The effects of sovereign credit assessments on equity and currency market return distributions: Evidence from past and present financial crises

Robert Brooks
Department of Econometrics and Statistics, Monash University, Clayton, VIC, Australia

Robert Faff
UQ Business School, The University of Queensland, QLD, Australia

Sirimon Treepongkaruna
UWA Business School, University of Western Australia, Australia.

Eliza Wu [#]
Finance Discipline Group, UTS Business School, The University of Technology, Sydney, Ultimo, NSW 2007, Australia.

This version: 12 December 2011

Abstract

We examine the effects of sovereign rating announcements on realized stock and currency market return distributions during normal and financial crises periods. Using an expansive set of intraday market and sovereign ratings data for 76 countries around the world over the period from January 1996 - May 2010, we find that currency and stock markets react differently to sovereign ratings information. Specifically, stock market return distributions are more responsive to sovereign rating news and other macroeconomic fundamentals than currency return distributions. We find robust evidence that sovereign ratings events have a significant impact on asset return distributions, while controlling for the influence of national market attributes, however, the effects of sovereign credit rating revisions are not necessarily heightened during episodes of financial crisis.

The effects of sovereign credit assessments on equity and currency market return distributions: Evidence from past and present financial crises

This version: 12 December 2011

Abstract

We examine the effects of sovereign rating announcements on realized stock and currency market return distributions during normal and financial crises periods. Using an expansive set of intraday market and sovereign ratings data for 76 countries around the world over the period from January 1996 - May 2010, we find that currency and stock markets react differently to sovereign ratings information. Specifically, stock market return distributions are more responsive to sovereign rating news and other macroeconomic fundamentals than currency return distributions. We find robust evidence that sovereign ratings events have a significant impact on asset return distributions, while controlling for the influence of national market attributes, however, the effects of sovereign credit rating revisions are not necessarily heightened during episodes of financial crisis.

1. Introduction

Credit rating agencies are entrusted as specialist information intermediaries in international financial markets and should in theory facilitate the efficient operation of financial markets. Yet, the informational value of credit ratings and the role of rating agencies in the international financial system remains widely debated, particularly their procyclical role in exacerbating financial crises (see, for example, Kaminsky and Schmukler (1999)).

The core objective of our paper is to assess the effect of sovereign credit rating and outlook announcements on the higher (realized) moments of stock and foreign exchange returns for an extensive sample of 76 developing and developed countries worldwide. Focusing on realized return distributions is important to fully understand the information transmission mechanism of sovereign credit assessments in international financial markets, especially during times of financial turmoil. Information transmission can conceivably extend to the dynamics of higher moments such as variance, skewness and kurtosis. These risks are also known to influence financial decision making and studies like Hong and Stein (2003) show for instance skewness is related to information dispersion within financial markets. While previous studies have typically documented significant impacts of public information releases on the first and second moments of asset returns, there is a dearth of evidence regarding the impact of public information on the higher moments of asset return distributions. Recent studies such as Harvey and Siddique (2000), Brunnermeier and Pedersen (2009) and Albuquerque (2010) have documented the importance of the third and fourth moments of asset returns. For example, Harvey and Siddique (2000) conclude that conditional skewness helps in explaining asset returns. Brunnermeier and Pedersen (2009) demonstrate that funding constraints can lead to high volatility

and kurtosis. Furthermore, speculators returns are negatively skewed in such circumstances.

Sovereign credit ratings provide publicly available assessments on national governments' ability and willingness to service debts in a timely manner.[1] As can be seen in Figure 1, credit rating agencies are generally more active in re-rating countries during international financial crises, which are correspondingly highly volatile periods. Thus, it is important to assess the wider impacts of rating agencies' credit assessments on the full distribution of financial market returns as such evidence remains lacking and is important for risk management by financial managers and crisis management by international policy makers. Hence, we distinguish our paper by uniquely focusing on the full market impact of sovereign rating events over the sample period from January 1996 to May 2010 (thereby covering several major episodes of financial crisis around the world including the beginning of the latest European debt crisis). We employ a flexible panel data method for fully capturing a country's own rating impacts across time, using intraday currency and stock market data to compute the first four realized moments of return distributions. Higher moments of distributions of financial variables, such as skewness and kurtosis, can be important for assessing the risk of a portfolio, complementing traditional variance measures, as well as for generally improving the performance of various financial models. The asset pricing literature documents that the higher return moments are priced. Hence, we can infer that there is information content in skewness and kurtosis.

<Insert Figure 1>

---

[1] Interestingly, the US government is going through a very tricky process of gaining approval for a debt ceiling hike to avoid defaulting on its loans. While there is no question of the ability of the US to meet its debt commitments, should it fail to agree on the required measure in time (early August), its "willingness" to meet the commitments will be brought into question. As such, it is predicted that the rating agencies will enact a downgrade of the US rating in very short time.

We find that currency and stock markets react somewhat differently from each other to ratings announcements. Overall, changes in sovereign credit ratings appear to have a more significant impact on realized measures than outlook revisions. We find clear evidence that rating events have significant impacts on the first four moments of returns during both normal market conditions and financial crises. However, when we control for national market attributes, we find that financial crises do not necessarily serve to increase the sensitivity of realized return distributions to different types of ratings information, as we find no evidence that rating agency decisions heighten financial market instability during times of financial turmoil. However, without the control variables, we find that the sensitivity of the first two moments of realized returns (mean return and volatility) tend to increase during financial crises – especially currency and debt crises.

While this paper complements existing studies, it also makes several significant contributions to the academic literature on rating impacts in international financial markets (see for instance, Kaminsky and Schmukler (1999, 2002), Brooks et al. (2004), Gande and Parsley (2005), Chiang et al. (2007), Ferreira and Gama (2007), Hill and Faff (2010)). First, we apply intraday financial market data to assess the impact of sovereign credit ratings on the *return distributions* of international financial markets. The advantages of using daily realized measures computed from intraday data compared to day to day closing prices is that they provide a better representation and more robust estimate of actual price behaviour (see, for example, Andersen et al. (2003)). Daily close-to-close measures are unable to capture the intraday price fluctuations, which can be substantial, particularly during times of financial distress. This is especially important given that we focus on the impacts of different types of ratings information during financial crises.

Second, we document the differential impacts of ratings on currency return distributions relative to those for stocks. Third, we provide a comprehensive assessment of sovereign rating effects during an array of financial crises that have occurred in recent years – Asian Financial Crisis, Russian Debt Crisis, Technology bust, Global Financial crises, and the onset of the current European Debt crisis providing new evidence on the information transmission mechanism of sovereign credit rating assessments during financial crises. We recognise that not all financial crises are the same in terms of causes and effects and an accurate assessment of sovereign rating revision effects requires a broad experiment across several financial crises. Third, the extant literature capturing information spillovers in international financial markets only examine at most to the second moment (ie. Variance and standardised covariance). We fill this gap in the literature by studying rating information effects in the higher third and fourth moments (skewness and kurtosis).

Overall, our research has important policy implications in light of the continued role of sovereign credit ratings under future financial regulatory frameworks. Sovereign credit rating assessments continue to be employed as yardsticks for determining asset risk and financial institutions are mandated to hold investment grade assets. A clearer understanding of rating impacts on stock and currency markets will not only be beneficial for forecasting asset returns and risk management by corporate treasurers, portfolio investors and financial institutions managers but also for system stability management by policymakers.

The organization of this paper is as follows. In section 2, we provide the data description followed by the empirical modelling in Section 3. In Section 4 we discuss our findings before concluding in Section 5.

2.   Data description

Our dataset consists of the bid-ask quotes for both currencies and stock market indices relating to an extensive sample of 76 countries from around the world. The country sample used in this study is listed in Table 1. These are all the countries in global financial markets for which both stock and currency data are available at the intraday frequency. Our sample period starts January 1996 and ends May 2010. The data are tick-by-tick FX rates and stock market indices captured from the Reuters' terminal and provided by SIRCA (Securities Industry Research Centre of Asia) in their RDTH (Reuters DataScope Tick History - formerly TACTIQ) database. All currencies are quoted against the USD.

Not surprisingly, the most liquid FX rate in our sample is the EURO[2] with the average number of daily quotes being 27,196. All indices are denominated in local currencies. We note that during our sample, emerging markets like Vietnam and Equador have provided the lowest stock market returns whilst stable currencies like the Canadian dollar have provided the lowest currency returns.

In addition, we use the history of foreign currency sovereign credit ratings and credit outlooks and watches from Standard and Poors.[3] As the timing of ratings announcements are irregular,[4] we focus on the monthly impact of ratings announcements on realized return measures aggregated from the daily frequency. Following the approach of Gande and Parsley (2005) and Ferreira and Gama (2007) (among others), we transform actual ratings and outlook and credit watch guidance on

---

[2] It should be noted that 13 European countries in our sample use the EURO as their currency. The second most liquid currency is JPY, with the average number of quotes being 21,698 per a day. This is consistent with reported findings in the BIS (2010) Triennial central bank survey of Foreign exchange and Derivatives market activity.
[3] We focus only on foreign currency sovereign ratings assessments provided by S&P as previous studies have found that these exert the greatest impact on market returns and are less anticipated (see, e.g., Reisen and von Maltzan (1999) and Brooks et al. (2004)).
[4] While S&P ratings announcements are generally made local a.m. time, the exact timing varies.

imminent rating changes into linear scores and we analyse the influence of these two

kinds of ratings information both individually and as a comprehensive credit rating

(CCR) measure over time. Following the literature, we define a 'rating event' as a

non-zero change in this CCR series. We examine a total of 373 sovereign rating

events in our overall sample, with Indonesia being the most actively re-rated country,

representing 16 of those events.

Based on the work of Andersen and Bollerslev (1998), Barndorff-Nielsen

and Shephard (2001) and Andersen et al. (2003), we argue that daily realized

measures calculated based on intraday returns provides more consistent and efficient

measures than their counterparts computed from close to close prices.

We define daily realized returns as:

$$\bar{R} = \frac{1}{D} \sum_{d=1}^{D} r_{d,t}$$

(1)

and the daily realized volatility as:

$$RV_t = \sum_{d=1}^{D} r_{d,t}^2$$

(2)

where $r_{d,t}$ denotes a dth 5-minute return[5] during day t and D denotes the total number

of 5-minute return intervals during any given trading day.[6]

The daily realized skewness for any given day t is calculated as:

$$SKW_t = -\frac{D(D-1)^{3/2} \left(\sum_{d=1}^{D} r_{d,t}^3 \right)}{(D-1)(D-2) \left(\sum_{d=1}^{D} r_{d,t}^2 \right)^{3/2}}$$

(3)

where $r_{d,t}$ denotes a dth n-minute return during day t.

---

[5] The intraday return is calculated as the log difference of the midpoint at time t and midpoint at time $t-1$. We use the mid-point quote between the bid and ask price to minimize the effect of bid-ask bounce, as suggested by Roll (1984).

[6] Based on volatility signature plots (available upon request), we use the daily realized measures computed from 5 minute intervals for our empirical estimations as they stabilize over this sampling interval. As a robustness check, we also use measures based on alternative lower frequency sampling intervals (10, 15, 30 minutes). Our regression results remain qualitatively unchanged.

We compute realised kurtosis as:

$$RK_{3,t} = \frac{\frac{1}{D}\sum_{d=1}^{D}\left(r_{d,t}-\bar{r}_t\right)^4}{\left(\frac{1}{D}\sum_{d=1}^{D}\left(r_{d,t}-\bar{r}_t\right)^2\right)^2}-3$$

(4)

Table 1 reports descriptive statistics for the first four daily realized moments of stock and currency market return distributions, across each of our sample countries.[7] Over the available sample periods, we find the Ecuador stock market index provides the lowest return while Malta's stock market index provides the highest return. The New Zealand stock market index exhibits the lowest sample volatility, while the French stock market index is the most volatile which makes intuitive sense given the smaller and stronger performance of the former over the sample period while the latter is associated with the turmoil in European financial markets in the recent European debt crisis. Moreover, the high return and high volatility of the French stock market is consistent with the risk-return trade off. The French stock market index also exhibits the highest kurtosis suggesting more observations in the tail of the distribution – or more extreme values.

