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Reza Tahmoorespour *, **Mohamed Ariff** **,
Alireza Zarei ***

Impact of Sovereign Debt Credit Rating Revision on Banking Industry: Evidence from G7 Countries

* University Putra Malaysia, Kuala Lumpur, Malaysia

E-mail:
reza.tahmoores@gmail.com

** Sunway University Malaya, Kuala Lumpur, Malaysia

E-mail:
Ariff13@gmail.com

*** Sunway University Malayia, Kuala Lumpur, Malaysia

E-mail:
ali2eza.67@gmail.com

Abstract: The aim of this study is to identify the economic impacts on G7 banking industry when sovereign rating is revised. We used event study methodology (t-statistics) and found that sovereign rating changes significantly affect share market prices. It seems that there is information leakage prior to sovereign rating announcement dates as released by the S&P: there are some negative price effects as well on mixed-type rating change effects, such as 'rating watch' announcements. These are new findings that may help to extend the sovereign rating literature in terms of findings from multiple countries, and on sustainability of debt taking.

Keywords: Sovereign Debt, Sovereign Credit Rating, Credit Rating Agency (CRA), Event Study

JEL Codes: H63, E58, G21

1. Introduction

This research aims to provide original findings on a current topic of interest, namely, how share markets react to revisions of credit ratings of sovereign issues of debt. Sovereign debt has grown sharply during the last five decades: it is 93 percent of Gross Domestic Product (GDP) in recent years compared to 39 percent of GDP in 1970 (Ariff, 2012).

Deregulation and financial innovation, e.g. securitisation, derivatives, etc., have made financial markets larger and more concentrated, thus attracting more borrowers being engaged in capital markets to raise money until, in a sort of way, the Global Financial Crisis occurred. Debt-takers, including sovereigns, have started to pull back so they are taking less debt from around 2010. Appetite of governments to borrow more in previous years has been facilitated by the simplified liquid markets ready to lend to all and sundry.

Theory suggests that obtaining financial information is costly, thus borrowers are supposed to be disciplined by rating grades given by Credit Rating Agencies (CRAs). Hence, investors prefer to outsource the process of collecting information and analysis to a third party, which is the CRA. Therefore, investors rely heavily on credit ratings from Rating Agencies (RAs). The last financial crisis in 2007-08 cast serious doubts on the quality and even the integrity of RAs since they were not able to predict the default of sovereign debts and in reality contributed to the evidence of confusion, as admitted by CEO of Standard & Poor's.

In general, the ratings provided by the RAs address default risk of a sovereign borrower (just as it does in the case of corporate borrowings). These ratings are used to assess the ability of sovereigns to meet their financial obligations. Simply put, these ratings are the RAs opinions about the sovereigns' financial strength or lack of strength. Moreover, the RA activities may lead to lower degrees of information asymmetry in financial markets being judged by the amount of sovereign information they often provide and disclose to the investors.

2. Literature Review

Several scholars analyse the effect of sovereign rating changes beyond equity markets. These studies suggests that sovereign rating changes affect bond yields (Cantor & Packer, 1996; Larraín, Reisen, & Von Maltzan, 1997), private-sector debt ratings and interest rates (Borensztein, Cowan, & Valenzuela, 2013; Cavallo & Valenzuela, 2010), firm-level ratings (Ferri & Liu, 2002; Ferri, Liu, & Majnoni, 2001), and sovereign credit spreads in other countries (Gande & Parsley, 2005; M. a. M. A. Safari, 2014). In addition, there are several studies that shed light on central banks dependency, challenges and related implications for financial sectors ((Bezhoska, 2017; Igbinosa, Sunday, & Babatunde, 2017; Nasir, Yagob, Solimanc, & Wud, 2017; Shijaku, 2017)). Moreover, several studies have shown the relationship among market reactions, banks, and stock markets and conducted sound methodologies techniques ((Ariff & Zarei, 2016; M. Safari & TahmooresPour, 2013; Tahmoorespour & Mahdavi-Ardekani, 2012; Tahmoorespour, Mina, &

Randjbaran, 2015; Tahmoorespour, Rezvani, Safari, & Randjbarand, 2015)). We note that most countries have yet been studied on this important phenomenon. So extending the study to a larger sample of unstudied countries would provide an opportunity to add new findings to the literature on bond market, this would also include Malaysia.

