The Effects of Moody’s Sovereign Ratings on European Stock Markets

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Abstract

The purpose of this study is to examine if the sovereign ratings which Moody’s provide have any effect on the respective countries stock markets. This study is only focusing on announcements made by Moody’s and include all rating changes available for our chosen sample of countries. It is of importance to examine, not only the effects of rating changes made by Moody’s but also if the magnitude of the effects has changed after the crisis in 2008 from what it was before. Our research is based on price series data from 11 European countries that have had a debt to GDP ratio of 80 % or more between the years of 2008-2012.

An event study methodology has been applied when analyzing the time series data using linear regressions with the Ordinary Least Squares (OLS) method in order to examine if there exist abnormal returns in relation to credit changes.

Our results suggest that credit changes announced by Moody’s do have an impact on the sample of stock markets and that the effects of negative credit changes have increased. We also conclude that the persistency of these negative effects has increased after the crisis of 2008.

Keywords: Moody’s, sovereign ratings, credit rating agencies, rating effects, European markets, stock markets, downgrades, upgrades, financial crisis, event studies, market model, abnormal returns, efficient markets, behavioural finance.
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1 INTRODUCTION

1.1 Background

“There are two superpowers in the world today in my opinion. There's the United States and there's Moody's Bond Rating Service. The United States can destroy you by dropping bombs, and Moody's can destroy you by downgrading your bonds. And believe me, it's not clear sometimes who's more powerful.” (PBS, 1996) This was suggested by journalist Thomas Friedman regarding the abilities of the credit rating agencies (hereafter referred to as CRAs), more specifically Moody’s. The CRAs hold a tremendous amount of power since they can affect the financial status of institutions. This situation has occurred mainly because of the lack of competition due to entry barriers in their industry. There are only three internationally acknowledged actors, Moody’s, Standard & Poor and Fitch, where the two first mentioned of them control about 80% of the total global credit rating market in terms of customers. (Elkhoury, 2008). One recent example of the strength and reliance of the credit ratings is the downgrade of UK’s sovereign rating in February 2013. UK’s outstanding debt got downgraded for the first time in history, which created big headlines and eventually devalued the British sterling\(^1\) to a 16 month low (\(BBC\), 2013). The downgrade of UK’s sovereign credit rating went from an AAA to an Aa1, which according to Moody’s not should be considered a low rating. Furthermore the bond market reacted to the news as well and the UK 10-year bond yield dropped by approximately 5% (Investing, 2013). What we can observe is that the information the CRAs release affects individuals in the markets quite profoundly.

The need and acceptance of sovereign ratings can be seen by the existence of available ratings. In figure 1 we can see how the number of sovereign ratings has increased dramatically in the past 20 years. This shows how the role of CRAs has increased.

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\(^1\) Silver Sterling is the national currency of the United Kingdom more known as Pounds (\(Nationalencyclopedin\), 2013)
CRAs exist in our society since there is an information asymmetry between two parties who wish to borrow and lend funds. For example, an organization that wishes to borrow funds might perceive themselves as low risk clients. The financial institution lending the money might have deviating beliefs regarding the requesting firms’ solvency and this difference of opinions creates impediments in the arrangement between these two actors. CRAs have the ability to reduce the gap of information asymmetry as an independent third party. The CRAs actions aim to eliminate the difference in opinion between these two types of actors (Elkhoury, 2008). The power Friedman was referring to in the quote is quite clear when we know the role of the CRAs in the society. With only one downgrade, the CRAs can change the financial circumstances of an entire organization or country since the downgrade indicates that organization or country is riskier than before.

Several of the world’s largest financial markets have recently been through financial turmoil which has had a negative effect in the corresponding sovereign economies. Some regions have recovered but many are still struggling to bring back their economies to normal levels.

The European Union is an example where we still in 2013 can see traces of the turmoil caused by the European sovereign debt-crisis². This crisis has put pressure on the CRAs to provide new ratings based on the new financial outlooks of the nations and one can observe how CRAs like Moody’s and Standard & Poor have provided an increasing amount of ratings, especially downgrades, during these past years characterized by financial turmoil.

The CRAs could be powerful sources of information and there are many studies concluding that firms in different financial stock markets react to the firm specific credit

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² The European sovereign debt-crisis is a period of time were financial institutions among the EU-countries collapsed, the period is characterized by high government debt. (Investopedia, 2013)
ratings. Holthausen & Leftwich (1986), as one example, presented their research focusing on how firm specific credit ratings affected the American stock market. These ratings are specified to the firms in these markets and should hence only affect the stock prices of those specific firms. Sovereign credit ratings, on the other hand, are ratings provided to nations which confer information on the whole nation and could thus affect entire markets. The studies on the effect of sovereign ratings are usually carried out in two types of ways. One approach could be to monitor if and in what way government bonds react to CRAs announcements. Previous research indicate similar results, namely that CRAs announcements tend to affect bonds. This is perhaps of little surprise since a change in the sovereign credit rate is often made because of a change in the default risk of a government which in turn would affect the bond valuation. The other approach concerns how the ratings would affect the stock market, in which large sums of nation’s wealth lie in. This is according to Pukthuanthong-Le, Elayan & Rose (2007, p.48) a less developed research area and there is no conclusive theory in regards to what effect CRAs announcements might have on stock markets. Investors usually invest in specific firms based on their beliefs and information. There are however certain macro news which will always affect financial stock market and the sovereign credit ratings are one such example.

1.2 Earlier Studies

One of the first studies which tested the relationship between sovereign risk evaluations and Euro-credit rating pricing was presented by Feder & Ross (1982). The authors made use of the credit worthiness ranking presented by Institutional Investors in 1979, which provides a measure of lenders perceived default probabilities. Through the usage of these rankings Feder et al. (1982) manage to conclude that the risk-premiums (Euro-spreads) in the market did reflect these perceptions. Hence, the authors suggested that anticipated events, such as that of an up/down grade were systematically incorporated in the Euro-credit prices. The conclusion was that the Euro-credit market should be considered as efficient. In relation to the research presented by Feder et al. (1982), Cantor & Packer (1996) investigated not only if sovereign default probabilities have an effect or not but also reconnected this reasoning to Eurodollar bonds. The authors examined what effects the sovereign rating announcements had on sovereign yields for Eurodollar and U.S-dollar bond spreads. Cantor et al. (1996) research concluded that sovereign ratings provided the international bond markets with information and therefore were considered to have an immediate effect on bond spreads.

The question of how stock markets are affected by up- or downgrades by the CRAs was, amongst several others, studied by Hand, Holthausen & Leftwich in 1992. The authors examined the daily excess returns on both stocks and bonds associated with announcements made by both Standard and Poor and Moody’s. Hand et al. (1992, p.734) managed to conclude that significant average excess stock returns were observed in the cases where there was an indication of a downgrade but not in the cases of indicated upgrades. Kaminsky & Schmukler (2002, p. 171) study also concludes that
rating changes not only affect bond yields but also stocks. Kaminsky et al. (2002, p.186) makes use of stock spreads between emerging markets stock price and the S&P 500 stock market index in order to determine the effects of announcements made by Moody’s, Standard and Poor and Fitch. Kaminsky et al (2002, p.188) suggest that these three rating agencies are behaving pro-cyclically. That is, they upgrade when the prices of the markets financial instruments go up and vice versa. The authors, also, conclude that stocks on average decline in the event of a downgrade but do not experience any excessive returns due to upgrades. Norden & Weber (2004, p. 2837-2838) were also able to conclude a very similar result where the stock markets examined showed significantly negative performance in relation to a negative announcement but insignificant reactions in relation to positive ones. There has, besides these presented studies been an extensive amount of research concluding how macroeconomic variables, containing information, influences stock markets. The general consensus is that investors incorporate the information provided by these variables into their estimations of for example their discount rate which influences the valuation of stocks and hence stock markets. For further elaboration, see: Pearce & Roley (1983); Chen, Roll & Ross (1986); Kim & Wu (1987); Mookerjee & Yu (1997).

