The impact of sovereign rating changes on the stock market. An analysis using alternative modelling techniques

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Abstract

This study investigates the aggregate stock market impact of sovereign rating changes. The objective of the paper is to assess whether different benchmark models of asset pricing matter in testing the significance of sovereign rating changes using the population of all rating change announcements for the period 1 January 1975 through January 2010 from Standard and Poor's. Specifically, the analysis is carried using the market model, the quadratic model, the downside model, a higher order downside model as well as the Fama French model including momentum factors. On average the results indicate that there is a stock market reaction following a downgrade announcement prior to the actual event day and for upgrades, there is a some market reaction on the announcement day only. However, our results suggest that of the alternative benchmark models used to reach this conclusion, only the quadratic market model and the higher order downside market model suggest different results, that is we have stock market reaction both pre and post announcement day over the entire window. Our main finding is that for all of the other different model specification, the results are consistent and similar. Hence, we conclude that assessment of the impact of sovereign rating changes is not sensitive to a multi-factor model specification.

JEL Classification: G12, G14 and G15

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1. Introduction

Given the current state of the world capital markets, more emphasis is being placed on the growing importance of credit rating agencies in providing standardised assessment of credit risk. One of the main applications of credit ratings is to assess the risk exposure of a national market. Sovereign credit ratings often serve as a ceiling for private sector ratings of any given country, which stretches their influence far beyond government securities. The change of sovereign ratings is one of the key factors that may trigger re-weighting of the portfolios held. One component of the literature assesses the national stock market impact of sovereign ratings changes, (see for example Brooks, Faff, Hillier and Hillier (2004), Pukthuanthong-Le, Elayan and Rose (2007), Ferreira and Gama (2007)). Most of the studies in this area have used an event study methodology to assess the impact of sovereign ratings changes on stock market return. It should be noted though that most of these studies have used the conventional market model to calculate the abnormal return in the event study. The sovereign rating literature suggests that in general rating downgrades have a significant impact on the market, while rating upgrades do not have the same informative value. This study uses different benchmark models to test the validity of the results that are found in previous papers.

The key objective of this study is to provide an empirical comparison of the assessment of the impact of sovereign rating changes on national stock market returns by using different benchmark models of asset pricing.This study has a number of distinctive features. First, we assess the impact of sovereign rating changes on stock market returns using four different approaches that is the market model, the quadratic market model, the downside model and the quadratic downside model. The major contribution is to assess whether the finding in the literature that in general rating downgrades have an impact on stock market returns while rating

upgrades do not have the same informational value, are different when the four models are applied. The second key aspect of this analysis is that we include in our modelling the Fama French factors. Hence the aim of this study is to make a comparison of the different methods of calculating abnormal returns to assess the impact of sovereign rating on the stock markets that is comparing the standard market model to the four variants of the Fama- French model: the standard three factors model, a higher order three factor model, a downside version, a higher order downside model and these models are then augmented with momentum factors.

Empirical evidence on tests of asset pricing models suggests that multifactor models have some success in explaining the anomalies of the CAPM. To date perhaps the most serious challenge to the validity of the CAPM has come from research by Fama and French (1992). According to the Capital Asset Pricing Model (CAPM), investors only price market risk. However, a growing literature identifies many non-market risk factors that appear to be priced. Fama and French (1993, 1996) find that the non-market risk factors SMB (the return on a portfolio of small stocks less the return on a portfolio of large stocks) and HML (the return on a portfolio of high book-to-market-value stocks less the return on a portfolio of low book-to-market-value stocks) are statistically important in explaining the cross-section of equity returns. There have been numerous studies which make use of the Fama French factors for asset pricing and assess their relevance as compared to the CAPM. However, it should be highlighted that the Fama French model has not been applied to test for the impact of sovereign rating changes on the market. A major debate in the asset pricing literature is whether the Fama French factors might be substitutes for other factors. Two popular alternatives have been higher order and downside factors. The Fama- French three factor model may proxy for higher order co-moments. For example for the US, Chung, Johnson and Schill (2006) find that Fama-French factors may proxy

for higher order co- moments. While for the UK, Hung, Shackleton and Xu (2004) find a similar effect. This suggests a need for consideration of such alternatives in the calculation of abnormal returns to provide a better insight on the impact of rating changes on stock markets.

Another criticism of the mean-variance CAPM, is that the model disregards the up and down movements of asset returns and the validity of the measure of risk, variance, is subject to the distribution of returns being symmetric and normal. Hence, there is argument in the literature that an alternate measure is to consider downside risk. In fact, Pettengill, Sundaram and Mathur (1995) argue that appropriate allowance for up/down betas can overcome some aspects of the Fama-French critique of the CAPM. Estrada (2002) argues that the semi variance of return is a more plausible measure of risk and supports the D-CAPM (mean semi-variance) model, providing evidence of the significance of the model in the emerging markets context. Estrada and Serra (2005) and Estrada (2007) extend the findings on the significance of the downside model to the developed market setting.

While the application of the traditional CAPM is still being tested, another extension of the Fama- French factor model is to consider momentum factors. Jegadesh and Titman(1993) reports that stocks with higher returns in the previous 12 months tend to have higher future returns than stock with lower returns in the previous 12 months, that is the momentum factor. In testing their three factor model, Fama and French (1996) find that the model is able to capture the size and book to market effect, but not the momentum effect, which remains a challenge to their model. Carhart (1997) develops what is known as the four factor model which includes momentum.

Most of the studies in this area of sovereign ratings have used an event study methodology to assess the impact of sovereign ratings changes on stock market returns by using

the market model as being the key model to calculate abnormal returns. Some of the most cited papers include, Brooks, Faff, Hillier and Hillier (2004), Reisen and von Maltzan (1999),Larrain, Reisen and von Maltan (1997), Pukthuanthong-Le, Elayan and Rose (2007), Ferreira and Gama (2007) and Gande and Parsley (2005). Hence, we differentiate our study by undertaking this analysis using alternative benchmark models.

Our results reveal that consistent with the literature on the impact of sovereign ratings on stock market returns, we do find a stock market reaction following a downgrade announcement, and in particular on day -3 and day -1 where the returns are significantly negative and an impact on the market following an upgrade announcement on the event day only with the returns being significant positive. Further, testing this impact using alternative benchmarks models suggests that the results are not sensitive to the multi factor model specification. On average all the models, namely, the market model, the downside model, the Fama French model as well as the Fama French model with the momentum factor, have consistent and similar results for both the upgrade and downgrade announcements. Contrary to the evidence from other models, the quadratic market model and the higher order downside market model suggest that both upgrades and downgrades announcement have a significant impact on the market and this is the case both pre and post announcement. The quadratic downside market model gives more plausible results in the case of upgrades, indicating that the rating announcements have a positive impact on the returns compared to the quadratic market model which provide some negative returns in this case. However, the overall results obtained in this study suggest that measuring abnormal returns using different benchmark models does not make a difference when assessing the impact of sovereign rating changes on national stock market returns. The remainder of the paper is

organised as follows. Section two explains the data and methodology used in the study. Section three discusses the results obtained and section 4 present some concluding remarks.

2. Data and Modelling framework

We investigate the impact of sovereign rating changes on the stock market return of countries using the population of all rating change announcements for the period 1 January 1975 through January 2010. We focus on the historical ratings for each country by Standard and Poor's. Standard and Poor's provides ratings in terms of foreign currency as well as local currency and is the earliest provider of ratings, thus S&P has a well-established set of rating history. In this study we use the long term foreign currency ratings. The initial sample of countries for which data could be available from S&P with a rating or a rating history from the year 1975 included 63 countries. This study focuses on the impact of a rating change and hence there have been nine countries for which there has been no rating change. These countries are the US[3], UK, France, Germany, Netherlands, Belgium, Croatia, Austria and Norway. For some of these countries it is quite obvious that the countries are currently at the highest rating scale of AAA (example, US, UK , France and Germany) and for the others, Standard and Poor's has initially assigned a rating but there has not been a review so far. Hence these countries were not included in the study. Following the inspection of the rating history for each country, daily market returns for each country were collected from *Datastream International.* The DataStream return index for each country was used to proxy for the market return. To ensure consistency in the data, those countries which did not have the return data from DataStream, were excluded. Hence the final sample of countries that was included in the study is 33 countries with rating changes. Table one provides a list of the countries that were included in the study as well as the dates from which the

[3] Note that the US has been downgraded in 2011, but our data is only until January 2010

return index was available from DataStream with 88 upgrades and 69 downgrades for all the countries.

To determine the impact of sovereign rating changes on stock market returns, an event study methodology is used. Following previous studies, we start our analysis with the conventional market model. In order to calculate the abnormal return that is the difference between the observed and predicted returns, we use the following equation.

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt}) \quad [1]$$

Where R_{it} is the return on country *i* at day *t*, R_{mt} is the corresponding return on the world index at day *t*, and α_i and β_i are the market model parameters obtained from ordinary least squares regressions.

In this paper, in addition to the conventional market model, we consider a different approach to the estimation of the abnormal returns. We consider the approach of specifying a quadratic market return term as an additional factor. The quadratic term is used to augment the traditional market model and produces a quadratic market model (QMM) and hence the abnormal returns are calculated as follows:

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt} + \mu_i R_{mt}^2) \quad [2]$$

The QMM has been used in a number of previous studies. For example, Brooks and Faff (1998) perform tests of Baron-Adesi's (1985) two-factor APT against the unrestricted QMM using Morgan Stanley country index data, see also Lee and Rahman (1990) and Chen, Rahman and Chan(1992). Krauss and Litzenberger (1976, 1983) proposed that the QMM is the returns generating process consistent with the three-moment CAPM (or covariance-coskewness CAPM).

A number of papers have since followed the Krauss and Litzenberger lead to examine higher moment asset pricing models using higher order market models. Accordingly, the focus of this paper is to analyse the impact of sovereign rating changes on stock market returns using the QMM framework for the estimation of the abnormal returns. Thus, our analysis extends the work in Mishra et al (2007) to the sovereign ratings case.

The Capital Asset Pricing Model (CAPM), developed by Sharpe (1964), allows calculation of investment risk and the expected return on investments. While some studies raise doubts about the CAPM's validity, the model is still widely used in the investment community. The CAPM is explained by an equilibrium in which investor's maximise their utility function that depends on the mean and variance of returns of their portfolio. A criticism of the mean-variance CAPM is that the model disregards the up and down movements of asset returns and the validity of this measure of risk, variance, is subject to the distribution of returns being symmetric and normal. Hence, there is the argument in the literature that an alternate measure is to consider downside risk. Estrada (2002) argues that the semi variance of return is a more plausible measure of risk and supports the D-CAPM model. He argues that the semi variance of returns is a better measure because firstly, investors do not dislike volatility, but they do dislike downside volatility. Secondly, the semi variance is more useful than the variance when the underlying distribution of the security is asymmetric; see also Nantell and Price (1979).Thirdly, semi variance combines the information on both the variance and skewness. Hence, in this paper, we extend our analysis to include the downside risk and hence estimate the following model to calculate abnormal returns.

