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The Impact of Sovereign Credit Rating Changes on the Capital Markets in Developing Countries: The Role of Regulation

Bachelor Thesis (International Economics and Business Economics)

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ABSTRACT

This paper examines the impact of credit rating agency reforms on the information content of sovereign credit ratings and capital market efficiency. Specifically, the dynamic behaviour of yield spreads and stocks returns around sovereign credit rating changes is examined over two time periods: Before and after the implementation of the Dodd-Frank Act of 2010. I study a sample of six developing countries and conduct event study analysis using 108 rating events. The results of the event studies show that the information content of sovereign credit ratings and the efficiency of the market response to rating changes has increased in developing country stock markets after the Dodd-Frank Act. However, the market efficiency and information content have not improved in sovereign bond markets after the Dodd-Frank Act.

Key Words: Sovereign Credit Ratings, Stock Returns, Yield Spreads, the Dodd-Frank Act

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1. INTRODUCTION

The Efficient Market Hypothesis states that security prices being realized reflect all available relevant information at all times (Fama, 1970). If a market is informationally efficient, announcements of company-specific or economy-wide events should produce an *immediate* and *permanent* price reaction at the announcement date and no further price reaction thereafter (Brooks, 2002). Event studies can produce useful evidence on how the market reacts to the release of new information and how the information is processed. Studying the market reaction at the announcement date allows us to determine the information content of the event in question. Looking at the returns before the announcement, enables us to determine the degree of anticipation or possible leakage of information. Examining the return development beyond the announcement date, allows us to determine whether the market response is complete and without delay i.e. whether the market processes the information efficiently (Van der Sar, 2018, p. 72). If the evidence suggests that the market systematically under- or over-reacts to certain events, the researcher is faced with a potential anomaly with respect to the Efficient Market Hypothesis which needs to be addressed.

Lately, event studies have focused on sovereign credit rating announcements and examined their impact on yield spreads and stock returns (Kaminsky and Schmukler, 2002). This can be explained by the increased demand for sovereign credit ratings and the fact that an increasing number of sovereign governments are borrowing internationally (Cantor and Packer, 1996). Additionally, large institutional investors are increasingly focused on international diversification and sovereign credit ratings are among the key inputs into their asset allocation decisions (Brooks et al, 2004). Sovereign credit ratings are assessments of countries' ability and willingness to meet their existing debt obligations in time and in full. They are measures of countries' default risk. Yield spreads are the difference between the interest rates on debt instruments and the interest rates on completely safe assets. If default risk is priced and if sovereign credit ratings contain private information about default risk, changes in ratings should result in bond price reactions which will mechanically affect yield spreads. Cantor and Packer (1996) document that the ability of sovereign credit ratings to explain the cross-sectional variation in yield spreads cannot be wholly attributed to publicly available sovereign risk indicators, suggesting that sovereign credit ratings contain private information. In theory, sovereign credit rating changes should also have spill over effects beyond the instruments being rated. The rationale lies in the so called "sovereign ceiling doctrine" which dictates that a country's sovereign rating serves as a ceiling rating for any financial instrument within that country (Reisen and Von Maltzan, 1999). Previous research has documented that sovereign credit rating changes are associated with changes in yield spreads and stock returns. However, evidence concerning the degree of anticipation and informational efficiency is quite mixed. Kaminsky and Schmukler (2002), for instance, document that sovereign credit rating actions are on a large part anticipated in both bond and stock markets in developing countries. Their results show that stock markets systematically under-react to rating changes while bond markets do not. An earlier study by Cantor and Packer (1996) shows that yield spreads exhibit

a discernible trend after the announcements in the direction of the announcement date effect, suggesting that bond markets systematically under-react.

Evidence of capital market inefficiency may lead the regulatory authorities to take the necessary reforms to correct it. In practice, regulators require adequate and fair public disclosure and prohibit insider trading. Whether promoting market efficiency is a first-order concern of regulators and whether they are successful at doing so is a topic of debate however (Saari, 1977). This paper will examine the impact of credit rating agency reforms on the informational efficiency of bond and stock markets in response to sovereign credit rating changes. The reforms in question pertain to the Dodd-Frank Act of 2010. The primary aim of these reforms was to improve the reliability and quality of credit ratings. Effectively, the regulators removed the rating agencies' exemption from Regulation Fair Disclosure and imposed additional disclosure requirements. Previously, the agencies were able to directly negotiate fees with the issuers whom they rated, creating an incentive to publish more favourable ratings. The reforms addressed this conflict of interest by requiring a clear separation of the rating business from the sale and marketing of those ratings. If the reforms were successful at improving the quality of the ratings, the information content of rating announcements should have increased. Moreover, greater availability of information and increased transparency should have increased the investor consensus and improve the efficiency of information processing. I am interested in whether this outcome was indeed realized. Specifically, I want to examine whether the Dodd-Frank Act increased the information content of rating announcements and the efficiency of processing of information. Hence my research question is *"Did the Dodd-Frank Act increase the information content of sovereign credit ratings and improve the informational efficiency of bond and stock markets in response to sovereign credit rating changes in developing countries".*

To answer this question I use event study methodology. I will re-examine the results from the Kaminsky and Schmukler (2002) study by using similar sample selection criteria, measurement of (abnormal) returns and the expected return model. However, I use an event window that is 41 days in length in order to better under understand how persistent the effects of rating changes are. In order to avoid the problem of serially correlated events, I eliminate the event windows that overlap in calendar time which leaves me with 108 non-contaminated events. Previous research has documented that the behaviour of yield spreads and stock returns around rating announcements differs across the type of the announcement (Alfonso et al, 2012). Therefore I study rating upgrades, downgrades and positive and negative changes in outlook separately. The sample contains data on six developing countries which are Argentina, Brazil, Colombia, Ecuador, Mexico, and Peru and covers the period from 2000 until 2018. There are at least two reasons for studying emerging markets. First of all, the degree of information asymmetry and the lack of transparency is likely to be more severe in emerging markets (Kaminsky and Schmukler, 2002). Correspondingly, the role of sovereign credit ratings in countering these problems becomes more important. Secondly, it is difficult to determine whether the market reaction to credit rating actions is due to the announcement itself or due

to event-induced trading stemming from investment restrictions and capital requirements. In developed countries regulators require financial institutions to preserve certain capital requirements which are often based on credit ratings. If a downgrade pushes the rating below investment-grade, institutional investors will be forced to rebalance their portfolios and the selling pressure will produce negative price movements. Studying emerging economies with less stringent regulatory regimes and below investment grade ratings diminishes this effect.

I split the full sample into two subsamples with the break date corresponding to the effective date of The Dodd-Frank Act. By comparing the behaviour of abnormal returns and yield spreads over the two sub-samples I am able to draw inferences regarding whether credit rating agency reforms increased the information content of rating announcements and improved market efficiency. I expect that the information content of rating announcements will be greater during the post-reform period as compared to the pre-reform period. Hence, I expect that the abnormal stock returns and changes in yield spreads at the announcement date will be greater in absolute form during the post-reform period. Furthermore, I expect that the market will process the information more efficiently during the post-reform period as compared to the pre-reform period. Therefore, I expect that the cumulative average abnormal returns and yield spreads over the twenty trading days following rating announcements will be lower during the post-reform period. The magnitude and the statistical significance of post-announcement (cumulative) average abnormal returns is expected to be lower during the post-reform period relatively to the pre-reform period. Suggesting that the market reaction has become more instantaneous and complete.

2. THEORETICAL FRAMEWORK

2.1. REVIEW OF THE RATING INDUSTRY

The History of Rating Agencies

The history of credit rating agencies in the context of security markets dates back to 1909 when John Moody started to rate US railroad bonds. In the era before the establishment of the Securities and Exchange Commission, the credit rating manuals published by private companies like Moody's Corporation and Poor's Publishing Company started to gain popularity among the investor community (Cantor and Packer, 1995). In the early 20th century, the products of these private companies were largely marketed towards individual investors. However, following the Great Depression, bank regulators required the majority of depository institutions to only invest in safe instruments. The safety (or characterization as non-speculative) were to be determined by recognized rating manuals which at the time were published by Moody's, Poor's, Standard, and Fitch. Essentially, this was the first instance that the opinions of these private parties have gained the status of law. In the following decades, the insurance and federal pension regulators followed in the footsteps of their bank counterparts, and delegated their credit risk assessment to the rating agencies (White, 2010).

In the early 1970's the industry has experienced a radical shift as the rating agencies have begun to transform their business model from "investor pays" to "issuer pays". This meant that in order to be rated, the issuers needed to pay the rating agencies. As a result, a potential conflict of interest has emerged. The conflict concerned the fact that the rating agencies were responsible for evaluating the default risk of their clients while at the same time negotiating fees. For the first three decades however, the reputational concerns and the depth of the bond market have kept this problem under the radar (White, 2010). In the late 1990s the rating agencies came under severe scrutiny as they failed to predict the currency crises and subsequent sovereign defaults in emerging markets. Few years later they were criticized for their sluggishness in downgrading the bonds of Enron and WorldCom (White, 2010). Despite their poor performance, the conflicts of interest that were largely due to their "issuer pays" model and their lack of transparency in disclosing their methodology were not addressed by regulatory authorities until 2008.

Sovereign Credit Ratings

Sovereign credit ratings, like other ratings, are the assessments of the likelihood of default of the borrowing entity on its debt obligations. The borrowers in this case are the national governments. The rating methodology is based on the assessment of institutional, economic, fiscal, monetary and external risk factors that affect the government's political and economic performance profile and ultimately its credit worthiness (Mishkin and Eakins, 2016).

Sovereign credit ratings are important for several reasons. First of all, the yield on government debt serves as a floor rate for yields on any other private-sector instrument within any country (Reisen and von Maltzan, 1999). Therefore it is only logical that the reassessment of a country's sovereign credit rating should have spill over effects on the return performance of other financial instruments within that country. Secondly, sovereign credit ratings are believed to influence credit default spreads on sovereign debt. This is relevant for both the investors when computing expected risk-adjusted returns as well as for the firms in their financing decisions. In the corporate valuation setting (or any instance when an estimation of the cost of capital is needed) rating-inferred credit default spreads are used to operationalize the risk free rates (Damodaran, 2012).

2.2. THE EFFICIENT MARKET HYPOTHESIS AND ABNORMAL RETURNS

A universally excepted theory of credit rating announcements does not exist. There exist however a number of conditional theories that I will review. But before presenting the theories and formulating my hypotheses, it is in order to describe what is meant by "market efficiency".