Having established a framework of previous research suggesting that stock markets along with bond markets are affected by the CRAs announcements, we now move on to examining previous research exploring the effects of a crisis. One such research is presented by Joo & Pruitt (2006) where the authors focused on times of instability from 1995-2002. The authors concluded that during the Asian crisis of 1997, Korean stocks reacted much more heavily to credit rating changes than they did pre crisis. The research showed that the stocks reacted approximately 15 times more heavily than before the crisis. More recently Pacheco (2012) performed a study on the Portuguese stock market where the author concluded that Portuguese stocks reacted more heavily after the financial crisis of 2008 than before, however the difference in effects were not as large as in the Korean study by Joo & Pruitt (2006).

1.3 Research Question

Given the discussion of the CRAs market power, their amplified role after the financial turmoil and the suggested but less researched effect on stock markets we aim to examine:

*The effects of Moody’s sovereign rating announcements on national stock exchanges and how they differ pre- and post crisis.*

The main purpose with our study is to examine what effects Moody’s announcements have on national stock exchanges for the years 1986-2013 Our first sub-purpose is to conclude if these effects tend to differ pending on if they were carried out pre- or post crisis. Our second and last sub-purpose is to determine if our examined stock markets
are considered to be perfectly efficient or not. That is, if Moody’s announcements have
effects on national stock exchanges, the markets cannot be described as being perfectly
efficient. The study will be conducted using an event study methodology were we treat
each rating as a separate event. We will aggregate the results of each event in order to
examine the total effect of the ratings. The sovereign stock markets which are examined
in this study are the: Belgium, Cyprus, France, Greece, Hungary, Iceland, Ireland, Italy,
Portugal, Spain and the United Kingdom.

1.3 Limitations of the data

We choose to go with Moody’s credit rating agency since it is considered to be a first-
mover in this industry, which we think could make a difference in the results because
they are first to give a rating in many cases (Alsakka & Gwilym, 2011). We have also
noticed that many of the studies done in this topic cover Standard & Poor which made
us feel that it would be more contributing to provide a study on the effects of Moody’s.
Lastly, because of the recent media coverage it has gotten due to downgrading the UK
sovereign credit rating.

We have chosen to study countries in Europe because of the European sovereign debt-
crisis. We have decided to select countries based on their debt to GDP ratio. If a
country’s debt exceeds 80% of its national GDP we will include it in our sample. By
applying a higher level of debt ratio we would have decreased our sample significantly
and we have therefore chosen a large sample rather than a higher debt ratio. Including a
larger sample is according to Studenmund (2010, p. 554-556) preferable since it
increases the statistical validity and accuracy.

Daily price indices for our examined countries are collected from Thomson Reuters
DataStream global indices section. We have made use of MSCI’s³ indices for all of our
examined countries as well as for our comparative index representing Euro markets. We
have chosen MSCI due to its sufficiently high level of price series data in order to be
able to include as many announcements as possible. The final data included in our
research gratify the following filters: (i) exceed a national debt to GDP level of 80%. (ii)
must have a MSCI price index available on DataStream. (iii) MSCI index must be
available at least 70 prior and 10 days after the announcement made by Moody’s⁴. We
included 11 countries in our research which in turn resulted in 58 credit announcements
during the time period of 1986-04-11 to 2013-05-06. We will include all available data
from the first initial rating presented by Moody’s up to 2013-05-06. Thus we have no
time restrictions in our data. All announcements were collected from Moody’s own
webpage (Moody’s, 2013).

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³ MSCI is an investment research firm that provides performance analytics, indices and performance
analytical tools (MSCI, 2013).

⁴ The choice 70 days between the announcements will be elaborated further in section 3.2.
Given the aim of our research, this section will handle the theory on which this research relies on and also uses as a collation towards its findings.

The conceptual understanding of the first two theoretical areas is relatively straightforward. The general consensus within the areas of Finance and Economics is that markets are assumed to, in accordance with the Efficient Market Hypothesis (hereafter referred to as EMH), be efficient. Hence, all information is assumed to be incorporated in e.g. the prices of stocks. Incorporating these assumptions on the area of the CRAs’ effects on sovereign stock markets, would suggest that a change in either a company’s investment rating or a country’s debt rating should not have any real effects on the overall stock market since all information available should already be incorporated. However if CRAs are assumed to be independent from the markets and instead are seen as new source of information then the effects affiliated from them might change. Since CRAs could be assumed to be a source of information to the market, the EMH will indicate how the markets will react to their information and therefore be included in our study. Markets do however not always act rationally and do sometimes deviate from the fundamental values on which prices are set, according to Thomaidis (2006, pp.1-6). These types of deviations are not explained within most models and one would instead turn to the theoretical area of behavioural finance which can provide explanations of why individuals turn away from the EMH. We have thus included behavioural finance as a explanatory theory which can provide explanations for eventual market deviations. To be able to estimate the normal returns of a market a well applicable model is needed, hence the market model is used in this study to aid us in estimating the returns. For further elaboration regarding the choice of the market model see section 2.3.

Our thesis is thus primarily concerned with three theoretical areas: (i) the EMH (ii) behavioural finance (iii) the market model.

2.1 Efficient Market Hypothesis

Micro- and macro economic research base their standpoints on the assumption that markets are efficient and that all information is embedded in market prices (Carlin & Soskice, 2006, p. 260). The theory of EMH, suggests according to Bodie et al. (2011, p. 373), that stock markets are based on all available information and follow a random walk along with the stream of new information. This would thus suggest that the changes in stock prices are due to new information and stock prices reflect all available information at that point in time. To what degree the CRAs will affect the stock markets depends on how the market digests the information that the CRAs bring forward in their ratings. Eugene Fama (1970) suggested that there are three different forms of market efficiency: (i) weak (ii) semi-strong (iii) strong. What separates the different market
efficiencies is the degree of information available on the market and to what degree the information is incorporated into prices.

In the weak form the trustworthiness of the hypotheses is tested using only historical market prices as information subset. It incorporates historical prices into current ones, which makes information regarding past prices reflected in today’s prices, according to Fama (1970, p. 389). Bodie et al. (2011) states that in the weak form, all possible signals - for instance a buy recommendation, would have been fully exploited and reflected through an increase in the stock price. A buy recommendation would thereby lose its value. A market characterized by the weak form of efficiency could be subject to the CRAs rating announcements since this particular market has not incorporated all the information the CRAs possess. Hence, a rating change has the ability to alter the financial climate on one such market.

