

Does Sovereign Rating Announcement have symmetrical Effect on Stock Market Returns?  
Case Study: Amman Stock Exchange (ASE)

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### Abstract

This paper aims to investigate whether the effect of Sovereign rating change is symmetrical or not. As well as are the effects are same of Sovereign rating upgrades and downgrades announcement on stock return in the Amman Stock Exchange (ASE).

In this study, the event study methodology was applied to analyse the effect of ten announcements (included four upgrades and six downgrades) from the rating agency S&P500 and Moody's over the period 2003-2013. By using the daily closing price of Amman free float market index as a proxy for return and an event period which are set as [-10, +10] days and [-5, +5] days. The findings of the study reveal the following: an asymmetrical effect of sovereign rating announcement on Amman Stock Exchange returns, upgrades rating has a significant positive reaction on prices (two out of four upgrade events have a significant positive reaction on stock price), and downgrades rating has no significant reaction on prices (one out of six downgrade events has a significant negative reaction on stock price). These findings would be useful to issuers, investors, and decision makers in assessing the credit risk of Amman stock exchange issuance.

Key words: sovereign rating, symmetrical, S&P500, Moody's, event study, stock returns, ASE, Jordan

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## ملخص

تهدف هذه الدراسة لتحديد مدى تماثل أثر تغيير التصنيف الائتماني للدول على أداء البورصات في الأسواق الناشئة، لتحقيق هذا الهدف سيتم دراسته بورصه عمان. حيث تم تتبع وتحليل التغيرات التي طرأت على التصنيف الائتماني للأردن والصادرة عن أهم وكالات التصنيف العالمية وهما (S&P500) و (Moody's) خلال الفترة الواقعة بين (2003-2013) حيث تبين أن الحكومة الأردنية خلال تلك الفترة قد تعرضت لرفع تصنيفها الائتماني بواقع أربعة مرات بينما تعرضت لتخفيض تصنيفها الائتماني بواقع ستة مرات. باستخدام طريقه (event study) تم تحليل البيانات اليومية التي تم جمعها من خلال مؤشر السوق المرجح بالقيمة السوقية للأسهم الحرة المتاحة للتداول (Free Float) من 1/8 / 2003 ولغاية 30 /6/ 2013.

وقد توصلت هذه الدراسة لوجود اثر غير متماثل لتغيير التصنيف الائتماني للأردن على أداء بورصه عمان خلال فتره الدراسة، حيث تبين بان التغيرات الايجابية المتعلقة برفع التصنيف الائتماني للأردن لها اثر ايجابي وقوي على أداء البورصه، إما التغيرات السلبية المتعلقة بتخفيض التصنيف الائتماني للأردن فليس لها اثر يذكر. ولاثبات صحة النتائج ودقتها تم الاختبار لفترتين زمنييتين مختلفتين: الاولى تضمنت عشره ايام قبل وبعد الحدث، اما الفتره الثانيه فتضمنت خمس ايام قبل وبعد الحدث. وأخيراً توصي هذه الدراسة بالاستفاده من النتائج التي قد تم التوصل اليها في التنبؤ بالمخاطر التي يمكن ان يتعرض لها المستثمرون في بورصه عمان.

## Introduction

Sovereign Credit ratings are widely used as indicators of government's default probability. Upgrades and downgrades are used as measures of credit risk for a particular country. Downgrades in credit ratings increase the credit risks, which makes a country's access to international capital markets more difficult and costly. In addition, downgrades affect the performance of the companies in their operating country.

During the time span between 2000 – 2009, Jordan experienced a period of robust growth averaging about 6½ percent (1). Jordan is reported to be one of the smallest and most open economies in the Middle East. Consequently, Jordan's economy has been suffering from external shocks including: high energy prices, high oil imports - more than 90% of its oil - regional unrest, tourism remittances, and shortage of foreign investment.

Furthermore, Jordanian government mainly depends on grants to support its budget and current account deficits. From 2003 till 2013, the Jordanian government experienced a period of high public debt: Jordan recorded a Government Debt to GDP of 71.90 percent of the country's Gross Domestic Product in 2012(2). During that period Jordan went through many successions of credit rating upgrades and downgrades.

Many previous studies agree that an upgrade rating has no significant positive reaction on prices, while a downgrade rating has a significant negative reaction on prices (Bannier and Hirrch, 2010; Hooper et al., 2008; Kaminsky and Schmukler, 2002).

This is a continual study that further investigates a pervious published .

(1) <http://www.imf.org/external/pubs/ft/scr/2012/cr12119.pdf>

(2) <http://www.tradingeconomics.com/jordan/government-debt-to-gdp>

paper (3) which investigates whether sovereign rating changes have effect on the stock return in the Amman Stock Exchange (ASE). The main results show that the effect of Sovereign rating is present. This paper aims to further investigate whether the effect is symmetrical or not, and whether the effects are the same of Sovereign rating upgrades and downgrades announcement on stock return in the Amman Stock Exchange (ASE).