The Efficient Market Hypothesis

The principal theory underlying all event studies is the *Efficient Market Hypothesis* which refers to the idea that the competition among investors works to eliminate all positive net present value trading opportunities (Berk and DeMarzo, 2014). A market is said to be efficient

if the security prices that are being realized fully contain all available relevant information at any point in time (Fama, 1970). In principle, the theory makes three distinctions regarding the degree of market efficiency or the informational subset of relevance. The *weak form*, in which past security prices are fully reflected in the prices being realized today. The *semi-strong form* in which all publicly available information is fully reflected in the current prices. And the *strong-form* in which the prices fully reflect all information, including private information. Fama identifies three primary factors that can hinder market efficiency which are transaction costs, information that is not freely available to all investors and the disagreement among those investors regarding the implications (or pricing) of given information (Fama, 1970). In the context of credit ratings, the last two impediments are particularly relevant.

The latest empirical tests of bond market efficiency and especially those that study credit ratings are concerned with the semi-strong form of the efficient market hypothesis. The primary concern of these studies is the speed of the price adjustment to the release of new information (Fama, 1970). Methodologically this amounts to conducting event studies i.e. studying the return developments around the announcements of corporate or economy-wide events. The abnormal returns at the announcement date reflect the information content (importance according to the market) of the event in question. If a market is efficient in the semi-strong form, the price reactions to event announcements should be immediate and complete, that is without delay. Studying the returns after the announcement allows us to understand the speed and completeness of information processing. Ideally, we should observe no significant abnormal returns after the announcement and no discernible trend in abnormal returns in either direction. Otherwise we could speak of a potential under- or over-reaction suggesting that the investors disagree on how to interpret new information (Van der Sar, 2018, p. 70).

Information Content Theory

If default risk is priced and the bond market is efficient in the semi-strong form, the release of any new information concerning default risk should produce a bond price reaction. If sovereign credit ratings contain non-public information about default risk, their announcements should produce instantaneous price reactions. Cantor and Packer (1996) show that sovereign credit rating contain both public and private information about sovereign default risk. This is confirmed by numerous event studies that document a statistically significant reaction in bond prices to announcements of rating changes. Mechanically, the bond price reaction will also be reflected in the movement of yield spreads in the opposite direction. Moreover, the move in prices should be permanent, since there is a new level of risk associated with the upgraded or downgraded bond (Steiner and Heinke, 2001).

Differential Information Theory

One of the major reasons for the existence of financial institutions is *the informational asymmetry* between the issuers of the securities and the investors (Mishkin and Eakins, 2016). When the issuers know more about their risk profile than the investors do, the investors will

be willing to pay a price that reflects only the average value of the issuing entities. The issuers will anticipate this, and high-quality ones knowing that their securities would be undervalued will decide not to issue in the first place. As a result only the low-quality issuers will remain in the market which will push valuations even lower. This outcome is known as *adverse selection* (Mishkin and Eakins, 2016). One partial solution that can alleviate the adverse selection problem is the production and sale of information that will reveal the quality of the issuer. Credit rating agencies gather information on issuers' financial health, assess the information according to specific criteria and publish credit ratings. It can be argued that the primary role that these rating agencies play in financial markets is to resolve the informational asymmetry problems by providing unbiased credit assessments that have information content.

In emerging markets the problem of informational asymmetry is likely to be more severe. Possible explanations include difficulties in estimating political risks, lack of equal access to information sources, institutional differences, cultural and language barriers, and reliance on unconventional accounting standards (Steiner and Heinke, 2001). Subsequently, the role of credit ratings becomes more important. If the rating agencies are competent and there are no additional conflicts of interest, ratings should carry a greater information content in emerging markets and correspondingly greater price reactions should be observed following rating changes.

Price Pressure Effects Due to Institutional Regulation

The most common use of credit ratings in investment restrictions and capital requirements is the distinction between investment-grade and speculative securities. Regulatory authorities prohibit certain financial institutions from investing in securities above a certain risk threshold determined on the basis of credit ratings. Contrary to the information content hypothesis, even if rating announcements carry no additional private information, we would still expect to observe a market reaction to a rating change due to the accompanying change in the regulatory status of the bond (Steiner and Heinke, 2001). This is particularly relevant when a bond is downgraded below investment-grade. Capital requirements will force financial institutions to sell which will create downward price pressure. If the price pressure hypothesis holds, we would expect to observe a market reaction to downgrades and no reaction to upgrades.

2.3. REVIEW OF EMPIRICAL STUDIES

The earliest research on the informational content of rating announcements has focused on corporate debt. With increasing availability of data, researchers began using higher frequency observations and more sophisticated models. Nevertheless, the results can at best be summarized as mixed.

One of the earliest studies to examine bond market efficiency as well as the first to examine the bond price effects of corporate credit rating reclassifications is Grier and Katz (1976). Using monthly data of public utility and industrial bonds, the authors examine the behaviour of bond

prices over a seven month window around rating downgrades. Acknowledging that the observed returns can possibly be contaminated by outside factors, the authors use control firms' bond returns selected on the basis of pre-event credit rating, maturity and nominal yields to operationalize normal returns. The authors find evidence of pre-announcement anticipation in the industrial bond market which is not observed for public utility companies. Moreover, the reaction to the announcement is not instantaneous and there is a gradual adjustment in the expected direction following rating reclassifications, which is more pronounced for industrial bonds (Grier and Katz, 1976).

The work of Weinstein (1977) provides a methodological criticism of the Grier and Katz (1976) study. Weinstein (1977) examines both upgrades and downgrades and approaches the problem in a different manner by using monthly holding period returns. Instead of using matching firms, normal returns are operationalized using a market-adjusted model with a portfolio of bonds with the same rating as the sample firms as the benchmark. Weinstein concludes that there is no evidence of a market reaction during the month the rating change is announced as well as thereafter. He finds some evidence of pre-announcement anticipation and attributes this finding to the release of information that leads to the rating change.

Hand, Holthausen and Leftwich (1992) apply the market model based event study to examine bond and stock price effects around actual and imminent upgrades and downgrades using daily data. The obvious advantage of this study compared to the earlier work is the use of higher frequency data, although this poses additional problems related to thin or non-existent trading. The authors bypass the problem of non-trading by using "window spanning" observations i.e. using the earliest observable transaction price following the announcement within a 10-day window. It should be noted however that using such a technique may reduce the power of parametric tests (Followill and Martell, 1997). Additionally, the authors implement a simple expectations model to distinguish between those events that are potentially anticipated by the market and those that are not. The technique compares the pre-announcement yield to maturity of the bond of interest with that of a benchmark bond with the same credit rating. When the yield on the bond is greater than that of the benchmark, the investors believe that the probability of default is greater than what is implied by the bond rating and hence expect a downgrade. If a downgrade does occur, it is classified as expected. The overall sample does not produce statistically significant abnormal bond returns to imminent upgrades or downgrades. However, imminent downgrades by Standard & Poor's that are classified as unexpected do produce statistically significant average excess bond returns in the expected direction (-1.39% for imminent downgrades and 2.25% for upgrades). For stocks, statistically significant abnormal returns are observed for forthcoming downgrades but not in the case of upgrades. For actual downgrades, the average excess bond return is statistically significant at -1.27%. For investment grade issuers this result is less pronounced (-0.55%) albeit statistically significant. Moreover, the effect of downgrades on equity are more pronounced than that on debt. The evidence on upgrades is weaker with 0.35% mean excess bond returns and minimal positive excess returns for stocks.

The research on sovereign credit ratings dates back to early 1990s. Much of the early contribution is due to Richard Cantor and Frank Packer who published a series of papers that examined the determinants, the market impact and the role of sovereign credit ratings. Cantor and Packer (1996) presents a systematic analysis of the macroeconomic determinants of sovereign credit ratings. The researcher show that credit ratings are largely determined by a set of macroeconomic variables which are per capita income, GDP growth, inflation and the level of external debt as well as two categorical variables that indicated the country's classification as developed and its recent default history. The authors also examine the cross sectional significance of the assigned ratings in explaining the observed yield spreads using multivariate regression analysis. Their results show that the macroeconomic indicators of default risk (the previously identified determinants of ratings) do not add any predictive power beyond their correlations with the ratings when explaining the variation in yield spreads. Hence the authors conclude that sovereign credit ratings appear to capture additional information that is not reflected by the macroeconomic indicators of default risk. The natural extension to this finding was to apply event study methodology to test whether rating actions have a dynamic impact on yield spreads i.e. whether the market assigns informational value to these announcements. Their event study uses daily data for the 1987-1994 period. The abnormal bond returns are operationalized through observed relative credit spreads on foreign currency denominated sovereign debt. The authors use an event window that is 50 days in length covering thirty days before and twenty days after the rating announcements. The authors find that the market anticipates the rating changes producing on average a 3.3% rise in cumulative relative yield spreads before downgrades and a 2.0% fall before upgrades. Moreover the pre-announcement anticipation (the trend before the event date) appears to gradually disappear six days before downgrades and shortly before upgrades. The instantaneous market response is statistically significant with 0.9% for downgrades and -1.3% for upgrades. There is evidence of a discernible post-announcement trend following both types of announcements suggesting perhaps that the market initially underreacts. The analysis of prediction errors for different categories of announcements produces more striking results. Rating events have a highly significant effect on relative yield spreads for below-investment grade countries but an insignificant effect on investment-grade sovereigns. Those announcements that are anticipated (measured by the cumulative change in relative yield spreads before the announcement) surprisingly produce a greater impact on the announcement date. Finally, the market impact does not depend on the type of the announcement (actual or imminent) but it does depend on the identity of the credit rating agency making it. Overall these results are in contrast to the earlier studies focusing on corporate bonds.

Similarly, Reisen and von Maltzan (1999) conduct an event study which examines the impact of rating events on absolute sovereign bond yield spreads. Their results, however, are somewhat in conflict to those of Cantor and Packer (1996). The researchers find that the subsamples of rating events from each of the three leading rating agencies do not produce a statistically significant response in sovereign yield spreads, but the aggregated sample of

rating announcements from all three rating agencies produces statistically significant results. Possibly this suggests that the market expects a certain degree of consensus from the credit rating agencies to produce a significant impact. Pre-event movement and post-event drift also differ across the types of rating events, depending on whether the reassessment is imminent or actually implemented. This contradicts the results of Cantor and Packer (1996).

Kaminsky and Schmukler (2002) offer the most comprehensive analysis of emerging market sovereign credit ratings, yield spreads and stock returns. The authors estimate a series of panel regressions of daily changes in yield spreads and stock returns to changes in sovereign credit ratings, outlooks, and U.S. interest rates. The concurrent change in yield spreads is around 0.6 percentage points following a rating or outlook announcement. Contrary to earlier studies, outlook changes produce larger absolute changes in yield spreads than actual rating changes, suggesting pre-announcement anticipation. The changes in yield spreads are greater during crisis times. Moreover, rating changes in one country appear to affect yield spreads in other countries, providing evidence of cross-country contagion effects. The researchers also perform a series of event studies that confirm the observation that rating events are on a large part anticipated by market participants. Announcement date effects are muted by the movement of yield spreads and stock returns in the expected direction during the 10 days preceding rating announcements. Post-announcement drift in excess bond returns is not observed for domestic rating events, although there appears to be a noticeable trend in excess stock returns following domestic upgrades.