The second form of efficiency is the semi-strong form. This form holds a higher degree of information than the weak form. In the semi-strong market form, today’s prices reflect both the historical prices as well as all other public information. Fama (1970, pp.404-405), states that all information will be interpreted equally by agents on the financial market and since everyone holds the same information it will be impossible for anyone to generate abnormal returns. Bodie et al. (2011, p.351) suggests that both fundamental and technical analysis will be superfluous in this market form but also questions the way individuals interpret information. That is, perhaps everyone does not perceive information in the same way and there might arise situations in which some individuals interpret information better than others and make abnormal returns based on this gap. The general understanding is however that the only way to make arbitrary profits under the semi-strong market form is to hold private information which other investors on the market are not aware about. Theoretically, the CRAs should thus not be able to affect sovereign stock markets since it would imply that they hold more information than all others in that specific market.

The third form of market efficiency is the strong form. In this type of market form, all previous types of information are embedded into markets: historical prices, all public available information and insider information. As in the semi-strong market form, CRAs would have no affect under these assumptions since they transfer information rather than deriving it themselves.

2.2 Behavioural finance

Behavioural finance is a relatively new concept applied on the financial sector where it is suggested to explain situations of market imperfection. It makes, accordingly to Barberis & Thaler (2003, pp.1053-1054) use of cognitive psychology which is argued to better explain the behaviour of the financial markets.

Bodie et al. (2011, pp.410-412) refers to the market anomalies that arises due to irrational behaviour as errors and they go against the principles of EMH. The author further suggests that these errors can be divided into two areas: (i) how investors process information (ii) and how investors capitalize on the information given to them.
Under these two areas there are several distinctive errors. In the following section we will account for some of the most prominent, according to Bodie et al. (2011, pp.410-412).

2.2.1 Information processing

*Overconfidence* - is a common characteristic when individuals are not being able to process the information provided. This in turn often results in investors overestimating their accuracy of their estimates, forecast, probabilities of events happening or not and their own abilities to make superior analysis according to Bodie et al. (2011, p.11).

*Representativeness* – this characteristic represents individuals that tend to adjust too quickly to events occurring frequently but not necessarily in the future, according to Thomaidis (2006, p.6). This phenomena could also be described accordingly by the law of small numbers, according to Ritter (2003, p.4). It suggests that individuals do not take heed of the relative size of the sample. Hence, individuals formulate their behaviour based on few observations which they think will be representative for an extensive period of time.

*Conservatism* – is the characteristic describing when individuals are underreacting to new information and put higher emphasis on their own experience and beliefs, according to Thomaidis (2006, p.9). If individuals in a market could be characterized as conservative in terms of information processing it would be unlikely that CRAs announcements would have effects on stock markets.

2.2.2 Decision making

After having absorbed the available information, individuals will formulate their decision. The decision itself do however not have to be rational even though the information process could have been completely rational, according to Bodie et al. (2011, p.412)

Prospect theory is one way of approaching the area of decision making. Expected utility (EU-theory) is perhaps the most commonly used within economics but according to Thomaidis (2006, p.7) individuals often violate the EU-theory and the authors therefore suggest the application of prospect theory instead. Prospect theory focuses more on the consequences due to change of wealth rather than the level of wealth as in the EU-theory. Prospect theory is according to Thomaidis (2006, p.6) more descriptive than that of EU-theory which suggest a more standardized way of explaining individuals decision making. According to Ritter (2003, p.4), the prospect theories descriptive concepts concerns among several: *mental accounting* and *loss aversion*.
Mental accounting, concerns the reasoning of individuals in terms of how they respond to e.g. capital gains/losses. Taking the mental accounting into consideration might affect an individual in such way that she is unwilling to get rid of e.g. her stock that has suffered a loss and a potential credit downgrade due to the unwillingness to realize the loss. She would rather than selling keep her stock and hope for a turnaround, according to Thomaidis (2006, p.8). What the mental accounting represents is thus an irrational way of reacting to bad news where the individual do not want to realize the financial loss. In relation to a negative announcement made by the CRAs, this concept suggests that individuals might not react in equal proportions as to positive ones.

Loss aversion is a concept much related to the previous and concerns how individuals are more sensitive to a loss than gain. Hence, a loss has a larger influence on the individual than a gain of equal proportion, according to Thomaidis (2006, pp.7-8). This reasoning would thus provide an indication that a negative announcement made by the CRAs might have a larger negative impact than a positive announcement of equal proportion.

2.3 The Market Model

In order to determine if there exist abnormal returns on the market we need to define what the expected normal return is. The types of models used at this instance is commonly divided into two groups: statistical models and economic models. Where the first mentioned relies on statistical assumptions and the later on assumptions regarding economic influential factors.

We will apply the statistical type of model since it is, according to Mackinlay (1997, pp.17-19) easy to apply and previous research has suggested that the usage of a statistical model provided for very good estimates. Another reason for not making use of an economic model is that it leaves out the many assumptions that an economic model is built upon, which will ease the process.

The statistical model commonly used to estimate the expected normal returns applied in previous research (see Hand et al. (1992) and Joo & Pruitt (2006)) is the market model which is an ex-ante model\(^5\). The market model was first introduced by Fama et al. (1969) and its purpose is to define the return of a security in comparison to the market index return. Since the market model is the most frequent used in previous research within this area we find it appropriate to use it in order to collide our results.

\[
Rit^* = \alpha_i + \beta_i R_{mt} + (\varepsilon_{it})
\]

\(^5\)Ex-ante is a term in economics which is used to characterize an expected event or variable like the stock returns in this case. Ex ante is Latin for beforehand. (NE.se, 2013)
where $R_{it}^*$ represents the return for a specific market index $(i)$ at the time $(t)$. $R_{mt}$ represents the return of all the markets, which in our case is the European market. Hence, the $R_{mt}$ is the return from the European market index at time $(t)$. $\alpha_i$, represents how much the specific market $(i)$ moves when the rest of the European market is unchanged. $\beta_i$ represents the chosen markets $(i)$ sensitivity to the rest of the European market. $\epsilon_{it}$, is the variable which represents the zero mean disturbance term which provides for how much the specific market $(i)$ responds to new information. This is thus the variable that represents any eventual abnormal returns between the $R_{it}^*$ and $R_{mt}$, and is thus not included in the model when estimating the normal return ($R_{it}^*$) otherwise we would get abnormal returns equal to zero (since $R_{it}^* = R_{tt}$).

$\alpha$ and $\beta$ will be estimated through the usage of an OLS regression with data from our estimation period. $R_{mt}$ represents our independent variable and $R_{it}^*$ is the dependent variable that is compared against $R_{mt}$. 
This part of our research concerns the practical approach that we will apply. We start of by explaining our chosen approach and the time window that we will examine. The rest of this chapter will aim to explain our two estimators used to derive our results.

3.1 Descriptive data

The raw data which we have collected are index prices which we used to get the returns from the indices. However the returns do not describe anything in this study, instead it is the abnormal returns which will tell us about the effects from the ratings in this study. The following tables will show a description of the abnormal returns for the upgrade and downgrades respectively.