Unfortunately, little research is reported on the empirical study on the Amman Stock Exchange (ASE). Much literature is lacking to explain the critical conditions where Jordanian economy faces volatility, high public debt, several successions of credit rating downgrade. This has forced the Jordanian authorities to implement a national reform program to correct domestic and external imbalances through fiscal and energy policies. Thus, this paper contributes to the previous literature, especially that the empirical studies on Amman Stock exchange (ASE) are relatively few.

The first section gives general view about the Sovereign rating effect in stock returns. The second section reviews briefly the previous studies conducted on the Sovereign rating effect in different developed and emerging markets. The third section outlines the methodology by describing the sample, data selection, and hypothesis. The fourth section analyzes and explains results. Finally, the paper summarizes the study's findings and gives recommendations for future research.

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(3) [www.multidisciplinarywulfenia.org](http://www.multidisciplinarywulfenia.org)

## Previous Studies

Barron, et al. (1997) (4) examined the impact of new credit ratings, credit rating changes and Credit Watch announcements on UK common stock returns by using data published by Standard and Poor's between 1984 and 1992. The results showed significant negative excess returns around the date of a downgrade and positive returns close to the date of a positive Credit Watch announcement. Although new ratings, whether short or long-term, have no significant impact on returns.

Reisen and Maltzan (1998) studied the interaction between ratings and yield spreads on sovereign government bonds, including those of emerging markets from early 1987 to mid-1996. Through the use of the Granger causality test event study, the results showed that the sovereign credit ratings affect the financial-market assessment of Sovereign risk.

Kaminsky and Schmukler (2002) examined whether changes in sovereign ratings and outlooks contribute to the instability of emerging financial markets. Sixteen emerging markets were examined over the period 1990 - 2000. Panel regression and performing event studies were applied, and the main results showed that rating and outlook changes significantly affect bond and stock markets. In addition, they have stronger effects on domestic as well as other countries financial markets during times of crisis.

Li, et al. (2004), examined if credit announcements provide valuable information for investors in Swedish stock market by using event study methodology for a combination of ratings by Moody's, Standard &

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(4)<http://www.blackwell-synergy.com/doi/abs/10.1111/1468-5957.00117>

Poor's, and Fitch. The main results showed that there were no significant cumulative average abnormal returns in all credit rating announcement types during the two and three days surrounding announcement periods. Also, the credit rating announcements may provide some informational content to the stock market, especially in the case of credit upgrade and credit downgrade. Martell (2005) examined the effects of changes in sovereign credit ratings at the aggregate level and firm level for 29 emerging countries over the period 1998-2003, using event study methodology. The main results showed that although there was no stock price reaction to sovereign rating upgrades, there was a significant negative stock price reaction to sovereign rating downgrades. It should be noted that local stock markets react only to news of sovereign rating downgrades. In addition, the study found that sovereign credit rating changes have more impact on larger firms and those firms in poorer emerging countries experience larger drops in the price of their shares. Subasi (2008) examined the effects of foreign credit rating and outlook changes on Turkish stock return, using event methodology from 1995-2007. The results showed that the sovereign rating downgrades have little effect on stock market returns, while upgrades do not; rating downgrades lead lower stock return volatility while upgrades have mixed effects on it; outlook changes do not alter stock return; downgrades cause TL/USA and TL/EUR exchange rate to depreciate and increase their volatility, whereas upgrades have mixed effects on their both levels and volatilities, and finally outlook changes have generally

mixed effects on TL/USA and TL/EUR exchange rates and their volatilities.

Hooper, et al. (2008), examined the impact of sovereign rating changes on international financial markets using a comprehensive database of 42 countries, covering the major regions in the world over the period 1995-2003. The main results showed that rating agencies provide stock and foreign exchange markets with new tradable information. In addition they found significant asymmetric effects of rating announcements. The market responses—both return and volatility – are more pronounced in the cases of downgrades, foreign currency debt, emerging market debt, and during crisis periods.

Klimaviciene (2011) examined the impact of sovereign rating announcements that conveys price-relevant information to investors in Baltic stock markets, and tests the degree of anticipation and price reaction. In Baltic countries such as (Estonia, Latvia, and Lithuania), event study methodology for a combination of ratings is made by Moody's, Standard & Poor's, and Fitch. The main results showed that sovereign credit rating announcements contain pricing relevant news in addition to information already in a public domain.

Khasawneh (2013) investigated whether sovereign rating changes have any effect on stock return in Amman Stock exchange (ASE). Two sample volatility tests are applied to analyze the effect of (10) announcements from rating agency S&P500, Moody's over the period 2003-2011, using the daily closing price of Amman market index from

August 1, 2003 to October 30, 2011. The main results showed that the effect of Sovereign rating is present in Amman Stock Exchange. The rating upgrades and downgrades for both foreign and local currency government bond, and country ceiling for foreign and local currency bond have significant (positive/ negative) effects on the stock return.