2.4. REGULATION OF THE CREDIT RATING AGENCIES: THE DODD-FRANK ACT

As discussed in Section 2.1., the current business model of credit rating agencies is the "issuer-pays" model. This means that in order to be rated, the borrowers need to pay credit rating agencies. Moreover, in the build-up to the most recent financial crisis, credit rating agencies started to provide consulting services to potential issuers, advising them on how to structure complex financial products in the form of mortgage-backed securities. The conflict of interest between the credit assessment business and the subsidiary consulting services became apparent in the 2007-2009 Financial Crisis. The agencies advised their clients on how to structure complex financial instruments in the form of mortgage-backed securities while at the same time being responsible for rating these products. With the collapse of the housing market, many AAA-rated products had to be downgraded multiple times until they reached junk status. This time, long-term reputational concerns did not hinder agencies' incentives to issue favourable rankings to their clients. Two possible explanations are the following. First and foremost, unlike the market for corporate or public debt, the asset-backed securities market was dominated by a select number of investment banks and hence losing clients would be a lot more costly. And secondly, very few people understood the securitization process and even fewer were able to correctly assess the credit risk underlying these instruments (White, 2010). All of this culminated in SEC's proposal for comprehensive reforms in 2008 and 2009 which became effective in 2010 under the Dodd-Frank Act. Along the call for increased transparency in the process of credit assessment and better disclosure, the commission

prohibited rating agencies from structuring the same products that they rate and required a clear separation of rating assessment and marketing (Mishkin and Eakins, 2016).

2.5. FORMULATION OF HYPOTHESES

Similarly to the earlier event studies and in accordance with the price pressure hypothesis, I expect to observe greater absolute abnormal returns in case of downgrades and negative changes in outlook. However, due to less stringent regulation in emerging markets and the fact that most ratings in my sample are below investment grade, this outcome should be less pronounced. Due to the differential information hypothesis, I expect to observe greater absolute abnormal returns than the previous studies document, largely due to the nature of the sample that I use. As mentioned earlier, institutional differences in emerging markets are likely to exacerbate the information asymmetry problems increasing the importance of credit ratings. Subsequently, the information content of rating announcements should be greater in emerging markets, producing larger absolute abnormal returns around the announcement date.

I expect the regulation of credit rating agencies to have an impact on the impediments to market efficiency identified by Fama (1970). The effect is largely due to increased disclosure requirements and encouragement to improve due diligence and corporate governance. The Dodd-Frank Act of 2010 required rating agencies to clearly define and disclose the meaning of any symbol or action used to denote a credit rating and apply the symbols consistently across all types of securities. The act eliminated rating agencies' exemption from Fair Disclosure Rule, requiring the agencies to disclose material non-public information to all investors at the same time. The reforms also addressed the conflicts of interest between the rating business and the marketing, negotiation and sale process of those ratings. The regulations required a clear separation of the rating business from the ancillary consulting services provided to the rated entities. In theory, these actions should increase the availability of information to all investors and increase the consensus among the investors as to how to interpret credit rating actions. If information availability and investor consensus increases market efficiency as stated by Fama (1970), the post-reform period should be associated with a more efficient information processing. Subsequently, the announcement date price reaction should become more complete meaning that the post-announcement behaviour of yield spreads and abnormal stock returns should become less significant. Moreover, if the quality of the assigned ratings has improved, the information content of rating announcements should be greater during the post-reform period, resulting in larger absolute abnormal returns.

Accordingly I formulate two hypotheses which are;

"The announcement-date abnormal returns will be greater in absolute form during the post-reform period, as compared to the pre-reform period".

"In the post-reform period, rating announcements will be processed more efficiently, as compared to the pre-reform period".

3. DATA

In the past, sovereign governments tended to seek ratings exclusively on their foreign currency obligations because international institutional investors demanded foreign currency bonds. As a result, the sample of foreign currency ratings in many developing countries (e.g. Argentina, Brazil) is a lot larger than that of local currency ratings. It is therefore not surprising that previous event studies (like Cantor and Packer (1996), Kaminsky and Schmukler (2002)) have focused on these ratings. Cantor and Packer (1996), for example, argue that foreign currency ratings are "the more prevalent and influential in the international bond markets" (Cantor and Packer, 1996). Kim and Wu empirically show that long-term foreign currency ratings are an important determinant of financial sector development and international capital flows in emerging markets (Kim and Wu, 2008). Due to these reasons, and in order to achieve comparability with previous studies, I will focus on *long term foreign currency ratings*.

The dates of sovereign credit rating changes (rating events) come from the announcements of the three leading credit rating agencies: Standard & Poor's, Moody's and Fitch. The announcement dates were retrieved from the official websites of these rating agencies. The original sample contains 195 rating events.

I examine the data for six developing economies: Argentina, Brazil, Colombia, Ecuador, Mexico and Peru. The data are split into two sub-samples that cover the periods 2000-2010 and 2010-2018. The break date in the full sample is chosen non-arbitrarily and corresponds to the effective date of Sections 932-935 of the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010. These sections pertain to the establishment of the Office of Credit Ratings to oversee the Nationally Recognized Statistical Rating Organizations (NRSRO) and the corporate governance, liability and disclosure requirements for these organizations. (SEC) These reforms were effectively implemented as of July 22, 2010 to which I refer to as the "reform date".

The data on JP Morgan EMBI+ Government Bond Yield Spreads come from the Global Financial Database (GFD). The EMBI+ yield spreads reflect the credit default risk of developing economies by tracking the foreign currency sovereign bond yields and comparing them with the yields of benchmark instruments issued by developed countries. The EMBI+ spreads are the difference between the yield on foreign currency sovereign debt and the yield on safe assets with the corresponding maturity (e.g. U.S. Treasury securities). Therefore, we can interpret the observed EMBI+ spreads as negative abnormal bond returns estimated using the market-adjusted model. The same measure of yield spreads is used by Kaminsky and Schmukler (2002). The GFD dataset reports the EMBI+ spreads in percentage points per annum. When daily returns are used to measure the return reaction, it is advisable from a consistency point of view to use daily data throughout the analysis (Van der Sar, 2018, p. 111). Thus, I assume discrete daily compounding and convert the reported annual yields into daily yields.

The data on daily stock market price indexes were retrieved from the GFD Database. In order to compare stock returns across countries, all returns are measured in U.S. Dollars. For Argentina, I use the Merval Index which reflects the market capitalization of a stock portfolio selected on the basis of participation in the Buenos Aires Stock Exchange, the number of transactions in the past 6 months and market value. For Brazil, the IBrX 100 Index is used which is a value weighted index that tracks the performance of a theoretical stock portfolio consisting of 100 most actively traded and representative stocks of the Brazilian stock market. For Colombia, the IGBC Index is used which is a value weighted index consisting of the 30 most actively traded and highest capitalised local stocks of the Colombia Stock Exchange. For Ecuador, the Bolsa de Valores de Guayaquil (BVG) Index is used which is a capitalisation weighted index of the most representative stocks trading on the Guayaquil Stock Exchange. For the Mexican equities market, the Indice de Precios y Cotizaciones (IPC) Index is used which is a value-weighted price index that tracks the performance of 40 local stocks trading at the Mexican Stock Exchange (BMV). For Peru, the IGBVL Index is used which is a value weighted index that tracks the performance of the largest and most actively traded local stocks at the Lima Stock Exchange. Finally, to operationalize normal stock returns I use the S&P 500 Composite Price Index. This is done in order to achieve comparability with the Kaminsky and Schmukler (2002) study.

4. METHODOLOGY

Event studies are considered to be tests for market efficiency and represent an attempt to gauge the effect of the announcement of an identifiable company-specific or economy-wide event on a financial variable, typically asset returns. If the financial markets are informationally efficient, there should be an immediate price reaction to the event on the announcement date and no further reaction on subsequent trading days (Brooks, 2002). Typical event studies in empirical finance literature pertain to the analysis of individual firms and their stock returns. However, the procedure can be extended to the analysis of countries and other financial instruments without altering the nature of the assumptions and the properties of statistical tests. Campbell, Lo and MacKinlay (1997) identify a number of distinct steps in conducting event studies. Each step presents a unique challenge that needs to be addressed by the researcher. While explaining these steps, I will detail how exactly I have approached each challenge.

***Event definition and specification of an event window*:** The initial task of the researcher is to define the event of interest, specify the theoretical link between the event and the financial variable in question, and decide on the length of the *event window*, the time period over which the behaviour of the financial variable will be analysed. This creates another time dimension and warrants the research to work with *event time* rather than calendar time. The event date is identified as $t = 0$ and the event window as $T \in \{...-3, -2, -1, 0, +1, +2, +3...\}$.

The events that I study are long-term foreign currency sovereign credit rating changes. The event dates correspond to the official announcements of the three leading credit rating agencies: Standard & Poor's, Moody's, and Fitch. Due to the previously documented differences in return reactions to upgrades and downgrades (Alfonso et al, 2012), I study each type of rating action separately i.e. a separate event study is conducted for rating upgrades and downgrades, and positive and negative changes in outlook. As recommended by Kaminsky and Schmukler (2002), I use a slightly wider event window that is 41 days in length, covering 20 trading days before and after an official rating action is announced. This is done in order to better understand how persistent the effects of rating announcements are.

For certain rating actions, the announcements are made when the markets are closed. I eliminate these observations in order to avoid the complications raised by *event date uncertainty*. While misidentifying the event date reduces the power of the statistical tests, thin or non-trading of bonds introduces more significant biases (Campbell et al, 1997). I take a conservative approach, and eliminate the event windows over which non-trading is observed. Since I am interested in modelling the return effects of only one single event for each event window, I eliminate the event windows that overlap in calendar time. These procedures leave me with 108 non-contaminated ("clean") events. Eliminating overlapping event windows is done in order to avoid the complications raised by serially correlated events or *event-clustering* (Kaminsky and Schmukler, 2002). The standard parametric tests used in event studies assume that abnormal returns are independently distributed. If abnormal returns are serially correlated (which often is the matter of positive correlation), their sample variance will underestimate the true population variance and the null hypothesis of no abnormal returns will be wrongly rejected too often (Van der Sar, 2018, p. 106). Eliminating the event windows that overlap in calendar time should mitigate this problem, at least at an individual country level. Of course, it is assumed that the event window is wide enough meaning that there is no autocorrelation in abnormal returns beyond the twentieth lag. Kaminsky and Schmukler (2002) show that sovereign credit rating changes in one country have a significant effect on the yield spreads and stock returns in other countries, producing cross-country contagion effects. Thus it could be the case that the abnormal returns are serially correlated across countries. In principle, an analysis of each individual country could mitigate this problem. Because my sample is simply not large enough, conducting such a study would violate the assumption of normally distributed abnormal returns. Therefore I do not pursue this issue further.

Sample selection criteria: This step specifies the characteristics of the sample used and notes the potential biases which may have been introduced through sample selection.