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt} + \beta_i^D D_{Down} R_{mt}), \text{ where } D_{Down} = 1 \text{ if } R_{mt} < 0 \qquad [3]$$

The issue of downside risk is also discussed by Galagedera and Brooks (2007), where they provide evidence that downside co-skewness is a better explanatory variable in emerging markets. If investors are more risk averse to down markets, then assets that have high exposure to downside risk are unattractive and must command a risk premium. There are a number of proposed measures that have been provided in the literature as alternative measures of downside coskewness, see for example, Hogan and Warren (1974) and Harlow and Rao (1989). In this paper we hence extend our analysis to estimate a different alternative to the CAPM by using a higher order model in a downside framework. The following model has been used to calculate the abnormal returns.

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt} + \beta_{2i}^{D} D_{Down} R_{mt} + \mu_i R_{mt}^{2} + \mu_{2i}^{D} D_{Down} R_{mt}^{2}),$$

where $D_{Down} = 1$ if $R_{mt} < 0$ [4]

Hence, this study assesses the impact of sovereign rating changes on stock market returns using four different approaches that is the market model, the quadratic market model, the downside model and the quadratic downside model.

A further key contribution of this paper is to test whether Fama French factors are supplements or complements to the higher order and downside models. Calculating abnormal returns using the Fama French model has not been undertaken in the context of sovereign ratings. Hence we extend our models using the Fama French factors. The Fama- French factors as well as the momentum factors, HML, SMB and UMD are available from the website of Kenneth French[4]. The Fama/French factors are constructed using the 6 value-weight portfolios formed on

[4] All the data details are available from the website- http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library.

size and book-to-market. SMB (Small Minus Big) is the average return on the three small portfolios minus the average return on the three big portfolios.

SMB= 1/3(Small Value+ Small Neutral + Small Growth) - 1/3(Big Value+ Big Neutral and Big Growth) (5)

HML (High Minus Low) is the average return on the two value portfolios minus the average return on the two growth portfolios.

HML=1/2(Small value+ Big value)-1/2 (Small Growth –Big Growth) (6)

The momentum factor is constructed using six value-weight portfolios formed on size and prior (2-12) returns. The portfolios, which are formed monthly, are the intersections of 2 portfolios formed on size (market equity, ME) and 3 portfolios formed on prior (2-12) return. The monthly size breakpoint is the median NYSE market equity. The monthly prior (2-12) return breakpoints are the 30^{th} and 70^{th} NYSE percentiles. Momentum is the average return on the two high prior return portfolios minus the average return on the two low prior return portfolios.

UMD=1/2(Small High+ Big High)-1/2(Small Low +Big Low) (7)

Even though these are US data, they have been used as a proxy to represent the world factors. There are some studies that explore the importance of US Fama-French factors in a local asset pricing setting, and the available evidence suggests that they may have a role as proxies for international factors of this type. In the context of explaining the returns on domestic portfolios and stocks, Griffin (2002) suggest that domestic factors are to be preferred. In contrast Durand et al (2006), following the argument of Bekeart and Harvey (1995) support the use of US factors as global factors in the Australian market. The focus of our analysis is at the national market level, as such we make use of US factors as proxies for global factors. As highlighted, the abnormal returns will be calculated using different models, namely, the conventional Fama- French model,

the higher order Fama French model, the downside Fama French Model and the higher order downside model. Hence the following equations are used to calculate the different abnormal returns (AR).

Fama French Three factor model

$$AR_{it} = R_{it} - (\alpha_i + \beta i\ R_{world} + \beta_{2i}\ HML + \beta_{3i}\ SMB\ ) \quad (8)$$

Higher order Fama French Model

$$AR_{it} = R_{it} - (\alpha_i + \beta_i\ R_{world}\ + \beta_{2i}\ R_{world}^{2} + \beta_{3i}\ HML + \beta_{4i}\ SMB\ ) \quad (9)$$

Downside Fama French model

$AR_{it} = R_{it} - (\alpha_i + \beta_1\ R_{world} + \beta_{2i}^{D}\ D_{Down}\ R_{world} + \beta_{3i}\ HML + \beta_{4i}\ SMB)$, where $D_{Down} = 1$ if $R_{world} < 0$ (10)

Higher order Downside Fama French Model

$AR_{it} = Rit - (\alpha i + \beta_i\ R_{world} + \beta_{2i}^{D}\ D_{Down}\ R_{world} + \beta_3\ R_{world}^{2} + \beta_{4i}\ D_{Down}\ R_{world}^{2} + \beta_{5i}\ HML + \beta_{6i}\ SMB$, where $D_{Down} = 1$ if $R_{world} < 0$ (11)

These multifactor models are then augmented to include the momentum factor and the following models are estimated:

Fama French Four Factor model

$$AR_{it} = R_{it} - (\alpha_i + \beta i\ R_{world} + \beta_{2i}\ HML + \beta_{3i}\ SMB + \beta_{4i}\ UMD) \quad (12)$$

Higher order Model Momentum

$$AR_{it} = R_{it} - (\alpha_i + \beta_i\ R_{world}\ + \beta_{2i}\ R_{world}^{2} + \beta_{3i}\ HML + \beta_{4i}\ SMB + \beta_{5i}\ UMD) \quad (13)$$

Downside Fama French model with Momentum

$AR_{it} = R_{it} - (\alpha_i + \beta_1\ R_{world} + \beta_{2i}^{D}\ D_{Down}\ R_{world} + \beta_{3i}\ HML + \beta_{4i}\ SMB + \beta_{5i}\ UMD\ )$, where $D_{Down} = 1$ if $R_{world} < 0$ (14)

Higher order Downside Fama French Model with Momentum

$AR_{it} = Rit - (\alpha i + \beta_i R_{world} + \beta_{2i}^{D} D_{Down} R_{world} + \beta_3 R_{world}^2 + \beta_{4i} D_{Down} R_{world}^2 + \beta_{5i} HML + \beta_{6i} SMB + \beta_{7i} UMD)$, where $D_{Down} = 1$ if $R_{world} < 0$ (15)

For all the different versions of the models, the parameters are estimated using approximately six months of daily return observations beginning 120 days through to 21 days before the sovereign rating change. The event period ranges from 10 days before to 10 days after the rating change. Averaging the abnormal returns over each day in the event period generates the average abnormal returns (AAR):

$$\overline{AAR} = 1/n \sum_{j=1}^{n} ARjt \quad (16)$$

Where N is the number of events for each day t in the event window

Abnormal return test statistics are calculated similar to Dodd (1980). In order to test whether the average abnormal returns are significantly different from zero, the following test statistic is calculated:

$$t = \overline{AAR}_t / \sigma_{ARt} \quad (17)$$

where AAR_t is the average abnormal returns for day t, and

$$\sigma_{ARt} = \left\langle 1/20 \left| \sum_{T=-10, T\neq t}^{+10} (ARt - AAR)\, 2 \right| \right\rangle \quad (18)$$

with AAR the grand mean of the abnormal returns.

3. Results and Discussion

3.1 Market Model Results

In order to determine the impact of foreign currency sovereign rating changes, an event study methodology is employed to detect the abnormal returns resulting from an upgrade or downgrade announcement. The results of our analysis are presented in tables II through VI. The results in the tables are reported in two panels, with panel A of each table reporting the results

for ratings downgrades, while panel B reports the results for ratings upgrades. We equally presents the results for each model in the same table on an aggregate basis. The analysis includes 33 countries with 69 downgrades and 88 upgrades. The results for each model are reported over an event window of –10 days to 10 days after the announcement date.

Table II reports the results of the models estimated using the market model, higher order market model, downside market model and higher order downside model. Analysis of panel A indicates similar results across the market model and the downside model. The results from the market model which are reported over an event window of –10 days to 10 days after the announcement date indicates that for the downgrades there is strong negative tendency in the abnormal returns eight days prior to the announcement day with the abnormal returns being significantly negative at -0.09 percent three days prior to announcement and -1.24 per cent one day prior to announcement day of the downgrade event. The results from the downside model indicate an average abnormal return of -0.07 percent three days prior and -1.27 percent one day prior to announcement. The average abnormal returns revert to positive after one day following the announcement for both the market model and the downside model. Similarly the results following the higher order downside model indicate a strong negative tendency in the returns 10 days prior to announcement and we have statistically significant result at four days prior to announcement at -0.3 percent and at – 0.4 percent one day prior to announcement. The market seems to anticipate the downgrade announcement prior to the actual announcement day, which does not support the efficient market hypothesis, if the rating change announcement is news. The results of the higher order model, in contrast, indicates a very strong negative abnormal returns 10 days prior to announcement and this tendency continues on announcement day as well two days following the announcement. The average abnormal return stands at -1.92 percent on

the announcement day. The use of this model indicate analyzing the impact of sovereign rating changes on stock market returns using the QMM framework for the estimation of the abnormal returns does provide some different results. However the results of all the four models in the case of downgrades is consistent with the literature, where downgrades are said to have a statistical impact on stock market returns (see Brooks, Faff, Hillier and Hillier (2004)).

For upgrades reported in panel B of table II, the market model and the downside model both find a strongly statistically significant reaction on the day of the ratings upgrade with the abnormal returns being positive at 0.43 percent for the market model and at 0.4 percent for the downside model. Once again the results from these two models are remarkably similar. The results from the market model and the downside model are consistent with the literature on ratings changes of individual companies, where upgrades do not have the same wealth impact on the market than downgrades,(see for example, see Barron, Clare and Thomas, 1997; Cornell, Landsman and Shapiro, 1989; Ederington and Goh, 1998; Goh and Ederington, 1993, 1999; Zaima and McCarthy, 1988). The results from using the quadratic market model and the higher order downside model are very different. For upgrades all of the days in the event window show strongly statistically significant results. This suggests that allowance for higher order moments might be important in assessing the national stock market impacts of sovereign rating changes. However, the results seems to be more plausible in the case of the higher order downside model, given that the average abnormal returns are positive over the entire event window, which is what we will be expecting following an upgrade announcement, as compared to the negative returns reported for the quadratic model.

The next stage in our analysis disaggregates the overall set of 33 countries into different groups. We commence by partitioning the set of 33 countries in to 15 developed and 18

emerging markets. The results for developed markets are reported in table III, while the results for emerging markets are reported in table IV. The countries which are included in the developed countries analysis include, Australia, Canada, Cyprus, Denmark, Finland, Hong Kong, Italy, Ireland, Japan, New Zealand, Portugal, Sweden, Singapore, South Africa and Spain. We have 15 downgrades and 32 upgrades in this category. The list of countries for the emerging countries include, Argentina, Brazil, Colombia, China, Chile, Indonesia, Korea, Malaysia, Mexico, Philippines, Taiwan, Poland, Qatar, Russia, Slovenia, Thailand, Turkey and Venezuela with a total of 56 upgrades and 54 downgrades.