### **Amman Stock Exchange (ASE)**

The Amman Stock Exchange (ASE) started its operations in 1978. The ASE market has some unique characteristics; such as, attracting many local and foreign investors, mainly from the region, and now it has become one of the most leading capital markets in the Middle East. The ASE listed that, the non-Jordanian ownership in companies by the end of the 2013 represented 49.9% of the total market value; 35.5% for Arab investors and 14.4% for non Arab investors.(5)

During 2012, ASE witnessed a regress of its performance where price index weighted by free float shares closed at 1958 points. Additionally, the number of traded shares decreased by 41.1% and reached 2.4 billion shares, traded through 975 thousand transactions, and the share turnover ratio decreased to reach 33.9%. Despite these regressions in 2012, Jordanian investments in the ASE increased by JD37.7 million and the market capitalization of listed shares at the ASE has amounted to JD19.1 billion, constituting 93.5% of the GDP(6).

### **Methodology**

The event study methodology was implemented to analyse the effect of

(5) <http://www.ase.com.jo/ar/node/2463>

(6) <http://www.ase.com.jo/ar/node/2463>

(10) announcements (including 4 upgrades and 6 downgrades).(7)  
 Fatum and Hutchison (1999) noted that if one variable in the study moves on a day to day basis while the other one is infrequent, it might be difficult to apply time series methods.

An event study is the most popular and preferred method of study in previous financial research. The very first event study by Fama, et al. (1969) examined the response of the stock market to stock splits. By using this method we can investigate whether any event (such as Sovereign rating announcement) was a statistically significant reaction in financial markets before and after occurrences. (8)

Fama, et al. (1969) have established a conventional methodology for event studies. Campbell and Mackinlay (1997) outline these steps as follows:-

- 1) Identify the event.
- 2) Determine the market index(9) and which firms to include in the study.(10)
- 3) Determine the event window which represents number of days before and after the event.
- 4) Collect the historical prices for both the stocks and the market index (which is determined in step 2).
- 5) Calculate the return by applying this equation:-

$$\text{Return} = [p(t) - p(t-1)] / p(t-1)$$

(7) See table (1)(2)

(8) <http://web.mit.edu/doncrum/www/eventstudy.html>

(9) Amman free float market index

(10) price index for banks sector

Where:  $p$  is the stock market daily price at closing.

6) Measure normal returns in the event window using one of two models (market model and the constant mean model).

7) Measure abnormal returns

8) Calculate Cumulative Abnormal Return and Average Abnormal Return.

9) Do significant test for the required result.

### ***Hypothesis***

H01: Sovereign upgrade rating has no significant positive reaction on Stock Market Returns.

H02:- Sovereign downgrade rating has no significant negative reaction on Stock Market Returns.

If the stock market return responds to the effect of upgrades Sovereign credit rating as same as the effect of downgrades, we expect to find symmetrical effect of Sovereign rating announcement on Amman stock market returns and vice versa.

### **Data**

I use the daily closing price of Amman free float market index from(11) August 1,2003 to June 30,2013 as a proxy for return,(12)the rating announcements by Moody's and S&P are collected from their official homepage. An event period which is set as [-10,+10] days and [-5, +5] days

### ***The Model***

In order to test the presence of asymmetrical Sovereign rating effect on

(11) This method is used by many international companies such as S@ p and Dow Jones.

(12) Return =  $[p(t)-p(t-1)]/p(t-1)$  where  $p$  is the stock market daily price at closing.

stock return, the traditional market model is used. An ordinary least squares regression is applied to estimate equation (1).

$$R_{it} = \alpha_i + \beta_i R_{m,t} + \epsilon_{i,t} \dots \dots \dots 1$$

Where:

$R_{it}$ :- the return of the stock  $i$  on day  $t$ .

$R_{m,t}$  := the market return on day  $t$ .

$\epsilon_{i,t}$  : a random error.

$\alpha_i$  and  $\beta_i$ :- are the parameters .

The normal return for stock calculated according to equation (2).

$$NR_{it} = \alpha_i + \beta_i R_{m,t} \dots \dots \dots 2$$

Where:

$NR_{it}$ :- the normal return of the stock  $i$  on day  $t$ .

$R_{m,t}$  := the market return on day  $t$ .

$\epsilon_{i,t}$  : a random error.

$\alpha_i$  and  $\beta_i$ :- are the parameters

The abnormal return for stock calculated according to equation 3.

$$AR_{it} = R_{it} - NR_{it} \dots \dots \dots 3$$

Where:

$AR_{it}$ :- the abnormal return of the stock  $i$  on day  $t$ .

$R_{it}$ :- the return of the stock  $i$  on day  $t$ .

$NR_{it}$ :- the normal return of the stock  $i$  on day  $t$ .