Sovereign rating represents assessment of the ability and willingness of governments to meet their financial obligations to lenders. It affects the dynamics of capital markets and influences the cost of capital. Brooks, Faff, Hillier, & Hillier (2004) use announcement effect models to show that sovereign rating downgrades have a strong negative impact on stock markets (so capital costs increases) but there is only limited evidence of abnormal returns linked to upgrades. Gande & Parsley (2005) and Ferreira & Gama (2007) find that sovereign downgrades incorporate valuable information for sovereign bond spread changes and the aggregate stock market returns of connected countries, particularly in emerging economies, neighbouring countries, and during crisis periods. Upgrades have an insignificant impact. Ismailescu & Kazemi (2010) analyse whether emerging market CDS spreads respond to sovereign rating changes. They find that positive signals add new information to the markets, while negative news is anticipated and hence reflected in the CDS. These results are contradictory to earlier studies that find negative rating signals to have the greatest effect on CDS spreads (e.g. Norden & Weber (2004)). However, they find that negative signals significantly widen CDS spreads for investment grade issuers: positive announcements significantly narrow CDS spreads for speculative grade issuers. Note that these studies are one-dimensional ones to measure impact, but say nothing about factors that are linked to debt or about sustainable debt.

Based on the results, they found that the rating process depends on the quantitative information which is publicly available. However, they found that, besides quantitative data, qualitative information and views of experts (not available to public) affect rating assignments. Therefore, estimation models cannot be 100% accurate in predicting ratings since these models do not have access to unavailable information.

The SEC implemented Regulation Fair Disclosure (Reg FD) in 2000. Reg FD requires firms to release material information to everyone simultaneously, thereby reducing information asymmetry between favoured stock analysts and others. Bond rating agencies were exempt from Reg FD in order to continue receiving the private firm information necessary for accurate credit default assessments. The exemption, if valuable to the bond market, should have resulted in an increase in the relative importance of bond rating changes on bond yield premiums

when Reg FD was implemented. In the first empirical study on the impact of Reg FD on the bond markets, Poon and Evans (2013) explore this hypothesis by measuring bond yield premiums reactions to bond rating changes around the implementation of Reg FD.

For downgrades, they find the impact of Reg FD is related to firm size. The smallest firms experienced a significantly weaker bond yield premium response. The evidence for the relevance of Reg FD for upgrades is weak. Contrary to concerns from the Bond Market Association, it appears that Reg FD lessened the impact of downgrades on the smallest firms, and did not affect speculative-grade bonds or bonds with higher debt levels.

3. Data and Methodology

3.1 Data Type

Data for this study are collected from Thomson-Reuters' Datastream database and the Standard & Poors rating records. This study uses a sample of Group 7 (G7) countries, and the data span over 2000 and 2014. The focus of this study is banking industry.

For this study, three rating changes made for country ratings are our basic data set as sovereign ratings. Those are: upgrades, downgrades, and changes in credit watch and/or outlook. This study will not study the impact of rating changes on individual bonds. We study the impact on Stock Composite Indices (Banks). Data for stock market will be extracted from Composite Indices instead of Price Indices because a Price Index is not adjusted for market capitalization of companies, nor does it consider returns to investors. Thus, changes in Price Index may not reflect the correct changes in the market. Hence, Composite Index which is the Market Capitalization Weighted Index for each country is chosen and used in this study to have more reliable results.

3.2 Research Methodology

The methodology for this research is event study. Event study will examine whether there is any significant change on stock market prices and the ordered probit modelling will be used to examine the significance of the size of notches in rating changes associated with the variables selected.

This study uses a 4-year period to examine the behaviour of sovereign ratings before and after the Global Financial crisis. The impact of event to be studied is over a measurement window of 15 days before the event and 5 days after the announcement day. Event study methodology suggests using a wider window first and then shrinking it to a shorter window. So that the shorter window enables the researcher to only pick up the impact of event under study. The t-statistic results prior to -15 days and after +5 days are smooth without major fluctuations. Thus, the window of the current study is bounded to 15 days prior to and 5 days after the announcement date.