As previously mentioned, my study concerns developing countries. This is done for at least three reasons. First of all, the problem of information asymmetry is likely to be more severe in these markets. As a result, sovereign credit ratings should carry a greater information content in these markets relative to more developed economies. Second of all, due to less stringent regulation and the fact that a large portion of the bonds remained in the below-

investment grade territory throughout the sample period, the price pressure effects induced by investment restrictions are likely to be smaller. In developed countries (e.g. United States, Germany), large institutional investors like depository institutions, pension funds, and insurance companies are prohibited from investing in below-investment grade securities. This makes the interpretation of results difficult, as it is unclear whether the observed abnormal returns are due to the information content of the event or simply event-induced trading. In developing countries on the other hand, statistically significant abnormal returns can be more easily interpreted as evidence for information content of sovereign credit ratings. Finally, by examining a market that is potentially inefficient (due to unequal access to information, poor investor protection and corporate governance regimes etc.), I am able to draw more general conclusions regarding whether regulation of credit agencies can improve market efficiency.

Operationalization of normal (expected) returns and computation of abnormal returns: Ideally, I want to calculate the return that would have been expected for the security if the event did not happen at all so that I can isolate the impact of the event from any unrelated incidents that may be occurring over the event window (Brooks, 2002). In practice, it is necessary to define the *normal return* according to a specific statistical or economic model, which represents the expected return conditional on the event not taking place. Typically the normal returns are estimated over the estimation (control) period which takes place prior to the event window. The most common technique is the *market model* which specifies the expected return as a function of the security's market risk.

$$E[R_{i,t}] = \alpha_i + \beta_i R_{M,t}$$

The market-model generated normal returns require a specification of a "clean" estimation window over which no rating event takes place. For my sample, rating events occur continuously throughout the calendar time for both the pre-reform sample and the post-reform sample. This makes it impossible to specify a pre-event window that is wide enough and can be applied consistently across all six countries. Campbell et al 1997 suggest that in such cases a restricted version of the market model, known as the *market-adjusted model* can be applied. The similar technique is used by Alfonso et al, 2012, and Kaminsky and Schmukler, 2002. The market-adjusted model specifies the normal return as the realized return on the proxy for a market portfolio, R_{Mt} such that;

$$E[R_{i,t}] = R_{M,t}$$

Afterward, the abnormal returns are measured as the difference between the realized returns and previously estimated normal returns. Essentially, the *abnormal return* for security *i* on event time t (AR_{it}) represents the effect of the occurrence of the event.

$$AR_{i,t} = R_{i,t} - E[R_{i,t}]$$

Where R_{it} and $E[R_{it}]$ are the realized and normal returns for security *i* at event time *t.*

I operationalize the abnormal returns on foreign currency sovereign bonds using the JP Morgan EMBI+ Government Bond Yield Spreads. The EMBI+ spreads reflect the difference in the yields of foreign currency denominated sovereign debt of emerging economies and that of benchmark instruments issued by industrialized countries (e.g. U.S Treasury securities with the corresponding maturity). If rating events have information content, a rating downgrade should result in a negative bond price reaction (negative return) and the yield spreads should rise. Similarly to the Kaminsky and Schmukler (2002) study, I define the abnormal bond return as the negative log change in observed daily yield spreads. For government bonds, the abnormal return AR_{it} is defined as,

$$AR_{it} = -\ln(\frac{EMBI_{i,t}}{EMBI_{i,t-1}})$$

Normal stock returns are estimated using the market-adjusted model with the S&P 500 Composite as the benchmark for the market portfolio. Correspondingly the abnormal stock returns become the "stock spreads" (the difference between the daily return on the national index and that on the S&P 500) that are being realized over the event window. Again, using the realized spreads amounts to using a market adjusted model. The use of this model is justifiable, due to the fact that a control period without event occurrences is simply not available. Similarly, earlier event studies examining sovereign credit rating changes apply the market-adjusted model (Kaminsky and Schmukler, 2002).

***Testing procedure**:* In order to make a judgement about the general validity of a return reaction as a result of the event, all abnormal returns concerning event time *t* must be grouped in a certain way (Van der Sar, 2018, p. 103). Usually, an arithmetic average of abnormal returns is taken across all relevant observations $i \in \{1,2,3,\ldots N\}$ and the *average abnormal returns* are calculated.

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

The average abnormal returns are estimated for the pre-reform and post-reform periods separately in order to determine the effect of credit rating agency regulations.

The null hypothesis is that the event does not have any systematic return effect. Meaning that the average abnormal return is equal to zero ($H_0: AAR_{it} = 0$). To determine the level of statistical significance, usually a variant of the parametric t-test is applied. It is assumed that the abnormal returns are independent and identically distributed, following a normal distribution with mean 0 and a finite variance σ_t^2. If these assumptions hold, average abnormal returns are also normally distributed with mean 0 and variance σ_t^2/N. Since the standard deviation, σ_t is unknown the sample estimator, s_t is used instead (Van der Sar, 2018, p. 104). Since the market-adjusted model is used, the sample standard deviation is computed using the abnormal return residuals realized over the event-window.

$$s_t^2 = \frac{1}{N-1}\sum_{i=1}^{N}(AR_{it} - AAR_t)^2$$

The obtained test statistic is

$$t_{AAR} = \frac{AAR_t}{s_t/\sqrt{N}}$$

Which follows a Student-t distribution with N-1 degrees of freedom (Van der Sar, 2018, p. 104).

Cumulating: To analyse the returns over a longer time period, cumulative abnormal returns are used (Van der Sar, 2018, p. 112). Since I am interested, in whether the credit rating agency reforms had an effect on market efficiency, I compute the cumulative abnormal returns between *t* = +1 and *t* = +20.

$$CAR_i = \sum_{t=+1}^{+20} AR_{it}$$

In order to determine whether on average, systematic (cumulative) abnormal returns are realized over the event window, the average of cumulative abnormal returns is computed across the events. The resulting cumulative average abnormal return becomes

$$CAAR = \frac{1}{N}\sum_{i=1}^{N} CAR_i$$

It is assumed that cumulative abnormal returns are independent and identically distributed following a normal distribution with zero mean and finite variance σ_{CAR}^2. The null hypothesis is that the cumulative average abnormal returns are equal to zero. Again, the sample estimator of the variance is used which produces the following test statistic:

$$t_{CAAR} = \frac{CAAR}{s_{CAR}/\sqrt{N}}$$

Where, $s_{CAR} = \frac{1}{N-1}\sum_{i=1}^{N}(CAR_i - CAAR)^2$

The test statistic follows a Student-t distribution with *N*-1 degrees of freedom (Van der Sar, 2018, p. 114)

5. RESULTS

Tables 1 and 2 report the results of the event studies for the pre-reform and the post-reform periods respectively. The actual behaviour of average yield spreads and abnormal stock returns is depicted in Figures 1-4 in the Appendix.

Table 1: Pre-Reform Event Study Results

Rating Event	Number of Clean Events	Government Bond AAR_0 (p-Value)	Stock Index AAR_0 (p-Value)	Government Bond $CAAR[+1;+20]$ (p-Value)	Stock Index $CAAR[+1;+20]$ (p-Value)
Upgrade	**24**	**0.6061 % (0.000)**	**0.1527 % (0.677)**	**0.1642 % (0.925)**	**2.5404 % (0.018)**
Downgrade	**10**	**-0.4103 % (0.000)**	**-0.7449 % (0.120)**	**-0.0494 % (0.977)**	**3.9103 % (0.195)**
Positive Outlook Change	**18**	**0.2095 % (0.000)**	**-0.1475 % (0.751)**	**0.3975 % (0.734)**	**0.4930 % (0.760)**
Negative Outlook Change	**7**	**-0.1233 % (0.000)**	**0.0725 % (0.892)**	**-1.0811 % (0.458)**	**5.0583 % (0.000)**

Table 2: Post-Reform Event Study Results

Rating Event	Number of Clean Events	Government Bond AAR_0 (p-Value)	Stock Index AAR_0 (p-Value)	Government Bond $CAAR[+1;+20]$ (p-Value)	Stock Index $CAAR[+1;+20]$ (p-Value)
Upgrade	**19**	**0.4716 % (0.000)**	**0.1501 % (0.491)**	**-0.8165 % (0.429)**	**-2.5744 % (0.014)**
Downgrade	**8**	**-1.4271 % (0.000)**	**-0.4767 % (0.655)**	**-1.1236 % (0.544)**	**1.6286 % (0.602)**
Positive Outlook Change	**11**	**0.0159 % (0.000)**	**1.3196 % (0.022)**	**-0.7314 % (0.645)**	**-1.2246 % (0.565)**
Negative Outlook Change	**11**	**-0.2673 % (0.000)**	**-0.7988 % (0.130)**	**-0.0877 % (0.961)**	**-2.0701 % (0.300)**

The AAR refers to the announcement date average abnormal return. For bonds, the abnormal returns are measured as the log changes in daily EMBI+ yield spreads. The CAAR is the cumulative average abnormal return computed over the twenty trading days following rating announcements. The numbers in brackets report the p-Values for the corresponding t-Test statistics (Two sided test of the null hypothesis of no (cumulative) average abnormal returns)

The announcement date average abnormal bond returns are statistically significant at the 1% level for all types of rating actions and for both time periods. Announcements of a particular type of rating action are associated with changes in yield spreads and subsequent average excess bond returns in the expected direction. However, in absolute form, the announcement date average abnormal bond returns are greater during the pre-reform period as compared to the post-reform period for upgrades and positive changes in outlook. Contrarily, the absolute values of the average abnormal bond returns are greater during the post-reform period for downgrades and negative changes in outlook. The cumulative average abnormal bond returns are statistically insignificant for all types of rating actions and for both time periods.

The average abnormal stock returns at the announcement date are statistically insignificant for all types of rating actions during the pre-reform period. During the post-reform period, the announcement date average abnormal stock returns are statistically significant for positive

changes in outlook. The cumulative average abnormal stock returns, are statistically significant for upgrades and negative changes in outlook during the pre-reform period. The statistical significance of the latter disappears during the post-reform period. During the pre-reform period, average abnormal stock returns rise by 2.54 percentage points over the twenty trading days following upgrade announcements. During the post-reform period, average abnormal stock returns fall by 2.57 percentage points on a cumulative basis following upgrade announcements. Both of these results are statistically significant.

Hence, three important observations need to be addressed: The announcement date effects in bond markets to "bad news" events are greater during the post-reform as compared to the pre-reform period. The announcement date effects in bond markets to "good news" events are greater during the pre-reform period as compared to the post-reform period. During the pre-reform period, stock markets used to under-react to rating upgrades. During the post-reform period the stock markets over-reacted to these events.