The average abnormal return for stock (AAR) is obtained by taking the average abnormal return that is calculated from equation (3). Whereas Cumulative Abnormal Return (CAR) is obtained by adding the abnor

mal return over the respective time window [-10, +10] days (10 days before the announcement and 10 days after announcement), and [-5,+5] days (5 days before the announcement and 5 days after announcement).

### **Results and Discussion**

According to the event study results for upgrade events, the following findings are obtained:-

1-The first event for [-10, 10] time window, shows that: Sovereign upgrade rating has a significant positive reaction on prices with 0.5462% cumulative abnormal return (CAR), and the average abnormal return is 0.0260%. This is strong evidence against the null hypothesis; so the first null hypothesis { table (3)} is rejected.

The first event for [-5, 5] time window shows that: Sovereign upgrade rating has a significant positive reaction on prices with 0.4893% cumulative abnormal return (CAR), and the average abnormal return is 0.0445%. This is strong evidence against the null hypothesis; so, the first null hypothesis is rejected {table (3)}.

2-The second event for [-10, 10] time window shows that: Sovereign upgrade rating has no significant positive reaction on prices with -0.7206% cumulative abnormal return (CAR), and the average abnormal return is -0.0343%. This is strong evidence for the null hypothesis; so the first null hypothesis is accepted { table (4)}.

The second event for [-5, 5] time window shows that: Sovereign upgrade rating has no significant positive reaction on prices with -0.1268% cumulative abnormal return (CAR), and the average abnormal return is -0.0115%. This is strong evidence for the null hypothesis;

so, the first null hypothesis is accepted {table (4)}.

3-The third event for [-10, 10] time window shows that: Sovereign upgrade rating has no significant positive reaction on prices with -0.8838% cumulative abnormal return (CAR), and the average abnormal return is -0.0421%. This is strong evidence for the null hypothesis; so, the first null hypothesis is accepted {table (5)}.

The third event for [-5, 5] time window shows that: Sovereign upgrade rating has no significant positive reaction on prices with -1.7881% cumulative abnormal return (CAR), and the average abnormal return is -0.1626%, this is strong evidence for the null hypothesis; so, the first null hypothesis is accepted {table (5)}.

4-The fourth event for [-10, 10] time window shows that: Sovereign upgrade rating has no significant positive reaction on prices with 0.2044% cumulative abnormal return (CAR), and the Average abnormal return is 0.0097%. This is strong evidence for the null hypothesis; so, the first null hypothesis is accepted {table (6)}.

The fourth event for [-5, 5] time window shows that: Sovereign upgrade rating has a significant positive reaction on prices with 0.0050% cumulative abnormal return (CAR), and the average abnormal return is 0.00045%. This is strong evidence against the null hypothesis; so, the first null hypothesis is accepted table (6)}.

*According to event study results for downgrade events, the following findings are obtained:-*

1-The first event for [-10, 10] time window shows that: Sovereign down

grade rating has no significant negative reaction on prices with 0.0000% cumulative abnormal return (CAR), and the average abnormal return is 0.0000%. This is strong evidence for the null hypothesis; so, the second null hypothesis is accepted {table (7)}.

The first event for [-5, 5] time window shows that: Sovereign downgrade rating has no significant negative reaction on prices with 0.0000% cumulative abnormal return (CAR) ), and the average abnormal return is 0.0000%. This is strong evidence for the null hypothesis; so, the second null hypothesis is accepted {table (7)}.

2-The second event for [-10, 10] time window shows that: Sovereign downgrade rating has no significant negative reaction on prices with 0.0000% cumulative abnormal return (CAR), and the average abnormal return is 0.0000%. This is strong evidence for the null hypothesis; so, the second null hypothesis is accepted {table (8)}.

The second event for [-5, 5] time window shows that: Sovereign downgrade rating has no significant negative reaction on prices with 0.0000% cumulative abnormal return (CAR), and the average abnormal return is 0.0000%. This is strong evidence for the null hypothesis; so, the second null hypothesis is accepted {table (8)}.

3-The third event for [-10, 10] time window shows that: Sovereign downgrade rating has no significant negative action on prices with 0.0000% cumulative abnormal return (CAR), and the average abnormal return is 0.0000%. This is strong evidence for the null hypothesis; so, the second null hypothesis is accepted {table (9)}.