Event study helps to identify the timing between the announcements and the impact on the bank market to specifically identify the events. Hence, possible information leaking can be found. To conduct the one-sample t-test, the following equation will be used as in Salamudin, Ariff, & Nassir (1999):

$$R_{it} = \ln\left(\frac{P_{it}}{P_{it-1}}\right) \tag{1}$$

where R_{it} is the return, P is the price, i and t denotes the sample observation at time t. Abnormal Return (AR) is measured by following market model definition:

$$AR_{it} = R_{it} - Rm_t \tag{2}$$

where AR and Rm denote the Abnormal Return and return of market.

$$AAR_t = \frac{\sum_{t=1}^{n} AR_t}{n} \tag{3}$$

where AAR denotes the Average Abnormal Return for each specific date. Table 2 clearly shows the calculation of AAR for sample set of data:

Table 2: Calculation of AAR

	A	B	C	D	E
1	Date	AR1	AR2	AR3	AAR
2	1/8/2010	0.0002	-0.0461	0.0022	=AVERAGE(B2:D2)
3	1/9/2010	-0.0087	-0.0336	-0.0237	-0.0220
4	1/10/2010	0.0073	-0.0047	0.0028	0.0018
5	1/11/2010	-0.0027	-0.0351	-0.0158	-0.0179
6	1/12/2010	0.0320	0.0248	0.0018	0.0195
7	1/13/2010	0.0406	0.0037	0.0133	0.0192
8	1/14/2010	-0.0060	0.0074	0.0028	0.0014
9	1/15/2010	-0.0675	-0.0071	-0.0016	-0.0254
10	1/16/2010	0.0066	-0.0161	-0.0061	-0.0052

To calculate the t-statistics of AAR, we need to find out first the Standard Deviation (S) and Standard Error of Estimate (SEE) of the AAR at time t:

$$S(AAR_t) = \sqrt{\frac{\sum(x-\bar{x})^2}{(n-1)}} \tag{4}$$

where x is the sample mean and n is the sample size.

$$SEE(AAR)_t = \frac{S(AAR)_t}{\sqrt{n-1}} \tag{5}$$

$$t-stat(AAR)_t = \frac{AAR_t}{SEE_t} \tag{6}$$

Variance of AAR (VAR) is calculated for further uses in Cumulative Average Abnormal Return (CAAR):

$$VAR(AAR) = \frac{\sum(x-\bar{x})^2}{(n-1)} \tag{7}$$

CAAR is calculated by summing Average Abnormal Return (AAR) over days:

$$CAAR_{(K,L)} = \sum_{t=K}^{L} AAR_t \tag{8}$$

Table 3 illustrates the calculation of CAAR:

Table 3: Calculation of CAAR

	A	B	C	D
1	Date	AAR	CAAR	CAAR Formula
2	1/8/2010	0.0002	0.0002	B2
3	1/9/2010	-0.0087	-0.0085	D2+B3
4	1/10/2010	0.0073	-0.0012	D3+B4
5	1/11/2010	-0.0027	-0.0039	D4+B5
6	1/12/2010	0.0320	0.0281	D5+B6
7	1/13/2010	0.0406	0.0687	D6+B7
8	1/14/2010	-0.0060	0.0627	D7+B8
9	1/15/2010	-0.0675	-0.0048	D8+B9
10	1/16/2010	0.0066	0.0018	D9+B10

As shown in Table 3, to calculate the t-statistics of CAAR, we need to find out first the Standard Deviation (S) of the AAR up to the event cumulated, and the Standard Error of Estimate (SEE) of CAAR as in the following equations:

$$S\left(CAAR_t\right) = \sqrt{\left(T\right) \times VAR\left(AAR_t\right)} \tag{9}$$

$$SEE\left(CAAR_t\right) = \frac{S\left(CAAR_t\right)}{\sqrt{\left(n-1\right)}} \tag{10}$$

$$t-stat\left(CAAR_t\right) = \frac{CAAR_t}{SEE\left(CAAR_t\right)} \tag{11}$$

where t equals the number of days in the CAAR statistics.