Table III indicates that for the developed markets the results are qualitatively similar to the overall set of results for the market model, the downside model and the higher order downside model, in that there are only a limited number of days in the event window where statistically significant results are found for downgrades in panel A. However it should be highlighted that for the market model and the downside model the results are significant two days prior to announcement but with the abnormal returns being positive at 0.09 percent and 0.15 percent following the downgrade announcement. The partitioning of the developed countries indicates that the level of economic growth and stock market activity seem to be an important component in the determinant of ratings as well as it may be that the market has access to more information than emerging markets, which highlights the different level of market efficiency. An interesting finding is the results are different when using the quadratic market model for developed countries as compared to the previous analysis but the results are similar to the market model and the downside model. The results for upgrades are reported in panel B. The results are similar to those obtained for the overall set of countries for the market model and the downside market model with the average abnormal returns being positive at 0.46 percent for the market

model and 0.45 percent for the downside model on the announcement day. Once again our results are consistent with the literature on sovereign ratings. The higher order model upgrades results are similar to those obtained for the results of all the countries. The average abnormal returns tend to be negative and are statistically significant over the entire event window. The higher order downside model indicates different results obtained from the all countries analysis in that the results are statistically significant only two days prior to announcement day, however the returns are negative at -0.39 per cent.

The emerging market results in table IV are qualitatively similar to the overall results obtained in table II showing the aggregate results of the 33 countries. This table reports the aggregate results of 18 countries with 56 upgrades and 54 downgrades. The downgrades in the emerging markets are a much more common event in the emerging market as compared to a downgrade event in a developed market. The market and downside model indicate a few days of significant results in panel A and in particular one day prior to the announcement where the average abnormal return is -0.16 percent for the market model and -0.19 percent for the downside model. The higher order downside model is very similar to the results obtained in the previous analysis with a negative tendency in the returns and statistically significant results over a period of four days prior to the announcement. This indicates much anticipated downgrade news in the emerging markets. The analysis of the quadratic market model reveals that the returns are significant for downgrades ten days prior to the announcement and the negative trend in the average abnormal returns continues ten days after the announcement day. Panel B reports the results of upgrades and as expected the results are similar to the previous analysis. The market model results and downside model results are consistent with the literature with the returns being significant on announcement day at 0.05 per cent and 0.04 per cent respectively.

The higher order and the higher order downside models indicate that there is a significant market reaction following the upgrade announcement throughout the entire event window, however the returns are all negative for the higher order model.

We also consider a geographic partitioning of the countries, in particular for European countries to check the validity of the results obtained for the developed countries as the sample of European countries include mostly the developed markets. The results are reported in table V. The sample consists of 11 countries with the 9 downgrades and 17 upgrades. A comparison between the results of the developed and the European countries indicate the results are very similar. Panel A reports the results of downgrades which indicates that the market does not seem to have a reaction following a downgrade announcement. When compared to the results obtained from the analysis undertaken of all the countries in panel A of table II, where the higher order model showed a significant impact on the market over the entire event window, the results suggest that the use of higher order models may be restricted to a certain subset of countries. Panel B of table V reports the results of upgrade announcement on the stock market returns. On average, the results for the market model, the higher order model, the downside model are similar to the developed market results in table III. However, the higher order downside model shows a significant reaction on the stock market over the entire event window with the returns being positive through all the days.

Overall, the results obtained from the analysis indicate that the market model and downside model seem to have the similar type of results in that the downgrades do have some impact on the market in particular prior to announcement days and the market reverts to normal following the announcement. For upgrades the market tends to react only on the announcement day. These results are consistent with the general literature on the impact of sovereign rating changes on the

stock market. However the use of the quadratic models indicate that the market reacts to both upgrades and downgrades announcements and it seems to have a reaction over a prolonged period of time.

3.2 Fama and French Factors and Momentum

The CAPM has been criticised because of empirical anomalies like size, financial distress and momentum, see for example, Banz (1981); Stattman (1980) and Rosenberg, Reid and Lanstein (1985); Jegadeesh and Titman (1993). Hence previous studies have extended the CAPM to include factors that will correct for these anomalies. Empirical work by Fama and French (1992, 1993) and Carhart (1997) have accounted for these factors and is commonly known as the three factor model and the four factor model respectively and reveals that these additional factor portfolios significantly improve the model's ability to capture the cross-sectional variation of stock returns, both within the US and internationally. In this study, we estimate the returns using the Fama French three factor model (equation 8) and the Fama French four factor model (equation 12) to assess if these different benchmark models have a significant impact on the abnormal returns following a rating change. In this section we report the results of the abnormal returns estimated using the Fama French model in table VI and the results using the four factor model that is including momentum in table VII. We augment the model to a quadratic version, a downside framework and a higher order downside model. The results are reported in table VI of the paper for the 33 countries with 88 upgrades and 69 downgrades. Rating agencies provide an independent assessment of the default probability. According to the private information hypothesis, equally known as the signaling or information asymmetry hypothesis, (see for example, Hsueh & Liu, 1992; Abad-Romero and Robles-Fernandez, 2006)), in order for a rating agency to make a decision about rating changes, the agency has not only used public

information, but it has also have access to information which is only known by insiders. Hence, what is therefore expected is that announcements of a rating upgrade will have a positive impact on the market whilst a negative market reaction can be expected for a downgrade announcement. Panel A of table VI reports the downgrade announcement and panel B the impact on the returns following upgrade announcements. The results obtained using the Fama French three factor models are consistent with the information asymmetry hypothesis for downgrades and consistent with the efficient market hypothesis for upgrades. Including the Fama French size, growth factors, provide similar results to the results obtained from estimating the abnormal returns using the market model. Studies in the literature suggest that the three factor model provide better results in stock pricing (see for example de Moore and Sercu (2004)), however, the results obtained in this study suggest that the three factor model does not make a difference to the abnormal returns following a rating change. The results are reported over a window of -10 days to 10 days after the announcement. For the downgrades the market tends to have a reaction on three days as well as one day prior to announcement. This result is consistent across all the versions of estimation that has been used in this study. The average abnormal returns are at -0.96 percent for the Fama French three factor model, -0.3 percent for the higher order model, -1.21 percent for the downside model and -1.31 percent for the higher order downside model one day prior to announcement. The market reverts back to normal following the announcement day. For the upgrades, across all the four estimation models, the market reacts only on the announcement day with the returns being positive and statistically significant over the event window.

Table VII reports the results using the Fama French four factor models that is we use the momentum factor in our analysis. Carhart (1997) develops what is known as the four factor model which includes momentum which we apply in the context of sovereign ratings. A very

interesting finding is that the use of four factors in the estimation does not reveal any different results as compared to a three factor model. Across all the four estimation techniques, panel A indicate similar results to what was obtained in the three factor analysis. The market seems to react three days as well as one day prior to announcement of the rating downgrade. There is a significant reaction on day three following the announcement of the downgrade, but the returns are positive which indicate that there could be other events affecting the stock market returns. Panel B reports the results following the upgrade announcement and the results are similar to what was obtained using the three factor models, that is the market reacts to the upgrade on announcement day only and the market reverts to normal on the other days. This is consistent across the four estimation techniques.

While in the previous section under the market models estimation, the quadratic model provided different results, it seems that applying the Fama- French three factors and four factors does not provide significantly different abnormal returns in comparison to the use of market model in calculating the abnormal returns following a rating change announcement. The literature on the debate on the use of CAPM has been extensive and justifies the use of the alternative models. In this paper we apply each of the different variation of the models to test if this is the case as we calculate the impact of sovereign rating changes on the stock market returns. Higher order moments are an alternative response to the poor performance of the standard CAPM. It allows investors to have preference for higher moments in the return distribution beyond mean and variance. Krauss and Litzenberger (1976) develop the three-moment CAPM, where investors are concerned with the skewness in addition to the mean and variance (see also Harvey and Siddique (2000)).

Similarly, in order to measure downside risk we include a downside framework analysis. The CAPM model asserts that investors are rewarded only for systematic risk since unsystematic risk can be eliminated through diversification. Hence the expected return on a portfolio is the sum of the risk free rate and a risk premium as measured by beta. Pettengill, Sundaram and Mathur (1995) test the relationship between portfolio beta and returns, which is modified to account for the conditional relationship between beta and realized returns. They argue that if the realized market return is above the risk-free return, portfolio betas and returns should be positively related, but if the realized market return is below the risk-free return, portfolio betas and returns should be inversely related. Hence they suggest that appropriate allowance for up/down betas can overcome some critiques of the CAPM.We equally test the models in a higher order downside framework which has been applied by Galagedera and Brooks (2007) who investigate the issue of co-skewness as measure of risk in a downside framework.

The results obtained in our study suggest that the calculation of the abnormal return in the event study is not sensitive to the model specification. However, we still conclude that there is a stock market reaction following the announcement of a rating downgrade and this does not seem to the case when we have the upgrade announcement.

4. Conclusion

This paper has analysed the national stock market impact of sovereign rating changes using different benchmark models for the calculation of abnormal returns, namely, the market model, the quadratic model, the downside model and the higher order downside model. We equally test whether Fama-French factors are complements or substitutes to higher order model and downside models in assessing the impact of sovereign rating changes on national stock markets.

We assess whether different benchmark models of asset pricing matter in testing the significance of sovereign rating changes using the population of all rating change announcements for the period 1 January 1975 through January 2010 from Standard and Poor's for a sample of 33 countries.

The results indicate that there is a stock market reaction following the announcement of a sovereign rating change. Upgrade announcements seem to have an impact on the market on the announcement day which is consistent with the efficient market hypothesis and the market seems to react prior to the announcement of the downgrade. The returns are significantly negative three days and one day prior to the announcement, which is consistent with the signalling hypothesis. As such our results are consistent with the general findings of the literature on sovereign ratings.

The aim of this paper was to assess whether different benchmark models will provide alternative results to this test. The result shows that the market model and a downside model that allows for asymmetry in risk produce similar results for all countries and for the set of emerging markets. However, a quadratic market model and the higher order downside model that allow for higher order moments being important in the determination of risk produces very different results for the overall set of countries. This initially suggests that higher order moments may play an important role in risk measurement for a subset of countries.

However, as we augment our model to use Fama French model and momentum, we find that the results are not sensitive to model specification. The key feature in the results is that these findings are robust across the different specification of the models and hence it seems that assessment of the impact of sovereign rating changes is not sensitive to the model specification. While the literature highlights that the problems associated with the CAPM can be corrected by

using different asset pricing models, our models suggest that the success of a multifactor model depends substantially on the methodology and the data used in the analysis which is a similar conclusion to that drawn by Harvey and Siddique (2000).