The third event for [-5, 5] time window shows that: Sovereign downgrade rating has no significant negative reaction on prices with 0.0000% cumulative abnormal return (CAR), and the average abnormal return is 0.0000%. This is strong evidence for the null hypothesis; so, the second null hypothesis is accepted {table (9

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The fourth event for [-5, 5] time window shows that: Sovereign downgrade rating has no significant reaction on prices with 0.0000% cumulative abnormal return (CAR), and the average abnormal return is 0.0000%. This is strong evidence for the null hypothesis; so, the second null hypothesis is accepted {table (10

5-The fifth event for [-10, 10] time window shows that: Sovereign downgrade rating has no significant reaction on prices with 0.0000% cumulative abnormal return (CAR), and the average abnormal return is 0.0000%. This is strong evidence for the null hypothesis; so the second null hypothesis is accepted {table (11

The fifth event for [-5, 5] time window shows that: Sovereign downgrade rating has no significant reaction on prices with 0.0000% cumulative abnormal return (CAR) ), and the average abnormal return is 0.0000%. This is strong evidence for the null hypothesis; so, the

second null hypothesis is accepted {table (11)}.

6-The sixth event for [-10, 10] time window shows that: Sovereign downgrade rating has a significant negative reaction on prices with -0.1448% cumulative abnormal return (CAR), and the Average abnormal return is -0.0069%. This is strong evidence against the null hypothesis; so the second null hypothesis is rejected {table (12)}.

The sixth event for [-5, 5] time window shows that: Sovereign downgrade rating has a significant negative reaction on prices with -0.3351% cumulative abnormal return (CAR), and the Average abnormal return is -0.0304%. This is strong evidence against the null hypothesis; so, the second null hypothesis is rejected {table (12)}.

#### Conclusions and Recommendations

The findings of the study reveal that there is asymmetrical effect of Sovereign rating announcement on Amman Stock Exchange returns during (2003-2013). The upgrades rating has a significant positive reaction on prices, while the downgrades rating has no significant reaction on prices.

These conclusions can be explained further by the following findings. First of all, two out of four upgrade events have a significant positive reaction on stock price. This finding does not support the previous studies (Banner and Hirrch, 2010), and (Hooper, et al., 2008).

This finding can be justified by such event that will make Jordanian investors more optimistic, and thus will encourage them to activate the Amman Stock Exchange.

Secondly, one out of six downgrade events has no significant negative reaction on stock price. This finding does not support the previous studies (Banner and Hirrch, 2010), and (Hooper, et al., 2008).

In conclusion, these findings can be justified. Despite the difficult situations and the challenging environments that face the Jordanian government, investors in Jordan still have high confidence in the Amman stock exchange because of the procedures adapted by authorities to correct imbalances in the economy. These findings would be useful to issuers, investors, and decision makers in assessing the credit risk of Amman stock exchange issuance. Further research, however, must be done to study other factors that might affect this relationship such as, firm characteristics and financial conditions.

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Table (1) Sovereign credit rating announcement by S@P

		26, Oct, 2011	^, Feb, 2011	14, March, 2010
Local currency government bond	Downgrades	BB	BB+	BBB-
Out look		Negative	Negative	Stable

Table (2) Sovereign credit rating announcement by Moody's

		26, June, 2013	8, Feb, 2011	1, Nov, 2010	8 ,Jan, 2007	31, Jan, 2006	24, May, 2006	21, Aug, 2003	23,Oct, 2003
foreign currency government bond	Upgrades (in general)			Ba2	Ba2			Ba2	
	Downgrades (in general)		Ba <sup>+</sup>			Ba2			
local currency government bond	Upgrades (in general)			Ba2	Baa3			Baa3	Baa3
	Downgrades (in general)	Ba1	Ba2			Baa3			
Country ceiling foreign currency Bonds	Upgrades (in general)				Baa3			Ba2	Ba2
	Downgrades (in general)	Ba1				Ba2	Baa3		
Country ceiling local currency bonds	Upgrades (in general)								
	Downgrades(in general)		Baa1						
		Negative							
Outlook			Negative	Stable	Stable	Stable	Negative	Stable	Stable

Table (3) Abnormal return for the first event: upgrade 21 August 2003  
 A)An event period set as [-10, +10]

event day	AR	CAR
-10	0.5462%	0.5462%
-9	-1.8840%	-1.3378%
-8	-1.8837%	-3.2214%
-7	٪٠,١١٤٠	-3.1075%
-6	0.8816%	-2.2259%
-5	0.8397%	-1.3862%
-4	-2.9078%	-4.2939%
-3	-0.3235%	-4.6174%
-2	-2.3666%	-6.9840%
-1	0.1675%	-6.8165%
0	-1.0464%	-7.8630%
1	1.3757%	-6.4872%
2	1.0642%	-5.4231%
3	0.7534%	-4.6696%
4	-0.5296%	-5.1992%
5	1.8933%	-3.3058%
6	1.3521%	-1.9537%
7	0.0893%	-1.8644%
8	1.8173%	-0.0471%

9	1.7800%	1.7329%
10	-1.1867%	0.5462%
	0.0260%	Average abnormal return
	(5.7739)***	t -Stat

B) An event period set  
as [-5, +5]

