# The Impact of Credit Rating Changes on Jamaica's Global Bond Prices

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## Abstract

*This paper assesses the impact of Jamaica's long term foreign currency sovereign ratings on Government of Jamaica (GOJ) US-denominated global bond prices for the period November 2008 to June 2015. Credit ratings contain valuable information that impacts investors' perception of sovereign credit risk, which by extension should impact the financial market. Using an event study technique, this paper examines the price-relevant information content of rating announcements made by Standard & Poor's and Moody's rating services. Specifically, we investigate the agency-reliability, information content, and expectation hypothesis of rating announcements. The results showed that both upgrade and downgrade generate market overreaction. However, investors respond more to a downgrade relative to an upgrade. In addition, excess returns for an unanticipated downgrade were greater than an anticipated downgrade while abnormal returns for an anticipated upgrade were greater than unanticipated upgrades. Finally, the study shows that the market places more weight on ratings from Standard & Poor's relative to Moody's. The results indicate that the Central Bank should continue to improve communication to the market. In particular, it is recommended that the Bank sensitizes the market about upcoming unfavourable news in an effort to allow investors to update their expectations over time which will then stabilize market reaction to these announcements.*

*Keywords: Credit Ratings, Bond returns, Event Study*

*JEL Classification: G120, G140*

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[1] The views and results expressed in this paper represent those of the authors and not necessarily those of the Bank of Jamaica.

## I.    Introduction

Over the past two decades there has been a growing body of literature that investigates the relationship between credit ratings and sovereign bond yields. Sovereign ratings have become increasingly important as national governments – some of the largest issuers increase their presence in the international capital markets. In light of the recent crises and the European sovereign downgrades, debates surrounding the accuracy of the credit assessments have emerged. Some analysts argue that credit rating agencies (CRAs) have been either too slow to downgrade initially or downgrading worse than the market fundamentals indicate.

Credit ratings are considered to be important for the efficiency and stability of financial markets, particularly if they influence the market or they are inaccurate. They help to mitigate issues arising from asymmetric information between debt issuers and investors. Ratings provided by these agencies have an impact on stakeholders in the market in several ways; rating downgrades usually trigger an increase in the interest rate of the sovereign debt issuer. Likewise, countries with less than favourable ratings may find it difficult to assess capital market as some investors limit their investment to counties that are rated above a minimum grade in order to limit their credit risk exposure. Notably, a "keen eye" is being placed on the credit ratings by market participants for implications of a change in credit quality.

Despite the growing literature on the relationship between credit ratings and international bond prices, to date only a few studies have focused on the implications of the small countries' sovereign bonds yields. The underlying conclusion for these studies such as Abad-Romero and Robles-Fernandez (2006), Hand, Holthaunsen & Leftwich (1992) and Steiner and Heinke (2001) was that only a negative announcement- an outlook, review or credit rating change had any impact on bond returns.

The aim of this paper is to provide further understanding of the information content of credit rating announcements from a small economy perspective. Additionally, the study examines the impact of various anticipated and unanticipated announcements, the reliability of on each rating agency to the market and the impact of downgrades relative to upgrades on Government of Jamaica (GOJ) global bond returns. We also isolate the periods of the 2010 Jamaica Debt Exchange (JDX) and the 2013 National Debt Exchange (NDX) and assess the impact of these events on the bond returns.

The contribution of this paper to the existing literature is twofold. Firstly, this study is the first to make a comprehensive investigation of how a change in the credit rating affects the returns on the USD-denominated GOJ global bonds. To the best of our knowledge, this study is the first to investigate the relationship between credit rating announcements from the two largest credit rating agencies for a Caribbean economy. Secondly, we use a composite of GOJ global bond price with a ten-day event window. As the Jamaican bond market has grown significantly in size and liquidity over recent years, the relatively new data spanning from November 2008 to June 2015 used in our study should yield more reliable results compared to prior studies which investigated the topic using less recent data set. Given the changes in our position on the international bond market since 2013 Extended Fund Facility agreement, the study will provide an update on the dynamics of our global bond returns.

We begin our thesis by outlining previous work done on this topic in Section 2. We then describe the data in Section 3. Based on the literature review we develop our methodology in Section 4. In Section 5 we present the results along with a discussion of the empirical findings. The conclusion and the policy prescriptions are then presented in Section 6.

## II. Literature Review

Sovereign credit ratings are assessments of the likelihood that the government will default on its obligations.[2] Credit assessment and evaluation for governments is generally done by international credit rating agencies such as Standard & Poor's or Moody's rating services. Intuitively, a change in the credit rating reflects a revision of a previous rating assigned to the country- an upgrade, downgrade or an outlook change. Rating outlooks indicate the direction in which a rating is likely to move over a one to two year period. They reflect financial or other trends that have not yet reached the level that would trigger a rating action, but which may do so if such trend continues. The majority of outlooks are generally stable. Positive or negative rating outlooks do not imply that a rating change is inevitable; similarly, ratings with stable outlooks can be raised or lowered without a prior revision to the outlook if circumstances warrant such an action. Occasionally, where the fundamental trend has strong, conflicting elements of both positive and negative developments, the rating outlook may be described as evolving.

Steiner and Heinke (2001)   investigated the impact of credit ratings on Eurobond prices. They examined the daily excess returns linked with announcements of watch listings and ratings changes by Standard & Poor's and Moody's. The study indicated that significant bond price reactions were observed for downgrades and negative watch listings while upgrades and positive watch listings do not have an impact on bond prices. They found that the price reaction was very strong for downgrades into speculative grade. In addition, this gave insight that the announcement effect can be explained by price pressure effects due to constraints in regulation rather than rating changes.