References:

Abad-Romero, P., and Robles-Fernandez, M. D.,2006, Risk and Return Around Bond Rating Changes: New Evidence From the Spanish Stock Market, Journal of Business Finance and Accounting, 33, 885-908.

Barron, M. J., Clare, A. D., and Thomas, S. H., 1997, The Effect of Bond rating Changes and New Ratings on UK Stock Returns, Journal of Business Finance and Accounting, 24, 497-509.

Barone-Adesi, G., 1985, Arbitrage equilibrium with skewed asset returns, Journal of Financial and Quantitative Analysis, 20, 299-313

Binder, J., 1998, The event study methodology since 1969, Review of Quantitative Finance and Accounting, 11, 111-37.

Bekeart, G., and Harvey, C.,1995, Time-varying world market integration, Journal of Finance,50,403-444

Banz, R.W., 1981, The Relationship between Return and Market Value of Common Stocks, Journal of Financial Economics, 9, 3-18.

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

Carhart, M., 1997, On persistence of mutual fund performance, Journal of Finance, 52, 57-82.

Chung, Y., Johnson, H., Schill, M., 2006, Asset pricing when returns are nonnormal: Fama-French factors versus higher-order systematic co-moments. Journal of Business, 79, 923-940

Cornell, B., Landsman W. and Shapiro, A. C.,1989, Cross-Sectional Regularities in the Response of Stock Prices to Bond Rating Changes, Journal of Accounting, Auditing, and Finance, 4, 460-479.

De Moor, L., and Sercu, P., 2004, CAPM tests and alternative factor portfolio composition:Getting the alpha's right, Tijdschrift voor Economie en Management, 49, 789 -846.

Dodd, P., 1980, Merger proposals, management discretion and stockholder wealth, Journal of Financial economics, 8, 105-137

Durand, R., Limkriangkrai, M., and Smith, G.,2006, In America's Thrall. The Effects of the US Market and US Security Characteristics on Australian Stock Returns, Accounting and Finance, 46, 577-604.

Ederington, H.L., Yawitz, B.J., and Roberts, B.E., 1987, the Informational Content Of Bond Ratings, The Journal of Financial Research, 10, 211-227

Estrada, J., 2002, Systematic risk in emerging markets: the D-CAPM, Emerging Markets Review, 3, 365–379.

Estrada, J and Serra, P., 2005, Risk and Return in Emerging Markets: Family Matters, Journal of Multinational Financial Management, 15, 257-272

Estrada, J., 2007, Mean-Semivariance Behavior: Downside Risk and Capital Asset Pricing. International Review of Economics and Finance,16, 169-185.

Fama, E.F. and French K.R., 1992, The Cross-Section of Expected Stock Returns, Journal of Finance, 47, 27–65.

Fama, E.F. and French, K.R., 1993, Common Risk Factors in the Returns on Stocks and Bonds, Journal of Financial Economics, 33, 3–56.

Fama, E.F. and French, K.R, 1996, Multifactor Explanations of Asset Pricing Anomalies, Journal of Finance, 51, 55–84.

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

Galagedera, D.U.A., and Brooks, R., 2007, Is co-skewness a better measure of sirk in the downside than downside beta? Evidence in emerging market data, Journal of Multinational Financial Management,17,214-230.

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

Goh, J. C. and Ederington, H.,1993, Is a Bond Rating Downgrade Bad news. Good News, or No news for Stockholders, Journal of Finance, 48, 2001-2008.

Goh, J. C. and Ederington, H., 1999, Cross-Sectional Variation in the Stock market Reaction to Bond rating Changes, Quarterly review of Economics and Finance, 39, 101-112.

Griffin, J., 2002, Are the Fama French factors global or country specific, Review of Financial Studies, 15, 1121-1152

Harlow, W. V, and Rao, R.K.S., 1989, Asset Pricing in a generalized mean-lower partial moment framework: theory and evidence, Journal of financial and Quantitative Analysis, 24,285-311.

Harvey, C., and Siddique,A., 2000, Conditional Skewness in Asset Pricing Tests, Journal of Finance,55, 1263-1295

Hogan, W., and Warren, J., 1974, Toward the development of an equilibrium capital-market model based on semivariance, Journal of Financial and Quantitative Analysis, 9, 1-11.

Hsueh, L. P., and Liu, Y. A,1992, Market anticipation and the effect of bond rating changes on common stock prices, Journal of Business Research, 24, 225-239.

Jegadeesh, N., and Titman, S., 1993. Returns to buying winners and selling losers: Implications for stock market efficiency, Journal of Finance, 48, 65-91.

Kraus, A. and Litzenberger R., 1976, Skewness preference and the valuation of risky assets, Journal of Finance, 31, 1085-1100

Mishra, S., Prakash, A., Karels, G. And Pactwa, T., 2007, Skewness preference and the measurement of abnormal returns, Applied Economics, 39, 739 – 757.

Nguyen, P., and Puri, T, N., 2009, Higher Order Systematic Comoments and Asset Pricing:New Evidence, The Financial Review, 44, 345-369.

Pettengill, G.N., Sundaram, S.and Mathur, I., 1995, The conditional relation between beta and returns,Journal of Financial and Quantitative Analysis, 30, 101- 116.

Price, Kelly, Barbara Price, and Timothy J. Nantell, 1982, Variance and lower partial moment measures of systematic risk: some analytical and empirical results, Journal of Finance, 37, 843-855.

Pukthuanthong-Le, K., Elayan, F. and Rose, L., 2007, Equity and debt market responses to sovereign credit ratings announcement, Global Finance Journal, 18, 47-83.

Rosenberg, B.,, Kenneth R., and Lanstein,R., 1985, Pervasive Evidence of Market Inefficiency, Journal of Portfolio Management, 9, 18-28.

Stattman, D.,, 1980, Book Values and Stock Returns, The Chicago MBA: a Journal of Selected Papers, 4, 25-45.

Zaima, J. K. and McCarthy, J., 1988, The Impact of Bond Rating Changes on Common Stocks and Bonds: Tests of the Wealth Redistribution Hypothesis, Financial Review, 23, 486-498.

Table I: Summary Statistics: List of Countries included in the study with the number of upgrades and downgrades for each countries.

Country	Returns date available - January 2010	Rating changes	Source	No of Upgrades	No of Downgrades
Argentina	3/08/1993	Y	DS	3	8
Australia	2/01/1973	Y	DS	2	2
Brazil	5/07/1997	Y	DS	3	2
Canada	3/01/1973	Y	DS	1	1
Chile	4/07/1989	Y	DS	3	0
China	4/05/1994	Y	DS	4	1
Colombia	1/01/2001	Y	DS	1	0
Cyprus	4/01/1994	Y	DS	0	2
Denmark	3/01/1976	Y	DS	2	2
Finland	2/01/1998	Y	DS	3	2
Hong Kong	2/01/1973	Y	DS	4	2
Indonesia	3/04/1990	Y	DS	7	9
Ireland	2/01/1973	Y	DS	4	0
Italy	2/01/1973	Y	DS	0	3
Japan	2/011/1973	Y	DS	0	3
Korea	10/09/1987	Y	DS	5	6
Malaysia	2/01/1986	Y	DS	5	4
Mexico	11/05/1989	Y	DS	3	1
New Zealand	5/01/1988	Y	DS	2	1
Philippines	9/11/1988	Y	DS	2	2
Poland	2/03/1994	Y	DS	3	0
Portugal	3/01/1990	Y	DS	3	1
Qatar	2/06/2005	Y	DS	1	0
Russia	18/07/2006	Y	DS	1	0
Singapore	2/01/1973	Y	DS	2	0
Slovenia	1/02/2005	Y	DS	2	0
South Africa	2/01/1973	Y	DS	4	0
Spain	4/05/1987	Y	DS	2	0
Sweden	5/01/1982	Y	DS	1	1
Taiwan	3/05/1988	Y	DS	1	2
Thailand	5/01/1987	Y	DS	3	3
Turkey	13/06/1989	Y	DS	4	6
Venezuela	3/01/1990	Y	DS	7	5

DS: DataStream Return index Available

Table II: This table reports average abnormal returns (AAR) and cumulative abnormal returns (CAR) for **all countries** in the analysis as measures of the market reaction to Standard & Poors (S&P) foreign currency rating changes. AAR and CAR are generated using a standard mean adjusted event study methodology. A rating change occurs when S&P announces a rating change. There are 88 upgrades and 69 Downgrades for a sample of 33 countries. This table reports the results using the market model (equation 1), higher order model (equation 2) , downside market model (equation 3) and higher order downside model (equation 4)

All Countries- 33

Panel A: 69 Downgrades

	OLS			Higher Order model			Downside Model			Co skewness-Downside		
Day	AAR	CAR	TStats	AAR	CAR	TStats	AAR	CAR	TStats	AAR	CAR	TStats
-10	-0.002	-0.002	-0.38	-0.0181	-0.0181	-2.95**	-0.0011	-0.0011	-0.2	-0.0252	-0.0252	-1.58
-9	0.0016	-0.0004	0.3	-0.0123	-0.0304	-2.00**	0.0019	0.0008	0.35	-0.0072	-0.0324	-0.45
-8	-0.008	-0.0084	-1.56	-0.0201	-0.0506	-3.27**	-0.0044	-0.0036	-0.79	-0.0039	-0.0363	-0.24
-7	0.0014	-0.007	0.28	-0.0126	-0.0632	-2.05**	0.0025	-0.0011	0.45	-0.0027	-0.039	-0.17
-6	-0.0051	-0.0121	-0.99	-0.0177	-0.0809	-2.88**	-0.0008	-0.0019	-0.14	-0.0054	-0.0444	-0.34
-5	-0.0012	-0.0133	-0.24	-0.0157	-0.0967	-2.55**	0.0001	-0.0017	0.03	-0.0036	-0.048	-0.23
-4	-0.0025	-0.0158	-0.48	-0.0179	-0.1145	-2.90**	0.0016	-0.0001	0.29	-0.0315	-0.0795	-1.97*
-3	-0.0091	-0.0249	-1.77*	-0.0244	-0.1389	-3.97**	-0.0077	-0.0079	-1.69*	-0.0335	-0.113	-2.10**
-2	-0.0052	-0.0301	-1.01	-0.0224	-0.1614	-3.64**	-0.0053	-0.0132	-0.95	-0.0316	-0.1446	-1.98**
-1	-0.0124	-0.0425	-2.41**	-0.0302	-0.1915	-4.90**	-0.0127	-0.0259	-2.29**	-0.0415	-0.1861	-2.61**
0	-0.0039	-0.0463	-0.75	-0.0192	-0.2108	-3.12**	-0.0043	-0.0302	-0.77	-0.0118	-0.198	-0.74
1	-0.0052	-0.0516	-1.01	-0.019	-0.2298	-3.09**	-0.0005	-0.0307	-0.1	-0.0459	-0.2439	-2.88**
2	0.0037	-0.0478	0.73	-0.0115	-0.2413	-1.87**	0.0054	-0.0253	0.98	-0.0196	-0.2635	-1.23
3	0.0056	-0.0423	1.08	-0.0089	-0.2502	-1.44	0.0088	-0.0165	1.69*	-0.0177	-0.2813	-1.11
4	0.0055	-0.0367	1.08	-0.0056	-0.2558	-0.91	0.0064	-0.0101	1.15	0.0037	-0.2776	0.23
5	0.0024	-0.0343	0.48	-0.0106	-0.2664	-1.72*	0.0091	-0.001	1.67*	0.0036	-0.274	0.23
6	-0.0091	-0.0434	**-1.77***	-0.0237	-0.2901	-3.84**	-0.0035	-0.0044	-0.62	-0.0105	-0.2845	-0.66
7	0.0037	-0.0397	0.72	-0.0076	-0.2977	-1.24	0.0048	0.0004	0.87	0.0065	-0.278	0.4
8	-0.0015	-0.0412	-0.28	-0.0145	-0.3122	-2.36**	0.0024	0.0028	0.43	-0.0022	-0.2803	-0.14
9	-0.002	-0.0432	-0.4	-0.016	-0.3282	-2.60**	0.0022	0.0049	0.39	-0.0263	-0.3066	-1.65*
10	-0.0011	-0.0443	-0.22	-0.0164	-0.3446	-2.66**	0.0035	0.0085	0.64	-0.0269	-0.3334	-1.68*