For the currency markets, we find Lithuanian Litas provide the highest return, while Canadian dollars have the least return. The Uruguayan peso is the most negatively skewed suggesting that it carried the greatest downside risk during the sample period. The Romanian Lei has the highest kurtosis, which suggests that it has the most extreme values during the sample period in comparison to the rest of the countries under examination.

<Insert Table 1>

---

[7] Most sample countries, exhibit negative correlations between their stock and currency market returns. A strong serial correlation exists for daily realized series as Ljung-Box Q-statistics reject the null hypothesis of no autocorrelation up to twenty lags in most cases.

3. Empirical modeling

To investigate the impact of sovereign ratings announcements on the realized return distributions for currency and stock returns, we utilise a dynamic panel data framework. To minimise the effects of outliers, we trim the top and bottom 1% of realized observations prior to running the dynamic panel regressions.

Instead of using a standard dummy or indicator variables for capturing rating announcement effects during the trading day, we adopt continuous measures for individual countries' credit ratings and outlook assessments provided by Standard and Poors decomposed from the aggregate comprehensive credit rating "event" variables used in Gande and Parsley (2005) and Ferreira and Gama (2007) for studying rating spillover effects from other countries in international debt and stock markets. In this way, we introduce a more flexible framework for investigating the impact of different types of ratings information on the first four moments of asset return distributions.

We specifically examine two different types of rating activity. First, rating changes are defined as changes in the S&P ratings whilst outlook changes are revisions in the credit outlooks and watches assigned to the country's sovereign debt.[8] Third, we also examine the combined comprehensive credit rating series comprising both rating and outlook revisions consistent with extant studies like Gande and Parsley (2005) and Ferreira and Gama (2007).[9] Both forms of ratings guidance (ratings and outlooks and sovereign watches) are intended to be forward-looking measures of the perceived ability and willingness of sovereign debt issuers to service their financial obligations. However, actual rating changes reflect perceived

---

[8] Like Gande and Parsley (2005), we opt to use only sovereign rating assessments provided by Standard and Poors as they are well documented to be more active and are generally the market leader in updating credit assessments. Furthermore, their sovereign rating activities have greater market impact than other rating agencies (Brooks et al., 2004).

[9] It should be noted that separate rating and outlook related variables are used in the base model, while a composite measure of rating and outlook is adopted in the full model with other control variables.

permanent changes in credit quality in the long-term, whereas credit outlooks and watches indicate a forewarning on changes in a country's sovereign ratings over the short-term.

We are aware that potentially there is an endogenous relationship between sovereign ratings and the various moments of asset returns. In order to avoid the problem of endogeneity, Arellano and Bond (1991) propose a generalized method of moments (GMM) estimator for dynamic estimation in a panel data set. The Arellano and Bond (1991) dynamic panel estimator takes first differences and exploits a different number of instruments in each time period using either an instrumental variable estimator or a GMM estimator as the estimation method.

Following their procedure we proceed to use unbalanced dynamic panel regressions to estimate the following base model specification with fixed country effects:

$$\Delta y_{it} = \sum_{e=1}^{m} \alpha_e \Delta y_{it-e} + \beta_1 RATING_{it} + \beta_2 \Delta RATING_{it} + \beta_3 \Delta OUTLOOK_{it} + \beta_4 CRISIS_t$$
$$+ \beta_5 CRISIS_t * \Delta RATING_{it} + \beta_6 CRISIS_t * \Delta OUTLOOK_{it} + \Delta u_{it},$$

(5)

where $y_{i,t}$ is the realized measure (return, volatility, skewness, kurtosis) for country i on day t; RATING is the level of sovereign credit ratings, whilst ΔRATINGS and ΔOUTLOOK are the first differences in ratings and outlook series and CRISIS is an indicator variable denoting the periods of financial crises (Asian Financial crisis – AFC, Russian Debt Crisis – RFC, Technology bust – TECH, the Global financial crisis – GFC, European Debt Crisis – EDC, and ALL aggregates all the individual

financial crises occurring during our sample period).[10, 11] The main variables of interest in our baseline model are the ratings and crises variablesand the interactive terms. The ratings variable (in levels) controls for the relative position of each country on the rating scale ie. their creditworthiness.

This empirical framework is sufficiently flexible to allow for an in-depth analysis of the market impact of different types of ratings information – outlook and rating changes and their interaction with financial crises and national market attributes.

Using this regression model, we first compare the impact of different episodes of financial crises on the various moments of asset return distributions and the interactive effects on ratings variables - region specific, global, currency, debt and technology-based financial crises – using intercept dummy variables. We also identify the potential differential market reactions to outlook and rating changes.

Secondly, we control for national market attributes to assess the robustness of sovereign rating effects on stock and currency markets under crisis conditions, as shown in the following specification:

$$\Delta y_{it} = \sum_{e=1}^{m} \alpha_e \Delta y_{it-e} + \beta_1 CCRATING_{it} + \beta_2 \Delta CCRATING_{it} + \beta_3 CRISIS_t$$
$$+ \beta_4 CRISIS_t * \Delta CCRATING_{it} + \sum_{e=1}^{n} \lambda_e \Delta M_{it-e} + \Delta u_{it},$$

(6)

where M is a matrix of national attribute variables shown in Appendix A and other variables are as already defined above. As there is a very long list of potential

---

determinants for stock and currency market returns, we utilise a general to specific model selection approach. For brevity, we only report estimation results for the most parsimonious model and we analyse the combined effects of ratings and outlooks in a composite ratings measure (akin to previous studies like Gande and Parsley (2005)) to maximise the degrees of freedom in our estimations. We report the full model specification which provided the best fit for all realized measures assessed across stock and currency markets.

4.   Results

4.1. Rating impact on stock return distributions during financial crises

Effects on realized returns

Panels A and B of Table 2 reports the effects of sovereign credit ratings information on realized returns during the various financial crises.

We find that there is an underlying relationship between a country's creditworthiness and realized market returns thereby confirming the importance of controlling for the position of a country on the rating scale in modeling sovereign rating effects. Specifically, there is a significant and negative relationship between rating levels and realized returns indicating that more creditworthy countries tend to present investors with lower realized returns and this is consistent with the basic risk-return tradeoff in finance.

As one would also expect, sovereign ratings information variables (i.e. change in RATING and change in OUTLOOK in eq. (5) and change in composite rating (CCRATING) in eq. (6)) have positive and significant effects on realized returns suggesting that upgrades (or any general improvements in sovereign credit assessments) are associated with an increase in realized returns, while downgrades (or

downward revisions in sovereign credit assessments) are associated with a decrease in realized returns.

The CRISIS intercept dummy variable is significant and negative for most financial crises, with the exception of the TECH boom/bust. This supports the notion of financial losses and poor performance during typical financial crises.

Financial crises appear to heighten the sensitivity of realized returns to sovereign rating information in both stock and FX markets. The impact of sovereign rating information on realized stock returns is stronger during the Russian Debt Crisis, start of the European Debt Crisis, TECH crash and across ALL crises. , On the other hand, ratings effects have been stronger on realized FX returns during the recent Global Financial Crisis and also categorically across ALL financial crises.

Based on our full model estimations (when national attribute and other control variables are included), we find heterogeneous reactions of currency and stock returns to ratings. Specifically, sovereign ratings information variables (i.e. changes in ratings and outlook in the base model and change in composite rating in the full model) have positive and significant effects on realized stock returns but for FX returns, outlook changes have opposite effects to rating changes and as a result composite rating changes are insignificant in the full model specification. In addition, there is a significant and negative relationship between a country's underlying creditworthiness and realized stock returns but ratings do not appear to be relevant for FX returns once other country-specific market attributes are controlled for. It is important to note that when control variables are included, financial crises do not appear to heighten the sensitivity of realized stock and currency returns to sovereign ratings information as evidenced by the insignificance of the interactive ratings and crisis terms.

Effects on realized volatilities

Panels A and B of Table 3 report the effects of sovereign credit ratings information on realized volatilities during the various financial crises. We find that there is an underlying relationship between a country's creditworthiness and both realized stock and currency market volatility confirming the importance of controlling for the position of a country on the rating scale in modeling sovereign rating informational effects on the second moments of asset return distributions. Interestingly, we find that there is a significant and positive relationship between rating levels and both stock and FX volatility indicating that more creditworthy countries have greater fluctuations in their stock market and currency values. The possible explanation of this slightly surprising result could be the liquidity effect. That is, our full sample of 76 countries contains some illiquid currency and stock markets. Results could be induced by illiquidity and national attributes of these countries and hence may need to be interpreted with caution. Typically, better rated countries have more developed financial markets which facilitate more trading and this could lead to higher return volatilities. However, when we exclude countries with a small number of observations in the stock market[12], we find a negative relation between realized volatility and the level of rating.

We find that ratings information have the expected effect on realized volatilities. We observe an unambiguously significant negative relationship between ratings and outlook revisions and realized volatility across both stock and FX markets. This implies that as a country's sovereign credit assessments improve elements of uncertainty and/or differences of opinion regarding the market value of its stocks and

---

[12] These results are available upon request. We do not report these results here to conserve space.

currency are reduced resulting in dampened realized volatilities. Consistent with this view, as the perceived credit risks of a country are assuaged, investors may respond by reallocating their funds towards countries with a higher risk/return tradeoff and this will have the effect of reducing trading in the market with improved credit assessments. Financial crises typically work to heighten the effects of ratings information on market volatilities but their effects become negligible in both stock and FX markets once other macroeconomic conditions have been accounted for (as reflected by all the insignificant interactive terms between crises and change in composite sovereign ratings). This implies that procyclical rating revisions by credit rating agencies do not have destabilizing effects on stock or currency markets during financial crises contrary to popular speculation.

Whilst ratings information appear to have more significant effects on FX volatility in baseline regressions, the effects of both ratings and outlook revisions totally disappear once other market level controls are considered. [13] Hence, the combined effects of sovereign rating and outlook revisions (ΔCCRATING) are weaker in FX markets than in stock markets.

We find that our other control variables are mostly significant for stock market volatilities. Composite country risk, world oil price and economic development and output are significant determinants in the estimation for all financial crises. However, in FX volatility regressions, the FX regime is consistently the standout determinant. Not surprisingly, the less flexible is the FX regime in place, the more volatile is the currency. The crises which have been the most influential on rating effects are the

---

[13] These results are from robust FX base line model, which we exclude illiquid markets from the sample. Results are not reported to conserve space but available upon request.

Asian Financial crisis, Russian debt crisis, Tech bust and the recent European debt crisis. This suggests that financial market stability is particularly sensitive to rating revisions given by credit rating agencies during currency and debt crises.

We find that actual sovereign rating changes have more economically significant effects on realized volatility in stock markets over shorter-term outlook changes suggesting that stock market participants respond to the permanent fundamental changes conveyed by sovereign credit rating revisions but less to the revisions in sovereign outlook. On the other hand, in FX markets, the two ratings information variables (both outlook and ratings change) impart statistically significant informational value as indicated by their joint significance for realized volatility but the magnitude of the effects is small. Nonetheless, a significant negative coefficient exists for both ratings information variables indicating there are clear market calming effects from rating improvements, consistent with the basic risk-return tradeoff in finance theory.