4. Event Study Results

Results of event study are presented in the following sections. Event period is 15 days before and 5 days after the event date. Starting with a larger sized window, we narrowed to this short window, since the effects are found within this short test window. Average Abnormal Return (AAR) and its t-statistics are calculated for each event study test.

Figure 1: Event Study Result of Canada - Rating Upgrade
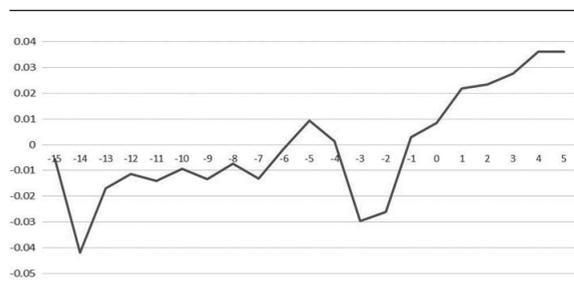
Figure 2: Event Study Result of Canada - Outlook Upgrade
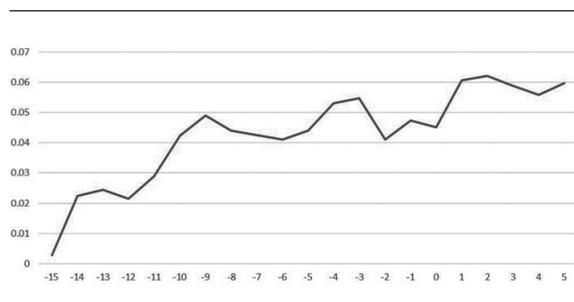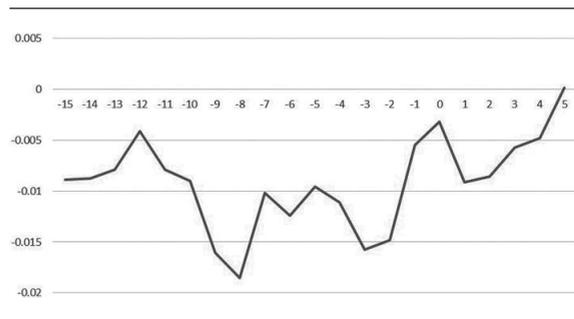

Figure 3: Event Study Result of France - Rating Downgrade

4.1 Canada

As expected, market shows an uptrend following the rating upgrade announcement. However, there is a possible leakage of information two days prior to announcement. Furthermore, there is a significant increase in market on 4th day after announcement (t-value: 5.53).

Outlook upgrade causes significant uptrend starting 14 days prior to the announcement (t-value: 4.16). In addition, the announcement leads to a significant increase in market on the 1st day following the announcement (t-value: 3.37).

4.2 France

French market shows unexpected increase in market one day prior to the announcement of rating downgrade (t-value: 3.44) and significant drop in the market on the 1st day following the rating announcement (t-value: -3.70).

Outlook downgrade indicates significant and unexpected hike in market on 3rd, 2nd, and event date (t-values: 5.19, 5.77, and 2.19 respectively) and significant downtrend starts on day 4 and 5 following the announcement (t-values: -4.83 and -2.90, respectively).

Regarding the negative watch, market reaction shows a possible leakage of inside information and a significant drop in market starts six days prior to the announcement (t-value: 2.03).
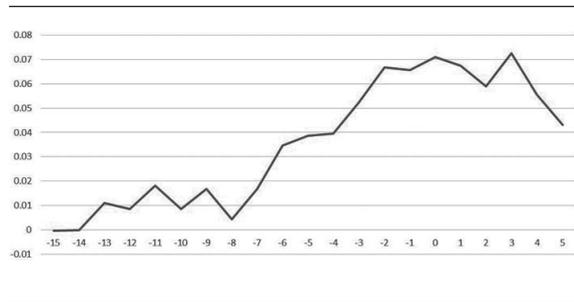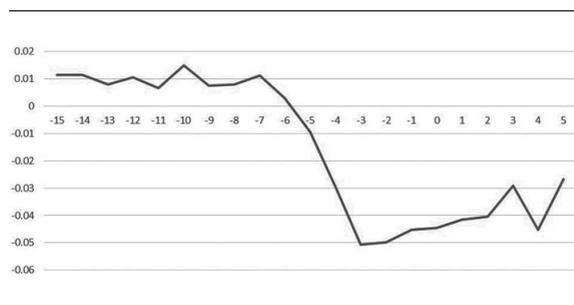
Figure 4: Event Study Result of France - Outlook Downgrade