Panel B: 88 Upgrades

	OLS			Higher Order model			Downside Model			Co skewness-Downside		
Day	AAR	CAR	TStats	AAR	CAR	TStats	AAR	CAR	TStats	AAR	CAR	TStats
-10	-0.0029	-0.0029	-1.4	-0.0274	-0.0274	-13.05**	-0.0031	-0.0031	-1.54	0.0038	0.0038	1.62
-9	-0.0018	-0.0046	-0.88	-0.0252	-0.0526	-11.96**	-0.0019	-0.005	-0.92	0.0056	0.0093	2.39**
-8	0.0019	-0.0027	0.95	-0.0211	0.9726	-10.02**	0.0018	-0.0032	0.87	0.0089	0.0183	3.83**
-7	-0.0003	-0.003	-0.12	-0.0249	0.9477	-11.82**	-0.0004	-0.0036	-0.21	0.0013	0.0196	0.56
-6	-0.0008	-0.0037	-0.38	-0.0245	1.9726	-11.66**	-0.0006	-0.0042	-0.29	0.0057	0.0253	2.45**
-5	-0.0011	-0.0048	-0.54	-0.0234	1.9492	-11.11**	-0.0012	-0.0054	-0.58	0.0051	0.0303	2.17**
-4	0.0032	-0.0016	1.59	-0.0196	2.9726	-9.32**	0.0033	-0.0021	1.63	0.0095	0.0398	4.08**
-3	0.002	0.0004	0.98	-0.0213	2.9513	-10.11**	0.0017	-0.0004	0.86	0.0077	0.0476	3.33**
-2	-0.0015	-0.0011	-0.73	-0.0254	3.9726	-12.07**	-0.0015	-0.0019	-0.77	0.0042	0.0518	1.82*
-1	0.0004	-0.0007	0.2	-0.0234	3.9492	-11.10**	0.0003	-0.0017	0.13	0.0065	0.0583	2.81**
0	0.0043	0.0037	2.13**	-0.02	4.9726	-9.53**	0.004	0.0023	1.97**	0.0106	0.0689	4.54**
1	0.0014	0.005	0.67	-0.0229	4.9496	-10.89**	0.001	0.0033	0.48	0.0086	0.0775	3.71**
2	-0.0026	0.0024	-1.3	-0.0253	5.9726	-12.01**	-0.0031	0.0001	-1.56	0.0039	0.0814	1.68*
3	0.0027	0.005	1.31	-0.0198	5.9528	-9.41**	0.0025	0.0026	1.22	0.0088	0.0902	3.76**
4	-0.0007	0.0043	-0.36	-0.0235	6.9726	-11.17**	-0.001	0.0016	-0.48	0.0052	0.0954	2.24**
5	-0.0018	0.0025	-0.87	-0.0238	6.9487	-11.33**	-0.0015	0.0001	-0.75	0.0056	0.101	2.41**
6	-0.0021	0.0005	-1.02	-0.024	7.9726	-11.41**	-0.0021	-0.002	-1.06	0.0035	0.1045	1.51
7	-0.0005	0	-0.23	-0.0249	7.9477	-11.81**	-0.0009	-0.0029	-0.44	0.006	0.1105	2.57**
8	0.0013	0.0013	0.66	-0.0218	8.9726	-10.37**	0.0013	-0.0017	0.62	0.0074	0.1179	3.18**
9	0	0.0013	0.01	-0.0232	8.9494	-11.02**	-0.0002	-0.0019	-0.11	0.0069	0.1248	2.95**
10	0.0007	0.0021	0.36	-0.0228	9.9726	-10.82**	0.0006	-0.0013	0.3	0.0073	0.132	3.12**

* Denotes Statistical significance at 10%, ** Denotes statistical significance at 5 %

Table III: This table reports average abnormal returns (AAR) and cumulative abnormal returns (CAR) for **Developed countries** in the analysis as measures of the market reaction to Standard & Poors (S&P) foreign currency rating changes. AAR and CAR are generated using a standard mean adjusted event study methodology. A rating change occurs when S&P announces a rating change**. There are 32 upgrades and 15 Downgrades for a sample of 15 countries**. This table reports the results using the market model (equation 1), higher order model (equation 2), downside market model (equation 3) and higher order downside model (equation 4).

Panel A: 15 Downgrades

	Market Model			Higher Order model			Downside Model			Co skewness-Downside		
Day	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**
-10	-0.0039	-0.0039	-0.84	-0.0013	-0.0013	-0.29	-0.0031	-0.0031	-0.36	0.0013	0.0013	0.23
-9	-0.001	-0.0049	-0.23	-0.0013	-0.0027	-0.29	-0.0011	-0.0041	-0.12	-0.0024	-0.0011	-0.41
-8	0	-0.0049	0	-0.0001	-0.0028	-0.02	0.0127	0.0086	1.47	0.0007	-0.0004	0.12
-7	0.003	-0.0019	0.66	0.0029	0.0001	0.63	-0.0034	0.0052	-0.39	0.0036	0.0033	0.62
-6	-0.0078	-0.0096	-1.68*	-0.0076	-0.0075	-1.65*	-0.0012	0.004	-0.14	-0.0086	-0.0053	-1.48
-5	0.0037	-0.0059	0.81	0.0034	-0.004	0.75	0.0036	0.0076	0.42	0.0042	-0.0011	0.72
-4	0.0051	-0.0008	1.1	0.0049	0.0009	1.07	0.0175	0.0251	2.02**	0.0012	0.0001	0.21
-3	0.003	0.0022	0.66	0.0024	0.0033	0.52	0.0084	0.0334	0.97	0.0003	0.0004	0.05
-2	0.0093	0.0115	2.02**	0.0095	0.0128	2.05**	0.0156	0.0491	1.81*	0.0038	0.0042	0.65
-1	-0.0011	0.0104	-0.24	-0.0011	0.0117	-0.24	0.0053	0.0544	0.61	0.001	0.0052	0.17
0	-0.0045	0.006	-0.97	-0.0043	0.0074	-0.94	-0.0104	0.044	-1.2	-0.0031	0.0021	-0.52
1	-0.0019	0.0041	-0.41	-0.0025	0.0048	-0.55	0.0107	0.0547	1.24	-0.0164	-0.0143	-2.81**
2	0.0037	0.0078	0.8	0.0036	0.0085	0.79	0.0037	0.0584	0.42	0.0033	-0.011	0.56
3	0.0008	0.0086	0.18	0.0008	0.0093	0.17	-0.0053	0.053	-0.62	0.0018	-0.0092	0.32
4	-0.0009	0.0077	-0.2	0.0034	0.0127	0.75	0.0074	0.0604	0.85	0.0068	-0.0024	1.17
5	0.0007	0.0084	0.15	0.0009	0.0136	0.2	0.0137	0.0741	1.58	0.0004	-0.002	0.07
6	-0.0065	0.0019	-1.41	-0.0068	0.0068	-1.47	0.0062	0.0803	0.72	-0.004	-0.006	-0.69
7	-0.0035	-0.0016	-0.76	-0.0034	0.0034	-0.74	-0.0098	0.0705	-1.14	0.0011	-0.0048	0.2
8	0.0094	0.0078	2.03**	0.0099	0.0133	2.15**	0.0162	0.0867	1.87*	0.0055	0.0007	0.94
9	-0.0008	0.0069	-0.18	-0.0007	0.0126	-0.16	-0.0008	0.0858	-0.1	0.0035	0.0042	0.61
10	-0.0015	0.0055	-0.32	-0.0009	0.0117	-0.2	0.0112	0.0971	1.3	0.0114	0.0156	1.95