Effects on realized skewness

Panels A and B of Table 4 reports the effects of sovereign credit ratings information on realized skewness during the various financial crises. We find that there is only a significant negative relationship between rating levels and currency return skewness suggesting that better rated countries have currency returns that are more skewed to the left. This is probably due to the fact that lower rated countries tend to run tightly fixed exchange rate regimes to prevent severe depreciations of their currency. There is no significant relationship between rating levels and stock market skewness. Interestingly, changes in outlook significantly affect stock return skewness and rating

changes affect currency return skewness. Whilst the financial crises intercept dummies are significant and positive for FX market skewness and to a lesser extent for stock market skewness as well, financial crises do not play a role in influencing the impact of either credit assessment on tail risk in either markets as indicated by insignificant crisis and ratings information terms in all instances. Hence, contrary to popular view, sovereign credit rating revisions during financial crises do not exacerbate tail risk and financial market instabilities. This suggests that the more forward-looking and shorter-term types of ratings guidance in the form of outlooks and credit watches on sovereign obligors are perceived to have more informational value for stock market participants than permanent rating changes. This is possibly because rating changes (especially downgrades) are often already anticipated by market participants as they are usually preceded by negative outlooks and credit watches (Gande and Parsley (2004)). This finding is consistent with both Larrain et al.'s (1997) previous finding that sovereign ratings have a particularly significant announcement effect on debt spreads when countries are given a negative outlook and Kaminsky and Schmukler's (2002) comparison of outlook and rating effects on debt spreads and stock market returns.

When control variables are included, they mute the relation between rating information and skewness in both currency and stock markets such that none of the ratings information variables are significant in explaining realized skewness. Similar insignificant results are found when countries with a small number of observations are excluded.

Effects on realized kurtosis

Panels A and B of Table 5 reports the effects of sovereign credit ratings information on realized kurtosis during the various financial crises. We find that better rated countries tend to have significantly higher kurtosis in their currency return distributions, again consistent with the notion that lower rated countries tend to operate fixed exchange rate systems which limit the variability in their currency values. However, a country's position on the rating scale becomes obsolete once other economic control variables are included. This is consistent with the traditional view that sovereign credit ratings are largely measures reflecting the macroeconomic strength of sovereign obligors and provide no incremental information over and above market level fundamentals. Yet, for stock market kurtosis, the combined ratings measure (CCRATING) does provide incremental informational value suggesting that stock market participants price in more than standard macroeconomic developments. There is a robust and significantly negative relationship between CCRATING and stock market kurtosis suggesting that better rated countries have less peaked stock market return distributions. While improvements in actual sovereign ratings can statically reduce the peakedness of currency return distributions, the economic magnitude of these reductions are very small and are usurped by control variables in the full model specifications. Stock markets became marginally more sensitised to sovereign credit assessments during the Asian Financial Crisis, Russian debt crisis and European debt crisis but when additional market level economic attributes are included, we find the interactive effects disappear. Overall, we reveal some new evidence that a better rated country is associated with a lower realized kurtosis and hence has a lower number of extreme returns or lower volatility in the stock market. Conversely, a lower rating country is associated with a higher realized kurtosis. This is consistent with Brunnermeier and Pedersen (2009) who find that funding

constraints (or lack of liquidity) leads to high kurtosis. Finally, there are only some mild effects of increasing kurtosis levels during financial crises for equity market kurtosis.

4.2 Robustness checks

Robustness of rating effects to national market attributes

In Tables 2 to 5, we present alongside baseline estimation results, the full model specifications including potentially important control variables for realized measures to avoid omitted variable biases. We reveal that the sensitivity of realized return moments to fundamentals are fairly consistent across financial crises. Specifically, some financial crises' intercept dummies are significant but no interaction dummies are significant. Hence, there is no evidence that financial crises change the sensitivity of return moments to sovereign credit rating revisions, especially once national market attributes are controlled for in our dynamic panel estimations.

Currency return distributions are on the whole less sensitive to macroeconomic fundamentals relative to stock return distributions. However, higher order currency moments are commonly sensitive to the exchange rate regime.

We find in most cases that rating levels are significant controls – that is the position of a country on the rating scale is important whilst the ratings information (change in composite sovereign ratings) is not always relevant for all return moments. This may be explained by asset returns adjusting to changing macroeconomic fundamentals in a

country (via announcements of macroeconomic news) before ratings guidance is actually updated by the rating agencies.

Composite country risk plays a significant role in shaping stock return distributions. We observe the higher the composite country risk level, the higher is the investment risk (volatility and kurtosis) and thus, the higher is the return required by investors as. This is a new finding for the country risk literature. Our measure from the International Country Risk Guide (ICRG) aggregates elements of financial, political and economic risks within a given country and presents a comprehensive measure of country risk. Whilst the existing work of Bekaert et al. (2011) and references therein documents the significance of the individual risk elements and economic development for financial market integration, less is known about the effects of country risk on asset return distributions.

The price of crude oil in the world appears to play a significant role in realised stock skewness and returns. We observe a negative relation between the crude oil price and stock return. This is consistent with Chan, Treepongkaruna, Brooks and Gray (2011) who find that stock and oil returns are negatively correlated during both normal and crisis regimes. Furthermore, we find a positive relation between crude oil prices and realised stock skewness. This implies that an increase in crude oil prices is associated with the distribution of stock return being more skewed to the right – this is what a risk averse investor will prefer. This is consistent with Basher and Sadorsky (2006) who find that investors will accept smaller returns for positive skewness but demand higher returns for negative skewness.

Economic performance as proxied by GDP also has some impact on stock return distributions. That is, we find a negative relation between GDP and realised return (only for TECH and ALL crisis periods), between GDP and realised volatility only for the TECH bust, and GDP and realised kurtosis in all cases. The significant negative relation implies that countries with high GDP have lower returns, which is consistent with Dimson et al. (2002) and Ritter (2005), who document a negative correlation between stock return and GDP. The significant negative relation between realised volatility in the stock market and GDP is also consistent with Duffee (1995) that a forecast of lowered gross domestic product (GDP) growth results in an immediate fall in stock prices, followed by higher stock return volatility in the period of low GDP growth. A similar argument can be applied to the negative relation between realised kurtosis (volatility of volatility) and GDP.

Robustness of rating effects to regional groups

We further divide our 76 countries into 4 different regions: The Americas, Europe, Asia and Africa. Then, we estimate both baseline and full models for each region.[14] Overall, we find results consistent with our main findings that investors react differently to sovereign credit assessments in national stock and currency markets. We also find stronger results in the stock market than the currency market. However, the regional results are weaker than our main findings. Furthermore, almost all crises have minimal effect on the realized distributions of stock and currency returns. Finally, key national attributes that are significant in the main findings such as crude

---

[14] Estimation results for additional regional analyses are available upon request. They have been excluded for brevity.

oil price, GDP, composite risk, developing dummy and IMF credit are still significant in some regional results.

Our results from both the base line and full models are not robust to regional groups in a sense that we find the strongest results in the Asian region and the weakest results in the African region. The European region also has stronger results than the American and African regions. A possible explanation of this result could be related to market liquidity and the diversities of countries in those regions.

Effects on Asian return distribution

For the Asian stock markets, rating information appears to be significantly related to all four moments of realized stock return distribution in the base line model but only the first three moments of realized stock return distributions for the full model, when national attributes and other control variables are included. Specifically, we find for almost all crisis dummies that the realized stock return is positively related with the rating level but negatively related with the change in rating in the base line model. Once we control for the national attributes and other control variables, only the change in rating is negatively related with the realized stock return. These results are in contrast to our main findings and imply that an upgrade is associated with a decrease in Asian stock returns.

In the base line model, rating level is positively related to the realized Asian stock volatility but the change in rating is negatively related to the realized Asian stock volatility. However, once we control for national attributes and other control variables,

we find the change in rating is positively related to the realized volatility. That is, an upgrade increases the Asian stock volatility, a consistent result with our main finding.

In the baseline model, we find realized skewness is positively related to the rating level and but negatively related to the change in rating. Once we control for national attributes and other control variables, we find a positive relation between the changes in rating and realized stock skewness. This implies more creditworthy countries have stock return skewed more to the right, which makes intuitive sense. However, these results are inconsistent with our main findings.

Finally, realized kurtosis is positively related to the rating level in the base line model. This implies more creditworthy Asian countries have a higher volatility of volatility. However, the national attributes and other control variables mute this effect. Again, these results are inconsistent with our main findings.

Comparing to the stock market, we find a weaker impact of rating information on the currency return distribution. Except for the GFC period, rating information only has an impact on realized currency skewness when control variables are excluded. For the GFC period, rating information has an impact on the first three moments of the currency return distribution. Specifically, we find realized currency skewness is negatively related to the rating level but positively related to the change in rating. Further, a change in outlook increases both realized currency return and volatility during the GFC period.

Effects on European return distribution

For the European stock markets, rating information appears to be significantly related to the first moment of the realized stock return distribution in the base line model but both the first and third moments of realized stock return distribution for the full model, when national attributes and other control variables are included. Specifically, we find that the realized stock return is negatively related with the rating level but positively related with the change in rating in both the base line and full models. These results are consistent with our main findings that an upgrade is associated with an increase in European stock returns.

Once we control for national attributes and other control variables, we find a negative relation between the rating level and realized stock skewness. This implies less creditworthy countries have stock returns skewed more to the right, which is inconsistent with our main findings.

Comparing to the stock market, we find a slightly stronger impact of rating information on currency return distribution. Excluding national attributes and control variables, we find the realized currency return is positively related with the rating level but negatively related with the change in rating. Further, we find the change in outlook has a positive impact on realized currency volatility and kurtosis and this relationship is stronger during the GFC and TECH periods.

For the full model, the change in rating is positively related to the realized currency return, but negatively related with the realized currency volatility and skewness in almost all models, except for the model with the GFC and model with the ALL crises

dummy. Finally, the realized currency kurtosis is negatively related with the level and change in rating for all full models.

Effects on American return distribution

For the American stock market, rating information appears to be positively related to realized kurtosis only in the base line model. Once we control for national attributes and other control variables, they mute the rating information impact on the realized stock return distribution in almost all cases, except for the model with the AFC and TECH dummy. That is, we find a change in rating reduces the realized skewness during the AFC period but increases the realized skewness and reaslied kurtosis during the TECH period.

Comparing to the stock market, we find investors hardly react to rating information for American currency markets. Excluding national attributes and control variables, we find the impact of a change in outlook on realized currency skewness is stronger during the RFC but weaker during the GFC periods. The impact of a change in rating on realized skewness is higher during the TECH period. Finally, we find national attributes and other control variables mutes the relationship found in the base line model.

Effects on African return distribution

We find almost none or a minimal effect of rating information in the African region. For the base line model, we find a positive relation between the rating level and realized stock volatility in the African region for all crisis dummies. For the full

model, we find a positive relation between the rating level and realized return during the GFC and RFC only.

Comparing to the stock market, we find investors hardly react to rating information for African currency markets. For the base line models with the ALL and TECH dummy, we find a change in rating is positively related with realized currency returns and the ALL crises and TECH dummies reduce this positive relation. For the base line model with the RFC dummy, we find a change in rating is positively related with the realized currency return. For the base line model with the TECH dummy, we also find a change in rating is negatively related with the realized skewness during the TECH period only. Finally, we find national attributes and other control variables mutes the relationship found in the base line model.

Robustness of rating effects to data frequency forming realized measures

To check whether our results are specific to the interval of intraday data examined (30 minutes), we also repeated our analyses using alternative data intervals of 10 mins, 15 minutes and 1 hour data. We find that our results on the effects of sovereign credit ratings information during financial crises remain robust to the time interval of the data used to compute the first four realized return moments.

5. Conclusions

We examine the effects of different sovereign rating announcements on stock and currency markets during all major financial crises in recent history. We study the period from 1996-2010, using ratings history from Standard and Poors, the longest established ratings agency.