Figure 5: Event Study Result of France - Negative Watch

4.3 Germany

Outlook upgrade in Germany reveals an insignificant increase in market few days prior to the announcement and an unexpected drop in market on the 1st and 2nd day after the announcement (t-values: -2.40 and -4.35, respectively).

Figure 6: Event Study Result of Germany - Outlook Upgrade
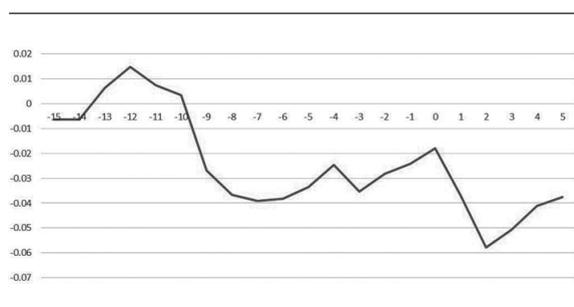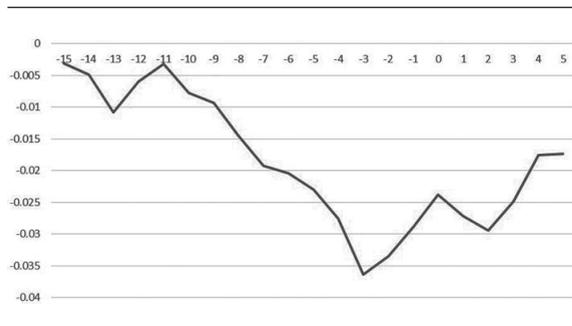
Figure 7: Event Study Result of Germany - Negative Watch
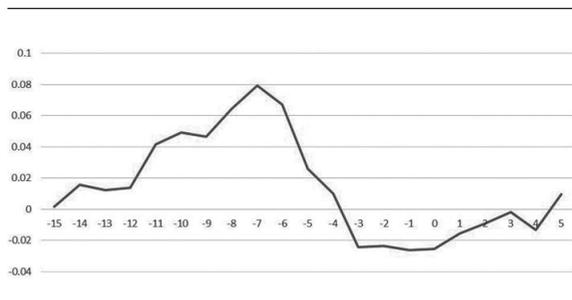
Negative watch announcement in Germany indicates a possible leakage of inside information prior to the announcement and significant drops in market on 5th, 4th, and 3rd day prior to the announcement.
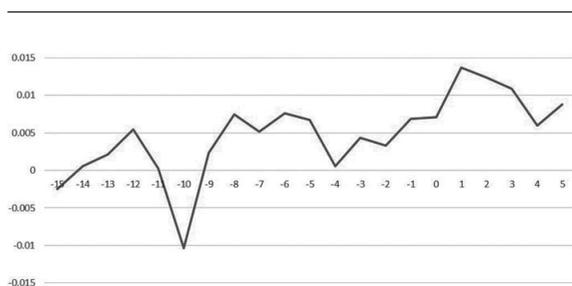
4.4 Italy

Figure 8: Event Study Result of Italy - Rating Downgrade

Rating downgrade in Italy shows a possible leakage of inside information starting 10 days prior to the announcement (t-value: -2.00). Also, trend switches in market start 2 days prior to the announcement and there is a significant hike on the event day (t-value: 2.44)

The event study for outlook upgrade shows market correction on days 10 and 9 prior to the announcement and a significant increase in market on the 1st day after the announcement.

Figure 9: Event Study Result of Italy - Outlook Upgrade

Outlook downgrade announcements indicate an unexpected change in market trend starting 3 days prior to the announcement, with a significant hike in market as at the event date.