<table>
<thead>
<tr>
<th></th>
<th>Upgrades</th>
<th>Downgrades</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average 0.002658</td>
<td>Average -0.00801</td>
</tr>
<tr>
<td>Standard error 0.0033</td>
<td>Standard error 0.004095</td>
<td></td>
</tr>
<tr>
<td>Median 0.000546</td>
<td>Median -0.00322</td>
<td></td>
</tr>
<tr>
<td>Mode #N/A</td>
<td>Mode #N/A</td>
<td></td>
</tr>
<tr>
<td>Standard deviation 0.01512</td>
<td>Standard deviation 0.024907</td>
<td></td>
</tr>
<tr>
<td>Variance 0.000229</td>
<td>Variance 0.00062</td>
<td></td>
</tr>
<tr>
<td>Range 0.057539</td>
<td>Range 0.155394</td>
<td></td>
</tr>
<tr>
<td>Minimum -0.02404</td>
<td>Minimum -0.13651</td>
<td></td>
</tr>
<tr>
<td>Maximum 0.0335</td>
<td>Maximum 0.01888</td>
<td></td>
</tr>
<tr>
<td>Sum 0.055823</td>
<td>Sum -0.29633</td>
<td></td>
</tr>
<tr>
<td>Count 21</td>
<td>Count 37</td>
<td></td>
</tr>
</tbody>
</table>

Table 1 – Descriptive for the upgrades

Table 2 – Descriptive for the downgrades

Table 1 presents the number of observations for each category. Pre categories comprise of observations before and post contain observations after the financial crisis, and Total contains both. Total pre and Total post contain both Actions and Outlooks, whereas Total total contain all Outlooks and Actions both pre - and post the financial crisis.
Table 3 – The number of observations in each category

<table>
<thead>
<tr>
<th>Days</th>
<th>Action pre</th>
<th>Action post</th>
<th>Action total</th>
<th>Outlook pre</th>
<th>Outlook post</th>
<th>Outlook total</th>
<th>Total pre</th>
<th>Total post</th>
<th>Total total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upgrade / positive</td>
<td>9</td>
<td>0</td>
<td>9</td>
<td>12</td>
<td>0</td>
<td>12</td>
<td>21</td>
<td>0</td>
<td>21</td>
</tr>
<tr>
<td>Downgrade / negative</td>
<td>4</td>
<td>18</td>
<td>22</td>
<td>3</td>
<td>12</td>
<td>15</td>
<td>7</td>
<td>30</td>
<td>37</td>
</tr>
</tbody>
</table>

3.2 Practical method

This research applies a quantitative approach using time series data from the period of 1986-2013. Our research will be conducted using an event study methodology which we consider appropriate since we wish to examine the effects of credit rating announcements on stock markets. However we should note that one can never be sure if the effects that are being observed actually arise from the events we wish to measure and this is a weakness of the event study methodology. The event study methodology requires the research to produce abnormal returns which, if exists will indicate that the announcements made by Moody’s have an effect on stock markets (Mackinlay, 1997). The abnormal returns will be estimated accordingly:

$$AR_{it} = R_{it} - R^{*}_{it}$$  \hspace{1cm} (2)

To produce abnormal returns ($AR_{it}$) we will estimate normal returns ($R^{*}_{it}$) by applying a regression model. The applied model is the market model which was elaborated and specified in depth in the theory chapter. The market model will be used since it is standard in this area of research. The normal returns will be estimated using a simple Ordinary Least Squares (OLS) linear regression method where the specification of the model will be set by the market model. Having estimated the normal return ($R^{*}_{it}$) we subtract the normal returns from our observed returns ($R_{it}$) to derive our abnormal returns. The abnormal returns will indicate in what way stock markets react to the event of a rating change (Peterson, 1989).

In the event study methodology one examines each event separately and then aggregates the effects of the events in order to conclude the overall reaction. Since markets not necessarily are perfectly efficient in the way they adjust to information in the real world compared to the hypothetical, an event window larger than one day is a convenient way to examine if there exist any wealth effects around the announcement day, according to
Peterson (1989, p. 38). Previous research, for example Hand et al. (1992) and Kaminsky & Schmukler (2002) makes use of this method since the market adjustments might be sluggish, or the market could have gained access to the rating prior to the announcement, and if so the market would perhaps not respond on the actual date of the announcement. Thus it would make sense to increase the span of examined days in order to conclude if the observed reality deviates from its expected path in terms of returns. The event window will hence show if the announcement has any effect on the stock returns before or after the announcement. In addition an event window can be used to show the persistency of the effect of the event as will be described below (Mackinlay, 1997). We have chosen a ±2 day event window but we will also do the study on a ±5 and ±10 to see if the effects reach even longer.

Each observation (rating announcement) will have a separate regression to estimate the parameters needed to produce the normal return. The data which these regressions will be based upon are a certain number of days before the event window called the estimation window. There is by definition no single formula for how many days to include in the estimation window and previous research within this area tend to use a length of approximately 100 days (Peterson, 1989, p. 38). The only consideration to be made is to have a large enough window for a good prediction model but also not too long because of structural shifts in security prices. Our regressions will be made on data ranging from 60-120 days prior to the event window. 60 days was set as a minimum because a higher minimum would create a lot of event clustering which would force us to eventually remove some of the observations. The time window for each observation will look like the illustration below

![Figure 2. A visual image of a time window](Source: Peterson, 1989)

With the abnormal returns estimated for each event, we produce different estimates with the help of a few formulas (3), (4), (5) and (6) as defined by Mackinlay (1997). These estimates will be presented below together with their respective formulas. Each estimates respective standard errors will be calculated as well to be able to conduct a t-test later on
We aggregate our abnormal returns throughout our observations in order to derive an aggregated estimate of the effects. The aggregated returns will provide for the average effect of a specific type of rating announcement\(^6\). This aggregation will however only be done through observations and not through time so that we can see the effects during a single day in time. The estimate is called Aggregated Abnormal Return (from here on referred to as AAR) and is calculated as followed where \(AR_{it}\) represents the abnormal return for a specific observation during a specific day in the event window and is defined accordingly:

\[
AAR_t = \frac{1}{N} \sum_{i=1}^{N} AR_{it}
\]  

(3)

The variance of the AAR \((\sigma^2(AAR_t))\) is calculated with the following formula where the variable \(\sigma_{\varepsilon_i}^2\) is the variance of our error terms produced by our regressions in equation (1) or more simple put the variance of the abnormal returns (AR). \(N\) is defined as the number of observations.

\[
\sigma^2(AAR_t) = \frac{1}{N^2} \sum_{i=1}^{N} \sigma_{\varepsilon_i}^2
\]  

(4)

A second estimate will be used to aggregate through two dimensions, both across observations and through time. This estimate is called Cumulative Aggregated Abnormal Return (hereon referred to as CAAR) and will calculate the persistency of the effects from the rating announcements throughout the event window. Thus the CAAR will estimate what the long lasting effects of the aggregated events will be through the event window. The CAAR will be estimated and defined accordingly where \(CAAR(t_1, t_2)\) is the cumulative average abnormal return for returns between time \(t_1\) and \(t_2\).

\[
CAAR(t_1, t_2) = \sum_{t=t_1}^{t_2} AAR_t
\]  

(5)

The variance of the CAAR \((\sigma^2(CAAR(t_1, t_2)))\) is calculated with the help of the variance of the AAR through the following formula:

\[
\sigma^2(CAAR(t_1, t_2)) = \sum_{t=t_1}^{t_2} \sigma^2(AAR_t)
\]  

(6)

\(^6\) The rating changes can be either divided in upgrades or downgrades. However in each group a further categorization can and will be made, for example between outlooks and actions and pre or post the financial crisis
Once calculated the estimates and their respective standard errors we examine if they are significantly different from zero. In order to examine their relationship we make use of a two-sided t-test. The null and alternative hypothesis is as follows:

\[
H_0: \text{AAR} = 0 \\
H_A: \text{AAR} \neq 0
\]

We only reject our null hypothesis if the p-value is smaller than 0.1. The same hypothesis tests will be done on all the calculated values for the AARs and CAARs presented in the results in the forthcoming chapter. It should be noted that the hypothesis tests will be done separately for the upgrades and downgrades respectively. This because according to the theory presented above an upgrade should give rise to a different effect than a downgrade does.
4 EMPIRICAL RESULTS

This section aims to read up on our results derived from our OLS regressions. In line with the purpose of this research, we will present our two estimates of AAR and CAAR in order to examine the effects of Moody’s sovereign ratings on our observed stock exchanges.