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[2] Cantor and Packer (1996)

Abad-Romero and Robles-Fernandez (2006) noted that for rating changes to have an impact on the market, it must contain some material non-public information. However, most of the information is transmitted to the market through incremental outlook announcements or watch listings. Therefore, according to the information-content hypothesis, rating actions should cause significant negative abnormal bond returns around the date of the announcement. A number of researchers have found evidence of the information-content hypothesis of rating announcements.

Baum, Karpava, Schafer and Stephan (2014) examined the impact of CRA downgrade announcements on the Eurozone during the sovereign debt crisis of 2011–2012. They studied the role of rating announcements on exchange rate movements and government bond yields. They found that a series of negative watch listings and outlook revisions were announced by S&P and Fitch, followed by massive downgrade announcements for Eurozone countries in early January 2012. Most importantly, the results showed evidence of a spill over effect in which downgrades increased the yields of French, Italian and Spanish bonds but lowered the German bond's yields, although Germany's rating status was not announced by the credit rating agencies at the time.

Hand, Holthaunsen and Leftwich (1992) examined the daily bonds returns associated with Standard and Poor's credit watch-list announcements, as well as, rating changes announced by Moody's, and Standard & Poor's. An expectation model was used to classify the addition of a reliable nonzero average excess bond to Standard and Poor's credit watch-list as either expected or unexpected. The upgrade and downgrade announcements by rating agencies were also observed for the bond price effects. Announcements with similar disclosures were excluded since it had a negative impact on downgrades but not upgrades. The results showed that there were both bond and stock price effects associated with announcements of additions to the credit watch-list and with announcements of actual rating changes by Moody's and Standard & Poor's.

The authors found that investors reacted more to downgrades than upgrades which produced negative abnormal returns.

Furthermore, Micu, Remolona and Wooldridge (2004) assessed indicators from the credit default swap market and highlighted that negative rating events had a strong significant impact on credit spreads. The impact was most effective for downgrades and negative reviews and less effective for changes in outlook. In addition, the impact was also significant when the rating events were anticipated by a prior expansion of the credit default swap spread. Notably, the results were similar regardless of whether rating announcements were preceded by other rating events. Considering that more than half of these prior events were rating changes by other agencies, the results suggest that two ratings seem to contain pricing-relevant information.

In addition, Micu et al (2006) further examined the impact of multiple announcements on credit default swap (CDS) spreads. The results showed that all announcements including changes in outlook and reviews had a significant impact on CDS spreads. Additionally, rating announcement followed by similar announcement also had an impact on prices. Mateev (2011) examined the impact of sovereign credit rating changes on emerging market economies. The general aim of previous work done in this area was to assess the effect of bond ratings in the financial markets. Furthermore, work such as the one done by Reisen, & von Maltzan (1999) stated that significant boom-bust cycles in emerging market lending might be a result of the sovereign ratings. However, Mateev (2011) found that changes in ratings of sovereign bonds ratings caused significant changes in yield spreads.

Majority of the credit rating assessments employed the use of the event study methodology. An event study is an empirical analysis performed on a security that has experienced a significant catalyst occurrence, and has subsequently changed dramatically in

value as a result of that catalyst. The event can have either a positive or negative effect on the value of the security[3].

Bessembinder, Kahle, Maxwell, and Xu (2009) examined different methods of abnormal bonds return by adding the size and the power of the parametric and non-parametric test statistics. They implemented monthly and daily bond return data along with stimulation methods to design empirical power curves for the non-parametric sign and signed-rank test and the parametric t-test. They were the first to make use of this method in the context of measuring abnormal bond returns. They found that the test statistics based on frequently used methods of calculating abnormal monthly bond returns are biased since they lack power to detect these abnormal returns. However, the use of daily bond data significantly increased the power of the tests when compared to the monthly data.

## III.    Data Description

To examine the impact of credit rating announcements on bond yields, the study uses a long a term foreign currency sovereign rating. A sample of rating announcements for the period March 18, 2009 to June 3, 2015 by Standard & Poor's and November 4, 2008 to May 27, 2015 by Moody's.  For the period, Standard & Poor's made eleven (11) announcements that included seven (7) rating changes and five (5) outlook changes[4]. Moody's made ten (10) announcements which included six (6) rating changes and four (6) outlook changes.

The study uses GOJ- US denominated bond prices (flat price) which were obtained from Bloomberg.  From the bond data we computed a nominal value weighted composite of bond prices.

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[3] Retrieved from http://www.investopedia.com/terms/e/eventstudy.asp
[4] These ratings were retrieved from the ratings services database.

## IV. Methodology

Majority of the previous literature used large event windows which contain monthly or weekly returns. However, both Brown & Warner (1985) and Bessembinder et al. (2009) stated the ineffectiveness of larger event windows for small samples. Brown and Warner (1980) highlighted the weak inherent precision of the measurement equipment in results of long-horizon windows used by Konchitchki & O'Leary (2011). Consequently, Rubin and Rubin (2007) defined a narrow event window of 10 days before and after the event. Cheng et.al. (2007) reduced the event window to five days before and after the event.