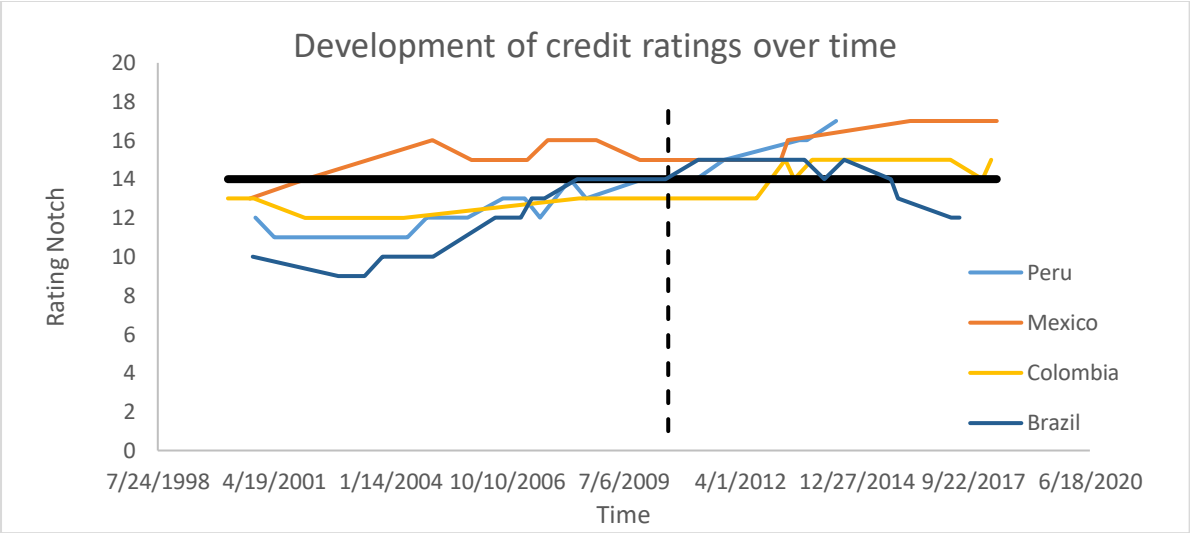
6. DISCUSSION

The fact that the announcement date average excess bond returns are statistically significant for all types of rating actions presents strong evidence in favour of the information content theory of credit ratings. This result is consistent with the previously discussed studies that document significant announcement date bond market reactions, such as Kaminsky and Schmukler (2002), and Cantor and Packer (1996). Events conveying "bad news" about sovereign default risk (rating downgrades and negative changes in outlook) are associated with a rise in yield spreads and corresponding negative average abnormal returns at the announcement date. Conversely, the announcements of "good news" events (upgrades and positive changes in outlook) produce a fall in yield spreads and corresponding positive average abnormal returns. Furthermore, the fact that the cumulative average abnormal returns are statistically insignificant suggests that bond markets respond efficiently to sovereign credit rating changes. This finding is somewhat inconsistent with Cantor and Packer (1996) result of a discernible post-announcement trend in relative yield spreads in the direction of the announcement date effect, although the authors do not report exact cumulative average abnormal returns. Since the cumulative average abnormal returns are statistically insignificant for both time periods, we cannot speak of an improvement in bond market efficiency after the Dodd-Frank Act. Hence, it can only be concluded that the bond markets were efficient before the reforms and continued to be efficient after the reforms. For that reason, I reject the second hypothesis of improved bond market efficiency after the implementation of the Dodd-Frank Act.

There is no evidence in favour of the price pressure hypothesis during the pre-reform period. This is quite surprising because previous empirical work by Hand, Holthausen and Leftwich (1992) and Alfonso et al (2012) has documented that bond markets respond more strongly to rating downgrades as opposed to rating upgrades. Before the implementation of the Dodd-

Frank Act, the bond markets used to respond more strongly to "good news" events relatively to "bad news" events. This is not the case for the post-reform period. This period is associated with a stronger announcement date reaction to rating downgrades as compared to upgrades. In order to interpret this finding it is useful to consider how the actual credit ratings of each individual country have evolved over time. Figure 6 in the appendix which is also shown below, plots the development of credit ratings of four sample countries.

Figure 6: The development of credit ratings over time



The credit ratings of Argentina and Ecuador are omitted because these remained in the below investment-grade territory throughout the entire time period. The dashed vertical line indicates the effective date of the Dodd-Frank Act. Because different rating agencies use different symbols to indicate ratings, the ratings are converted into a numerical scale with a higher number corresponding to a higher rating. The comparison of ratings across rating agencies and corresponding numbers for each rating are shown in Figure 5 in the Appendix. The investment grade threshold corresponds to the BBB- rating by Standard and Poor's and Fitch, and the Baa3 rating by Moody's. This threshold is equivalent to the 14th notch on the numerical scale and is indicated by the solid horizontal line in Figure 6. Looking at Figure 6, it can be observed that the credit ratings of Peru and Brazil have crossed the investment-grade threshold around the implementation of the Dodd-Frank Act. For Colombia, this occurred a few years later but still during the post-reform period. It could well be the case that for these countries, crossing the investment-grade threshold may have attracted larger institutional investors that were previously unable to invest due to regulatory restrictions. Subsequently, the downgrades and negative outlook changes occurring during the post-reform period may have forced these investors to rebalance their portfolios which created downward price pressure. As a result, during the post-reform period, downgrades and negative changes in outlook produce stronger announcement date reactions as compared to upgrades and positive changes in outlook. This explanation can also be reconciled with the observation that announcement date market reactions to "bad news" events are greater during the post-

reform period as compared to the pre-reform period. Therefore, I am not able to interpret the larger absolute average abnormal returns to downgrades and negative outlook changes during the post-reform period, as evidence in favour of the improved information content of credit ratings after the Dodd-Frank Act. The fact that the announcement date average abnormal returns to upgrades and positive outlook changes are smaller during the post-reform period, suggests that the information content of these events has in fact decreased. Therefore, the hypothesis of increased information content of credit ratings in bond markets after the Dodd-Frank Act is rejected.

With respect to the national stock markets, a quite different picture emerges. Before the Dodd-Frank Act, the announcement date market reactions as specified by the average abnormal returns (shown in the fourth column of Table 1) are statistically insignificant for all types of rating events. This finding contradicts the results of Kaminsky and Schmukler (2002) who document that over the 1990-2000 period developing country stock markets responded significantly to sovereign credit rating changes. It can also be observed that during the pre-reform period, the stock markets reacted negatively to positive outlook changes and positively to negative outlook changes, although both results are statistically insignificant. During the post-reform period, a slight improvement in the information content of credit rating ratings is documented. As shown in column four of Table 2, the stock markets responded in the expected direction following all types of rating actions. However, the announcement date mean abnormal stock returns are statistically significant only for positive changes in outlook, with the average abnormal return of 1.32 percentage points. This presents weak evidence in favour of the improved information content of credit ratings after the credit rating agency reforms. Thus, with respect to the stock markets, I fail to reject the first hypothesis of improved information content of credit ratings after the Dodd-Frank Act.

The evidence concerning stock market efficiency is a lot more difficult to interpret. Before the reforms, the cumulative average abnormal returns are statistically significant for two types of rating actions, upgrades and negative outlook changes. After the reforms, the cumulative average abnormal returns are statistically significant only for rating upgrades. This presents weak evidence in favour of the improved information efficiency of stock markets after the credit rating agency reforms. However, for rating upgrades cumulative average abnormal returns are positive during the pre-reform period and negative during the post-reform period. This suggests that the developing country stock markets used to under-react to rating upgrades before the Dodd-Frank Act and began to over-react after it. A potential explanation of this phenomenon is related to credit rating agencies' reputational concerns. The Dodd-Frank Act significantly increased the credit rating agencies' liability exposure by allowing penalty provisions in case of issuance of faulty ratings. It is plausible that these enforcements combined with rating agencies' reputational concerns created an incentive to refrain from issuing more favourable ratings. As a consequence, the credibility of rating upgrades were likely to increase after the Dodd-Frank Act. Hence during the post-reform period, the

investors' confidence in rating upgrades grew beyond what was implied by the ratings, causing the market to over-react.

To summarise, the information content of sovereign credit rating changes and the efficiency of processing of information did not improve in developing country bond markets after the Dodd-Frank Act. The analysis of stock markets, suggests a slight improvement in information content and information processing efficiency, at least at the level of specific types of rating events. Therefore, it appears that the Dodd-Frank Act of 2010 failed to achieve its intended objective with respect to the credit rating industry which was to increase the quality and the reliability of credit ratings. However, this does not mean that the Dodd-Frank Act when considered as a whole was futile. The reforms addressed much broader issues such as management of systemic risk in the financial industry, reducing the probability and costs to the society of future failures of financial institutions and increasing investor protection by promoting better disclosure in derivatives markets. Moreover, even with respect to credit rating agencies, my results do not necessarily imply reduced quality and reliability of credit ratings. For one, the reduced information content of credit ratings in international bond markets can be due to increased availability of information due to improved information technology and investors' reduced reliance on credit ratings when assessing default risk. Secondly, it should be noted that the regulators were primarily concerned with the ratings of structured-products (e.g. mortgage backed securities and their derivatives) and not with sovereign bonds. In short, the results of this study should be interpreted with caution especially in the context of future policy design.

7. CONCLUSION

This paper examined the impact of the Dodd-Frank Act on the information content and market efficiency of developing country bond and stock markets in response to sovereign credit rating changes. The credit rating agencies' "issuer pays" model and lax transparency and disclosure standards have exposed the industry to severe conflicts of interest. These problems became apparent during the most recent financial crisis as the agencies were unable to properly assess the credit risk of structured financial products. In 2010, the U.S. Securities and Exchange Commission introduced comprehensive reforms that limited credit rating agencies' access to private information, increased their oversight, addressed their corporate governance problems and imposed more severe liability requirements. The SEC clearly stated that their objective was to minimize the conflicts of interest and increase the quality and reliability of credit ratings. Whether these actions have indeed increased the informational value of credit ratings as perceived by financial markets was the topic of this research.

In order to study this outcome, event study analysis was conducted using a sample of six developing countries over the period of 2000-2018. The full sample was split into two subsamples with the break date corresponding to the effective date of the Dodd-Frank Act. Afterward, the behaviour of log changes in EMBI+ yield spreads and stock index returns was

analysed over the twenty trading days before and after a sovereign credit rating or outlook change was officially announced. The average abnormal bond and stock returns were computed and then cumulated over the post-announcement event window to gauge the degree of market over- or under-reaction.

The results show that the market for sovereign bonds was efficient before and continued to be efficient after the Dodd-Frank Act. Consistently with previous empirical studies, evidence in favour of the information content of sovereign credit rating actions was documented for both time periods. However, the information content of rating events appears to have decreased after the Dodd-Frank Act. The announcement date excess bond returns were smaller for "good news" events and larger for "bad news" events during the post-reform period. I attribute the latter finding to the price hypothesis of credit ratings. For national stock markets, there is evidence in favour of both improved information content and market efficiency during the post-reform period. Additionally, there appears to be evidence of market under-reaction to rating upgrades during the pre-reform period and over-reaction during the post-reform period. This finding is reconciled with rating agencies' reputational concerns due to their increased liability exposure after the Dodd-Frank Act.