Event day	AR	CAR
-5	0.4893%	0.4893%
-4	-2.4116%	-1.9223%
-3	0.2530%	-1.6693%
-2	-2.3196%	-3.9889%
-1	0.0980%	-3.8909%
0	-0.8003%	-4.6912%
1	1.5267%	-3.1645%
2	1.1006%	-2.0638%
3	0.7929%	-1.2710%
4	-0.5760%	-1.8469%
5	2.3363%	0.4893%
	0.0445%	Average abnormal return
	(2.7748)**	t -Stat

Table (4) abnormal return for the second event: Upgrade 23 October, 2003  
 A) An event period set as [-10, +10]

Event day	AR	CAR
-10	-0.7206%	-0.7206%
-9	.0.1195%	-0.8401%
-8	-0.5174%	-1.3575%
-7	-1.0740%	-2.4315%
-6	0.4280%	-2.0035%
-5	0.1042%	-1.8994%
-4	0.0051%	-1.8943%
-3	0.7843%	-1.1100%
-2	0.3611%	-0.7489%
-1	-0.3250%	-1.0739%
0	-0.6054%	-1.6792%
1	0.2067%	-1.4725%
2	0.5003%	-0.9722%
3	2.0866%	1.1145%
4	-0.7834%	0.3310%
5	0.1208%	0.4518%
6	-1.5498%	-1.0980%
7	0.3844%	-0.7136%
8	-0.1698%	-0.8833%
9	0.2529%	-0.6304%
10	-0.0902%	-0.7206%
	-0.0343%	Average abnormal return
	1.0493	t -Stat

## B) An event period set as [-5, +5]

Event day	AR	CAR
-5	-0.1268%	-0.1268%
-4	-0.2953%	-0.4221%
-3	0.5897%	0.1676%
-2	0.1321%	0.2997%
-1	-0.5431%	-0.2434%
0	-0.8294%	-1.0727%
1	-0.0038%	-1.0765%
2	0.3483%	-0.7282%
3	1.8024%	1.0742%
4	-1.0451%	0.0292%
5	-0.1559%	-0.1268%
	-0.0115%	Average abnormal return
	0.95705	t -Stat

Table (5) abnormal return for the third event: Upgrade 8 January, 2007  
 A) An event period set as [-10, +10]

Event day	AR	CAR
-10	-0.8838%	-0.8838%
-9	-0.4462%	-1.3300%
-8	-0.7996%	-2.1295%
-7	-0.0287%	-2.1582%
-6	-1.3709%	-3.5291%
-5	-2.2672%	-5.7964%
-4	-2.1432%	-7.9395%
-3	-2.5476%	-10.4871%
-2	4.5930%	-5.8941%
-1	-2.9320%	-8.8261%
0	-0.0051%	-8.8312%
1	1.6928%	-7.1384%
2	-0.1877%	-7.3261%
3	-0.8079%	-8.1340%
4	-0.1924%	-8.3265%
5	6.3156%	-2.0108%
6	1.2824%	-0.7285%
7	-0.6332%	-1.3617%
8	0.3740%	-0.9877%
9	-0.0299%	-1.0175%
10	0.1338%	-0.8838%
	-0.0421%	Average abnormal return
	0.44067	t -Stat

Event day	AR	CAR
5	.1.7881%	.1.7881%
4	-0.8728%	-2.6609%
3	-3.8315%	-6.4924%
2	3.1536%	-3.3388%
1	-3.2290%	-6.5678%
0	0.7813%	-5.7865%
1	1.1907%	-4.5958%
2	-0.6710%	-5.2667%
3	-1.5313%	-6.7981%
4	-0.9115%	-7.7096%
5	5.9215%	-1.7881%
	-0.1626%	Average abnormal return
	0.827	t -Stat

Table (6) abnormal return for the fourth event: Upgrade 1 November 2010

A) An event period set as [-10, +10]

Event day	AR	CAR
-10	-0.2044%	-0.2044%
-9	-0.2000%	-0.4044%
-8	-0.1557%	-0.3556%
-7	-0.1690%	-0.3247%
-6	0.5743%	0.4053%
-5	0.4519%	1.0262%
-4	-0.0177%	0.4341%
-3	-0.3115%	-0.3293%
-2	-0.5670%	-0.8785%
-1	0.9164%	0.3493%
0	-0.7103%	0.2060%
1	-0.1396%	-0.8500%
2	-0.1761%	-0.3158%
3	1.4100%	1.2339%
4	-1.1316%	0.2784%
5	-0.1430%	-1.2747%
6	0.2411%	0.3841%
7	-0.1258%	-0.3669%
8	1.2488%	1.1230%
9	-0.1638%	0.1448%
10	0.0596%	0.2044%
	0.0097%	Average abnormal return
	0.3185	t -Stat

event day	AR	CAR
.5	$\bar{0.2159\%}$	$\bar{0.2159\%}$
.4	0.1445%	$\bar{0.0714\%}$
.3	$\bar{0.4439\%}$	$\bar{0.5153\%}$
.2	$\bar{0.5478\%}$	$\bar{1.0631\%}$
.1	0.9651%	$\bar{0.0980\%}$
0	$\bar{0.8373\%}$	$\bar{0.9353\%}$
1	0.1651%	$\bar{0.7702\%}$
2	$\bar{0.2928\%}$	$\bar{1.0630\%}$
3	1.0342%	$\bar{0.0288\%}$
4	$\bar{0.0935\%}$	$\bar{0.1223\%}$
5	0.1273%	0.0050%
	0.00045%	Average abnormal return
	(2.42784)***	t -Stat

