating (ICR). For example, if a country is rated BB+ with no further information on its credit outlook, its ECR and ICR is 6. If S&P now places the country on watch for a possible upgrade, the ECR is still 6. However, its ICR is 6.50.

Explicit Credit Rating

Sovereign Rating	*ECR*
AAA	16
AA+	15
AA	14
AA-	13
A+	12
A	11
A-	10
BBB+	9
BBB	8
BBB-	7
BB+	6
BB	5
BB-	4
B+	3
B	2
B-	1

Credit Outlook

	Add to ECR
Positive	1
CW-Pos	0.5
Stable	0
CW-Neg	-0.5
Negative	-1

Figure 1

Ratings Announcements

Frequency and Duration

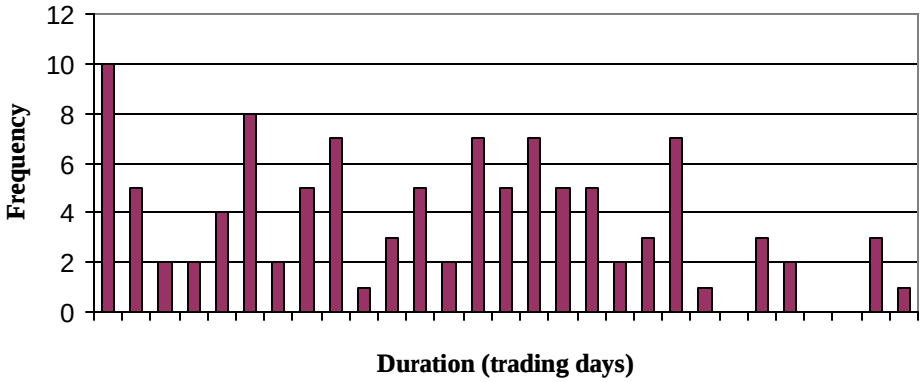
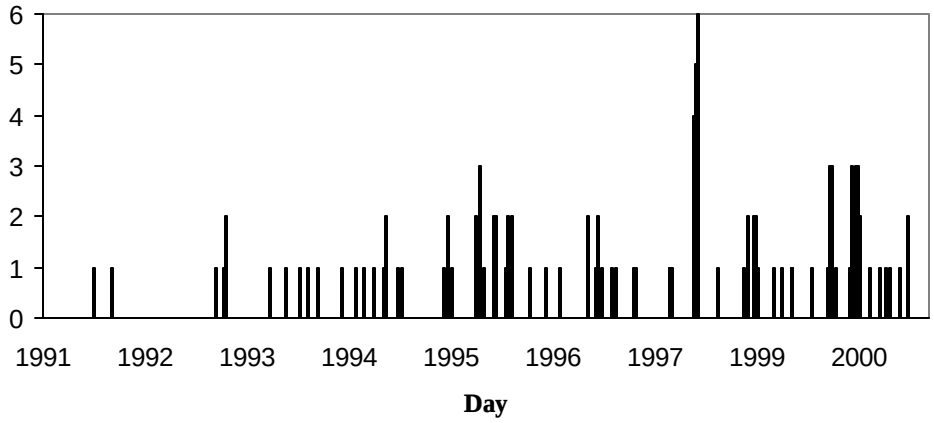


Figure 2

Positive Events within a two-week window



Negative Events within a two-week window