8. SUGGESTIONS FOR FUTURE RESEARCH

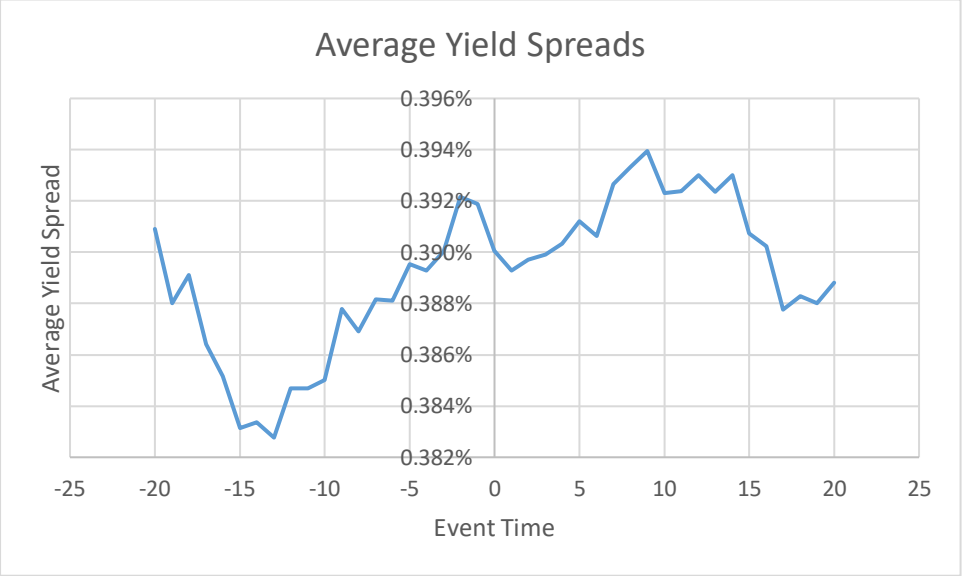
The main limitation of this study is the small sample bias introduced due to limited data availability. Conducting an event study of sovereign credit rating changes introduces a trade-off between being able to fully examine the differential impact of different types of rating actions and being able to work with a sufficiently large sample. The parametric test statistics used in this study are all asymptotic and hence require a sufficiently large sample of rating events for the central limit theorem to hold (Brooks, 2002). Thus it is highly recommended to re-examine the obtained results with a larger sample of events. An alternative methodology could employ the use of non-parametric tests that are robust in the presence of non-normal distributions and thin trading. The second limitation concerns the use of a highly restricted model to operationalize normal returns. It would certainly be interesting to test whether the results are robust to an alternative expected return model specification. Finally, it would be interesting to compare the impact of regulation in developing and developed counties and extend the analysis beyond stock and bond markets.

APPENDIX

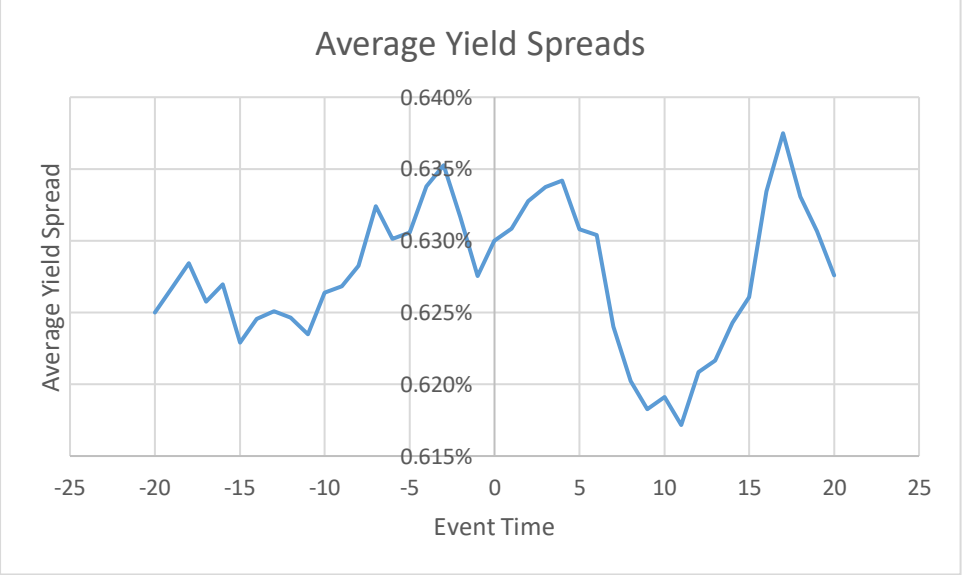
Figure 1: Event Studies of Bonds during the Pre-Reform Period

The following graphs depict the movements of average yield spreads around each type of sovereign credit rating actions. The spreads are the J.P Morgan EMBI+ Spreads converted into daily spreads assuming daily compounding. The spreads are measured in percentage points and reported up to the third decimal place. The event window covers 20 trading days before and after a rating or outlook change is officially announced. The pre-reform period is between 2000 and 2010.

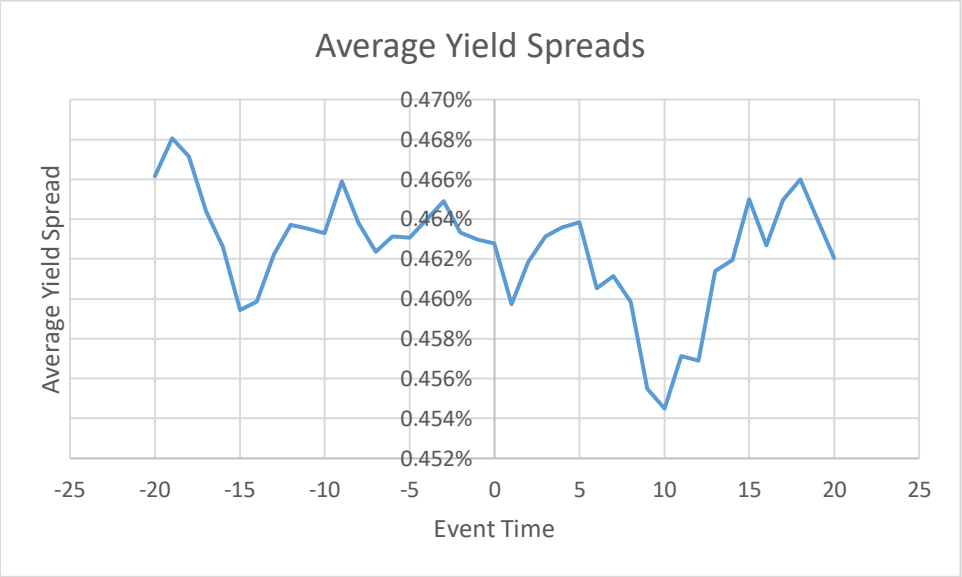
1.1. Actual Upgrades (24 Clean Events)



1.2. Actual Downgrades (10 Clean Events)



1.3. Positive Outlook Changes (18 Clean Events)



1.4. Negative Outlook Changes (7 Clean Events)

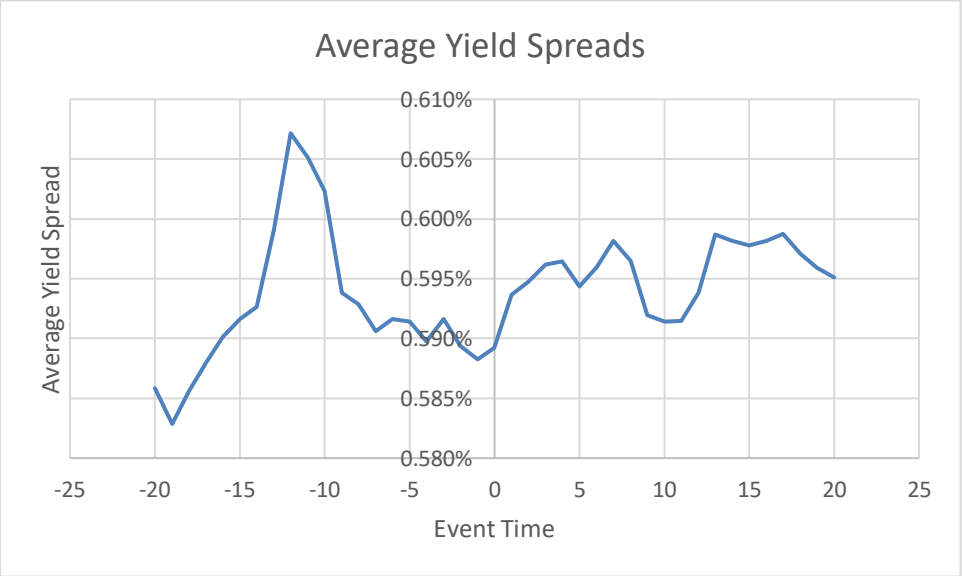
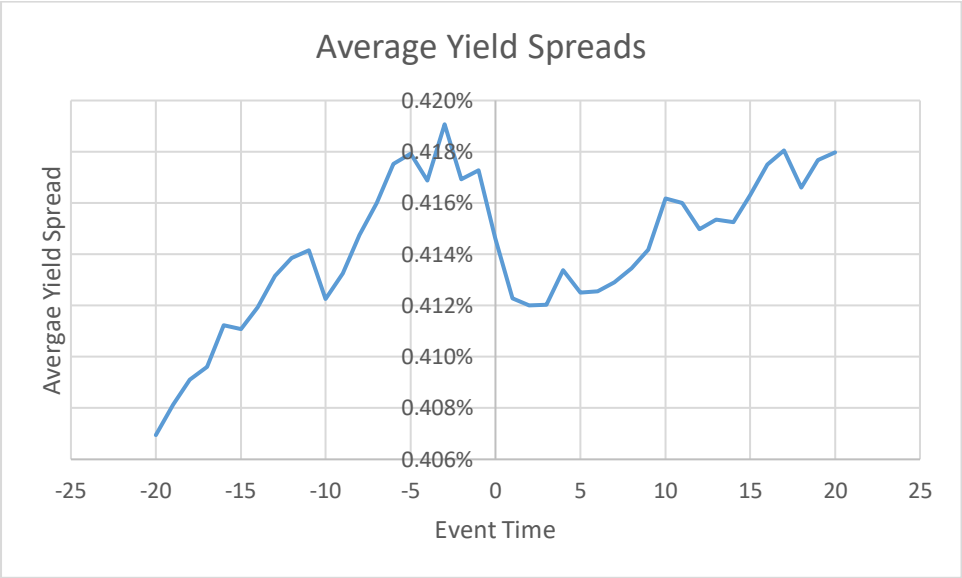