We find that currency and stock markets react somewhat differently to ratings announcements as ratings appear to provide more incremental information for stock return distributions than market level macroeconomic determinants. Changes in sovereign credit ratings tend to have a more significant impact on realized measures than outlook revisions in both markets. We find clear evidence that rating events have significant impacts on the first four moments of both asset market returns during both normal market conditions and in times of financial crises. Financial crises do not necessarily serve to increase the sensitivity of realized return distributions to different types of ratings information as we find no evidence that rating agency decisions heighten financial market instability captured in the dynamics of higher moments during times of financial turmoil once we control for other national market attributes.

In a period where credit rating agencies are increasingly placed under the spotlight due to a new international banking regulatory framework and their failures to provide early warnings on financial crises, our findings are especially insightful. Our results provide clear evidence that rating announcements are heeded by market participants and consequently have significant impacts on financial return distributions, albeit to differing extents across asset markets. We find no evidence of heightened sensitivity to sovereign credit ratings information in times of financial crises, suggesting that rating agencies do not exert destabilizing effects on international financial markets during times of financial turmoil, contrary to popular belief.

Future research into the impacts of credit ratings on international financial markets need to recognize and account for the influence of credit information on the dynamics of higher moments of return distributions to fully capture the true extent of rating influences on asset returns. Our findings have important implications for

international policy makers, financial market participants and corporate managers of

multinational firms.

References

Andersen, T. G., Bollerslev, T., 1998. Answering the skeptics: Yes, standard volatility models do provide accurate forecasts. International Economic Review 39(4), 885-905.

Andersen, T., Bollerslev, T., Diebold, F., Labys, P., 2003. Modeling and Forecasting Realized Volatility, Econometrica 71(2), 579-625.

Arellano, M. and S. Bond. 1991. Some Test of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. Review of Economic Studies 58, 277-297.

Bekaert, G., Harvey, C., Lundblad, C., Siegel, S., 2011. What segments equity markets. The Review of Financial Studies, forthcoming.

Barndorff-Niesen, O. E., Shephard, N., 2001. Non-Gaussian Ornstein – Uhlenbeck – based models and some of their uses in financial economics. Journal of the Royal Statistical Society, Series B 63, 167-241.

Brooks, R., Faff, R., Hillier, D., Hillier, J., 2004. The national market impact of sovereign rating changes. Journal of Banking and Finance 28, 233-250.

Brunnermeier, M., Pedersen, L., 2009. Market liquidity and funding liquidity. The Review of Financial Studies 22, 2201-2238.

Committee on the Global Financial System (CGFS), 2011. The impact of sovereign credit risk on bank funding conditions. Bank for International settlements CGFS Papers No. 43. (Available at: http://www.bis.org/publ/cgfs43.pdf)

Chakrabati, R., Roll, R., 2002. East Asia and Europe during the 1997 Asian collapse: a clinical study of a financial crisis, Journal of Financial Markets 5, 1-30.

Chiang, T.C., Jeon, B.N., Li H., 2007. Dynamic correlation analysis of financial contagion: Evidence from Asian markets, Journal of International Money and Finance 26, 1206-1228.

Cumperayot, P., Keijzer, T., Kouwenberg, R., 2006. Linkages between extreme stock market and currency returns, Journal of International Money and Finance, 25, 528-550.

Ferreira, M.A., Gama, P.M., 2007. Does sovereign debt ratings news spill over to international stock markets? Journal of Banking and Finance 31, 3162-3182.

Fleming, J., Kirby, C., Ostdiek, B., 1998. Information and volume linkages in the stock, bond and money markets, Journal of Financial Economics 49, 111-137.

Gande, A., Parsley, D.C., 2005. News spillovers in the sovereign debt market. Journal of Financial Economics 75, 691-734.

Harvey, C. and Siddique, A., 2000. Conditional skewness in asset pricing tests, Journal of Finance, 55, 1263-1295.

Hill, P., Brooks, R., Faff, R., 2010. Variations in Sovereign Credit Quality Assessments Across Rating Agencies. Journal of Banking and Finance, 34, 1327 – 1343.

Hill, P. and Faff, R., 2010. The Market Impact of Relative Agency Activity in the Sovereign Ratings Market, Journal of Business Finance and Accounting, 37, 1309-1347.

Hong, H. and Stein, J., 2003. Differences of opinion, short sales constraints and market crashes, Review of Financial Studies, 6, 473-506.

Kallberg, J.G., 2005. An examination of the Asian crisis: Regime shifts in currency and equity markets. Journal of Business 78, 169-211.

Kaminsky, G., Reinhart, G., Vegh, C., 2003. The unholy trinity of financial contagion. Journal of Economic Perspectives 17, 51-74.

Kaminsky, G., Schmukler S.L, 2002. Emerging market instability: Do sovereign ratings affect country risk and stock returns? World Bank Economic Review 16(2), 171-195.

Kaminsky G, Schmukler S.L, 1999. What triggers market jitters? A chronicle of the Asian crisis, Journal of International Money and Finance 18, 537-560.

Kim, S-J., 2003. The spillover effects of U.S. and Japanese public information news in advanced Asia-Pacific stock markets, Pacific Basin Finance Journal 11, 611-630.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny R.W., 1997. Legal determinants of external finance, Journal of Finance 52, 1131-1150.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny R.W., 1998. Law and Finance, Journal of Political Economy 106, 1113-1155.

Larrain, G., Reisen, H., von Maltzan, J., 1997. Emerging market risk and sovereign credit ratings. OECD Development Centres, Technical Papers No. 124.

Phylaktis, K., Ravazzolo, F., 2005. Stock prices and exchange rate dynamics. Journal of International Money and Finance 24, 1021-1053.

Reisen, H., Von Maltzan, 1999. Boom and bust and sovereign ratings. International Finance 2, 273-293.

Roll, R., 1984. An implicit measure of the bid-ask spread in an efficient market. Journal of Finance, 39, 1127-1139.

Figure 1. Distribution of sovereign credit rating events over various financial crises: 1996-2010

This figure shows the aggregate rating event dates for all sample countries (blue bars) and periods of major financial crises (in red).
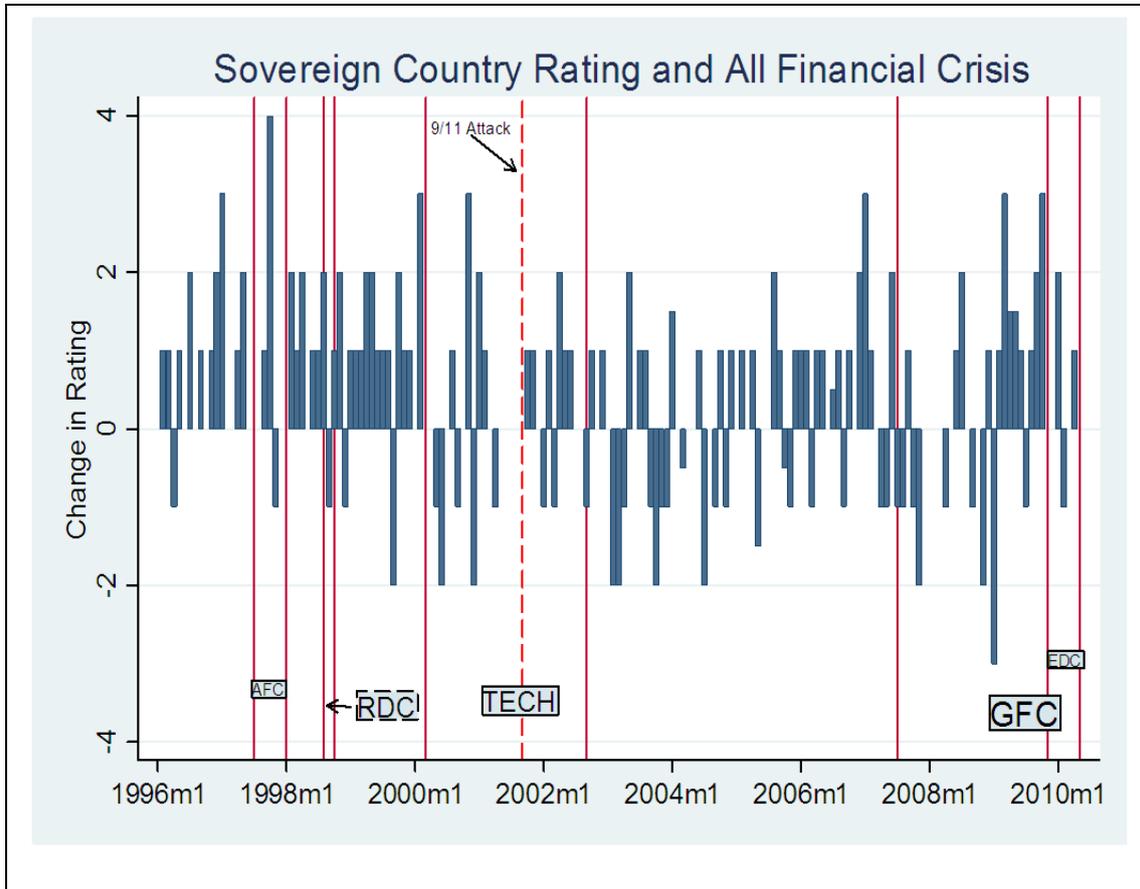
Table 1. Descriptive statistics
This table reports the average values of daily realised return, realised volatility, skewness and kurtosis for stock and foreign exchange markets in each of the 76 sample countries from Jan 1996 to May 2010.

Country	Equity				Forex			
	Return	*Volatility*	*Skewness*	*Kurtosis*	*Return*	*Volatility*	*Skewness*	*Kurtosis*
Argentina	0.00008	0.00028	-0.18561	0.00000	0.00005	0.00015	-0.00307	0.00002
Australia	0.00007	0.01452	-0.12898	0.46346	0.00000	0.00006	-0.01616	0.00000
Austria	0.00002	0.05183	-0.16014	4.56037	0.00000	0.00032	0.00733	0.00011
Bahrain	-0.00000	0.00007	0.01575	0.00000	-0.00007	0.00664	0.01657	0.03314
Belgium	0.00022	0.00295	-0.04395	0.01503	0.00000	0.00031	0.01369	0.00011
Botswana	0.00067	0.00042	-0.00211	0.00000	-0.00000	0.00953	0.05663	0.04534
Brazil	-0.00010	0.00206	-0.08711	0.00879	0.00001	0.00016	-0.16230	0.00002
Bulgaria	0.00000	0.00410	-0.08985	0.01860	0.00000	0.00028	0.02424	0.00012
Canada	0.00017	0.00003	-0.13428	0.00000	-0.00183	0.05174	-0.07864	4.38104
Chile	0.00013	0.00257	-0.15260	0.01010	0.00000	0.00004	-0.03062	0.00000
China	0.00085	0.00323	-0.02761	0.01201	-0.00068	0.06495	-0.01852	1.58946
Columbia	0.00071	0.00018	-0.14710	0.00000	0.00017	0.00020	-0.08282	0.00004
Costa Rica	0.00003	0.00038	-0.13453	0.00000	0.00055	0.04585	-1.21805	1.35400
Croatia	-0.00045	0.03768	-0.10326	0.90303	0.00000	0.00012	-0.01362	0.00000
Cyprus	0.00032	0.00016	-0.22606	0.00000	0.00000	0.00031	0.01530	0.00011
Czech Rep	0.00013	0.00095	-0.12572	0.00045	-0.00007	0.00082	-0.10912	0.00110
Denmark	-0.00005	0.00210	-0.25855	0.00269	-0.00000	0.00006	-0.02186	0.00000
Ecuador	-0.01060	0.05820	0.01760	0.28241	0.00015	0.00047	-0.52005	0.00000
Egypt	-0.00283	0.16023	-0.14593	4.30264	0.00000	0.00006	0.01345	0.00000
Estonia	0.00000	0.00022	-0.16591	0.00000	0.00000	0.00173	-0.05453	0.00726
Finland	-0.00000	0.00024	-0.19368	0.00000	0.00055	0.11284	0.01230	2.29952
France	0.00095	26.0985	0.13195	1702.186	-0.00000	0.00040	-0.01460	0.00011
Germany	0.00005	0.00096	-0.10564	0.00097	0.00000	0.00031	0.02650	0.00011
Ghana	0.00179	0.00021	-0.03711	0.00000	-0.00000	0.00003	0.02764	0.00000
Greece	0.00009	0.00189	-0.06776	0.00459	0.00000	0.00032	0.01083	0.00011
Hong Kong	-0.00125	0.00621	-0.16033	0.12316	-0.00000	0.00000	0.00260	0.0000
Hungary	0.00017	0.01451	-0.14959	0.29332	-0.00000	0.00049	-0.09963	0.00010
Iceland	-0.00003	0.00024	-0.17130	0.00000	-0.00006	0.00004	-0.04142	0.00000
India	0.00008	0.01610	-0.16509	0.09330	0.00001	0.00002	-0.41333	0.00000
Indonesia	0.00004	0.00024	-0.12889	0.00000	-0.00007	0.00330	-0.05123	0.01874
Ireland	0.00011	0.04736	-0.16267	2.91451	0.00000	0.00031	0.01888	0.00011
Israel	-0.00002	0.00015	-0.08888	0.00000	0.00000	0.00003	-0.0.2629	0.00000
Italy	-0.00006	0.00033	0.00253	0.00000	0.00000	0.00032	0.00708	0.00011
Japan	0.00006	0.00019	-0.06995	0.00000	0.00000	0.00023	-0.07752	0.00009
Jordan	-0.00019	0.00020	0.15047	0.00000	-0.00000	0.00119	-0.01865	0.00251