Panel B: 32 Upgrades

	Market model			Higher Order model			Downside Model			Co skewness-Downside		
Day	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**
-10	-0.0048	-0.0048	-2.10**	-0.0373	-0.0373	-14.15**	-0.0049	-0.0049	-2.11**	-0.0055	-0.0055	-2.31**
-9	-0.0043	-0.0091	-1.86*	-0.0348	-0.0722	-13.21**	-0.0041	-0.009	-1.76*	-0.0023	-0.0078	-0.97
-8	-0.0018	-0.011	-0.8	-0.0296	-0.1018	-11.24**	-0.0017	-0.0107	-0.73	-0.0013	-0.0091	-0.52
-7	0.0014	-0.0095	0.62	-0.029	-0.1308	-10.99**	0.0021	-0.0086	0.9	0.0008	-0.0083	0.34
-6	0.0005	-0.0091	0.21	-0.0318	-0.1626	-12.05**	0.0007	-0.0078	0.32	0.0017	-0.0066	0.72
-5	0.0025	-0.0065	1.11	-0.0274	-0.19	-10.39**	0.0025	-0.0053	1.09	0.0019	-0.0046	0.81
-4	0.0001	-0.0064	0.03	-0.029	-0.219	-11.00**	0.0002	-0.0051	0.07	-0.0018	-0.0065	-0.77
-3	-0.0007	-0.0071	-0.3	-0.029	-0.248	-10.99**	-0.0007	-0.0059	-0.31	-0.0024	-0.0089	-1.02
-2	-0.0028	-0.0099	-1.22	-0.0349	-0.2829	-13.23**	-0.003	-0.0088	-1.28	-0.0039	-0.0127	-1.69*
-1	0.0008	-0.0092	0.34	-0.0326	-0.3155	-12.34**	0.0006	-0.0082	0.25	0.001	-0.0118	0.41
0	0.0046	-0.0046	**2.00****	-0.0282	-0.3437	-10.68**	0.0045	-0.0038	1.93*	0.0033	-0.0085	1.37
1	-0.0013	-0.0058	-0.56	-0.0343	-0.378	-13.01**	-0.0014	-0.0052	-0.6	0.0004	-0.0081	0.17
2	-0.0021	-0.0079	-0.91	-0.0309	-0.4089	-11.71**	-0.0023	-0.0074	-0.98	-0.0029	-0.011	-1.23
3	0.0005	-0.0075	0.21	-0.0298	-0.4387	-11.30**	0.0001	-0.0073	0.06	0.0001	-0.0109	0.05
4	-0.0018	-0.0092	-0.76	-0.0296	-0.4683	-11.24**	-0.0019	-0.0092	-0.81	-0.0035	-0.0144	-1.45
5	-0.0024	-0.0116	-1.03	-0.0317	-0.5	-12.01**	-0.0025	-0.0117	-1.07	-0.0023	-0.0167	-0.97
6	-0.0019	-0.0134	-0.81	-0.0313	-0.5313	-11.86**	-0.0017	-0.0133	-0.73	-0.0021	-0.0187	-0.86
7	-0.0004	-0.0139	-0.19	-0.032	-0.5633	-12.15**	-0.0008	-0.0141	-0.32	-0.0002	-0.0189	-0.08
8	0.0013	-0.0125	0.57	-0.0302	-0.5935	-11.44**	0.0013	-0.0128	0.55	0.0007	-0.0182	0.29
9	0.0002	-0.0123	0.09	-0.0315	-0.625	-11.93**	0.0001	-0.0128	0.04	0.0016	-0.0166	0.67
10	-0.0027	-0.015	-1.16	-0.0344	-0.6594	-13.03**	-0.0027	-0.0155	-1.18	-0.0038	-0.0204	-1.59

* Denotes Statistical significance at 10%, ** Denotes statistical significance at 5 %

Table IV: This table reports average abnormal returns (AAR) and cumulative abnormal returns (CAR) for **Emerging** countries in the analysis as measures of the market reaction to Standard & Poors (S&P) foreign currency rating changes. AAR and CAR are generated using a standard mean adjusted event study methodology. A rating change occurs when S&P announces a rating change. **There are 56 upgrades and 54 Downgrades for a sample of 18 countries**. This table reports the results using the market model (equation 1), higher order model (equation 2), downside market model (equation 3) and higher order downside model (equation 4).

Panel A: 54 Downgrades

	Market Model			Higher Order model			Downside Model			Co skewness-Downside		
Day	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**
-10	-0.0015	-0.0015	-0.22	-0.0238	-0.0238	-2.95**	-0.0004	-0.0004	-0.05	-0.0336	-0.0336	-1.65*
-9	0.0023	0.0008	0.34	-0.016	-0.0398	-1.97***	0.003	0.0026	0.36	-0.0089	-0.0425	-0.44
-8	-0.0109	-0.0101	-1.62*	-0.0269	-0.0667	-3.33**	-0.0105	-0.0079	-1.24	-0.0052	-0.0477	-0.26
-7	0.0006	-0.0096	0.08	-0.0181	-0.0848	-2.23**	0.0046	-0.0033	0.54	-0.0046	-0.0523	-0.22
-6	-0.0042	-0.0138	-0.63	-0.021	-0.1058	-2.59**	-0.0006	-0.004	-0.07	-0.0044	-0.0567	-0.22
-5	-0.0032	-0.0171	-0.48	-0.0223	-0.1281	-2.76**	-0.0011	-0.0051	-0.13	-0.0061	-0.0628	-0.3
-4	-0.0038	-0.0208	-0.56	-0.0241	-0.1521	-2.97**	-0.0041	-0.0092	-0.48	-0.0411	-0.1039	-2.02**
-3	-0.0134	-0.0342	-1.97*	-0.0334	-0.1856	-4.13**	-0.0136	-0.0227	-1.69	-0.0438	-0.1478	-2.15**
-2	-0.0105	-0.0447	-1.55	-0.0336	-0.2191	-4.15**	-0.0128	-0.0356	-1.52	-0.0423	-0.19	-2.08**
-1	-0.0166	-0.0612	-2.45**	-0.0402	-0.2593	-4.96**	-0.0192	-0.0548	-2.27**	-0.0543	-0.2443	-2.67**
0	-0.0036	-0.0648	-0.53	-0.024	-0.2832	-2.96**	-0.0021	-0.0568	-0.24	-0.0142	-0.2585	-0.7
1	-0.0061	-0.0709	-0.9	-0.0243	-0.3075	-3.00**	-0.0046	-0.0614	-0.54	-0.0542	-0.3127	-2.66**
2	0.0035	-0.0674	0.52	-0.0167	-0.3242	-2.06**	0.006	-0.0554	0.71	-0.0268	-0.3395	-1.31
3	0.007	-0.0604	1.03	-0.0121	-0.3363	-1.5	0.0139	-0.0415	1.64	-0.0237	-0.3631	-1.16
4	0.0069	-0.0535	1.01	-0.0094	-0.3457	-1.16	0.006	-0.0355	0.71	0.0026	-0.3606	0.13
5	0.0021	-0.0514	0.31	-0.0152	-0.361	-1.88*	0.0075	-0.028	0.88	0.0043	-0.3562	0.21
6	-0.0113	-0.0627	-1.67*	-0.0305	-0.3914	-3.77**	-0.0069	-0.035	-0.82	-0.0125	-0.3688	-0.62
7	0.0055	-0.0573	0.81	-0.0095	-0.4009	-1.17	0.0101	-0.0249	1.19	0.0078	-0.3609	0.39
8	-0.0036	-0.0609	-0.53	-0.0212	-0.4221	-2.62**	-0.0026	-0.0274	-0.3	-0.0048	-0.3658	-0.24
9	-0.0028	-0.0637	-0.41	-0.0212	-0.4434	-2.63**	0.0032	-0.0242	0.38	-0.0356	-0.4014	-1.75*
10	-0.0017	-0.0653	-0.25	-0.0221	-0.4655	-2.74**	0.0008	-0.0234	0.09	-0.0389	-0.4402	-1.91*

Panel B: 56 Upgrades

	Market Model			Higher Order model			Downside Model			Co skewness-Downside		
Day	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**
-10	-0.002	-0.002	-0.67	-0.039	-0.039	-13.57**	-0.002	-0.002	-0.88	0.0117	0.0117	3.32**
-9	-0.001	-0.002	-0.27	-0.036	-0.074	-12.57**	-0.001	-0.003	-0.39	0.0098	0.0214	2.77**
-8	0.004	0.002	1.57	-0.031	-0.105	-10.76**	0.004	0	1.36	0.0162	0.0377	4.61**
-7	-0.001	0	-0.56	-0.039	-0.144	-13.69**	-0.002	-0.002	-0.73	0.0019	0.0396	0.55
-6	-0.002	-0.002	-0.85	-0.038	-0.182	-13.36**	-0.002	-0.004	-0.72	0.0101	0.0497	2.86**
-5	-0.003	-0.005	-0.96	-0.036	-0.218	-12.66**	-0.002	-0.006	-0.83	0.0078	0.0575	2.22**
-4	0.005	0	1.85	-0.03	-0.247	-10.45**	0.005	-0.001	1.89*	0.0161	0.0736	4.58**
-3	0.003	0.004	1.29	-0.031	-0.279	-11.04**	0.003	0.002	1.13	0.0151	0.0887	4.30**
-2	-0.001	0.003	-0.23	-0.037	-0.315	-12.92**	-0.001	0.001	-0.27	0.0087	0.0974	2.46**
-1	0	0.003	0.13	-0.035	-0.351	-12.44**	0	0.001	-0.04	0.011	0.1084	3.12**
0	0.005	0.008	1.87*	-0.032	-0.383	-11.17**	0.004	0.006	1.67*	0.0147	0.123	4.17**
1	0.003	0.011	1	-0.034	-0.416	-11.88**	0.002	0.008	0.92	0.0146	0.1376	4.14**
2	-0.002	0.009	-0.89	-0.036	-0.453	-12.78**	-0.003	0.005	-1.24	0.0085	0.1461	2.42**
3	0.004	0.012	1.35	-0.03	-0.483	-10.54**	0.003	0.008	1.33	0.0143	0.1605	4.08**
4	-0.001	0.012	-0.25	-0.035	-0.517	-12.25**	-0.001	0.007	-0.36	0.0106	0.171	3.01**
5	-0.002	0.01	-0.57	-0.035	-0.552	-12.15**	-0.001	0.006	-0.48	0.0114	0.1824	3.24**
6	-0.002	0.008	-0.83	-0.035	-0.587	-12.38**	-0.002	0.004	-0.94	0.0075	0.19	2.14**
7	-0.001	0.007	-0.49	-0.038	-0.625	-13.26**	-0.002	0.002	-0.7	0.0108	0.2008	3.06**
8	0.002	0.008	0.6	-0.033	-0.658	-11.62**	0.001	0.003	0.57	0.012	0.2127	3.40**
9	0	0.008	-0.11	-0.035	-0.693	-12.35**	0	0.003	-0.18	0.0112	0.2239	3.18**
10	0.002	0.01	0.92	-0.033	-0.726	-11.55**	0.002	0.005	0.86	0.0142	0.2382	4.05**

* Denotes Statistical significance at 10%, ** Denotes statistical significance at 5 %

Table V: This table reports average abnormal returns (AAR) and cumulative abnormal returns (CAR) for **European countries** in the analysis as measures of the market reaction to Standard & Poors (S&P) foreign currency rating changes. AAR and CAR are generated using a standard mean adjusted event study methodology. A rating change occurs when S&P announces a rating change. **There are 17 upgrades and 9 Downgrades for a sample of 11 countries**. This table reports the results using the market model (equation 1), higher order model (equation 2), downside market model (equation 3) and higher order downside model (equation 4).