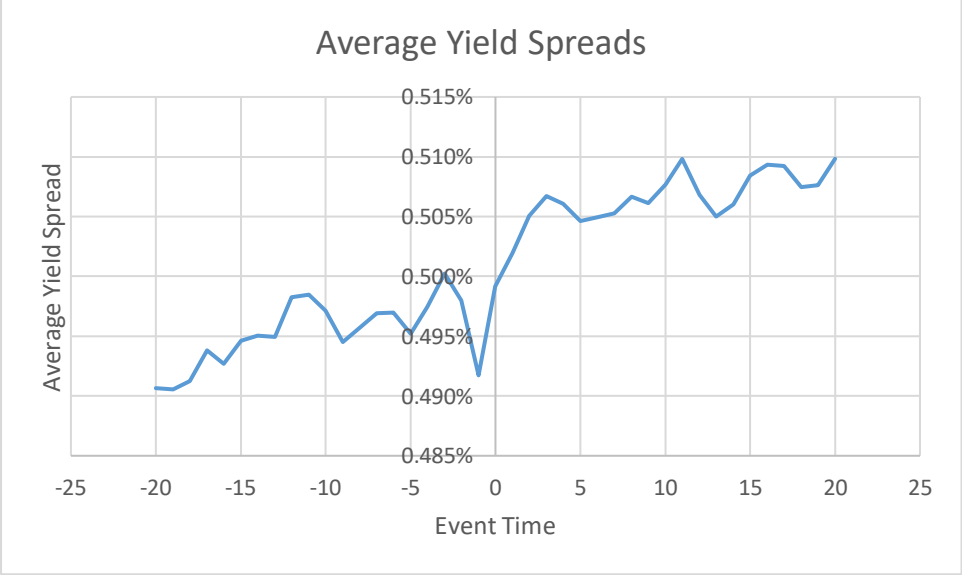
Figure 2: Event Studies of Bonds during the Post-Reform Period

The following graphs depict the movements of average yield spreads around each type of sovereign credit rating actions. The spreads are the J.P Morgan EMBI+ Spreads converted into daily spreads assuming daily compounding. The spreads are measured in percentage points and are reported up to the third decimal place. The event window covers 20 trading days before and after a rating or outlook change is officially announced. The post-reform period is between 2010 and 2018.

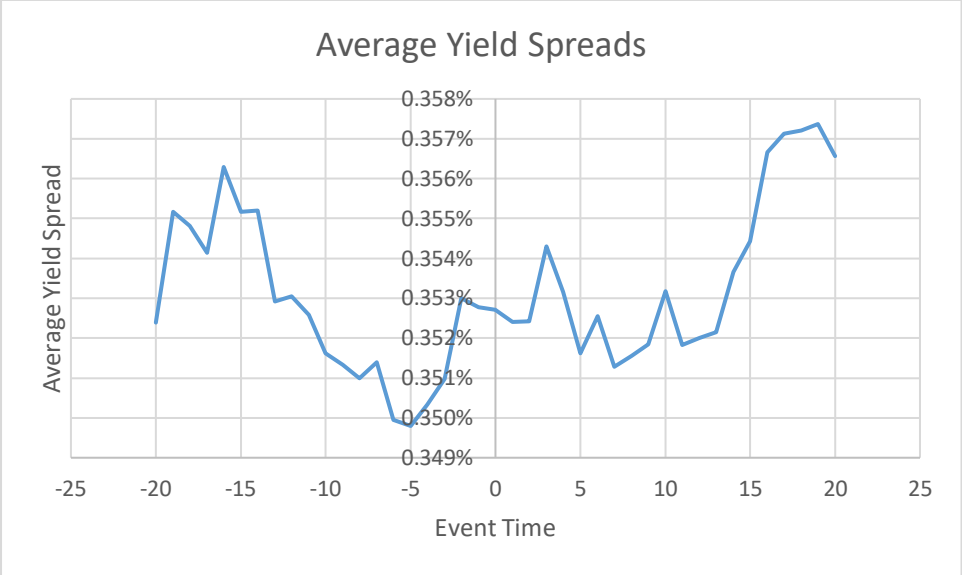
2.1. Actual Upgrades (19 Clean Events)



2.2. Actual Downgrades (8 Clean Events)



2.3. Positive Outlook Changes (11 Clean Events)



2.4. Negative Outlook Changes (11 Clean Events)

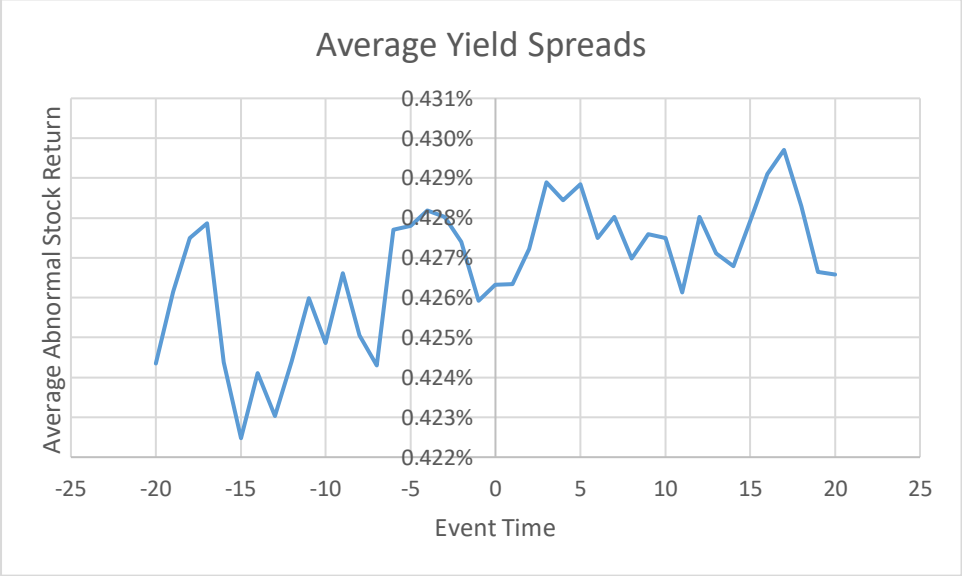
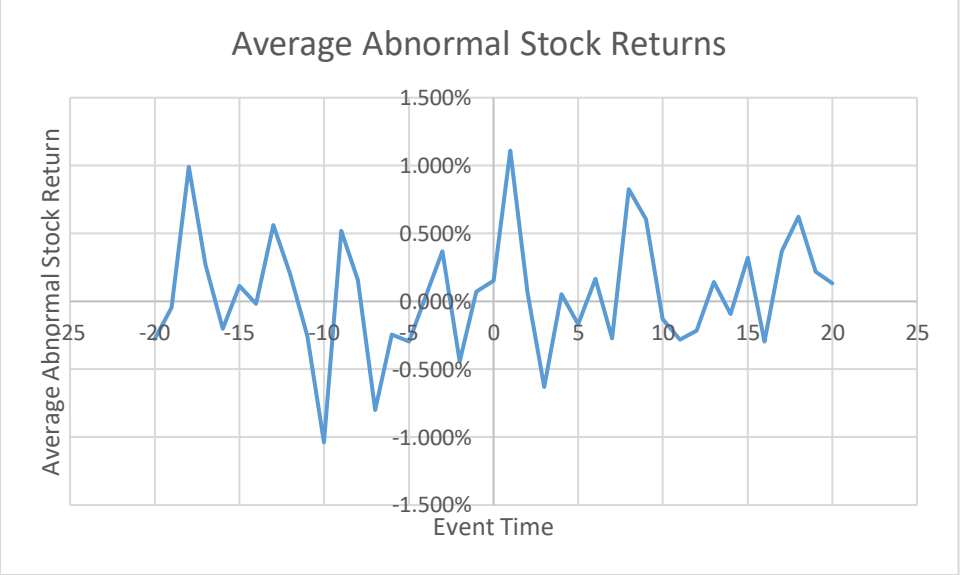


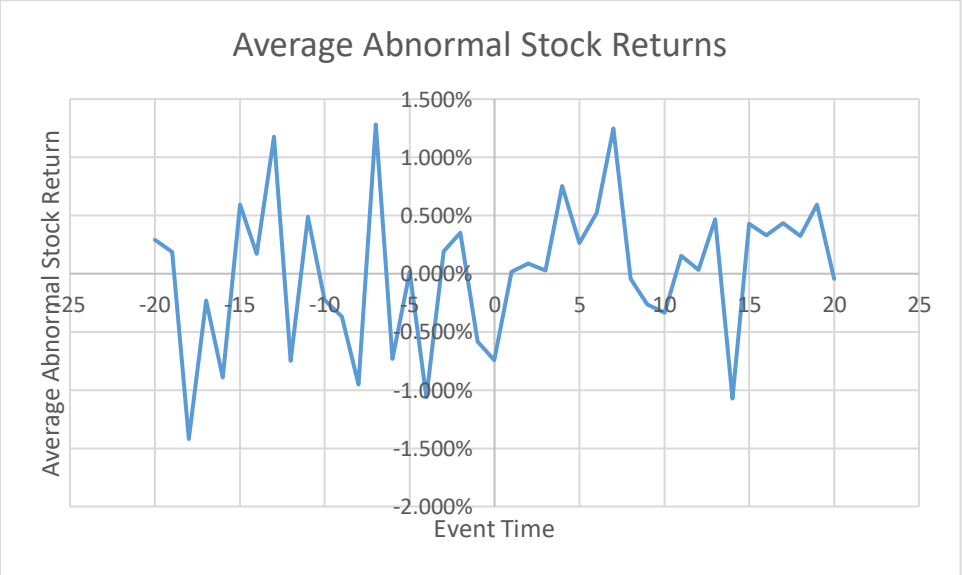
Figure 3: Event Studies of Stocks during the Pre-Reform Period

The following graphs depict the movements of average daily abnormal stock returns around each type of sovereign credit rating actions. The abnormal returns are estimated using the market-adjusted model with the S&P 500 Composite as the proxy for the market portfolio. The realized returns represent the daily returns on the most important value-weighted stock indexes of the six sample countries. The abnormal returns are measured in percentage points and are reported up to the third decimal place. The event window covers 20 trading days before and after a rating or outlook change is officially announced. The pre-reform period is between 2000 and 2010.