4.1 Quality of data

When estimating normal returns, 58 independent regressions were conducted - one for each observation. Presenting the results and qualities of each and every one of the regressions would be too exhaustive, thus we will present and discuss the qualities of the regressions in general. Approximately all of the regressions showed indications of similar qualities. It should however be noted that each regression was conducted and analysed separately to check for statistical errors.

One of the preconditions for the regressions and hypothesis tests is that the sample is approximately normally distributed. According to the central limit theorem, a large enough sample will eventually become normally distributed. Each and every one of our regressions is conducted on a time-series data of at least 60 days and a maximum of 120 days. The majority of the regressions are conducted on a sample of 120 days or close to 120 days. In accordance with the central limit theorem it is safe to assume that we have a large enough sample to assume that each observation has a normal distribution (Studenmund, 2011, p.552). In addition to this assumption, a normality plot has been made for each regression and all of them showed a fairly straight line indicating that they are normally distributed. En example of one of these plots can be found in the appendix 1. Peterson (1989, p. 55) further argues that the non-normality of stock returns has a quite small effect on the test statistics.

The aggregations of our observations (AARs & CAARs) are subdivided into categories. Some of these categories have few observations which will make it difficult for us to generalize the results. However studies in this field have been conducted and conclusions have been made on a sample as small as two observations (Barron et al, 1997), hence we still consider our results to be reliable.

Two of the statistical issues which could have been present in our data were heteroskedasticity and autocorrelation. Both of which would not affect our point-estimates but could affect our standard errors which in turn would increase the risk for type I errors when performing the hypothesis tests. We did not find any indications of neither heteroskedasticity nor autocorrelation in the tests or the plots of each regression. The tests we performed for the indication of heteroskedasticity was the White test, and
likewise the tests for autocorrelation were performed using the Durbin-Watson d test (Studenmund, 2011, pp. 315, 349). An example of one of the residual plots can be found in the appendix 1. Peterson (1989, p. 55) further argues that autocorrelation in event studies should only be attended to in extreme cases since it could do more harm than good otherwise.

All the regressions produced \( \beta \) which were significant at a 99% confidence level with \( R^2 \) ranging from about 0.22 - 0.63, which is similar to the results of the research conducted by Pacheco (2012).

4.2 Presentation of results

In the following paragraphs we will presents the findings from our two estimates: AAR and CAAR. As discussed (see Method), event studies within this area often make use of a ±2 day window for the estimates. In our research we have made use of three separate windows (± 2, 5 and 10 days) in order to examine the results sensitivity. From our results, we could however conclude that the five respective ten day windows did not provide any results suggesting that these estimation windows were affected by announcements made by Moody’s. In regards to the findings from this sensitivity analysis, we will only present the two-day estimation period due to (i) it is closer to the announcement date, which should minimize the risk of including other effects as well. (ii) the two-day period did show effects in contrast to the other two estimation windows.

4.2.1 Aggregate Abnormal Return

This paragraph will present the results of the AARs which provides for the aggregated effect of a rating change. We will start off by presenting the positive action and outlooks announced by Moody’s during our observed years in accordance with table:

<table>
<thead>
<tr>
<th>DAYS</th>
<th>Action pre</th>
<th>Action post</th>
<th>Action total</th>
<th>Outlook pre</th>
<th>Outlook post</th>
<th>Outlook total</th>
<th>Total pre</th>
<th>Total post</th>
<th>Total total</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2</td>
<td>-0.0006</td>
<td>-</td>
<td>-0.0006</td>
<td>0.0043 **</td>
<td>-</td>
<td>0.0043 **</td>
<td>0.0022 *</td>
<td>-</td>
<td>0.0022 *</td>
</tr>
<tr>
<td>-1</td>
<td>0.0017</td>
<td>-</td>
<td>0.0017</td>
<td>0.0021 ***</td>
<td>-</td>
<td>0.0021</td>
<td>0.0020</td>
<td>-</td>
<td>0.0020</td>
</tr>
<tr>
<td>0</td>
<td>-0.0042 **</td>
<td>-</td>
<td>-0.0042 **</td>
<td>0.0078 ***</td>
<td>-</td>
<td>0.0078 ***</td>
<td>0.0027 **</td>
<td>-</td>
<td>0.0027 **</td>
</tr>
<tr>
<td>1</td>
<td>-0.0053 **</td>
<td>-</td>
<td>-0.0053 **</td>
<td>-0.0083 ***</td>
<td>-</td>
<td>-0.0083 ***</td>
<td>0.0070 ***</td>
<td>-</td>
<td>-0.0070 ***</td>
</tr>
<tr>
<td>2</td>
<td>-0.0008</td>
<td>-</td>
<td>-0.0008</td>
<td>0.0011</td>
<td>-</td>
<td>0.0011</td>
<td>0.0003</td>
<td>-</td>
<td>0.0003</td>
</tr>
</tbody>
</table>

Table 4 – AARs for upgrades during a ±2 day window
Table 4 shows the effects in terms of aggregated abnormal returns from our observations where the positive returns are positive deviations from its expected value and the negative represents negative deviations. Furthermore, all cells in table 4 is denoted by either, one, two three or no asterisk. These denote the significance level of the observed abnormal returns for the corresponding day where one asterisk represents a confidence level of 90%, two asterisk – 95%, three asterisk -99%, and no asterisk – no significance.

From table 4 we can conclude that there have been no positive outlooks or upgrades post-crisis for any of our observations. That is, there has not been one single positive outlook or upgrade since 2008-05-30 to the date of 2013-05-06. Moving on to the examination of outlooks in the pre-crisis time period, our results suggests that the outlooks presented by Moody’s tend to have a positive impact on the examined countries with aggregated abnormal returns ranging from approximately 0.2-0.8%. There is also a positive trend where the returns peak on the day of the announcement. Notice how drastic the drop is after the announcement day where the negative abnormal return (-0.0083) is larger than the positive return (0.0078) on the announcement day. The overall result from positive outlook announcements pre-crisis is according to table 4 that it has a temporary positive effect, especially on the announcement day. But it rather quickly moves back to normal levels during the day after the announcement. Examining the actions during the pre-crisis time span, ranging from all dates previous to 2008-05-30, one can, again, detect a pattern suggesting that the largest deviations are centred surrounding the announcement day. From table 4, we can detect that there are no positive abnormal returns in relation to an upgrade for our chosen stock markets, quite the contrary actually. According to table 4, the aggregated abnormal returns are negative, both for the announcement day as well as for the day after. The only day that indicates positive abnormal returns is the day preceding the announcement day, but they are according to table 4 not significant and cannot be used for any statistical secured interpretations. The overall effect of a positive action announcement pre-crisis is that there is no general positive pattern amongst our observed stock markets. The overall pattern would rather be described by a negative abnormality along the positive actions made by Moody’s.