Kazakhstan	-0.00006	0.00012	0.03581	0.00000	0.00002	0.05835	-0.00821	1.71243
Korea	0.00002	0.00028	-0.08062	0.00000	0.00001	0.00007	0.02772	0.00000
Kuwait	0.00007	0.01370	-0.15284	0.26164	0.00001	0.00004	-0.21399	0.00000
Latvia	-0.00048	0.00169	0.06401	0.00155	0.00000	0.00011	-0.04086	0.00000
Lebanon	-0.000514	0.01080	0.00179	0.08757	-0.00003	0.02980	0.00964	1.25974
Lithuania	-0.00005	0.00020	-0.00224	0.00000	-0.00000	0.00122	0.00679	0.00231
Luxembourg	-0.00000	0.00012	-0.18167	0.00000	0.00000	0.00031	0.00047	0.00011
Malaysia	-0.00043	0.10803	-0.01492	2.73877	0.00000	0.00003	0.00361	0.00000
Malta	0.00239	0.00990	-0.15741	0.15068	0.00003	0.00010	-0.08192	0.00000
Morocco	0.00023	0.00214	-0.10692	0.00337	0.00000	0.00580	-0.00524	0.04438
Netherlands	-0.00002	0.00040	-0.14181	0.00011	-0.00035	0.00018	-0.08710	0.00000
New Zealand	0.00000	0.00006	-0.10811	0.00000	-0.00001	0.00012	-0.03686	0.00000
Nigeria	0.00036	0.03026	-0.37644	0.80129	0.00012	0.01596	0.01730	0.41761
Norway	0.00001	0.00009	-0.07928	0.00000	-0.00000	0.00006	-0.01929	0.00000
Oman	0.00039	0.00103	0.12028	0.00083	-0.00000	0.00219	0.13632	0.01018
Pakistan	0.00008	0.00026	-0.11896	0.00000	0.00008	0.04743	-0.18256	1.76060
Peru	0.00000	0.00262	-0.18121	0.00620	0.00000	0.00002	-0.01537	0.00000
Philippines	0.00080	0.11763	-0.00289	10.85617	0.00002	0.00021	-0.03214	0.00000
Poland	0.00073	0.06885	0.03734	5.01540	0.00002	0.00002	-0.36683	0.00000
Portugal	0.00004	0.00327	-0.13439	0.01206	0.00000	0.00031	0.04240	0.00011
Qatar	-0.00020	0.00042	-0.13648	0.00000	-0.00001	0.00171	0.10617	0.00377
Romania	0.00010	0.00033	-0.02801	0.00000	0.00000	0.00009	0.01305	0.00000
Russia	0.00013	0.00047	-0.20863	0.00000	-0.00002	0.01239	-0.02425	0.57315
Saudi Arabia	0.00006	0.00017	-0.15152	0.00000	0.00000	0.00001	0.01948	0.00000
Serbia	0.00053	0.00124	0.18350	0.00037	-0.00001	0.00030	0.05346	0.00000
Singapore	-0.00002	0.00021	-0.09078	0.00000	0.00000	0.00002	-0.02173	0.00000
Slovakia	0.00011	0.06096	-0.25398	2.08371	0.00000	0.00000	-0.02535	0.00000
Slovenia	-0.00004	0.00022	-0.26883	0.00000	0.00002	0.00028	-0.09524	0.00003
South Africa	-0.00004	0.00026	-0.06358	0.00000	-0.00000	0.00006	-0.02068	0.00000
Spain	0.00006	0.00035	-0.13738	0.00002	-0.00000	0.00132	-0.01439	0.00001
Sri Lanka	-0.00003	0.01503	-0.108649	0.29305	0.00005	0.02764	-0.11636	0.52545
Sweden	-0.00010	0.00026	0.05281	0.00000	0.00000	0.00955	-0.00380	0.18068
Switzerland	0.00007	0.00026	-0.11883	0.00000	-0.00000	0.00800	0.09025	0.16938
Taiwan	0.00001	0.00028	-0.11821	0.00000	0.00000	0.00000	-0.00000	-0.07513
Thailand	-0.00004	0.00067	0.10587	0.00044	0.00001	0.00034	-0.01030	0.00009
Turkey	0.00035	0.00070	-0.05842	0.00028	0.00000	0.00006	-0.00660	0.00000
Ukraine	-0.00069	0.00259	-0.06568	0.00386	0.00006	0.00009	-0.08727	0.00000
U.K.	-0.00000	0.00012	-0.09557	0.00000	0.00000	0.00058	0.003484	0.00026
Uruguay	-0.00000	0.00024	-0.07336	0.00000	0.00005	0.00004	0.12304	0.00000
Venezuela	-0.00011	0.03920	-0.09126	1.00993	0.00000	0.00009	-0.88496	0.00000
Vietnam	-0.00524	0.01691	0.05074	0.24096	0.00011	0.00013	-0.10741	0.00000

Table 2. Impact of sovereign ratings and outlooks on realized returns across financial crises

This table presents the base and full model panel estimation results for stock and currency market realized returns over the sample from January 1996 to May 2010 for all 76 countries. Model specifications are based on Eq. (8-9). Crisis takes on a value of one during crisis periods and zero otherwise and the crises periods are from Jul. 1997 – Jan. 1998 for the Asian Financial Crisis (AFC), Aug. 1998 – Oct. 1998 for the Russian Debt Crisis (RFC), Mar. 2000 – Sept. 2002 for the Tech/Terrorist (Tech) crisis of confidence, Jul. 2007 – May 2010 for the Global Financial Crisis (GFC) and Dec. 2008 – May 2010 for the European Debt crisis (EDC). All is an aggregate of these major crises including the brief Brazilian (in Feb. 1999) and Turkish (Feb. 2001) crises. *, ** and *** denote significance at the 10, 5 and 1% levels.

	Alternative Choices for Crisis Dummy ("Crisis")											
Variable	ALL		AFC		GFC		RFC		TECH		EDC	
Panel A: Stock Market Returns												
$RRET_{t-1}$	-0.0155 (-63.023)***	0.0273 (1.37)	- 0.0158 (-45.33)***	0.0407 (2.03)**	-0.0156 (-46.95)***	0.0408 (2.05)**	-0.0137 (-53.59)***	0.0409 (2.05)**	-0.0146 (-55.62)***	0.0218 (1.09)	-0.0156 (-40.55)***	0.0407 (2.04)**
RATING	-0.0005 (-160.81)***	-	-0.0006 (-80.10)***		-0.0006 (-112.92)***	-	-0.0006 (-105.25)***	-	-0.0006 (-153.04)***	-	-0.0006 (-56.78)***	-
D(OUTLOOK)	0.0002 (19.13)***	-	0.0000 (2.44)**		0.0000 (3.47)***	-	0.0000 (2.77)***	-	0.0000 (2.33)**	-	0.0000 (2.23)**	-
D(RATING)	0.0003 (21.95)***	-	0.0004 (19.68)***		0.0003 (24.56)***	-	0.0003 (24.11)***	-	0.0003 (23.70)***	-	0.0003 (14.33)***	-
CCRATING	-	-0.0002 (-3.39)***		-0.0002 (-2.90)***	-	-0.0001 (-2.65)***	-	-0.0002 (-2.84)***	-	-0.0001 (-2.41)***	-	-0.0001 (-2.78)***
D(CCRATING)	-	0.0016 (4.20)***		0.0016 (5.02)***	-	0.0018 (5.04)***	-	0.0016 (4.92)***	-	0.0015 (4.71)***	-	0.0015 (4.88)***
Crisis	-0.0001 (-3.13)***	-	-0.0001 (-0.84)	-0.0003 (-0.50)	0.0001 (0.83)	-0.0003 (-0.86)	-0.0038 (-46.96)***	0.0004 (0.32)	0.0003 (7.72)***	0.0023 (6.69)***	-0.0004 (-7.06)***	-0.0006 (-0.28)
Crisis*D(OUTLOOK)	-0.0003 (-10.11)***	-	-0.0003 (-1.21)		-0.0002 (-0.97)	-	0.0035 (9.78)***	-	-0.0000 (-0.11)	-	-0.0004 (-3.70)***	-
Crisis*D(RATING)	0.0002 (9.08)***	-	0.0001 (1.25)		0.0000 (0.15)	-	0.0072 (18.62)***	-	0.0002 (8.92)***	-	0.0002 (3.45)***	-
Crisis*D(CCRATING)		-0.0005 (-0.71)		-0.0074 (-0.83)		-0.0010 (-1.39)		-0.0001 (-0.04)		0.0012 (0.97)		0.0073 (1.24)
COMPRISK	-	-0.0001 (-3.69)***	-	0.0001 (3.06)***	-	0.0001 (2.56)***	-	0.0000 (2.94)***	-	0.0001 (2.49)***	-	0.0001 (2.85)***
Oil	-	-0.0000 (-2.34)***	-	-0.0000 (-2.83)***	-	-0.0000 (-3.01)***	-	-0.0000 (-2.93)***	-	-0.0000 (-2.60)***	-	-0.0000 (-2.85)***
Devping	-	-0.0042 (-3.87)***	-	-0.0026 (-2.52)**	-	-0.0021 (-1.80)*	-	-0.0025 (-2.41)**	-	-0.0023 (-2.25)**	-	-0.0024 (-2.30)**
FXReG	-	0.0002 (2.42)**	-	0.0001 (1.82)*	-	0.0001 (1.72)*	-	0.0001 (2.08)**	-	0.0000 (0.63)	-	0.0001 (2.05)**
GDP	-	-0.0000 (-1.81)*	-	-0.0000 (-1.53)	-	-0.0000 (-1.44)	-	-0.0000 (-1.39)	-	-0.0000 (-1.95)	-	-0.0000 (-1.36)
IMF_Credit	-	-0.0000 (-0.73)	-	-0.0000 (-1.96)**	-	-0.0000 (-2.08)**	-	-0.0000 (-1.91)*	-	-0.0000 (-0.51)	-	-0.0000 (-1.93)*
Monetary	-	-0.0001 (-0.94)	-	-0.0001 (-1.22)	-	-0.0001 (-1.02)	-	-0.0001 (-1.12)	-	-0.0001 (-0.83)	-	-0.0001 (-1.11)