Panel A: 9 Downgrades

	Market Model			Higher Order model			Downside Model			Co skewness-Downside		
Day	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**
-10	-0.0004	-0.0004	-0.07	0.0048	0.0048	0.83	0.0013	0.0013	0.09	0.0104	0.0104	1.64
-9	-0.0015	-0.0019	-0.27	-0.0017	0.0031	-0.29	-0.0015	-0.0003	-0.11	-0.0013	0.0091	-0.21
-8	-0.0018	-0.0037	-0.31	-0.0018	0.0013	-0.32	0.0236	0.0233	1.69	-0.0018	0.0073	-0.29
-7	-0.0041	-0.0078	-0.73	-0.0043	-0.003	-0.75	-0.0042	0.0191	-0.29	-0.0042	0.003	-0.66
-6	-0.0034	-0.0112	-0.6	-0.0026	-0.0056	-0.45	0.0229	0.042	1.58	-0.0042	-0.0012	-0.66
-5	-0.0041	-0.0153	-0.72	-0.0044	-0.01	-0.76	-0.0043	0.0377	-0.3	-0.0039	-0.0051	-0.61
-4	0.0079	-0.0074	1.39	0.0075	-0.0024	1.32	0.0327	0.0704	2.25**	0.0072	0.002	1.13
-3	0.0024	-0.005	0.43	0.0022	-0.0002	0.39	0.0274	0.0978	1.89*	0.003	0.005	0.46
-2	-0.0028	-0.0078	-0.49	-0.0018	-0.002	-0.31	0.0226	0.1205	1.56	0	0.005	0.01
-1	0.0021	-0.0057	0.37	0.002	0	0.34	0.0276	0.148	1.90*	0.0025	0.0075	0.39
0	-0.0048	-0.0105	-0.85	-0.0039	-0.0039	-0.67	-0.0036	0.1444	-0.25	-0.0044	0.0032	-0.69
1	0.0048	-0.0057	0.85	0.004	0.0001	0.69	0.0297	0.1742	2.05**	0.0027	0.0059	0.43
2	0	-0.0057	-0.01	-0.0002	-0.0001	-0.03	-0.0001	0.174	-0.01	-0.0002	0.0057	-0.03
3	-0.0001	-0.0059	-0.02	0	-0.0001	0	0.0007	0.1747	0.05	-0.0008	0.0049	-0.13
4	-0.0066	-0.0125	-1.18	0.0021	0.002	0.36	0.0227	0.1974	1.57	0.0045	0.0094	0.7
5	-0.0137	-0.0262	-2.43**	-0.0135	-0.0115	-2.35**	0.0118	0.2092	0.81	-0.0138	-0.0044	-2.16**
6	-0.0094	-0.0356	-1.68*	-0.0096	-0.0211	-1.68*	0.0156	0.2248	1.08	-0.0102	-0.0146	-1.6
7	-0.0046	-0.0403	-0.82	-0.0047	-0.0258	-0.82	-0.0045	0.2203	-0.31	-0.0047	-0.0193	-0.74
8	0.0086	-0.0317	1.52	0.0095	-0.0163	1.65*	0.0347	0.255	2.39**	0.0094	-0.0099	1.48
9	-0.0008	-0.0325	-0.14	-0.0012	-0.0175	-0.21	-0.001	0.254	-0.07	-0.0017	-0.0117	-0.27
10	-0.0099	-0.0423	-1.75*	-0.0099	-0.0274	-1.72*	0.0155	0.2695	1.07	-0.0106	-0.0222	-1.66*

Panel B: 17 Upgrades

	Market Model			Higher Order model			Downside Model			Co skewness-Downside		
Day	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**
-10	-0.006	-0.006	-1.67*	-0.0674	-0.0674	-13.75**	-0.0062	-0.0062	-1.69*	0.0256	0.0256	7.54**
-9	-0.0089	-0.015	-2.46**	-0.0663	-0.1337	-13.53**	-0.0085	-0.0147	-2.30**	0.0286	0.0542	8.41**
-8	0	-0.0149	0.01	-0.0525	-0.1862	-10.72**	0.0002	-0.0145	0.06	0.0334	0.0876	9.82**
-7	0.0008	-0.0141	0.23	-0.0569	-0.2432	-11.62**	0.0017	-0.0128	0.46	0.0317	0.1193	9.32**
-6	0.0027	-0.0114	0.75	-0.0584	-0.3016	-11.92**	0.003	-0.0098	0.81	0.0334	0.1527	9.83**
-5	0.0024	-0.009	0.66	-0.0543	-0.3559	-11.09**	0.0022	-0.0076	0.59	0.0333	0.186	9.79**
-4	0.0017	-0.0072	0.48	-0.0535	-0.4094	-10.93**	0.002	-0.0056	0.55	0.0335	0.2195	9.86**
-3	-0.0004	-0.0076	-0.1	-0.0536	-0.463	-10.94**	-0.0003	-0.0059	-0.07	0.0307	0.2501	9.02**
-2	-0.0072	-0.0148	-1.99**	-0.0682	-0.5312	-13.91**	-0.0076	-0.0135	-2.07**	0.0222	0.2723	6.53**
-1	0.0025	-0.0122	0.7	-0.0602	-0.5914	-12.29**	0.0027	-0.0108	0.72	0.0338	0.3062	9.95**
0	0.0053	-0.0069	**1.67***	-0.0564	-0.6478	-11.51**	0.0053	-0.0056	1.68*	0.0351	0.3413	10.32**
1	-0.0016	-0.0085	-0.45	-0.064	-0.7118	-13.05**	-0.0018	-0.0073	-0.48	0.0334	0.3746	9.82**
2	-0.003	-0.0115	-0.82	-0.0569	-0.7686	-11.61**	-0.003	-0.0104	-0.82	0.0264	0.401	7.76**
3	0.0005	-0.011	0.14	-0.0561	-0.8248	-11.46**	0.0003	-0.0101	0.08	0.03	0.431	8.83**
4	-0.0027	-0.0137	-0.74	-0.0553	-0.8801	-11.29**	-0.0029	-0.013	-0.8	0.0274	0.4584	8.07**
5	-0.0016	-0.0153	-0.44	-0.0565	-0.9366	-11.54**	-0.0016	-0.0146	-0.44	0.0288	0.4872	8.46**
6	0.0012	-0.0141	0.32	-0.0543	-0.9909	-11.08**	0.0016	-0.013	0.43	0.0333	0.5205	9.79**
7	-0.0022	-0.0163	-0.6	-0.062	-1.0529	-12.65**	-0.0028	-0.0158	-0.75	0.0298	0.5503	8.77**
8	0.001	-0.0153	0.28	-0.0583	-1.1112	-11.90**	0.0012	-0.0146	0.33	0.0331	0.5834	9.73**
9	-0.001	-0.0163	-0.27	-0.0606	-1.1717	-12.36**	-0.001	-0.0155	-0.26	0.0311	0.6144	9.15**
10	-0.0046	-0.0209	-1.28	-0.0638	-1.2355	-13.02**	-0.004	-0.0195	-1.09	0.0286	0.643	8.41**

* Denotes Statistical significance at 10%, ** Denotes statistical significance at 5 %

Table VI: This table reports average abnormal returns (AAR) and cumulative abnormal returns (CAR) for all countries in the analysis as measures of the market reaction to Standard & Poors (S&P) foreign currency rating changes. AAR and CAR are generated using a standard mean adjusted event study methodology and the AR are calculated using Fama French three factor model (equation 8), the higher order Fama French model (equation 9), the Fama French downside model (equation 10) and the fama French higher order downside model(equation 11). Results are reported for 33 countries on an aggregate basis with 88 upgrades and 69 downgrades.

Panel A: 69 Downgrades

	FF Model 3 factor			Higher Order model			Downside Model			Coskewness-Downside		
Day	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**
-10	0.0066	0.0066	1.09	0.003	0.003	0.50	0.001	0.001	0.18	-0.0019	-0.0019	0.07
-9	-0.0028	0.0038	-0.46	-0.0027	0.00028	-0.45	-0.0034	-0.0024	-0.63	-0.0026	-0.0045	-0.45
-8	0.0023	0.0062	0.38	0.00406	0.00434	0.67	0.0017	-0.0007	0.32	0.0026	-0.0019	0.45
-7	-0.0083	-0.0022	-1.38	-0.0041	0.00025	-0.68	-0.0059	-0.0066	-1.08	-0.0053	-0.0072	-0.92
-6	0.0027	0.0005	0.45	-7.00E-05	0.00018	-0.01	0.0016	-0.005	0.29	0.0001	-0.0071	0.01
-5	-0.0006	-0.0001	-0.1	-0.0027	-0.0025	-0.45	-0.0024	-0.0074	-0.44	-0.0007	-0.0079	-0.13
-4	0.0000	0.0000	0.00	0.00147	-0.0011	0.24	0.0012	-0.0062	0.23	0.0007	-0.0071	0.13
-3	-0.0118	-0.0119	-1.96**	-0.0122	-0.0133	-2.02**	-0.0116	-0.0177	-2.14**	-0.0134	-0.0206	-2.32**
-2	-0.0091	-0.021	-1.6	-0.0084	-0.0217	-1.59	-0.008	-0.0257	-1.48	-0.0071	-0.0277	-1.23
-1	-0.0096	-0.0306	-1.69*	-0.014	-0.0356	-2.31**	-0.0121	-0.0378	-2.23**	-0.0131	-0.0407	-2.25**
0	-0.0026	-0.0332	-0.44	-0.003	-0.0387	-0.50	-0.0046	-0.0424	-0.85	-0.0047	-0.0455	-0.81
1	-0.0064	-0.0397	-1.06	-0.0066	-0.0453	-1.09	-0.0049	-0.0473	-0.9	-0.0088	-0.0543	-1.52
2	0.0025	-0.0372	0.41	-0.0004	-0.0457	-0.07	0.0011	-0.0463	0.19	-0.0021	-0.0563	-0.35
3	0.0104	-0.0268	1.72*	0.01162	-0.0341	1.92*	0.0111	-0.0352	2.04**	0.0093	-0.047	1.66*
4	0.007	-0.0198	1.15	0.00266	-0.0315	0.44	0.0023	-0.0329	0.42	0.0022	-0.0449	0.38
5	-0.0042	-0.024	-0.69	-0.0025	-0.034	-0.42	-0.0019	-0.0348	-0.36	-0.0005	-0.0454	-0.09
6	0.0005	-0.0235	0.08	0.00214	-0.0318	0.35	0.0014	-0.0334	0.26	0.002	-0.0434	0.35
7	-0.0079	-0.0313	-1.3	-0.007	-0.0388	-1.15	-0.0052	-0.0387	-0.96	-0.0042	-0.0476	-0.73
8	-0.0041	-0.0355	-0.69	-0.005	-0.0437	-0.82	-0.0057	-0.0444	-1.05	-0.005	-0.0526	-0.86
9	0	-0.0354	0.01	0.00421	-0.0395	0.70	0.0022	-0.0421	0.41	0.0068	-0.0458	1.17
10	-0.0003	-0.0357	-0.05	-0.0001	-0.0396	-0.02	-0.0012	-0.0433	-0.22	-0.0031	-0.0489	-0.54