In terms of significance, we can from table 4 determine that most values, in both the positive outlooks and actions, are significant at a 10, 5 or 1 % level. Noticeable is that the highest level of significance is surrounding the announcement day of the positive outlooks and actions. Hence, these are the days where the majority of our population is subject to effects giving rise to both negative and positive abnormal returns. These results further support the reasoning to only include an estimation period consisting of ±2 days, since these are the days where we can statistically determine that announcements made by Moody’s have an effect. Furthermore, we are not able to determine if the positive announcements made by Moody’s has a larger effect or not pre- or post-crisis on the aggregated abnormal returns since we have no observations from the time period after 2008-05-30.
Table 5 - AARs for downgrades during a ±2 day window

Table 5 examine the effects of negative outlooks and actions delivered by Moody’s during our chosen time period on our chosen stock markets.

Contrary to the results from the aggregated abnormal returns due to positive outlooks and actions, table 5 suggest that Moody’s has announced both negative actions and outlooks pre- and post the crisis. In terms of negative outlook announcements made, our results suggest that outlooks pre-crisis effects are dissenting. The aggregated abnormal returns for our estimation window provides negative returns for the two days preceding the announcement day but positive returns on the actual announcement day and onwards for two additional days. Only one of these five days are however significant, thus not being able to statistically ensure any relationships between our observed stock markets. The only day being significant, at a 5 % level, is two days after the announcement day of the negative outlook in accordance with table 5. Regarding negative outlook announcements made post-crisis, there is a different pattern. Our results suggest that there are no negative effects in the days preceding the announcement day but is follow by negative returns on the announcement day as well as two days later. Noticeable is that the effects post-crisis contrary to effects pre-crisis are significant at a 1 % level meanwhile pre-crisis are not. Hence, there is a strong concurring effect amongst our chosen stock markets after the crisis.

Examining the actions made by Moody’s pre-crisis, table 5 suggests that there are overall negative abnormal returns within our two-day estimation window. The lowest levels of returns can be observed one day after the downgrade announcement and is also the value that holds the highest level of significance amongst our observations from the pre-crisis time period after a negative announcement. The overall pattern from the pre-crisis period indicates that our observed stock markets are suffering from negative abnormal returns, primarily on the announcement day and the following two days. The majority of our chosen estimation days are however not significant which suggests that our observed markets tend to differ in terms of sensitivity due to negative actions. Examining the effect on the returns due to actions from Moody’s in the post-crisis time period, the outcomes amongst our sample shows a similar pattern as pre-crisis observations. The overall effect due to negative announcements results in negative

\[
\begin{array}{cccccccccc}
\text{DAYS} & \text{Action pre} & \text{Action post} & \text{Action total} & \text{Outlook pre} & \text{Outlook post} & \text{Outlook total} & \text{Total pre} & \text{Total post} & \text{Total total} \\
-2 & -0.0040 & -0.0035 & -0.0036 & -0.0094 & 0.0026 & 0.0002 & 0.0063 & ** & -0.0011 & -0.0021 \\
-1 & 0.0055 & 0.0059 & 0.0058 & -0.0018 & 0.0025 & 0.0017 & 0.0024 & ** & 0.0046 & 0.0041 \\
0 & -0.0038 & -0.0045 & -0.0044 & 0.0014 & -0.0171 & 0.0034 & ** & -0.0095 & 0.0080 \\
1 & -0.0075 & -0.0027 & -0.0036 & 0.0043 & 0.0017 & 0.0022 & - & 0.0024 & -0.0009 & -0.0012 \\
2 & -0.0010 & -0.0011 & -0.0011 & 0.0206 & -0.0072 & 0.0017 & 0.0082 & ** & -0.0035 & -0.0013 \\
\end{array}
\]
returns on all days but one. The general pattern is however negative where the only day of observations being significant is the announcement day. All other aggregated negative abnormal returns are not significant and cannot be used as statistical certain measures for our observed stock markets. Aggregating the results from the pre- and post crisis date, all days except the + 2 day observation is significant. All previous estimation days are significant at minimum of 10 %. Examining the aggregated differences between negative announcements made pre- and post crisis table 5 suggest that the negative effects are not only more frequent post-crisis but also possess an overall higher level of significance. Thus, our results indicate that the effects caused by negative announcements are, to a larger degree, more common for our observed stock markets after the crisis in 2008. One can also conclude by further examination of table 5 that the effects post-crisis is not only more significant but also more severe than pre-crisis. Hence, our results suggest that negative announcements made by Moody’s post-crisis have a larger effect on our chosen stock markets than do pre-crisis in terms of aggregated abnormal returns.

Figure 3 and 4 makes the effects of both up- downgrades made by Moody’s more visible. Both figure 3 and 4 are formulated in aggregated forms, hence showing the effects of both outlooks and actions but is separated into pre- and post crisis time periods. From figure 3, we can closer examine the patterns of the aggregated abnormal returns and the reactions after a negative announcement. From figure 3, we can observe that pre-crisis announcements do not bring strong effects. The strongest effects are as a matter of fact most prominent two days ahead of the announcement. But, as suggested by table 3 these effects are not significant. The effects post-crisis show different patterns where the strongest effects can be located on the announcement day and as suggested by table 3 these effects are significant at 1 %.
The general patterns of abnormal returns due to positive announcements released by Moody’s are shown in figure 4. The pattern suggests that our observed countries are experiencing stable positive abnormal return during the days preceding the announcement day and slight increase on relation to the actual announcement. The positive effects are however eliminated on the following day. Unfortunately it is impossible to compare the effects of positive announcements made by Moody’s post-crisis since there has been none.
4.2.2 Cumulative Average Abnormal Return

In tables 6 and 7 we will examine the CAARs for the upgrades and downgrades respectively for the time windows ±2, ±5 and ±10 days. These values will conclude the persistency of the effects from the credit ratings which were showed in the results for the AARs above. The level of significance of each value will be denoted by an asterisk as above. One asterisk represents a level of significance of 10%, two asterisks represent a level of significance of 5%, and three asterisks will represent a level of significance of 1%. Thus a value with no asterisk could not be concluded to be significantly different from zero at a 90% confidence level or higher. Together with some visual illustrations we will examine the path of the effects from the credit ratings. The results for the credit rating upgrades will be considered first and then the downgrades.

<table>
<thead>
<tr>
<th>Days</th>
<th>Action pre</th>
<th>Action post</th>
<th>Action total</th>
<th>Outlook pre</th>
<th>Outlook post</th>
<th>Outlook total</th>
<th>Total pre</th>
<th>Total post</th>
<th>Total total</th>
</tr>
</thead>
<tbody>
<tr>
<td>±2</td>
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<td>***</td>
<td>-0.0092</td>
<td>0.0020</td>
<td></td>
<td>0.0020</td>
<td>-</td>
<td>0.0028</td>
<td>-0.0028</td>
</tr>
<tr>
<td>±5</td>
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<td>-0.0192</td>
<td>-0.0102</td>
<td>***</td>
<td>-0.0102</td>
<td>-</td>
<td>0.0141</td>
<td>-0.0141</td>
</tr>
<tr>
<td>±10</td>
<td>-0.0193</td>
<td>***</td>
<td>-0.0193</td>
<td>-0.0124</td>
<td>***</td>
<td>-0.0124</td>
<td>-</td>
<td>0.0154</td>
<td>-0.0154</td>
</tr>
</tbody>
</table>

Table 6 – CAARs for upgrades.