Figure 10: Event Study Result of Italy - Outlook Downgrade
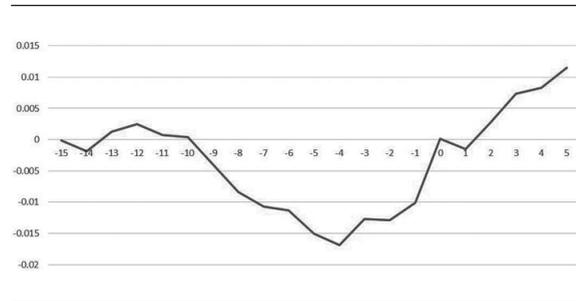
4.5 Japan

Rating downgrade announcement in Japan causes a significant drop as at the event date while an unexpected hike in market occurs on the 1st and 4th day after announcement.

Turning to outlook upgrade, the results show an overall uptrend until 1st day after the announcement and an unexpected change in market trend on the 1st and 3rd days following the announcement.

Outlook downgrade announcements in Japan show an unexpected uptrend in market starting on day 13 prior to the announcement. Moreover, the results indicate a significant drop in market as at the event date and on the 2nd and 3rd day after the announcement.

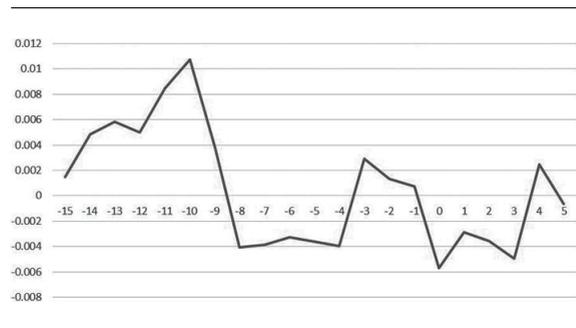**Figure 11: Event Study Result of Japan - Rating Downgrade**

Figure 12: Event Study Result of Japan - Outlook Upgrade
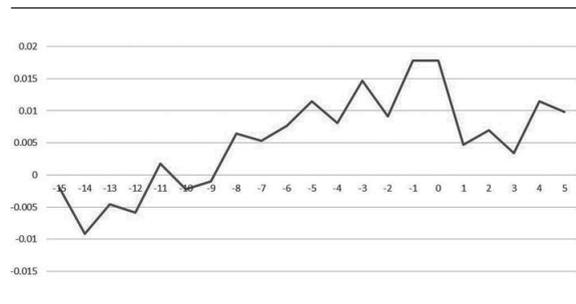
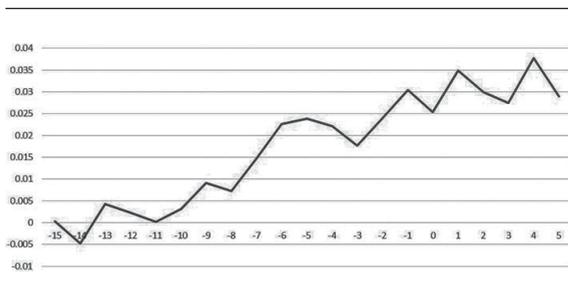**Figure 13: Event Study Result of Japan - Outlook Downgrade**

Figure 14: Event Study Result of the United Kingdom - Outlook Upgrade
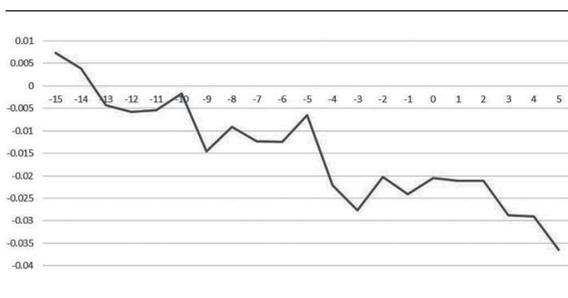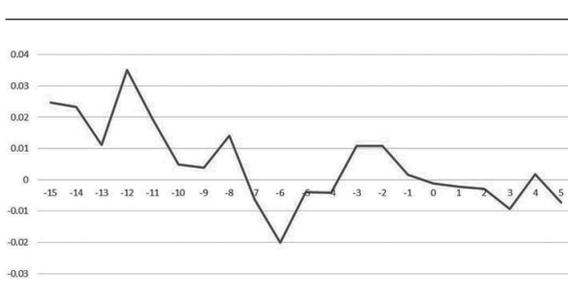