Panel B: FX Market Returns												
RRET$_{t-1}$	-0.2352*** (-25874.34)	0.0000 (0.00)	-0.2352*** (-2567.77)	0.0001 (0.00)	-0.2352*** (-81247.22)	0.0000 (0.00)	-0.2352*** (-25020.59)	0.0000 (0.00)	-0.02353*** (-60415.15)	0.0000 (0.00)	-0.2352*** (-19287.79)	0.0000 (0.00)
RATING	-0.0003 (-58.57)***		-0.0003 (-90.40)***		-0.0003 (-87.42)***		-0.0003 (-64.74)***		-0.0002 (-52.38)***		-0.0002 (-85.38)***	
D(OUTLOOK)	-0.0001 (-6.35)***		0.0000 (5.41)***		-0.0000 (-21.81)***		0.0000 (1.86)*		0.0000 (12.48)***		0.0000 (4.17)***	
D(RATING)	0.0002 (40.35)***		0.0001 (28.56)***		0.0002 (37.45)***		0.0001 (16.77)***		0.0001 (31.60)***		0.0001 (21.63)***	
CCRATING		-0.0000 (-0.12)		-0.0000 (-0.10)		-0.0000 (-0.10)		-0.0000 (-0.11)		-0.0000 (-0.11)		-0.0000 (-0.11)
D(CCRATING)		-0.0002 (-0.27)		-0.0000 (-0.06)		-0.0002 (-0.26)		-0.0000 (-0.04)		-0.0000 (-0.03)		-0.0000 (-0.04)
Crisis	-0.0000 (0.58)	-0.0000 (-0.03)	-0.0000 (-1.09)	0.0002 (0.12)	-0.0000 (-1.64)*	0.0000 (0.02)	-0.0000 (-1.07)	-0.0001 (-0.04)	0.0001 (19.98)***	-0.0001 (-0.07)	-0.0001 (-4.26)***	0.0000 (0.00)
Crisis*D(OUTLOOK)	0.0002 (18.99)***		-0.0001 (-1.22)		0.0003 (20.17)***		0.0000 (1.16)		-0.0000 (-1.11)		-0.0001 (-0.52)	
Crisis*D(RATING)	-0.0001 (-21.96)***		0.0000 (0.19)		-0.0002 (-2.47)**		0.0001 (0.47)		-0.0000 (-0.08)		0.0000 (0.17)	
Crisis*D(CCRATING)		0.0006 (0.41)		0.0002 (0.03)		0.0007 (0.46)		0.0006 (0.03)		-0.0000 (-0.04)		-0.0012 (-0.08)
COMPRISK	-	-0.0000 (-0.21)	-	-0.0000 (-0.24)	-	-0.0000 (-0.21)	-	-0.0000 (-0.23)	-	-0.0000 (-0.22)	-	-0.0000 (-0.21)
Oil	-	0.0000 (0.76)	-	0.0000 (0.74)	-	0.0000 (0.73)	-	0.0000 (0.74)	-	0.0000 (0.73)	-	0.0000 (0.72)
Devping	-	0.0006 (0.26)	-	0.0007 (0.30)	-	0.0006 (0.24)	-	0.0006 (0.28)	-	0.0007 (0.28)	-	0.0006 (0.27)
FXReG	-	-0.0001 (-0.74)	-	-0.0001 (-0.74)	-	-0.0001 (-0.70)	-	-0.0001 (-0.75)	-	-0.0001 (-0.70)	-	-0.0001 (-0.74)
GDP	-	0.0000 (0.79)	-	0.0000 (0.75)	-	0.0000 (0.76)	-	0.0000 (0.75)	-	0.0000 (0.74)	-	0.0000 (0.74)
IMF_Credit	-	0.0000 (0.17)	-	0.0000 (0.16)	-	0.0000 (0.20)	-	0.0000 (0.16)	-	0.0000 (0.15)	-	0.0000 (0.16)
Monetary	-	-0.0000 (-0.13)	-	-0.0000 (-0.14)	-	-0.0000 (-0.14)	-	-0.0000 (-0.14)	-	-0.0000 (-0.15)	-	-0.0000 (-0.15)

Table 3. Impact of sovereign ratings and outlooks on realized return volatility across financial crises

This table presents the base and full model panel estimation results for stock and currency market realized volatility over the sample from January 1996 to May 2010 for all 76 countries. Model specifications are based on Eq. (8-9). Crisis takes on a value of one during crisis periods and zero otherwise and the crises periods are from Jul. 1997 – Jan. 1998 for the Asian Financial Crisis (AFC), Aug. 1998 – Oct. 1998 for the Russian Debt Crisis (RFC), Mar. 2000 – Sept. 2002 for the Tech/Terrorist (Tech) crisis of confidence, Jul. 2007 – May 2010 for the Global Financial Crisis (GFC) and Dec. 2008 – May 2010 for the European Debt crisis (EDC). All is an aggregate of these major crises including the brief Brazilian (in Feb. 1999) and Turkish (Feb. 2001) crises. *, ** and *** denote significance at the 10, 5 and 1% levels.

Variable	Alternative Choices for Crisis Dummy ("Crisis")											
	ALL		AFC		GFC		RFC		TECH		EDC	
Panel A: Stock Market Volatility												
RVOL$_{t-1}$	-0.0000	0.0273	-0.0000	-0.0016	-0.0000	-0.0027	-0.0000	-0.0015	-0.0000	-0.0069	-0.0000	-0.0015
	(-0.75)	(1.37)	(-0.76)	(-0.08)	(-0.76)	(-0.14)	(-0.76)	(-0.08)	(-0.75)	(-0.36)	(-0.76)	(-0.08)
RATING	0.0005		0.0005		0.0005		0.0005		0.0004		0.0005	
	(2.32)**		(2.31)**		(2.30)**		(2.30)**		(2.16)**		(2.29)**	
D(OUTLOOK)	-0.0001		-0.0001		-0.0001		-0.0001		-0.0001		-0.0001	
	(-1.81)*		(-1.18)		(-1.00)		(-1.15)		(-2.00)**		(-2.10)**	
D(RATING)	-0.0004		-0.0003		-0.0003		-0.0004		-0.0004		-0.0003	
	(-2.97)**		(-2.70)***		(-2.58)***		(-2.68)***		(-2.86)***		(-2.68)***	
CCRATING		-0.0001		-0.0163		-0.0148		-0.0161		-0.0130		-0.0162
		(-3.39)***		(-2.13)**		(-1.93)*		(-2.12)**		(-1.70)*		(-2.12)**
D(CCRATING)		0.0016		-0.0081		-0.0034		-0.0078		-0.0043		-0.0083
		(4.20)***		(-0.22)		(-0.09)		(-0.22)		(-0.12)		(-0.23)
Crisis	-0.0000	0.0015	-0.0001	-0.0307	0.0001	-0.0857	0.0000	-0.0028	-0.0002	0.1771	0.0001	0.0405
	(-0.87)	(5.11)***	(-0.64)	(-0.41)	(1.06)	(-1.91)*	(0.87)	(-0.03)	(-1.35)	(4.78)***	(0.38)	(0.16)
Crisis*D(OUTLOOK)	0.0001		0.0001		0.0000		0.0002		0.0001		0.0006	
	(1.27)		(1.85)*		(0.55)		(2.08)**		(0.43)		(1.14)	
Crisis*D(RATING)	0.0002		0.0001		0.0000		0.0001		0.0003		0.0001	
	(2.62)***		(1.86)*		(0.46)		(1.32)		(2.10)**		(1.95)**	
Crisis*D(CCRATING)		-0.0004		0.6430		-0.0283		-0.0554		-0.0007		0.0611
		(-0.71)		(0.52)		(-0.25)		(-0.13)		(-0.00)		(0.10)
COMPRISK		0.0001		0.0069		0.0059		0.0069		0.0056		0.0069
		(3.69)***		(2.22)**		(1.87)*		(2.24)**		(1.81)*		(2.24)**
Oil		-0.0000		-0.0000		-0.0001		-0.0000		-0.0000		-0.0000
		(-2.34)**		(-0.11)		(-0.41)		(-0.08)		(-0.00)		(-0.09)
Devping		-0.0042		-0.2903		-0.2001		-0.2897		-0.2518		-0.2912
		(-3.87)***		(-1.97)**		(-1.30)		(-1.98)**		(-1.72)*		(-1.98)**
FXReG		0.0001		0.0091		0.0030		0.0080		0.0011		0.0080
		(2.42)**		(1.01)		(0.34)		(0.91)		(0.12)		(0.91)
GDP		-0.0000		-0.0001		-0.0001		-0.0001		-0.0001		-0.0001
		(-1.81)*		(-1.48)		(-1.56)		(-1.54)		(-1.85)*		(-1.54)
IMF_Credit		-0.0000		-0.0000		-0.0000		-0.0000		-0.0000		-0.0000
		(-0.73)		(-1.49)		(-1.66)*		(-1.51)		(-0.60)		(-1.51)
Monetary		-0.0001		-0.0229		-0.0223		-0.0237		-0.0215		-0.0237
		(-0.94)		(-1.47)		(-1.44)		(-1.54)		(-1.40)		(-1.54)

Panel B: FX Market Volatility

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
RVOL$_{t-1}$	-0.0001 (-55.25)***	0.3352 (1.81)*	-0.0001 (-15.48)***	0.0336 (1.82)*	-0.0001 (-61.17)***	0.0325 (1.75)*	-0.0001 (-58.78)***	0.0335 (1.82)*	-0.0001 (-18.64)***	0.0335 (1.81)*	-0.0001 (-87.67)***	0.0336 (1.82)*
RATING	0.0001 (26.21)***		0.0001 (18.93)***		0.0001 (19.75)***		0.0001 (27.78)***		0.0001 (12.13)***		0.0001 (25.11)***	
D(OUTLOOK)	-0.0000 (-2.97)***		-0.0000 (-1.82)*		-0.0001 (-1.03)		-0.0000 (-4.76)***		-0.0000 (-1.78)*		-0.0000 (-2.61)***	
D(RATING)	-0.0001 (-36.65)***		-0.0001 (-13.83)***		-0.0001 (-28.49)***		-0.0001 (-26.51)***		-0.0001 (-8.67)***		-0.0001 (-20.81)***	
CCRATING		0.0019 (0.60)		0.0018 (0.56)		0.0016 (0.51)		0.0017 (0.51)		0.0016 (0.51)		0.0017 (0.52)
D(CCRATING)		-0.0059 (-0.28)		0.0004 (0.02)		-0.0067 (-0.34)		-0.0001 (-0.00)		-0.0006 (-0.03)		-0.0035 (-0.02)
Crisis	-0.0000 (-13.02)***	0.0171 (1.05)	-0.0001 (-10.78)***	0.0148 (0.30)	-0.0000 (-0.43)	0.0271 (1.34)	0.0000 (3.84)***	0.0039 (0.07)	-0.0000 (-1.4)	-0.0021 (-0.10)	0.0000 (0.66)	-0.0001 (-0.00)
Crisis*D(OUTLOOK)	0.0000 (2.95)***		0.0000 (0.10)		-0.0000 (-0.95)		-0.0006 (-38.99)***		0.0001 (6.27)***		0.0000 (0.26)	
Crisis*D(RATING)	0.0001 (21.88)***		0.0001 (0.55)		-0.0002 (-0.66)		-0.0008 (-36.65)***		0.0001 (5.84)***		0.0001 (1.99)**	
Crisis*D(CCRATING)		0.0215 (0.52)		-0.0841 (-0.53)		0.0418 (0.87)		-0.0185 (-0.11)		0.0085 (0.10)		0.0356 (0.10)
COMPRISK		-0.0007 (-0.56)		-0.0007 (-0.54)		-0.0004 (-0.37)		-0.0006 (-0.50)		-0.0007 (-0.50)		-0.0007 (-0.50)
Oil		-0.0001 (-1.45)		-0.0002 (-1.62)		-0.0002 (-1.32)		-0.0001 (-1.62)		-0.0002 (-1.59)		-0.0002 (-1.61)
Devping		0.0332 (0.51)		0.0436 (0.67)		0.0184 (0.28)		0.0409 (0.63)		0.0408 (0.63)		0.0413 (0.64)
FXReG		0.0078 (1.90)*		0.0074 (1.80)*		0.0093 (2.17)**		0.0075 (1.84)*		0.0076 (1.79)*		0.0075 (1.84)*
GDP		-0.0000 (-0.85)		-0.0000 (-0.87)		-0.0000 (-0.78)		-0.0000 (-0.90)		-0.0000 (-0.86)		-0.0000 (-0.90)
IMF_Credit		0.0000 (0.18)		-0.0000 (-0.11)		0.0000 (0.10)		-0.0000 (-0.12)		-0.0000 (-0.14)		-0.0000 (-0.12)
Monetary		0.0027 (0.38)		0.0023 (0.32)		0.0019 (0.26)		0.0023 (0.32)		0.0024 (0.32)		0.0024 (0.33)