In table 6 we can observe that the cells for all the categories post the financial crisis are empty; this is due to the fact that there have not been any positive sovereign credit ratings made after the financial crisis. The absence of any positive ratings after the financial crisis suggests a lot about the financial situation of the world as perceived by Moody’s. If we begin by examining the rating outlooks we can observe that the ±2 day window is the only window which shows a persistency of effects which is positive. The
other two windows show a negative persistency of the effects which indicate that the
effects are not very long lasting. The rating actions however, exhibit a negative
persistency in abnormal returns throughout all three of the windows. The persistent
effect is about -1.9% in both the ±5 and ±10 window, thus it is quite constant. In total,
we can observe negative effects in persistency throughout all three windows.

The majority of values in the table are significantly different from zero at a 90%
confidence level or higher, however the positive returns are not. We can conclude that
the long-term effects from the positive credit ratings are negative and will be compared
to the results of the respective AARs in the analysis to be able to precisely conclude on
the persistency of the effects.

<table>
<thead>
<tr>
<th>Days</th>
<th>Action pre</th>
<th>Action post</th>
<th>Action total</th>
<th>Outlook pre</th>
<th>Outlook post</th>
<th>Outlook total</th>
<th>Total pre</th>
<th>Total post</th>
<th>Total total</th>
</tr>
</thead>
<tbody>
<tr>
<td>+2</td>
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<td>-0.0059</td>
<td>-0.0068</td>
<td>0.0151</td>
<td>-0.0224</td>
<td>-0.0149</td>
<td>0.0003</td>
<td>-0.0125</td>
<td>-0.0101</td>
</tr>
<tr>
<td></td>
<td>***</td>
<td>*</td>
<td>***</td>
<td>***</td>
<td>**</td>
<td>***</td>
<td></td>
<td>***</td>
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</tr>
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<td>+6</td>
<td>-0.0391***</td>
<td>0.0082*</td>
<td>-0.0004</td>
<td>0.0112</td>
<td>-0.0192***</td>
<td>-0.0131**</td>
<td>0.0175***</td>
<td>-0.0028</td>
<td>-0.0056*</td>
</tr>
<tr>
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<td>***</td>
</tr>
<tr>
<td>-10</td>
<td>-0.0425***</td>
<td>0.0298***</td>
<td>0.0166***</td>
<td>0.0051</td>
<td>-0.1038***</td>
<td>-0.0820***</td>
<td>0.0221***</td>
<td>-0.0236***</td>
<td>-0.0233***</td>
</tr>
</tbody>
</table>

Table 7 – CAARs for downgrades.

Table 7 shows the persistency in the effects from the rating downgrades. Starting with
analysing the effects from the rating outlooks we can observe that in all three of the time
windows there is a positive effect in persistency before the financial crisis, and a
negative effect in persistency after the financial crisis. The total effects in the outlooks
are negative which origins from the effects from the outlook ratings after the financial
crisis. We see a long and strong persistency in the effects from the outlooks because the
more extensive time window ±10 days show a long-lasting effect with cumulated
abnormal returns of about –8.2%. All the values in the outlook post category are
significant to a 99% confidence-level. However none of the values in the category
outlooks pre are significant to a 90% confidence level or higher. The negative rating
actions portrait a different story from the rating outlooks where the actions made before
the financial crisis all produce negative long-term effects before the financial crisis and
then after the financial crisis only the ±2 day window produces a negative effect in
persistency. In total the actions move from negative to positive as the time windows
expands, however the initial effects from the two first time windows are not significant.
In time window ±2, none of the categories have significant values at a 90% confidence-
level or higher. In total when both actions and outlooks are combined we can conclude
that most effects are negative and only one negative value cannot be concluded different
from zero at a 90% confidence-level or higher. In time window ±6 we observe a weaker
total effect in persistency than what can be detected in the two other time windows.
In figure 5 we can see the path of the persistency of the effects from both downgrades and upgrades. As can be observed, the persistent effects show that both the upgrades and the downgrades move towards the same negative direction. However it can be determined that the downgrades show a larger persistency in the effects, which continues beyond the time window whilst the upgrades stabilizes and even begin to recover thus not being as persistent as the downgrades.

In figure 6 we observe the effects of persistency of the downgrades divided into two categories. The first one being downgrades before the financial crisis whilst the second one is downgrades after the financial crisis. As can be observed in figure 6, the persistency of the effects look very much a like both before and after the financial crisis. However we can observe a slightly stronger persistency from the downgrades post the financial crisis, especially after the announcement day.
5 ANALYSIS

This section of our research aims to reconnect our empirical results with our theoretical framework. Recall the aim of this study which is to examine the effects of up/downgrades on sovereign ratings presented by Moody’s on national stock exchanges. In order to answer this question we will in this section contrast our results to previous research and examine eventual deviation and discuss if these could be explained by theory or not. The following section will be divided into examination of the AARs, CAARs and the corresponding theory and previous research.

5.1 Aggregated Abnormal Returns

Starting off with the results from the positive outlook announcements made by Moody’s during the time period preceding the crisis in 2008 we managed to conclude that there was an overall positive trend in relation to positive announcements. These positive abnormal returns were however eliminated on the day following the announcement day. Hence, there is a significant positive effect on stock market returns that could be explained by outlook announcements made by Moody’s. Examining the action announcements, the pattern deviates to some extend where there is no significant excessive return surrounding the announcement day as in the case of an outlook announcement. On the contrary, there seems to be negative abnormal returns surrounding the action announcement day. These results go in line with previous research presented by for example: Hand et al. (1992); Kaminsky et al. (2002) and Norden et al. (2004). The above-mentioned research also suggested that stock markets did not react significantly in relation to positive announcements made by CRAs. The authors did however conclude that stock markets showed significantly negative abnormal returns in relation to negative announcements. Our results provide a similar conclusion where outlooks announced post-crisis is negative and highly significant. The effects pre-crisis are however not negative or significant around the announcement day of negative announcements. This pattern is however not deviating from previous observations. Joo et al. (2005) and Pacheco (2012) presented similar results in their research were effects after the Koran crisis had deeper impact on return than do previous to the crisis. Our results from action announcements pre- and post the crisis date further go in line with previous results providing negative abnormal returns in relation to action announcements made by Moody’s. Hence, our results also provide patterns suggesting that stock markets do not react significantly to upgrades but react to negative announcements, especially to outlooks. Another conclusion to be drawn from our results is that, these already by previous research suggested negative effects, are enhanced post-crisis. Hence, we suspect that stock markets have become more sensitive towards announcements made by Moody’s after the crisis of 2008. This reasoning goes in line with the findings of Joo et al. (2005) and Pacheco (2012).
In terms of EMH, we can reject the possibility of our examined markets to be considered as holding strong forms of market efficiency since we have determined that there are, at several occasions, has been abnormal aggregated returns that are significantly certain to have a relation to the announcements made by Moody’s. Since, this relationship exits, the market is thus not perfectly efficient. The question is rather if our chosen markets are to be considered to hold weak or semi-strong market efficiency. What separates them both is, in short, that the weak form do not necessarily include public information mean whilst the semi-strong form do. This discussion is hard to determine since we cannot determine what kind of information Moody’s bring in their announcements. We can only conclude that they do bring new information to markets – or at least that is what investors believe.