Figure 15: Event Study Result of United Kingdom - Outlook Downgrade

4.6 United Kingdom

Outlook upgrades in the UK shows an unexpected downtrend in market starting from 9 days prior to the announcement and significant drops in market on the 3rd and 5th day after the announcement.

Regarding outlook downgrades, results of the UK indicate an overall downtrend supports the downgrade announcement. Also, downtrend slows down from 5 days prior to announcement.

4.7 United States

About the market in the U.S., rating downgrade announcements show an unexpected uptrend in market regardless of the downgrade announcement. Moreover, market started to react on the 4th day after the announcement.

Outlook upgrade news in the U.S. show a smooth uptrend during event window and market correction on event date.

Outlook downgrade announcements in the U.S. point out that a significant trend started from 13 days prior to announcement. Moreover, there was an unexpected hike in market 4 days prior to the announcement while downtrend continues from the 3rd day after the announcement onwards.

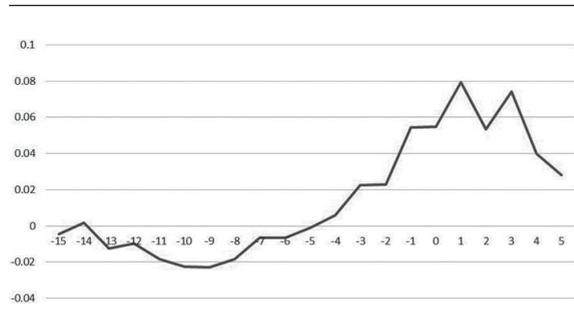**Figure 16: Event Study Result of United States - Rating Downgrade**

Figure 17: Event Study Result of United States - Outlook Upgrade
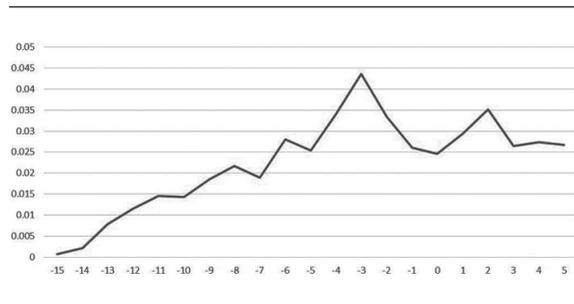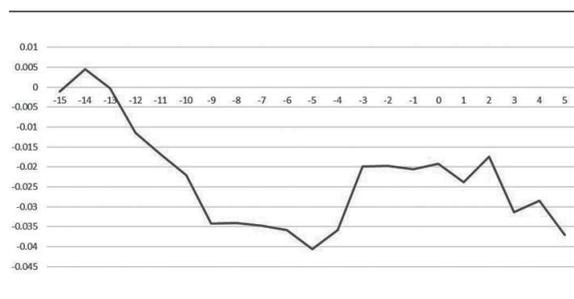

Figure 18: Event Study Result of United States - Outlook Downgrade

5. Conclusion

An overview of results of event tests indicates that stock market shows sudden reaction to sovereign downgrade news rather to upgrade one. Market behaviour is smoother for upgrade announcements, while downgrade news of sovereign rating triggers impulsive movements.

Another finding is about the negative watch announcements. Among downgrade news (rating downgrade, outlook downgrade and negative watch), it seems that market practitioners were not expecting negative watch announcements. The t-values clearly indicate that once negative watch was announced by S&P, market heavily responded and, to some extent, it was shocked by the news.

Based on the findings of event tests, it appears that inside information of S&P could be leaked before the announcement. Results show that market has started the expected trend few days prior to announcement. In addition, it seems that the rating change information for negative watch of S&P was not leaked prior to announcements.

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