Based on the liquidity of the global bonds on the international bond market, this study used a 10-day event window and an estimation period of 100 days.[5]
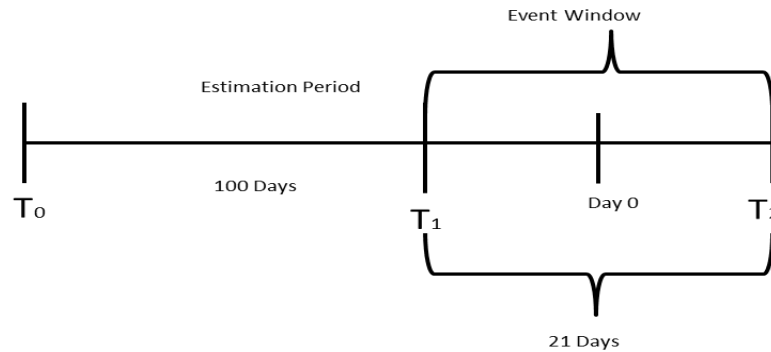


To evaluate the impact on the excess/abnormal bond returns, we defined abnormal returns as the difference between the actual return- daily holding period return and the expected return- the average holding period return within the estimation window.

$$AR_t = R_t - E(R) \text{ (1)}$$

Where E($R$) is the expected return for each window, $T_1$ is the latest date in the estimation period and $T_0$ is the earliest date in the estimation period. The use of the holding period return as the

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[5] Due to the availability of the data and the time span between the announcements, an estimation period of 70 days was used for events on March 4, 2009, March 18, 2009, August 6, 2009 & February 24, 2010 and 50 days was used for event on November 2, 2009. All other events had an estimation window of 100 days.

actual bond return is similar to the procedure used by Steiner & Heinke (2001), Hand,

Holthaunsen and Leftwich (1992) and Hite and Warga (1997). [6]

The daily holding period return is calculated using the following:

$$R_t = \ln(\frac{F_t}{F_{t-1}}) \quad (2)$$

where $R_t$ is the holding period return of the composites between closing day $t—1$ to closing day $t$,

$F_t$ is the flat price of bond at day $t$.

The expected return is computed as the mean adjusted return over the estimation period as used

by Brown & Warner (1985). [7]

$$E(R_t) = \frac{1}{n}\sum_{t=t1}^{t=t0} R_t, \text{ where } n \neq 0 \quad (3)$$

To minimize the influence of estimation errors we compute cumulative abnormal returns for the

each event window. [8]

$$CAR_{km} = \sum_{i=k}^{m} AR_{it} \quad (4)$$

$CAR_{km}$ is the cumulative average abnormal return between day $t = k$ and day $t = m$. The line plot

of the yield to maturity, the abnormal and cumulative abnormal returns for a representative

window are presented in Figures 1.1 and 1.2 of the appendix.

Similar to the tests carried out by Steiner and Heinke (2001), the Wilcoxon's sign rank

test - the non-parametric test and the T-test - the parametric test, were used to test the

significance of the abnormal and cumulative abnormal return within the event window.

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[6] An analytical comparison of both methods is shown by Swidler (1990).
[7] According to Brown & Warner (1985), this approach provides similar results to the more sophisticated market models.
[8] See Brown & Warner (1985)

| Statistical Test | Statistic for the daily ARs | Statistic for the daily CARs |
|---|---|---|
| Simple t-test | $t_{AR} = \dfrac{AR_{i,t}}{S_{AR_t}}$ <br><br> where <br><br> $S^2 AR_t = \dfrac{1}{M_i - 2} \displaystyle\sum_{i=T_0}^{T} (AR_{i,t})^{\wedge}2$ | $t_{CAR} = \dfrac{CAR}{S_{CAR}}$ <br><br> where <br><br> $S^2 CAR = L_2 S^2 AR_t$ |
| Wilcoxon Rank Signed Test | $z = \dfrac{(\min(W^+, W^-) + 0.5)) - \mu}{\sigma}$ <br><br> where <br><br> $\mu = \dfrac{n(n+1)}{4}$ <br><br> and <br><br> $\sigma^2 = \dfrac{n(n+1)(2n+1)}{24}$ <br><br> Or <br><br> $\sigma^2 = \dfrac{n(n+1)(2n+1)}{24} - \sum_{i=1}^{g} \dfrac{(t_i^3 - t_i)}{48}$ <br><br> For many ties | |

*Where $M_i$ refers to the number of non-missing returns and $L_2 = T_2 - T_1$. $T_1$ is the latest day of the estimation window relative to the event day and $T_2$ is the latest day of the event window relative to the event day. Wilcoxon z; $W^+$ is the sum of the positive rank of the returns and $W^-$ is the sum of the negative rank of the returns, g is the number of group of different ranks and t is the rank number.*

These tests were applied to the event window, that is, ten (10) days before the announcement and ten (10) days after the announcement. The announcements were separated by changes in outlook and rating changes for the two (2) agents to eliminate clustering. The rating and outlook changes by Standards & Poor's on March 6, 2013 was removed from the original sample since it was relatively close to the announcement on February 12, 2013. The rating and outlook changes by Moody's on February 14, 2013 was removed from since they made an announcement on March 6, 2013. These were removed to avoid the overlapping of the event window and the estimation period.

## 1) Expectations

*The Information Content Hypothesis*

An efficient international bond market is one in which prices reflect all new information available. Therefore, if the market is efficient rating changes should not result in significant price reactions. Our assumption is that we have incomplete market efficiency where full information is not readily available to all investors at any point in time. As a result, rating changes should cause prices to move to a new level since there is a new level of risk associated with the bond. Masciandaro (2012) posited that ratings are expected to contain valuable information for at least three reasons- credit rating agencies have access to material non-public information; high quality human resources and technology are used to provide the ratings and these agencies have incentives to provide quality output independent of the issuer country. Our expectation is that rating agencies should result in significant excess bond returns following the action.

*The Agent Hypothesis*

The credit market is dominated by Standard and Poor's, Moody's and Fitch rating services – the big three. Standard & Poor's and Moody's have a market share of 40% each while Fitch has a market share of approximately 15%. Based on the stance of Standard & Poor's and Moody's, rating announcements from these agencies are not expected to have significantly different effects on the market. Therefore, there is no reason to believe that there are reliability differences in the international bond ratings of each agency. Consequently, we expect the excess bond returns associated with rating actions to be independent of the announcing rating agency.