Having established that there are abnormal returns in relation to announcements made by Moody’s –especially negative ones. We move in to the area of trying to explain these market anomalies. Recalling how positive announcements had very little effect and not necessarily significant results amongst our observations. There are two ways of interpreting these patterns. One way would be to assume that individuals already have incorporated the positive news which would leave no room for abnormal returns or that individuals are conservative. Hence, individuals are under-reacting to information and put trust in their own beliefs and previous experience when they interpret information in accordance with Thomaidis (2006, p. 9). Negative announcements did however not have a neutral impact on our examined stock markets and one suggestion could be that individuals are, in negative scenarios, applying the representativeness heuristics when incorporating the information. Hence, individuals would let one negative observation set the tone for all coming negative observations. This would thus have the implication that if one severely negative announcement was released and realized, this theoretical viewpoint would suggest that individuals might expect that the next negative announcement too will have the same severe impact. For example, a downgrade from the investment grade B to C- would theoretically be worse than a downgrade from AAA to AA but individuals interpret the event as being equal. Hence, there is a possibility that severe negative announcements might be influencing other negative announcements and therefore creating abnormal negative returns. Given the reasoning in regards to how individuals process information the question arise how individuals capitalize on information. From the patterns we have observed with no abnormal returns due to positive announcements and negative abnormal returns due to negative announcements. We would suggest that the reason for these patterns is due to individuals being loss averse. That is, individuals are more sensitive to losses than gains and reacts thereafter. In a positive announcement situation, individuals see no reason to overreact to good news. But when they are faced with negative ones, they tend to be discouraged to invest and stock markets fall as suggested by Thomaidis (2006, pp. 7-8)
5.2 Cumulative Aggregate Abnormal Returns

In this section the results for the CAARs presented above will be interpreted and discussed using theory and previous studies as a comparison.

In the results for the upgrades we observed that the persistency of the significant effects where all negative, this goes against the reasoning of the EMH developed by Fama (1970). Positive information should create a positive reaction according to the EMH. We believe that people do not attention the rating upgrades in the long-run thus the negative reaction are not reactions to the ratings but rather the market going about as usual. In behavioural finance this reaction could be explained with the help of conservatism. Conservatism indicates that people value their own expectations and beliefs more than new information thus these investors will not react to the information as in this case (Thomaidis, 2006, p. 9). Together with the reaction which we observed from the AAR where there were some small positive effects we can conclude that in the longer-run the effects are not persistent. These results are similar to the results from previous studies in this topic. For example Hand et al. (1992, p. 734) found that rating upgrades have no effect on the stocks of the stock market. Kaminsky et al. (2002, p. 188) also found results with the same resemblance.

The results for the rating downgrades show a different picture than what the upgrades show. Almost all the significant results in the downgrades indicate a negative effect in persistency which goes according to the EMH developed by Fama (1970). Hence with negative information comes a negative reaction in the effects. This reaction can be interpreted differently depending on the form of market efficiency of the markets. If the Markets are in a weak form of market efficiency then the negative ratings could convey both public information and private information. In a semi-strong form of market efficiency the negative ratings only convey private information, and finally we can conclude that a strong from of market efficiency is not present in our study since we do see a reaction. If a strong from of market efficiency existed then all information would be incorporated in the price and the ratings could not convey any new information (Fama, 1970). Another pattern which we observed in the CAARs was that the negative rating outlooks were more significant than the negative rating actions. One potential explanation for this could be the fact that outlooks usual are announced before actions and thus some of the information which actions convey could have already been conveyed by the outlook. When we compared the result pre and post the financial crisis in the results we did not see any substantially big differences in persistency of the effects. However we did see that before the crises there are indications that the information from the ratings could have been leaked into the market before the announcement day. After the announcement day we observe that the negative rating announcements after the crisis have a slightly stronger persistency in the effects than the ratings before the crisis have. These results show similar results as those found by
Norden & Weber (2004, p. 2837-2838), were substantial effects from rating downgrades were found. Hand *et al.* (1992, p. 734) also found similar effects on the American stock market.

The fact that we found a persistency in the effects from downgrades but not upgrades makes us believe that once again the behaviour of the investor controls the reactions. We believe that the concept of loss aversion could be an explanation for these results. People are in general more sensitive to losses than gains therefore negative information would create a stronger reaction in the minds of the investor than positive information would. This reaction could occur even if the ratings do not incur any new information, as long as the investor believes that it does (Thomaidis, 2006, pp. 7-8).
6 CONCLUSION

The last section in our research aims to review what we have derived by contrasting our results toward previous research and our theoretical framework and compare our conclusion with our research question. This section will start off with a review of our research question and purpose to show how our conclusions are associated. We will thereafter elaborate on how our research has contributed to this research area. In the ending paragraph we give recommendations for further research.

Our research is built on two separate theoretical areas related to the area of CRAs effects. The theoretical areas we have built our research around are: the market model, the efficient market hypothesis and behavioral finance. In line with our event study methodology approach we have aimed to, through usage of established methods and precious theories, derive our own data in order to examine and conclude:

**The effects of up/downgrades on sovereign ratings presented by Moody’s on national stock exchanges.**

Our main purpose with this research is to conclude what effects Moody’s announcements have on national stock exchanges. Our first sub-purpose is to conclude if these effects tend to differ pending on if they were carried out pre- or post crisis. Our second and last sub-purpose is to determine if our examined stock markets are considered to be perfectly efficient or not. Based on our empirical results we are able to conclude:

(i) Positive announcements have a small positive effect in the short run but not in the long run. Negative announcements have a relatively larger negative effect compared to positive announcements and they tend to persist over time.

(ii) Negative announcements hold a significantly larger effect post crisis than do pre and the persistence of the effects are somewhat stronger post crisis.

(iii) Our examined stock markets are according to our results not considered to hold a strong form of efficiency and should rather be explained as holding a weak – or semi-strong form. Which one of the latter two is however inconclusive.

We have contributed to the existing theoretical framework by concluding that the CRAs announcements have different impact on our chosen segment of stock markets pre – and post crisis. Thus far, previous research has concluded that CRAs announcements not only affect bond markets but also stock markets. But, from what we have observed, there has been no extensive research made which separates the event study into two separate periods and examined if there are differences in the effects caused by the announcements made by the CRAs. The research made with a similar approach has only included one country of choice (see, Joo & Pruitt (2005); Pacheco (2012)) mean whilst our research includes a larger segment of countries that to larger degree than others were in debt during our chosen time period. Furthermore, our research presents a,
perhaps limited, ground for trying to explain market anomalies that arise due to CRAs announcements by including behavioural finance.

In regards to further research, we recommend upcoming researchers to further elaborate on the behavioural financial aspect of why individuals tend to react stronger to e.g. downgrade announcements than do upgrades. Perhaps a qualitative research approach would be of interest for this question. Another related topic is if our results are applicable for the other larger CRAs? Do their announcements provide the same market reaction or are there any deviations? Including the perspective of pre- and post crisis would thus examine if some CRAs has increased their influence meanwhile others may have lost theirs.
REFERENCES


Appendix I - Plots

Residual Plot

Normal Probability Plot