Table (7) abnormal return for the first event: Downgrade 31 January, 2006

A) An event period set as [-10, +10]

Event day	AR	CAR
-10	-0.2107%	-0.2107%
-9	-0.8772%	-1.0880%
-8	1.4949%	0.4070%
-7	-0.7971%	-0.3902%
-6	0.7578%	0.3677%
-5	0.6326%	1.0003%
-4	1.2115%	2.2118%
-3	1.4248%	3.6366%
-2	3.8097%	7.4463%
-1	1.3383%	8.7846%
0	1.3642%	10.1488%
1	-5.1261%	5.0227%
2	-3.1984%	1.8243%
3	0.3342%	2.1585%
4	-0.5386%	1.6198%
5	0.3973%	2.0171%
6	-0.0934%	1.9238%
7	-1.9998%	-0.0760%
8	1.7988%	1.7227%
9	0.5824%	2.3051%
10	-2.3051%	0.0000%
	0.0000%	Average abnormal return
	(4.7284)***	t -Stat

Event day	AR	CAR
5	0.3849%	0.3849%
4	0.7415%	1.1264%
3	0.9263%	2.0528%
2	3.6733%	5.7260%
-1	1.6342%	7.3602%
0	1.4606%	8.8208%
1	-5.2544%	3.5664%
2	3.2549%	0.3115%
3	0.0328%	0.3443%
4	0.4729%	-0.1285%
5	0.1285%	0.0000%
	0.0000	Average abnormal return
	(2.18491)***	t -Stat

Table (8) abnormal return for the second event: Downgrade 24 MAY 2006  
 A) An event period set as [-10, +10]

Event day	AR	CAR
-10	3.1205%	3.1205%
-9	11.7034%	14.8239%
-8	-4.9387%	9.8852%
-7	0.0911%	9.9763%
-6	1.0265%	11.0028%
-5	-1.6127%	9.3901%
-4	0.1893%	9.5794%
-3	3.4322%	13.0117%
-2	17.5725%	30.5841%
-1	-31.3503%	-0.7661%
0	-3.3818%	-4.1480%
1	-9.7904%	-13.9383%
2	-1.7876%	-15.7260%
3	0.7190%	-15.0070%
4	8.8926%	-6.1143%
5	5.8865%	-0.2279%
6	-5.0301%	-5.2580%
7	4.2852%	-0.9728%
8	5.2324%	4.2596%
9	-4.5338%	-0.2742%
10	0.2742%	0.0000%
	0.0000%	Average abnormal return
	(3.49612)***	t -Stat

Event day	AR	CAR
-5	-2.3388%	-2.3388%
-4	-0.0016%	-2.3404%
-3	4.4251%	2.0846%
-2	21.4310%	23.5156%
-1	-26.0178%	-2.5022%
0	-3.7812%	-6.2834%
1	-11.6751%	-17.9585%
2	-2.8890%	-20.8474%
3	0.8910%	-19.9564%
4	10.2429%	-9.7135%
5	9.7135	0.000%
	0.000%	Average abnormal return
	(3.211512)***	t -Stat

Table (9) abnormal return for the third event: Downgrade 14 March 2010

A) An event period set as [-10, +10]

Event day	AR	CAR
- 10	- 0.2201%	- 0.2201%
- 9	- 0.3609%	-0.5810%
- 8	1.0905%	0.5095%
- 7	0.2554%	0.7648%
- 6	- 0.3081%	0.4567%
- 5	- 1.4437%	-0.9870%
- 4	1.0436%	0.0566%
- 3	0.0935%	0.1502%
- 2	- 0.4117%	-0.2615%
- 1	- 0.5154%	-0.7769%
0	0.7971%	0.0201%
1	0.0733%	0.0934%
2	0.1103%	0.2038%
3	0.4327%	0.6364%
4	0.3496%	0.9860%
5	-0.3335%	0.6524%
6	-0.1974%	0.4551%
7	-0.7760%	-0.3209%
8	0.0327%	-0.2883%
9	0.1824%	-0.1059%
10	0.1059%	0.0000%
	0.0000%	Average abnormal return
	(1.5960)*	t –Stat