*The Anticipation Hypothesis*

The observable price reaction of a rating announcement can also be influenced by preceding rating actions of the same or the competing rating agency. The excess bond return associated

with the rating changes is expected to be lower if an outlook has been previously announced or a change in rating has been announced by the same or a competing rating agency. If the anticipation hypothesis holds, we expect significantly different (lower) excess abnormal returns for rating action that were anticipated by the market relative to those that were anticipated

*Asymmetric Effect*

Rating announcements are an indicator of credit-related risk, rating downgrades should be "bad news" for bondholders while rating upgrades should be "good news". We expect investors to react differently to a rating downgrade compared to a downgrade. For a downgrade, we are expected significantly negative abnormal returns and positive abnormal returns for an upgrade.

## V.    Results

**Table 1- The Results of the Hypotheses**

| Test of Hypotheses | |
| --- | --- |
| **Hypothesis** | **Difference of Mean T-Stat** |
| Agency Hypothesis | -1.1648*** |
| Anticipation Hypothesis | |
| Downgrades | 3.1043*** |
| Upgrades | -5.2786*** |
| Asymmetries | 0.7837* |

**Table 2- The Wilcoxon Sign Ranked Test (W$^E$)[9], the Average and Cumulative Abnormal Returns for the 10 & 5 days windows.**

| Agency | Event | Event Type | Window | $\overline{AR}$ | CAR | $\sigma$ | $T^E$ | $W^E$ | $T^{CAR}$ |
|---|---|---|---|---|---|---|---|---|---|
| Standard & Poor's | 18-Mar-09 | Downgrade | (-10,+10) | -0.3436 | -7.2149 | 0.5744 | -2.7410 | 58** | -1.0916** |
| | | | (-5,+5) | -0.3649 | -4.0144 | 0.7592 | 0.0000 | 10 | -2.082*** |
| | 5-Aug-09 | Downgrade | (-10,+10) | -0.8814 | -15.1591 | 1.0433 | -3.8720 | 52** | -15.1591* |
| | | | (-5,+5) | -1.0822 | -11.3208 | 1.3781 | -2.6044 | 10 | -2.082*** |
| | 2-Nov-09 | Downgrade | (-10,+10) | -0.2866 | -16.1606 | 1.0031 | 0.0000 | 58** | -1.7754*** |
| | | | (-5,+5) | -1.1067 | -12.1736 | 1.1249 | 0.0000 | 10** | -1.2879*** |
| | 24-Feb-10 | Upgrade | (-10,+10) | -0.2866 | -6.0195 | 1.0031 | 0.0000 | 58 | -0.288234 |
| | | | (-5,+5) | -0.1108 | -1.2190 | 1.1439 | 0.0000 | 10 | -0.055 |
| | 12-Feb-13 | Downgrade | (-10,+10) | -0.0072 | -0.1503 | 0.2570 | 0.0001 | 58 | -5.8701*** |
| | | | (-5,+5) | -0.0193 | -0.2120 | 0.2508 | 0.0000 | 10 | -7.0124*** |
| | 19-Sep-14 | Upgrade | (-10,+10) | -0.0051 | -0.1069 | 0.1037 | 0.0001 | 58 | -1.4727*** |
| | | | (-5,+5) | -0.0193 | -0.0069 | 0.2508 | 0.0000 | 10 | -0.7640* |
| | 3-Jun-15 | Upgrade | (-10,+10) | 0.0200 | 0.4197 | 0.1543 | 0.5935 | 58 | 19.2301*** |
| | | | (-5,+5) | 0.0312 | 0.3511 | 0.1539 | -0.0001 | 10 | 8.3615*** |
| Agency | Event | Event Type | Window | $\overline{AR}$ | CAR | $\sigma$ | $T^E$ | $W^E$ | $T^{CAR}$ |
| Moody's | 6-Mar-09 | Downgrade | (-10,+10) | -0.1701 | -3.5712 | 0.1256 | 0.0000 | 58 | -0.5836 |
| | | | (-5,+5) | -0.1444 | -1.5885 | 0.7531 | 0.0000 | 10 | -0.1705 |
| | 18-Nov-09 | Downgrade | (-10,+10) | -0.3342 | -7.0174 | 0.8818 | 0.0000 | 58 | 1.1678** |
| | | | (-5,+5) | 0.1500 | 1.6501 | 0.1559 | 3.1906 | 10 | 0.1265 |
| | 2-Mar-10 | Upgrade | (-10,+10) | -0.3542 | -7.4381 | 1.0086 | 0.0000 | 58 | -0.5804 |
| | | | (-5,+5) | -0.8596 | -9.4553 | 0.5880 | -4.8487 | 10** | -0.5155 |
| | 6-Mar-13 | Downgrade | (-10,+10) | 0.0827 | 1.7363 | 0.1533 | 0.0000 | 58 | 11.285*** |
| | | | (-5,+5) | 0.0454 | 0.4997 | 0.1537 | 0.0001 | 10 | 15.9363*** |
| | 27-May-15 | Upgrade | (-10,+10) | -0.0087 | -0.1835 | 0.1230 | -0.3256 | 58 | -7.6271*** |
| | | | (-5,+5) | -0.0300 | -0.6555 | 0.0509 | 0.0003 | 10 | 30.2841*** |

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[9] Critical values for the Wilcoxon Sign Rank test