Table 4. Impact of sovereign ratings and outlooks on realized return skewness across financial crises

This table presents the base and full model panel estimation results for stock and currency market realized return skewness over the sample from January 1996 to May 2010 for all 76 countries. Model specifications are based on Eq. (8-9). Crisis takes on a value of one during crisis periods and zero otherwise and the crises periods are from Jul. 1997 – Jan. 1998 for the Asian Financial Crisis (AFC), Aug. 1998 – Oct. 1998 for the Russian Debt Crisis (RFC), Mar. 2000 – Sept. 2002 for the Tech/Terrorist (Tech) crisis of confidence, Jul. 2007 – May 2010 for the Global Financial Crisis (GFC) and Dec. 2008 – May 2010 for the European Debt crisis (EDC). All is an aggregate of these major crises including the brief Brazilian (in Feb. 1999) and Turkish (Feb. 2001) crises. *, ** and *** denote significance at the 10, 5 and 1% levels.

Variable	Alternative Choices for Crisis Dummy ("Crisis")											
	ALL		AFC		GFC		RFC		TECH		EDC	
Panel A: Stock Market Skewness												
$RSKEW_{t-1}$	0.0340	0.0642	0.0356	0.0657	0.0344	0.0646	0.0351	0.0660	0.0351	0.0622	0.0341	0.0653
	(0.90)	(2.88)***	(0.95)	(2.96)***	(0.91)	(2.91)***	(0.94)	(1.28)	(0.94)	(2.80)***	(0.91)	(2.94)***
RATING	0.1999		0.1783		0.2154		0.1824		0.1787		0.1820	
	(1.37)		(1.30)		(1.55)		(1.33)		(1.30)		(1.34)	
D(OUTLOOK)	0.0336		0.0731		0.0637		0.0719		0.0470		0.0728	
	(0.81)		(3.01)***		(2.01)**		(2.83)***		(1.52)		(3.23)***	
D(RATING)	-0.0785		-0.0954		-0.1009		-0.0992		-0.0906		-0.0979	
	(-1.01)		(-1.35)		(-1.41)		(-1.41)		(-1.27)		(-1.40)	
CCRATING		0.0012		0.0003		0.0027		-0.0029		0.0006		0.0005
		(0.12)		(0.03)		(0.26)		(-0.12)		(0.06)		(0.05)
D(CCRATING)		-0.1248		-0.0505		-0.0693		-0.0255		-0.0747		-0.0526
		(-1.44)		(-0.79)		(-0.88)		(-0.17)		(-1.12)		(-0.82)
Crisis	0.0002	0.0718	-0.0371	-0.1065	-0.0971	-0.0637	-0.0300	-0.0792	-0.0545	0.1429	0.1585	0.4060
	(0.00)	(1.31)	(-0.55)	(-0.92)	(-0.64)	(-0.98)	(-0.45)	(-0.14)	(-0.90)	(2.13)**	(1.76)*	(0.34)
Crisis*D(OUTLOOK)	0.0772		-0.0788		0.0381		-0.0568		0.1328		-0.0551	
	(1.10)		(-0.64)		(0.46)		(-1.51)		(1.64)		(-0.28)	
Crisis*D(RATING)	-0.0605		-0.0709		-0.0519		0.0587		-0.0428		-0.0061	
	(-1.35)		(-0.59)		(-1.17)		(0.19)		(-1.07)		(-0.09)	
Crisis*D(CCRATING)		0.1405		0.1027		0.0603		-51.0444		0.2518		1.066
		(1.08)		(0.16)		(0.45)		(-1.58)		(1.12)		(0.64)
COMPRISK		-0.0016		-0.0015		-0.0029		0.0007		-0.0020		-0.0017
		(-0.39)		(-0.37)		(-0.68)		(0.07)		(-0.48)		(-0.39)
Oil		0.0009		0.0009		0.0008		0.0003		0.0010		0.0008
		(2.72)***		(2.56)***		(2.28)**		(0.35)		(2.77)***		(2.40)**
Devping		-0.0615		-0.0092		0.0796		-0.0692		-0.0076		-0.0027
		(-0.30)		(-0.05)		(0.37)		(-0.15)		(-0.04)		(-0.01)
FXReG		0.0098		0.0086		0.0051		0.0309		0.0014		0.0084
		(0.80)		(0.71)		(0.41)		(0.97)		(0.11)		(0.70)
GDP		-0.0000		-0.0000		-0.0000		-0.0001		-0.0000		-0.0000
		(-0.04)		(-0.14)		(-0.05)		(-0.72)		(-0.22)		(-0.09)
IMF_Credit		0.0000		-0.0000		-0.0000		-0.0000		0.0000		-0.0000
		(0.36)		(-0.11)		(-0.09)		(-0.05)		(0.27)		(-1.10)
Monetary		-0.0191		-0.0212		-0.0205		-0.0724		-0.0178		-0.0210
		(-0.89)		(-0.99)		(-0.96)		(-1.22)		(-0.84)		(-0.98)

Panel B: FX Market Skewness

RSKEW$_{t-1}$	0.0446 (14.27)***	0.1302 (5.77)***	0.0418 (10.71)***	0.1274 (5.58)***	0.0437 (13.86)***	0.1314 (5.83)***	0.0461 (5.85)***	0.1323 (5.85)***	0.0456 (10.33)***	0.1315 (5.83)***	0.0431 (12.44)***	0.1327 (5.86)***
RATING	-0.3712 (-26.37)***		-0.3857 (-17.66)***		-0.3479 (-10.63)***		-0.3911 (-10.60)***		-0.3605 (-19.01)***		-0.3775 (-19.74)***	
D(OUTLOOK)	-0.0074 (-0.14)		0.0552 (0.70)		0.0646 (1.01)		0.0538 (0.73)		0.0134 (0.12)		0.0141 (0.43)	
D(RATING)	-0.0074 (-0.14)		0.1923 (4.14)***		0.1776 (3.39)***		0.1993 (3.91)***		0.1876 (1.76)*		0.1751 (4.04)***	
CCRATING		-0.0025 (-0.21)		0.0034 (0.28)		-0.0065 (-0.53)		-0.0002 (-0.02)		-0.0014 (-0.12)		-0.0001 (-0.01)
D(CCRATING)		0.0816 (0.92)		0.0567 (0.77)		0.1081 (1.29)		0.0913 (1.27)		0.0893 (1.21)		0.0893 (1.24)
Crisis	0.0001 (0.00)	0.1393 (2.44)**	-0.0742 (-0.60)	1.0186 (3.13)***	-0.3070 (-0.41)	0.1182 (1.89)*	-0.0670 (-0.39)	0.3463 (1.18)	0.0220 (0.21)	0.0096 (0.14)	0.0835 (0.75)	-0.5552 (-0.51)
Crisis*D(OUTLOOK)	0.0105 (0.23)		0.0401 (0.22)		-0.3771 (-1.41)		-0.7020 (-0.93)		0.1335 (0.77)		0.0446 (0.27)	
Crisis*D(RATING)	-0.0235 (-0.49)		0.3419 (0.50)		0.5170 (0.54)		-0.3314 (-0.33)		-0.0845 (-0.65)		0.1609 (0.69)	
Crisis*D(CCRATING)		0.0013 (0.01)		-1.0945 (-1.12)		-0.0562 (-0.35)		-0.4182 (-0.24)		0.1119 (0.35)		-0.0325 (-0.02)
COMPRISK		0.0037 (0.78)		-0.0000 (-0.01)		0.0054 (1.11)		0.0026 (0.55)		0.0030 (0.64)		0.0024 (0.49)
Oil		0.0006 (1.60)		0.0004 (1.23)		0.0006 (1.67)*		0.0004 (1.01)		0.0005 (1.33)		0.0005 (1.37)
Devping		-0.4749 (-2.06)**		-0.2449 (-1.06)		-0.5233 (-2.17)**		-0.3504 (-1.55)		-0.3651 (-1.61)		-0.3327 (-1.43)
FXReG		0.0437 (3.35)***		0.0419 (3.15)***		0.0485 (3.61)***		0.0439 (3.34)***		0.0418 (3.10)***		0.0421 (3.22)***
GDP		0.0002 (3.38)***		0.0002 (4.05)***		0.0003 (3.53)***		0.0002 (3.46)***		0.0002 (3.46)***		0.0002 (3.52)***
IMF_Credit		0.0000 (0.37)		-0.0000 (-0.00)		-0.0000 (-0.22)		-0.0000 (-0.02)		-0.0000 (-0.12)		-0.0000 (-0.13)
Monetary		-0.0303 (-1.28)		-0.0281 (-1.17)		-0.0336 (-1.42)		-0.0330 (-1.39)		-0.0324 (-1.37)		-0.0318 (-1.34)

Table 5. Impact of sovereign ratings and outlooks on realized return kurtosis across financial crises

This table presents the base and full model panel estimation results for stock and currency market realized return kurtosis over the sample from January 1996 to May 2010 for all 76 countries. Model specifications are based on Eq. (8-9). Crisis takes on a value of one during crisis periods and zero otherwise and the crises periods are from Jul. 1997 – Jan. 1998 for the Asian Financial Crisis (AFC), Aug. 1998 – Oct. 1998 for the Russian Debt Crisis (RFC), Mar. 2000 – Sept. 2002 for the Tech/Terrorist (Tech) crisis of confidence, Jul. 2007 – May 2010 for the Global Financial Crisis (GFC) and Dec. 2008 – May 2010 for the European Debt crisis (EDC). All is an aggregate of these major crises including the brief Brazilian (in Feb. 1999) and Turkish (Feb. 2001) crises. *, ** and *** denote significance at the 10, 5 and 1% levels.