Event day	AR	CAR
-5	-1.4430%	-1.4430%
-4	1.0636%	-0.3794%
-3	0.0698%	-0.3095%
-2	-0.4417%	-0.7513%
-1	-0.5508%	-1.3021%
0	0.7720%	-0.5301%
1	0.0525%	-0.4776%
2	0.0842%	-0.3934%
3	0.4198%	0.0265%
4	0.2886%	0.3150%
5	0.3150%	0.0000%
	0.0000%	Average abnormal return
	0.60875	t - Stat

Event day	AR	CAR
-10	-0.0418%	-0.0418%
-9	0.1000%	0.0582%
-8	-0.1607%	-0.1025%
-7	-0.0020%	-0.1044%
-6	-0.0343%	-0.1388%
-5	-0.0364%	-0.1752%
-4	-0.0494%	-0.2246%
-3	0.5770%	0.3524%
-2	-0.0411%	0.3113%
-1	-0.0261%	0.2852%
0	-0.0376%	0.2476%
1	-0.0232%	0.2244%
2	-0.0255%	0.1989%
3	-0.0338%	0.1651%
4	-0.0144%	0.1507%
5	-0.0187%	0.1320%
6	-0.0222%	0.1098%
7	-0.0136%	0.0962%
8	-0.0323%	0.0639%
9	-0.0278%	0.0362%
10	-0.0362%	0.0000%
	0.0000%	Average abnormal return
	0.3537	t -Stat

Event day	AR	CAR
-5	-0.0714%	-0.0714%
-4	-0.1101%	-0.1815%
-3	0.5419%	0.3605%
-2	-0.0854%	0.2751%
-1	-0.0408%	0.2343%
0	-0.0749%	0.1593%
1	-0.0320%	0.1273%
2	-0.0388%	0.0885%
3	-0.0638%	0.0247%
4	-0.0060%	0.0187%
5	-0.0187%	0.0000%
	0.0000%	Average abnormal return
	0.51189	t-Stat

Event day	AR	CAR
-10	-2.3694%	-2.3694%
-9	2.0129%	-0.3565%
-8	0.1219%	-0.2346%
-7	0.1860%	-0.0486%
-6	-0.5339%	-0.5825%
-5	0.0808%	-0.5017%
-4	0.0801%	-0.4216%
-3	-0.4882%	-0.9098%
-2	0.7954%	-0.1144%
-1	-1.2301%	-1.3445%
0	1.4048%	0.0602%
1	0.6618%	0.7220%
2	-1.8361%	-1.1141%
3	1.9614%	0.8473%
4	0.1155%	0.9629%
5	0.2707%	1.2336%
6	0.1015%	1.3351%
7	0.1093%	1.4444%
8	-0.0056%	1.4389%
9	-1.6717%	-0.2328%
10	0.2328%	0.0000%
	0.0000%	Average abnormal return
	0.49708	t -Stat

event day	AR	CAR
-6	0.0000%	
-5	-0.0118%	-0.0118%
-4	-0.0101%	-0.0220%
-3	-0.7779%	-0.7999%
-2	0.4342%	-0.3657%
-1	-1.1482%	-1.5139%
0	1.1475%	-0.3664%
1	0.7269%	0.3604%
2	-1.7909%	-1.4305%
3	1.9682%	0.5377%
4	-0.0913%	0.4464%
5	-0.4464%	0.0000%
	0.0000%	Average abnormal return
	0.28892	t -Stat

Table (12) abnormal return for the sixth event: Downgrade 26 June, 2013

A) An event period set as [-10, +10]

Event day	AR	CAR
-10	-0.1448%	-0.1448%
-9	-0.0949%	-0.2398%
-8	0.5962%	0.3564%
-7	-0.1235%	0.2329%
-6	-0.1874%	0.0454%
-5	0.3142%	0.3596%
-4	0.0712%	0.4308%
-3	-0.0590%	0.3718%
-2	0.0747%	0.4465%
-1	-0.0396%	0.4070%
0	-0.0894%	0.3175%
1	-0.1053%	0.2122%
2	-0.0343%	0.1779%
3	0.1019%	0.2798%
4	-0.1104%	0.1694%
5	-0.0371%	0.1323%
6	-0.1100%	0.0223%
7	-0.0788%	-0.0565%
8	-0.0310%	-0.0875%
9	-0.0449%	-0.1323%
10	-0.0125%	-0.1448%
	-0.0069%	Average abnormal return
	(2.8878)***	t -Stat

Event day	AR	CAR
-5	0.3351%	0.3351%
-4	0.1577%	0.4928%
-3	-0.0296%	0.4632%
-2	0.0328%	0.4960%
-1	-0.0205%	0.4755%
0	-0.0438%	0.4317%
1	-0.0512%	0.3805%
2	-0.0181%	0.3624%
3	0.0455%	0.4079%
4	-0.0536%	0.3543%
5	-0.6894%	0.3351%
	-0.0304%	Average abnormal return
	(1.68216)*	t –Stat

\*\*\* Significant at 1% level

\*\* Significant at 5% level

\* Significant at 10% level