**Table 3- Abnormal returns for Standard & Poor's Rating Changes**

| Event | Event Type | Event Days | AR | Event | Event Type | Event Days | AR |
|---|---|---|---|---|---|---|---|
| 18-Mar-09 | Downgrade | -5 | -2.5499*** | 19-Sep-14 | Upgrade | -10 | 0.1486*** |
| | | -2 | -1.0645* | | | -9 | -0.0903*** |
| | | | | | | -8 | -0.0166** |
| | | | | | | -7 | -0.0824*** |
| | | | | | | -6 | -0.0593*** |
| 5-Aug-09 | Downgrade | 2 | -3.1487* | | | -5 | -0.0381*** |
| | | 3 | -4.4132** | | | -4 | -0.021*** |
| | | | | | | -3 | -0.1119*** |
| | | | | | | -2 | 0.2041*** |
| | | | | | | -1 | 0.009 |
| 2-Nov-09 | Downgrade | 1 | -1.4327* | | | 0 | -0.0393*** |
| | | 2 | -1.3480* | | | 1 | -0.1974*** |
| | | 3 | -2.7877*** | | | 2 | 0.1643*** |
| | | 4 | -3.5838*** | | | 3 | 0.0519*** |
| | | | | | | 4 | -0.0099 |
| | | | | | | 5 | -0.0475*** |
| | | | | | | 6 | -0.0932*** |
| 24-Feb-10 | Upgrade | -3 | 2.9961* | | | 7 | -0.0646*** |
| | | | | | | 8 | 0.1817*** |
| | | | | | | 9 | 0.0161** |
| | | | | | | 10 | -0.0113* |
| 12-Feb-13 | Downgrade | -10 | -0.2557*** | 3-Jun-15 | Upgrade | -10 | 0.0551*** |
| | | -9 | 0.2743*** | | | -9 | -0.0166*** |
| | | -8 | -0.4085*** | | | -8 | -0.0794*** |
| | | -7 | 0.2158*** | | | -7 | -0.0444*** |
| | | -6 | -0.3434*** | | | -6 | -0.0254*** |
| | | -5 | -0.0997*** | | | -5 | 0.0032* |
| | | -4 | 0.4874*** | | | -4 | -0.0029 |
| | | -3 | -0.4945*** | | | -3 | -0.1392*** |
| | | -2 | -0.033257 | | | -2 | -0.0557*** |
| | | -1 | -0.2155*** | | | -1 | -0.0219*** |
| | | 0 | 0.1421*** | | | 0 | 0.0067*** |
| | | 1 | -0.1271*** | | | 1 | -0.0749*** |
| | | 2 | -0.1392*** | | | 2 | -0.0443*** |
| | | 3 | 0.1984*** | | | 3 | 0.3664*** |
| | | 4 | 0.0259*** | | | 4 | 0.2869*** |
| | | 5 | -0.0177*** | | | 5 | 0.0191*** |
| | | 6 | 0.0110*** | | | 6 | 0.4255*** |
| | | 7 | 0.1813*** | | | 7 | 0.0688*** |
| | | 8 | 0.1016*** | | | 8 | -0.1702*** |
| | | 9 | 0.4095*** | | | 9 | -0.0857*** |
| | | 10 | -0.0633*** | | | 10 | -0.0514*** |

**Table 4- Abnormal statistics returns for Moody's Rating Changes**

| Event | Event Type | Event Days | AR | Event | Event Type | Event Days | AR |
|---|---|---|---|---|---|---|---|
| 4-Mar-09 | Downgrade | -5 | -2.3726*** | 27-May-15 | Upgrade | -10 | -0.0875*** |
| | | | | | | -9 | -0.1402*** |
| | | | | | | -8 | -0.0048** |
| | | | | | | -7 | 0.0236*** |
| | | | | | | -6 | -0.1345*** |
| 18-Nov-09 | Downgrade | -10 | -1.0135*** | | | -5 | 0.0506*** |
| | | -9 | -2.4532*** | | | -4 | -0.0211*** |
| | | -8 | -3.2493*** | | | -3 | -0.084*** |
| | | -2 | -0.4923*** | | | -2 | -0.049*** |
| | | 8 | -0.2062*** | | | -1 | -0.0299*** |
| | | | | | | 0 | -0.0014 |
| 2-Mar-10 | Upgrade | -7 | 2.9965** | | | 1 | -0.0074*** |
| | | 4 | -2.3225* | | | 2 | -0.1438*** |
| | | | | | | 3 | -0.0603*** |
| | | | | | | 4 | -0.0264*** |
| | | | | | | 6 | -0.0794*** |
| | | | | | | 7 | -0.0488*** |
| | | | | | | 8 | 0.3619*** |
| | | | | | | 9 | 0.2823*** |
| | | | | | | 10 | 0.0146*** |
| 6-Mar-13 | Downgrade | -9 | 0.1793*** | | | | |
| | | -8 | 0.0997*** | | | | |
| | | -7 | 0.4075*** | | | | |
| | | -6 | -0.0653*** | | | | |
| | | -5 | 0.0368** | | | | |
| | | -4 | 0.2166*** | | | | |
| | | -3 | 0.0496*** | | | | |
| | | -2 | -0.0257* | | | | |
| | | -1 | 0.029** | | | | |
| | | 0 | -0.0219* | | | | |
| | | 1 | 0.3077*** | | | | |
| | | 2 | -0.1123*** | | | | |
| | | 3 | -0.2078*** | | | | |
| | | 4 | 0.012 | | | | |
| | | 5 | 0.2408*** | | | | |
| | | 6 | -0.0209 | | | | |
| | | 7 | 0.1669*** | | | | |
| | | 8 | -0.0291** | | | | |
| | | 9 | 0.2697*** | | | | |
| | | 10 | 0.1945*** | | | | |