Panel B: 88 Upgrades

	FF Model 3 factor			Higher Order model			Downside Model			Coskewness-Downside		
Day	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**
-10	-0.0023	-0.0023	-1.08	-0.0019	-0.0019	-1.03	-0.0023	-0.0023	-1.17	-0.0019	-0.0019	-0.78
-9	-0.0011	-0.0034	-0.51	-0.0012	-0.0031	-0.61	-0.0012	-0.0035	-0.64	-0.0008	-0.0027	-0.34
-8	-0.001	-0.0043	-0.46	-0.0004	-0.0035	-0.21	-0.0011	-0.0046	-0.59	-0.0008	-0.0035	-0.35
-7	0.0019	-0.0024	0.89	0.0017	-0.0018	0.9	0.0013	-0.0034	0.65	0.0017	-0.0018	0.72
-6	0.0009	-0.0016	0.41	-0.0004	-0.0022	-0.21	-0.0004	-0.0037	-0.2	-0.0066	-0.0084	-2.76
-5	-0.0014	-0.0029	-0.64	-0.0008	-0.003	-0.43	-0.0011	-0.0049	-0.6	-0.0011	-0.0095	-0.47
-4	0.0022	-0.0007	0.17	0.00171	-0.0013	0.9	0.0019	-0.0029	1.01	0.0011	-0.0084	0.47
-3	0.0009	0.0002	0.41	0.00119	-0.0001	0.63	0.0015	-0.0015	0.78	0.0007	-0.0077	0.3
-2	-0.0006	-0.0004	-0.26	0.00027	0.00015	0.14	-0.0004	-0.0018	-0.2	-0.0008	-0.0085	-0.35
-1	0.0008	0.0004	0.39	0.00059	0.00074	0.31	0.0001	-0.0018	0.03	-0.0009	-0.0094	-0.37
0	0.0056	0.006	2.62**	0.00453	0.00527	2.40**	0.0044	0.0027	2.32**	0.0047	-0.0047	1.96**
1	0.0001	0.0061	0.07	0.0004	0.00567	0.21	0.0004	0.0031	0.22	0.0006	-0.0041	0.27
2	-0.0019	0.0042	-0.9	-0.003	0.00272	-1.56	-0.003	0.0001	-1.56	-0.0028	-0.0068	-1.17
3	0.0033	0.0075	1.56	0.00318	0.0059	1.68	0.0028	0.0029	1.46	0.0027	-0.0041	1.15
4	-0.0004	0.0071	-0.19	-0.0007	0.00517	-0.39	-0.0008	0.0021	-0.43	-0.0013	-0.0054	-0.56
5	-0.0017	0.0055	-0.78	-0.0016	0.00356	-0.85	-0.0016	0.0005	-0.81	-0.0008	-0.0063	-0.35
6	-0.0031	0.0024	-1.47	-0.0028	0.00073	-1.5	-0.0025	-0.002	-1.33	-0.0027	-0.009	-1.15
7	-0.0002	0.0021	-0.1	-0.0004	0.00036	-0.19	-0.0007	-0.0027	-0.36	-0.001	-0.01	-0.42
8	0.0026	0.0048	1.25	0.00138	0.00174	0.73	0.0019	-0.0008	0.99	0.0018	-0.0083	0.74
9	-0.001	0.0038	-0.46	-0.0011	0.00061	-0.6	-0.0015	-0.0024	-0.81	-0.0006	-0.0089	-0.25
10	0.0006	0.0044	0.26	0.00064	0.00125	0.34	0.0007	-0.0017	0.34	0.0017	-0.0072	0.71

* Denotes Statistical significance at 10%, ** Denotes statistical significance at 5 %

Table VII: This table reports average abnormal returns (AAR) and cumulative abnormal returns (CAR) for all countries in the analysis as measures of the market reaction to Standard & Poors (S&P) foreign currency rating changes. AAR and CAR are generated using a standard mean adjusted event study methodology and the AR are calculated using Fama French four factor model (equation 12), the higher order Fama French model (equation 13), the Fama French downside model (equation 14) and the fama French higher order downside model(equation 15). Results are reported for 33 countries on an aggregate basis with 88 upgrades and 69 downgrades.

Panel A: 69 Downgrades

	FF Model - 4 factor			Higher Order model			Downside Model			Co skewness-Downside		
Day	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**
-10	0.0005	0.0005	0.1	0.0028	0.0028	0.48	0.0008	0.0008	0.14	0.0013	0.0013	0.21
-9	-0.0038	-0.0033	-0.71	-0.0028	0.0001	-0.46	-0.0034	-0.0027	-0.64	-0.0034	-0.0021	-0.55
-8	0.0022	-0.0011	0.41	0.004	0.0041	0.67	0.0017	-0.001	0.3	0.0022	0	0.36
-7	-0.0056	-0.0067	-1.04	-0.004	0	-0.68	-0.0058	-0.0068	-1.07	-0.0051	-0.0051	-0.84
-6	0.0005	-0.0061	0.1	-0.0005	-0.0005	-0.08	0.0013	-0.0055	0.25	0	-0.0051	0
-5	-0.0026	-0.0088	-0.49	-0.0035	-0.0039	-0.58	-0.003	-0.0085	-0.55	-0.0034	-0.0084	-0.55
-4	0.0012	-0.0076	0.22	0.0014	-0.0025	0.24	0.0012	-0.0073	0.22	0.0013	-0.0071	0.22
-3	-0.0112	-0.0188	-2.07**	-0.0112	-0.0137	-1.88*	-0.0109	-0.0181	-2.01**	-0.0109	-0.018	-1.78*
-2	-0.0068	-0.0256	-1.26	-0.0086	-0.0223	-1.44	-0.0083	-0.0265	-1.54	-0.0077	-0.0257	-1.26
-1	-0.0118	-0.0374	-2.18**	-0.0138	-0.0361	-2.30**	-0.012	-0.0385	-2.22**	-0.0144	-0.0401	-2.36**
0	-0.0054	-0.0428	-1	-0.0029	-0.039	-0.49	-0.0047	-0.0432	-0.88	-0.0052	-0.0453	-0.85
1	-0.0069	-0.0496	-1.27	-0.007	-0.0461	-1.18	-0.0051	-0.0483	-0.94	-0.0123	-0.0576	-2.02
2	0.0009	-0.0488	0.16	-0.0004	-0.0465	-0.07	0.0012	-0.0472	0.21	-0.0001	-0.0577	-0.02
3	0.0111	-0.0377	2.05**	0.0118	-0.0347	1.98**	0.0113	-0.0358	2.09**	0.01	-0.0477	1.65*
4	0	-0.0377	0	0.0022	-0.0324	0.37	0.0017	-0.0341	0.32	0.0025	-0.0452	0.41
5	-0.0029	-0.0405	-0.53	-0.0025	-0.035	-0.43	-0.002	-0.0361	-0.37	-0.0014	-0.0465	-0.23
6	0.0036	-0.0369	0.67	0.0021	-0.0329	0.35	0.0016	-0.0346	0.29	0.0007	-0.0459	0.11
7	-0.0061	-0.043	-1.13	-0.007	-0.0399	-1.17	-0.0053	-0.0399	-0.98	-0.0045	-0.0504	-0.74
8	-0.0057	-0.0487	-1.06	-0.005	-0.0449	-0.83	-0.0059	-0.0458	-1.09	-0.0048	-0.0552	-0.78
9	0.0019	-0.0468	0.35	0.0045	-0.0404	0.76	0.0027	-0.0431	0.49	0.0071	-0.0481	1.17
10	-0.0022	-0.049	-0.4	-0.0002	-0.0406	-0.04	-0.0011	-0.0443	-0.21	-0.0022	-0.0503	-0.36

Panel B: 88 Upgrades

	FF Model 4 factor			Higher Order model			Downside Model			Co skewness-Downside		
Day	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**	**AAR**	**CAR**	**T Stats**
-10	-0.002	-0.002	-1.07	-0.0019	-0.0019	-0.98	-0.0021	-0.0021	-0.91	-0.0024	-0.0024	-0.96
-9	-0.0011	-0.0031	-0.57	-0.0013	-0.0031	-0.66	-0.0013	-0.0033	-0.56	-0.0011	-0.0035	-0.44
-8	-0.001	-0.0041	-0.53	-0.0013	-0.0045	-0.71	-0.0018	-0.0052	-0.82	-0.0016	-0.005	-0.64
-7	0.0009	-0.0033	0.45	0.0011	-0.0034	0.56	0.0004	-0.0048	0.16	0.001	-0.004	0.42
-6	-0.0003	-0.0036	-0.16	-0.0012	-0.0046	-0.63	-0.0009	-0.0057	-0.38	-0.0067	-0.0107	-2.71
-5	-0.0007	-0.0043	-0.38	-0.0005	-0.0051	-0.26	-0.0016	-0.0072	-0.7	-0.0008	-0.0115	-0.34
-4	0.0025	-0.0018	1.3	0.0022	-0.0029	1.13	0.003	-0.0042	1.35	0.0014	-0.0101	0.58
-3	0.0018	0	0.94	0.0017	-0.0013	0.87	0.0021	-0.0021	0.94	0.0011	-0.009	0.45
-2	-0.0004	-0.0004	-0.19	0.0004	-0.0009	0.19	0.0005	-0.0016	0.22	-0.0003	-0.0093	-0.14
-1	0.0002	-0.0002	0.09	0.0003	-0.0006	0.16	0	-0.0016	0	-0.001	-0.0104	-0.42
0	0.0043	0.0041	2.25**	0.004	0.0034	2.09**	0.0046	0.003	2.03**	0.0043	-0.0061	1.72*
1	0.0007	0.0048	0.38	0.0006	0.0039	0.3	0.0002	0.0031	0.08	0.0007	-0.0054	0.27
2	-0.002	0.0027	-1.08	-0.0025	0.0014	-1.34	-0.004	-0.0009	-1.78	-0.0029	-0.0084	-1.19
3	0.0032	0.006	1.7	0.0033	0.0047	1.76	0.0027	0.0018	1.19	0.0022	-0.0062	0.88
4	-0.0007	0.0052	-0.39	-0.0008	0.0039	-0.44	-0.0012	0.0006	-0.54	-0.0017	-0.0079	-0.69
5	-0.002	0.0032	-1.04	-0.0017	0.0022	-0.89	-0.0017	-0.0011	-0.74	-0.0017	-0.0096	-0.69
6	-0.0027	0.0006	-1.4	-0.0027	-0.0005	-1.43	-0.0034	-0.0045	-1.53	-0.004	-0.0136	-1.64
7	-0.0001	0.0005	-0.07	-0.0001	-0.0006	-0.04	0.0001	-0.0045	0.03	-0.0006	-0.0142	-0.23
8	0.0024	0.0028	1.23	0.0023	0.0017	1.2	0.0024	-0.002	1.08	0.0019	-0.0123	0.78
9	-0.0008	0.002	-0.41	-0.0009	0.0008	-0.48	-0.0016	-0.0036	-0.71	-0.0004	-0.0127	-0.16
10	0.0011	0.0031	0.56	0.001	0.0017	0.51	0.0012	-0.0025	0.52	0.0019	-0.0108	0.75

* Denotes Statistical significance at 10%, ** Denotes statistical significance at 5 %