Variable	Alternative Choices for Crisis Dummy ("Crisis")											
	ALL		AFC		GFC		RFC		TECH		EDC	
Panel A: Stock Market Kurtosis												
$RKURT_{t-1}$	0.0000	-0.0121	0.0000	-0.0106	0.0000	-0.0103	0.0000	-0.0101	0.0000	-0.0175	0.0000	-0.0101
	(1.24)	(-0.62)	(1.22)	(-0.55)	(1.21)	(-0.53)	(1.22)	(-0.52)	(1.25)	(-0.90)	(1.22)	(-0.52)
RATING	0.0000		0.0000		0.0000		0.0000		0.0000		0.0000	
	(0.78)		(0.79)		(0.73)		(0.78)		(0.81)		(0.79)	
D(OUTLOOK)	-0.0000		-0.0000		-0.0000		-0.0000		-0.0000		-0.0000	
	(-0.61)		(-0.49)		(-0.42)		(-0.46)		(-0.78)		(-0.52)	
D(RATING)	-0.0000		-0.0000		-0.0000		-0.0000		-0.0000		-0.0000	
	(-1.35)		(-1.26)		(-1.39)		(-1.23)		(-1.23)		(-1.28)	
CCRATING		-2.7526		-2.8333		-2.6631		-2.7738		-2.4143		-2.7797
		(4.16)***		(4.26)***		(-3.97)***		(-4.19)***		(-3.65)***		(-4.20)
D(CCRATING)		-0.5398		-0.76661		-0.5775		-0.8071		-0.4486		-0.8795
		(-0.17)		(-0.27)		(-0.19)		(-0.28)		(-0.15)		(-0.31)
Crisis	-0.0000	9.8021	0.0000	-8.9518	0.0000	-4.2956	-0.0000	-4.1586	-0.0000	19.5560	0.0000	8.2421
	(-1.01)	(3.04)***	(0.31)	(-1.08)	(0.66)	(-1.09)	(-0.74)	(-0.38)	(-0.97)	(5.30)***	(0.09)	(0.38)
Crisis*D(OUTLOOK)	0.000		0.0000		-0.0000		-0.0000		0.0000		0.0000	
	(0.71)		(0.77)		(-0.11)		(-6.35)***		(0.96)		(0.64)	
Crisis*D(RATING)	0.0000		0.0000		0.0000		-0.0000		0.0000		0.0000	
	(1.53)		(2.75)***		(1.9)*		(-3.63)***		(1.06)		(3.01)***	
Crisis*D(CCRATING)		-0.9437		0.2585		-4.3218		-6.6836		-1.3508		0.7114
		(-0.12)		(0.00)		(-0.44)		(-0.20)		(-0.11)		(0.01)
COMPRISK		1.1648		1.1802		1.0731		1.1455		0.9938		1.1494
		(4.31)***		(4.32)***		(3.88)***		(4.24)***		(3.68)***		(4.24)***
Oil		0.0216		0.0164		0.0106		0.0162		0.0172		0.0143
		(0.93)		(0.71)		(0.45)		(0.70)		(0.75)		(0.62)
Devping		-56.0512		-50.6049		-43.6969		-49.1077		-44.6809		-49.3546
		(-4.30)***		(-3.91)***		(-3.20)***		(-3.83)***		(-3.49)***		(-3.83)***
FXReG		0.2807		0.0972		-0.1480		0.0839		-0.6661		0.1018
		(0.36)		(0.11)		(-0.18)		(0.11)		(-0.84)		(0.13)
GDP		-0.0093		-0.0094		-0.0091		-0.0090		-0.0106		-0.0090
		(-2.34)**		(-2.28)**		(-2.29)**		(-2.29)**		(-2.67)***		(-2.29)**
IMF_Credit		-0.0000		-0.0000		-0.0000		-0.0000		-0.0000		-0.0000
		(-1.45)		(-2.31)**		(-2.34)**		(-2.28)**		(-1.13)		(-2.27)**
Monetary		-1.7820		-2.0003		-1.8620		-1.9440		-1.7268		-1.9534
		(-1.30)		(-1.41)		(-1.35)		(-1.41)		(-1.26)		(-1.42)

Panel B: FX Market Kurtosis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
RKURT$_{t-1}$	-0.0000 (-0.77)	0.0092 (0.49)	-0.0000 (-0.88)	0.0091 (0.48)	-0.0000 (-0.85)	0.0085 (0.45)	-0.0000 (-0.88)	0.0091 (0.48)	-0.0000 (-0.79)	0.0090 (0.48)	-0.0000 (-0.79)	0.0091 (0.48)
RATING	0.0000 (2.12)**		0.0000 (2.11)**		0.0000 (2.13)**		0.0000 (2.12)**		0.0000 (1.91)*		0.0000 (2.11)**	
D(OUTLOOK)	0.0000 (0.44)		0.0000 (0.28)		0.0000 (0.89)		0.0000 (0.65)		0.0000 (0.63)		0.0000 (-1.76)*	
D(RATING)	-0.0000 (-1.55)		-0.0000 (-1.89)*		-0.0000 (-1.71)*		-0.0000 (-1.88)*		-0.0000 (-1.61)		-0.0000 (-0.52)	
CCRATING		0.0257 (0.21)		0.0281 (0.23)		0.0138 (0.11)		0.0312 (0.25)		0.0297 (0.24)		0.0283 (0.23)
D(CCRATING)		-0.1335 (-0.17)		-0.0211 (-0.03)		-0.1148 (-0.15)		-0.0261 (-0.04)		-0.0453 (-0.06)		-0.0278 (-0.04)
Crisis	-0.0000 (-0.61)	0.5558 (0.86)	-0.0000 (-0.39)	-0.3563 (-0.20)	0.0000 (0.88)	0.8486 (1.11)	0.0000 (0.82)	0.5211 (0.21)	-0.0000 (-1.21)	-0.0601 (-0.08)	-0.0000 (-0.52)	0.5074 (0.10)
Crisis*D(OUTLOOK)	0.0000 (0.13)		0.0000 (1.12)		-0.0000 (-0.86)		0.0000 (0.87)		-0.0000 (-0.21)		-0.0000 (-0.87)	
Crisis*D(RATING)	-0.0000 (-0.43)		0.0000 (0.52)		-0.0000 (-0.85)		-0.0000 (-0.02)		-0.0000 (-0.07)		0.0000 (0.77)	
Crisis*D(CCRATING)		0.3857 (0.23)		-0.3298 (-0.05)		0.7634 (0.39)		-0.9434 (-0.14)		0.3067 (0.10)		-1.5558 (-0.05)
COMPRISK		-0.0179 (-0.36)		-0.0186 (-0.37)		-0.0098 (-0.19)		-0.0205 (-0.41)		-0.0200 (-0.40)		-0.0189 (-0.37)
Oil		-0.0048 (-1.02)		-0.0053 (-1.14)		-0.0042 (-0.90)		-0.0055 (-1.17)		-0.0053 (-1.12)		-0.0054 (-1.15)
Devping		0.9447 (0.38)		1.3074 (0.53)		0.4829 (0.19)		1.3811 (0.56)		1.3641 (0.56)		1.3067 (0.52)
FXReG		0.2284 (1.44)		0.2211 (1.40)		0.2728 (1.66)*		0.2246 (1.42)		0.2250 (1.38)		0.2227 (1.41)
GDP		-0.0004 (-0.57)		-0.0005 (-0.61)		-0.0004 (-0.50)		-0.0005 (-0.58)		-0.0004 (-0.55)		-0.0005 (-0.59)
IMF_Credit		-0.0000 (-0.05)		-0.0000 (-0.25)		-0.0000 (-0.15)		-0.0000 (-0.23)		-0.0000 (-0.25)		-0.0000 (-0.24)
Monetary		0.1315 (0.46)		0.1196 (0.42)		0.1083 (0.38)		0.1219 (0.43)		0.1226 (0.43)		0.1199 (0.42)

Appendix

Table A.1 Variables and definitions

Variable Name	Brief Definition	Data Source
Dependent variables		
RRET	Realised equity (FX) market returns	Authors' calculations; Thomson Reuters Tick History
RVOL	Realised volatility of equity (FX) market returns	Authors' calculations; Thomson Reuters Tick History
RSKEW	Realised skewness of equity (FX) market returns	Authors' calculations; Thomson Reuters Tick History
RKURT	Realized kurtosis of equity (FX) market returns	Authors' calculations; Thomson Reuters Tick History
Explanatory variables		
No_trades_eq	Number of trades in the equity market - monthly average of daily trading volume	Thomson Reuters Tick History
No_trades_fx	Number of trades in foreign exchange market - monthly average of daily trading volume	Thomson Reuters Tick History
polrisk	Political risk rating of a country	International Country Risk Guide (ICRG)
finrisk	Financial risk rating of a country	International Country Risk Guide (ICRG)
ecorisk	Economic risk rating of a country	International Country Risk Guide (ICRG)
comprisk	Composite risk indicator - Average of polrisk, finrisk and ecorisk ratings	International Country Risk Guide (ICRG)
IMF Stk Mrkt	Stock market index price level	IMF's International financial statistics
Monetary (Policy Stance)	An indicator variable set equal to one if the short-term interest rate was increased (until the next interest rate cut), zero otherwise	World development indicators
GDP (Per Capita)	Gross domestic product- value of goods produced per person in the country	Global financial development
Trade	Sum of imports and exports for a country (as a % of GDP)	World development indicators
Stock Traded Total Vaue	Total value of shares traded during the period (current US$)	World development indicators
IMF Credit	Use of IMF credit	Global financial development
Currency Comp Debt USD	currency composition of PPG debt denominated in US dollars	Global financial development
Inflation	Rise in the general level of prices of goods and services in an economy	World development indicators
US TREASURY BILL	Short-term, interest-bearing obligation of U.S. Treasury, maturing in three months or less	Datastream
VIX	Implied volatility on the S&P500 index	Datastream
VDAX	Implied volatility on DAX index	Datastream
S&P 500	S&P500 stock market index return	Datastream
crude oil price	Average crude oil price	Datastream
oil	world oil price	Datastream
fxregm	Foreign exchange regime indicator variable set as: 4 = Dollarization, 3 = Currency board, 2 = Currency pegs, 1 = Crawling pegs, 0 = Floating	IMF's Classification of Exchange Rate Arrangements and Monetary Frameworks, http://www.imf.org/external/np/mfd/er/index.asp IMF's Annual Report on Exchange Arrangements and Exchange Restrictions, Various issues.
devping	Indicator variable set equal to one for a developing country (included in the MSCI emerging markets index) and zero otherwise	MSCI emerging market index
region	Indicator variable denoting the geographical region of a country, set as 1=Asia-pacific, 2=Americas, 3=Europe, 4=Africa and Middle East	Authors' calculations
IFC	An indicator variable set equal to one if the country is from an international financial centre and zero otherwise.	Authors' calculations

Sovereign rating variables		
Rating	Sovereign credit ratings provided by Standard and Poors. The ratings have been converted to a linear time series following Gande and Parsley (2005).	Standard and Poors
Outlook	Credit outlooks provided by Standard and Poors. An S&P rating outlook assesses the potential direction in which a rating will move over the next six months to two years. The outlooks have been converted to a linear time series following Gande and Parsley (2005).	Standard and Poors
CCRATING	Comprehensive credit ratings are computed as the sum of Rating and Outlook	Standard and Poors
Financial Crises		
AFC	Asian Financial Crisis indicator which is equal to 1 from July 1997 to Jan 1998 and zero otherwise	Kaminsky and Schmukler (2002) and Kaminsky et al. (2003)
GFC	Global Financial Crisis indicator which is equal to 1 from July 2007 to May 2010 and zero otherwise	Authors' calculations
RFC	Russian Debt Crisis indicator which is equal to 1 from August 1998 to October 1998 and zero otherwise	Kaminsky and Schmukler (2002) and Kaminsky et al. (2003)
TECH	Technology Boom/bust indicator which is equal to 1 from March 2000 to September 2002 and zero otherwise	Authors' calculations
EDC	European Sovereign Debt Crisis indicator which is equal to 1 from December 2008 to May 2010 and zero otherwise	CGFS (2011)
ALL	All Crises is an aggregate indicator of the above major crises including the brief Brazilian (in Feb. 1999) and Turkish (Feb. 2001) crises. It takes on a value of 1 during any of the above crisis periods and zero otherwise	Kaminsky and Schmukler (2002) and Kaminsky et al. (2003) plus authors' own calculations