The results presented in Table 2 to 4 above show significant abnormal bond returns around Standard and Poor's rating announcements on February 12, 2013-following the National Debt Exchange (NDX).
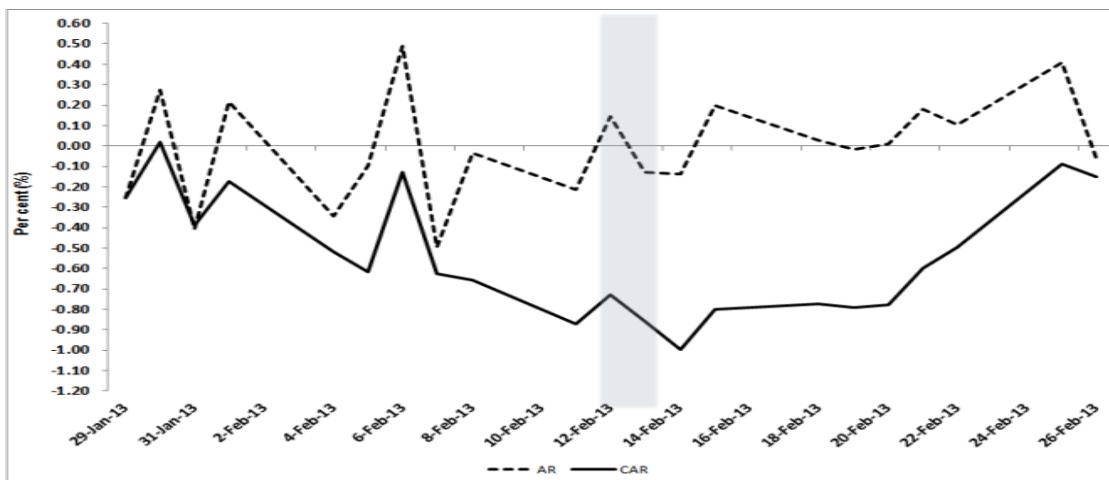


**Figure 1-Reponse to Standard & Poor's Rating Change**

The abnormal holding period return for the GOJ US composite on 12 February 2013 was +14 basis points (bps) which was significant in both test statistics employed. Notably, this event had significant abnormal returns for the entire event window (-10, +10). The strongest reactions were observed prior to event, particularly four (4) days before the event (AR + 49 bps). Given that this rating change (selective default) was in response to the Government's National Debt Exchange program, the significant response prior to the event suggests that investors were anticipating the event prior to the actual announcement. However, the presence of significant abnormal returns following the event supports the information content hypothesis of credit ratings. It may also support the expectation that the international bond market may not be entirely efficient.

Generally, governments seek credit ratings to increase their access to the international capital market where investors prefer rated to unrated securities (Cantor & Packer, 1996). Therefore, from the perspective of the capital markets, if the rating contains valuable

information, a positive rating change should result in more favourable access to the market while a negative rating should result in less favourable market access. Consequently, if the rating action contains valuable information, it should generate significant abnormal returns around the event.

The results presented in Tables 3 and 4 shows statistically significant abnormal returns following most events examined[10]. The presence of these abnormal returns following the ratings also supports the information content hypothesis. The average significant excess return on the event day (day 0) ranges between 3 bps and 14 bps, with the strongest responses observed between days 2 and day 3 of the rating action. It may be expected that the most significant reaction is observed on the event day, however the results are not surprising 1) given that rating agencies generally make announcements at the close of business and 2) given the relative liquidity of the global bonds on the international capital market, investors may not respond as quickly as would have been anticipated.

There appears to be weak significant abnormal returns around days 4 and 8 for the 02 March 2010 and 18 November 2009 event. For the most part, these events are associated with significant abnormal returns up to 10 days prior to the event. In a context where bond liquidity was severely low during that period, we hypothesized that these abnormal returns prior to the event were being driven by "market noise"- other events occurring around the same time. To test the robustness of these results, we conducted another test using a 5-day window to capture the volatility closer to the event date. These results of this test shown in appendix 1 indicate that the market did not respond to the rating announcements on 18 November 2009, 24 February 2010 and 02 March 2010.

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[10] There were no statically significant results observed immediately following the events on 18 March 2009, 4 March 2009 and 24 February 2010.

Using the 5-day event window, the most significant market responses were observed following the 05 August 2009 and 02 November 2009 rating downgrades by Standard & Poor's. These actions were taken against the background of a looming JDX operation by the general government that would have indicated a selective debt default. Following the November 2009 downgrade, the composite price fell by 1.4%, 2.8% and 3.6% on days 1, 3 and 4 following the event[11].

*Asymmetric Effects*

We also examined the differences in the information contained in rating upgrades versus downgrades. Previous studies have suggested that rating downgrades are likely to induce the strongest price reactions – as investors tend to place more weight on the "bad news" than the "good news". The results of the 10-day window study indicated that the NDX downgrade had a statistically significant price effect on the global bonds. In particular, the CAR indicates a negative excess abnormal return of approximately 15 bps following the 12 February 2013 downgrade. On average, of the seven (7) downgrades studied, we found evidence of statistically significant excess returns for three (3) rating events. In comparison, of the five (5) upgrades studied, we found evidence of statistically significant excess return for (3) rating events.

The average abnormal return for the downgrades was -0.321% (-32 bps) and -0.231% (-23 bps) for upgrades. The difference of mean test showed that these results are statistically different from each other suggesting that overall investors react more to downgrades when compared to rating upgrades[12]. These results matched our expectations.

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[11] See tables 1 and 2 in the appendix.
[12] See table 1

*Anticipation Hypothesis*

We also examined the anticipation effect of rating changes. On occasions when the market expects a rating change agency to update the rating after an outlook has been issued or after a competing agency took a rating action, we expected that the respective information would be taken into consideration by the investor. As a result, the rating action that was preceded by a prior action by the agency or a competing agency should produce lower abnormal returns.

We found that there is a difference in the abnormal returns for a downgrade. The average abnormal a return for the anticipated downgrade was -0.220% (-22 bps) whilst the average abnormal returns for the unanticipated downgrades was -0.59% (-59 bps). We found that these average abnormal returns were significantly different from each other, presented in table 1 above. The results showed that investors reacted more to an unanticipated downgrade relative to an anticipated downgrade. This result is different to that of Steiner and Heinke (2001).

Additionally, there is a difference in the abnormal returns for an anticipated upgrade compared to an unanticipated upgrade. The average abnormal returns for the anticipated upgrade was -0.307% (-31 bps) and 0.003% for unanticipated upgrades. The difference of mean test presented in table 1 above showed that the price reaction was stronger for anticipated upgrades than unanticipated upgrades. The information content of upgrading is different for anticipated and unanticipated rating actions. However, Imbierwicz & Wahrenburg (2010) stated that positive rating events generate either statistically or economically insignificant outcome. These results are economically and statistically significant.

*The Agency Hypothesis*

The sovereign rating comparisons of the two rating agencies, Moody's and Standard & Poor's showed that there is a considerable increase in the average difference in the ratings

provided by these agencies over time. The difference in the ratings assigned by the two agencies during a given year is statistically significant.  The sovereign rating process followed by the two agencies involves a few similar changes but the most recent announcements differed by at least 3 notches in their ratings which is due to the subjective assessments of Jamaica's current economic climate. The average abnormal return around a rating action by Standard & Poor's and Moody's was -0.340% (-34bps) and -0.222% (-22bps) respectively. We tested if these averages were significantly different from each other, presented in table 1 above. We found that investors place more weight on a rating change from Standard & Poor's relative to Moody's.

## VI.    Conclusion & Policy Prescription

The significance of changes in the rating and outlook announcements on the international bond market continues to grow. This paper assessed the impact of these announcements on a composite of Government of Jamaica (GOJ) US denominated global bonds. In addition, the paper focused on the price-relevant information content of rating announcements, the reliability of the two agencies -  Standard & Poor's and Moody's, the effect of market anticipation, and how investors react to upgrades compared to downgrades. The study found evidence to support the hypothesis that rating announcements contain valuable information that influences the investment decisions of the market. However, these announcements may lead to market overreaction. Although, significant abnormal returns were observed for both rating upgrade and downgrade, investors respond more to a downgrade relative to an upgrade. The results also showed that the market responds more to an unexpected downgrade relative to an anticipated downgrade. However, abnormal returns for an anticipated upgrade were greater than those of expected rating upgrade announcements. Finally, the international market places more weight on announcements from Standard & Poor's relative to Moody's, rating services.

Against this background, it is recommended that the Bank of Jamaica continues to improve its communication to the market, by releasing accurate and timely information. In particular, it is recommended that the Bank sensitizes the market about upcoming unfavourable news in an effort to allow investors to update their expectations over time. For further studies, we recommend an assessment of the impact of credit ratings on Euro-denominated bonds relative to US-denominated global bonds. Additionally, we recommend an assessment of the response of longer term GOJ global bonds relative to shorter term global bonds.

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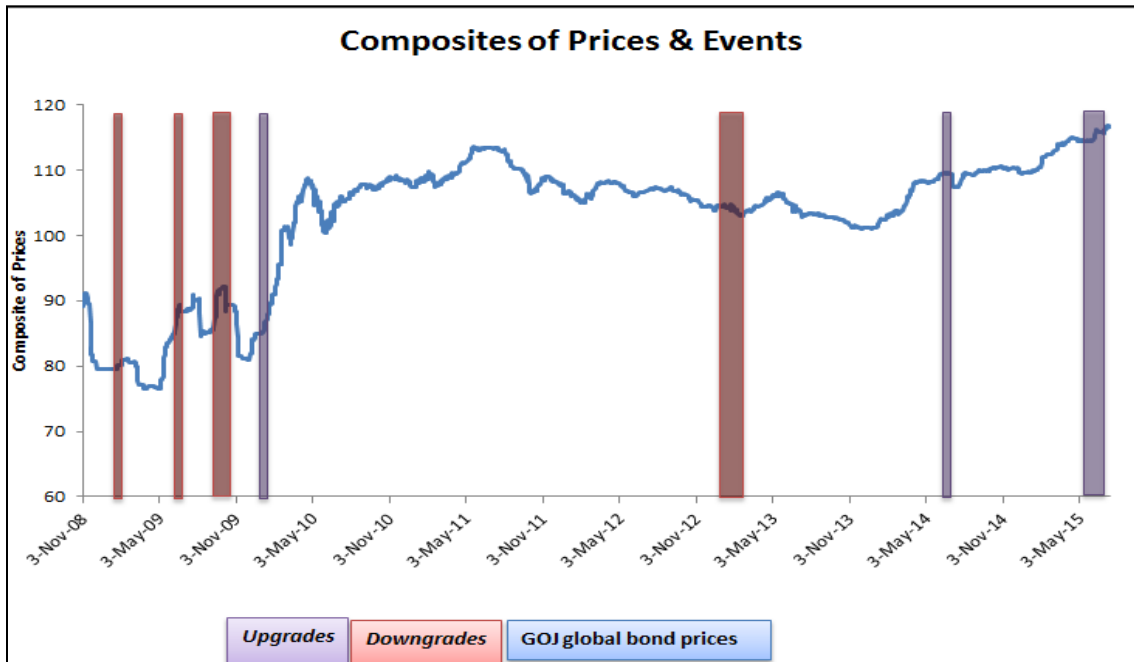
# Appendix

Figure 1.1- Line Graph



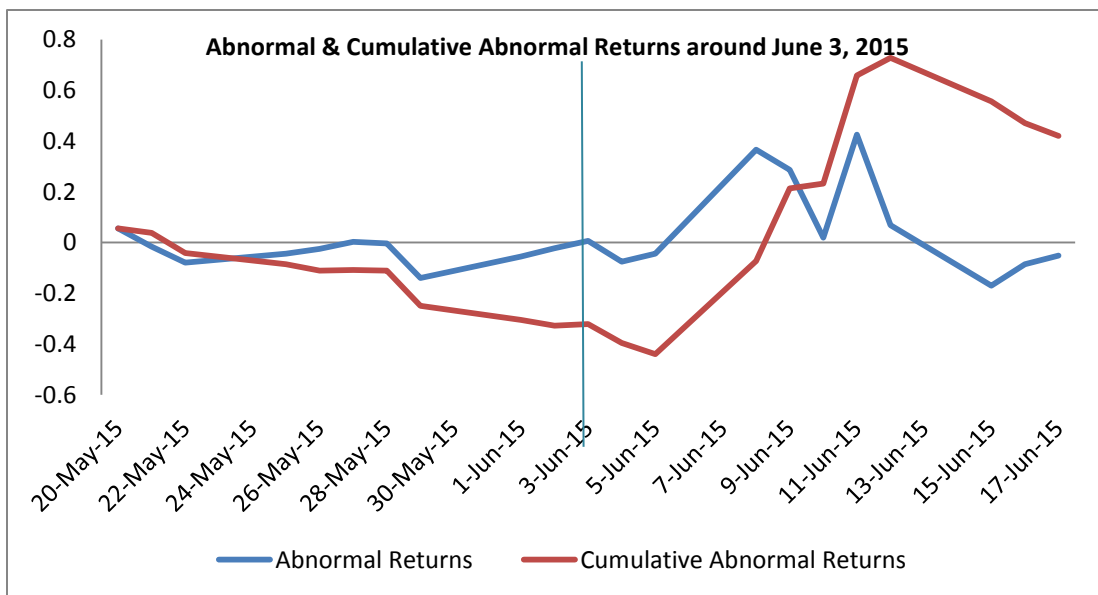Figure 1.2- Line Plot of the Abnormal and Cumulative Abnormal Returns

**Table 1-Abnormal returns and T-test statistics for Standard & Poor's rating changes**

| Abnormal Returns around Standard & Poor's Ratings Changes | | | | | | | |
|---|---|---|---|---|---|---|---|
| Event | Event Type | Event Days | AR | Event | Event Type | Event Days | AR |
| 18-Mar-09 | Downgrade | -5 | -2.4802*** | 19-Sep-14 | Upgrade | -5 | -0.0355*** |
| | | -3 | -0.2823* | | | -4 | -0.0183*** |
| | | -2 | -0.9948*** | | | -3 | -0.1093*** |
| | | | | | | -2 | 0.2068*** |
| 5-Aug-09 | Downgrade | 2 | -3.1387* | | | -1 | 0.0116*** |
| | | 3 | -4.4031** | | | 0 | -0.0367*** |
| | | | | | | 1 | -0.1948*** |
| | | | | | | 2 | 0.1669*** |
| | | | | | | 3 | 0.0545*** |
| 2-Nov-09 | Downgrade | 1 | -1.4083* | | | 4 | -0.0073*** |
| | | 3 | -2.7633*** | | | 5 | -0.0449*** |
| | | 4 | -3.5594*** | | | | |
| 24-Feb-10 | Upgrade | | | 3-Jun-15 | Upgrade | -3 | -0.1385*** |
| | | | | | | -2 | -0.055*** |
| 12-Feb-13 | Downgrade | -5 | -0.0941*** | | | -1 | -0.0212*** |
| | | -4 | 0.493*** | | | 0 | 0.0074* |
| | | -3 | -0.489*** | | | 1 | -0.0742*** |
| | | -2 | -0.0277*** | | | 2 | -0.0436*** |
| | | -1 | -0.2099*** | | | 3 | 0.3671*** |
| | | 0 | 0.1477*** | | | 4 | 0.2876*** |
| | | 1 | -0.1215*** | | | 5 | 0.0198*** |
| | | 2 | -0.1336*** | | | | |
| | | 3 | 0.204*** | | | | |
| | | 4 | 0.0315*** | | | | |
| | | 5 | -0.0123*** | | | | |

**Table 2-Abnormal returns and T-test statistics for Moody's rating changes**

| Abnormal Returns around Moody's Ratings Changes | | | | | | | |
|---|---|---|---|---|---|---|---|
| Event | Event Type | Event Days | AR | Event | Event Type | Event Days | AR |
| 18-Mar-09 | Downgrade | -3 | -0.4524** | 27-May-15 | Upgrade | -5 | 0.0542*** |
| | | -5 | -2.3185*** | | | -4 | -0.0175*** |
| | | | | | | -3 | -0.0803*** |
| 18-Nov-09 | Downgrade | | | | | -2 | -0.0453*** |
| | | | | | | -1 | -0.0263*** |
| 2-Mar-10 | Upgrade | | | | | 0 | 0.0023 |
| | | | | | | 1 | -0.0038* |
| 6-Mar-13 | Downgrade | -5 | 0.0345*** | | | 2 | -0.1401*** |
| | | -4 | 0.2143*** | | | 3 | -0.0566*** |
| | | -3 | 0.0473*** | | | 4 | -0.0228*** |
| | | -2 | -0.028*** | | | 5 | 0.0058*** |
| | | -1 | 0.0267*** | | | | |
| | | 0 | -0.0242*** | | | | |
| | | 1 | 0.3054*** | | | | |
| | | 2 | -0.1146*** | | | | |
| | | 3 | -0.2101*** | | | | |
| | | 5 | 0.0097*** | | | | |
| | | 4 | 0.2385*** | | | | |
| | | 5 | -0.053033 | | | | |