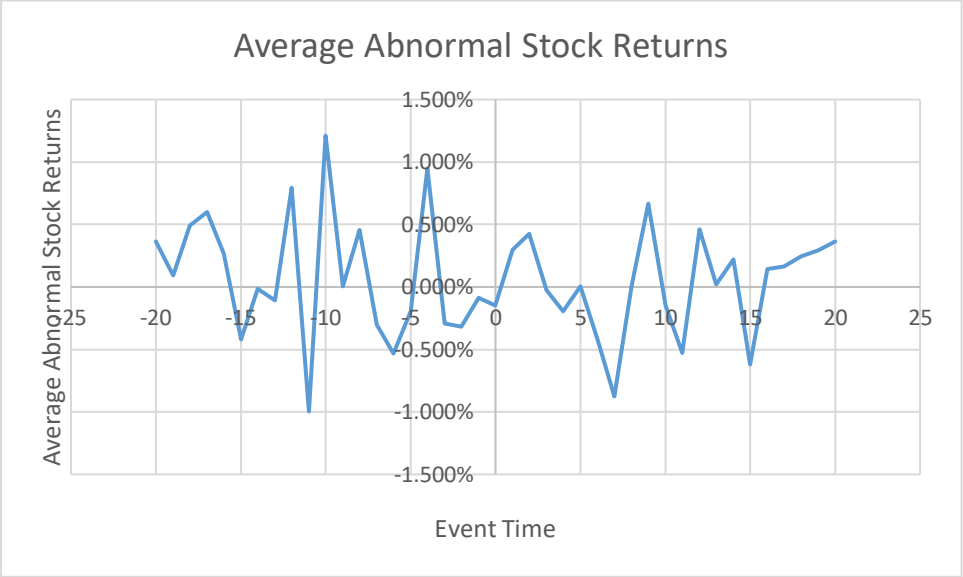
3.1 Actual Upgrades (24 Clean Events)



3.2 Actual Downgrades (10 Clean Events)



3.3. Positive Outlook Changes (18 Clean Events)



3.4. Negative Outlook Changes (7 Clean Events)

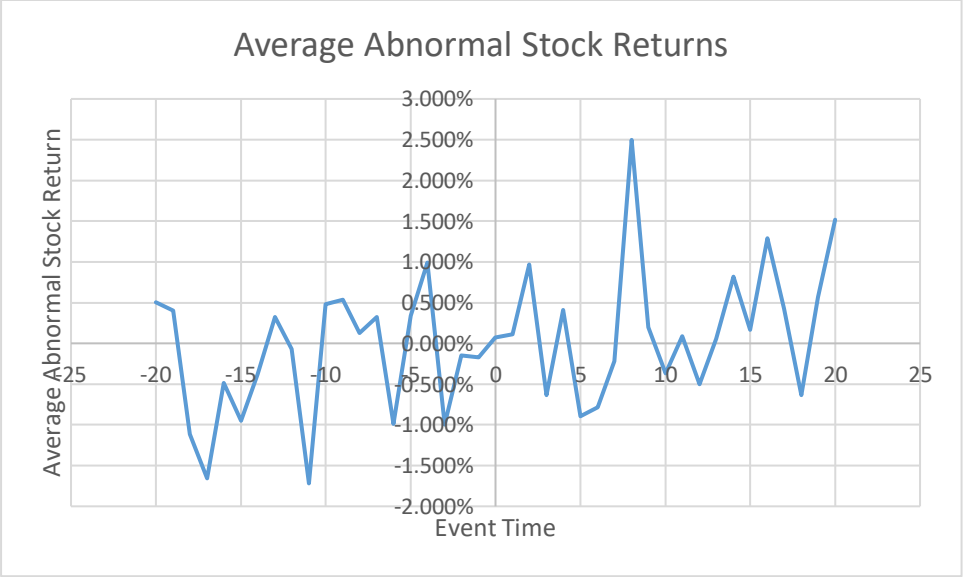
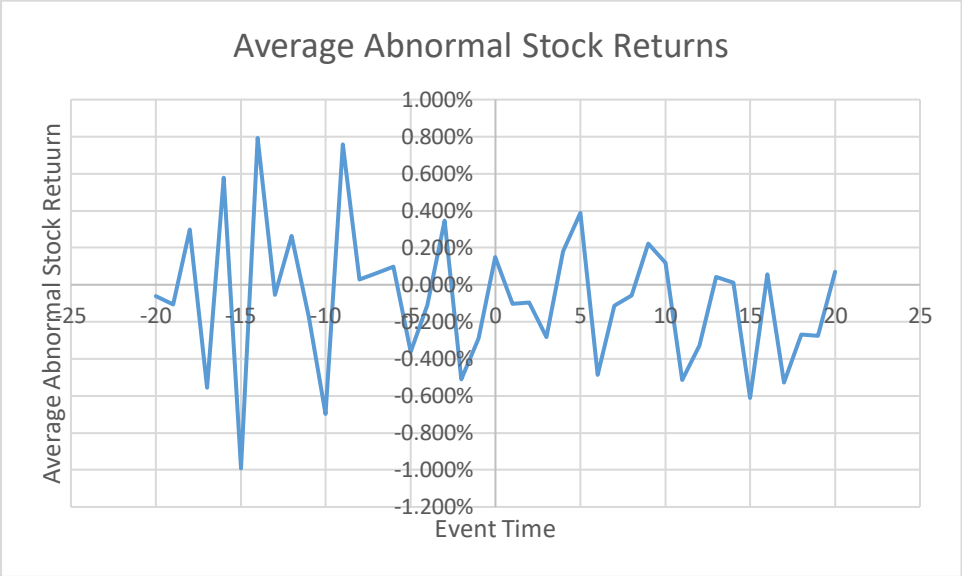


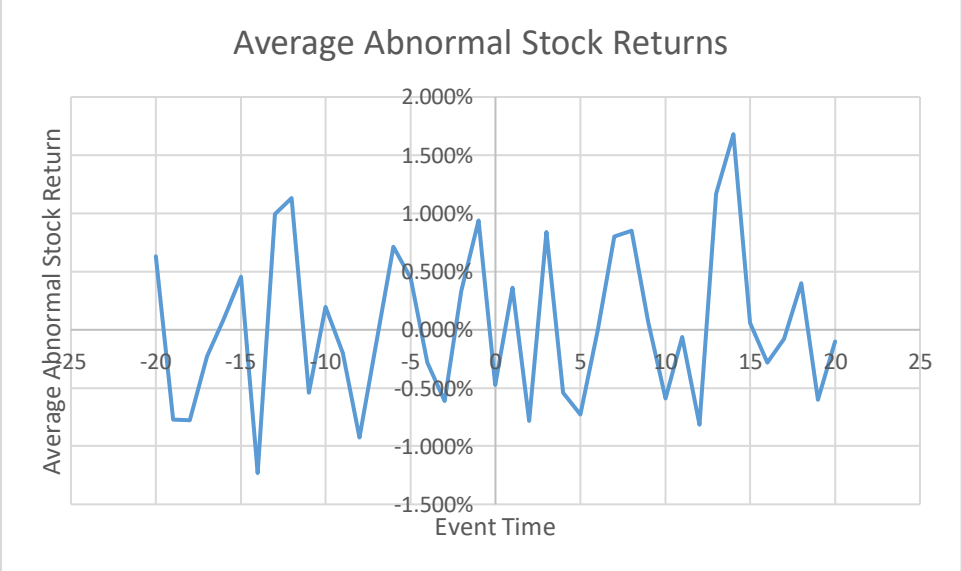
Figure 4: Event Studies of Stocks during the Post-Reform Period

The following graphs depict the movements of average daily abnormal stock returns around each type of sovereign credit rating actions. The abnormal returns are estimated using the market-adjusted model with the S&P 500 Composite as the proxy for the market portfolio. The realized returns represent the daily returns on the most important value-weighted stock indexes of the six sample countries. The abnormal returns are measured in percentage points and are reported up to the third decimal place. The event window covers 20 trading days before and after a rating or outlook change is officially announced. The post-reform period is between 2010 and 2018.

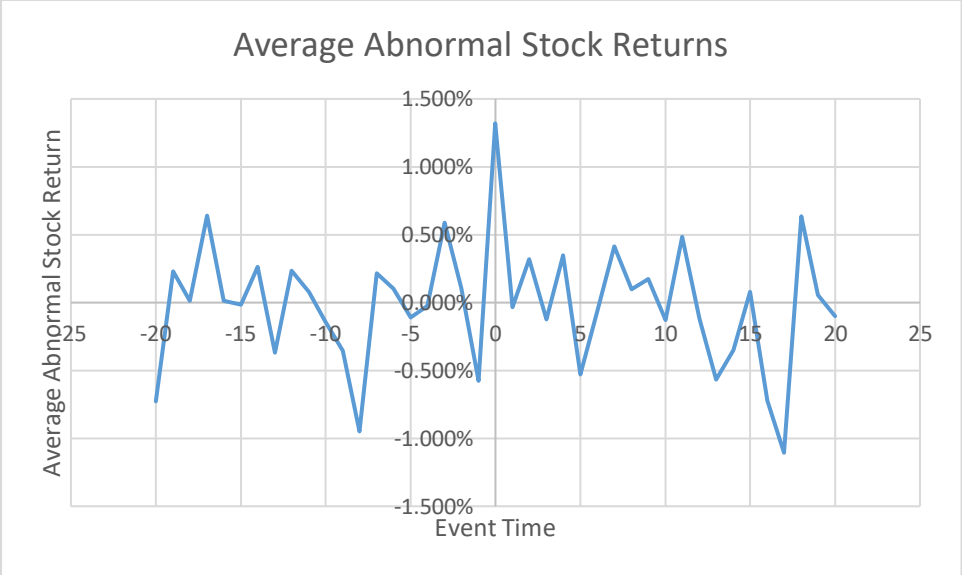
4.1. Actual Upgrades (19 Clean Events)



4.2. Actual Downgrades (8 Clean Events)



4.3. Positive Outlook Changes (11 Clean Events)



4.4. Negative Outlook Changes (11 Clean Events)

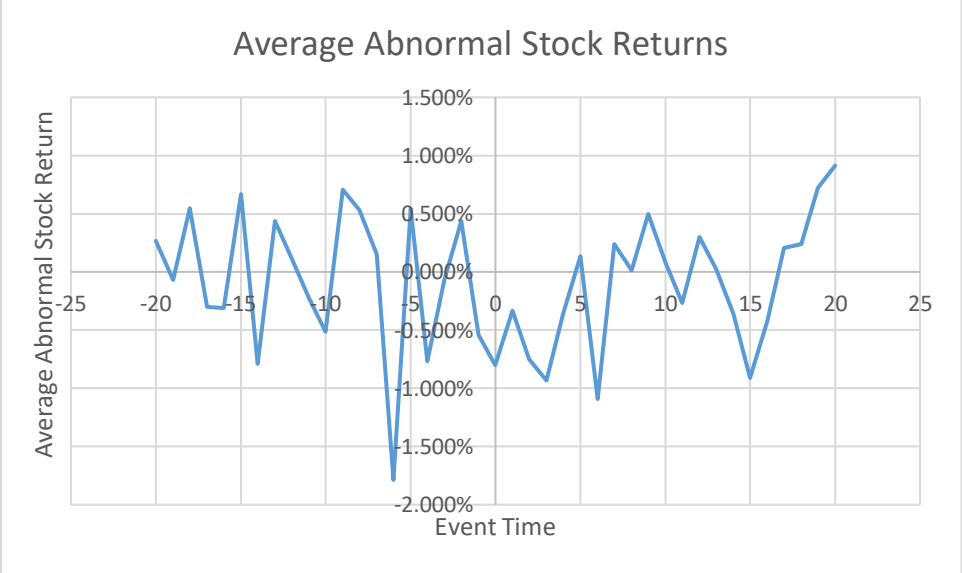
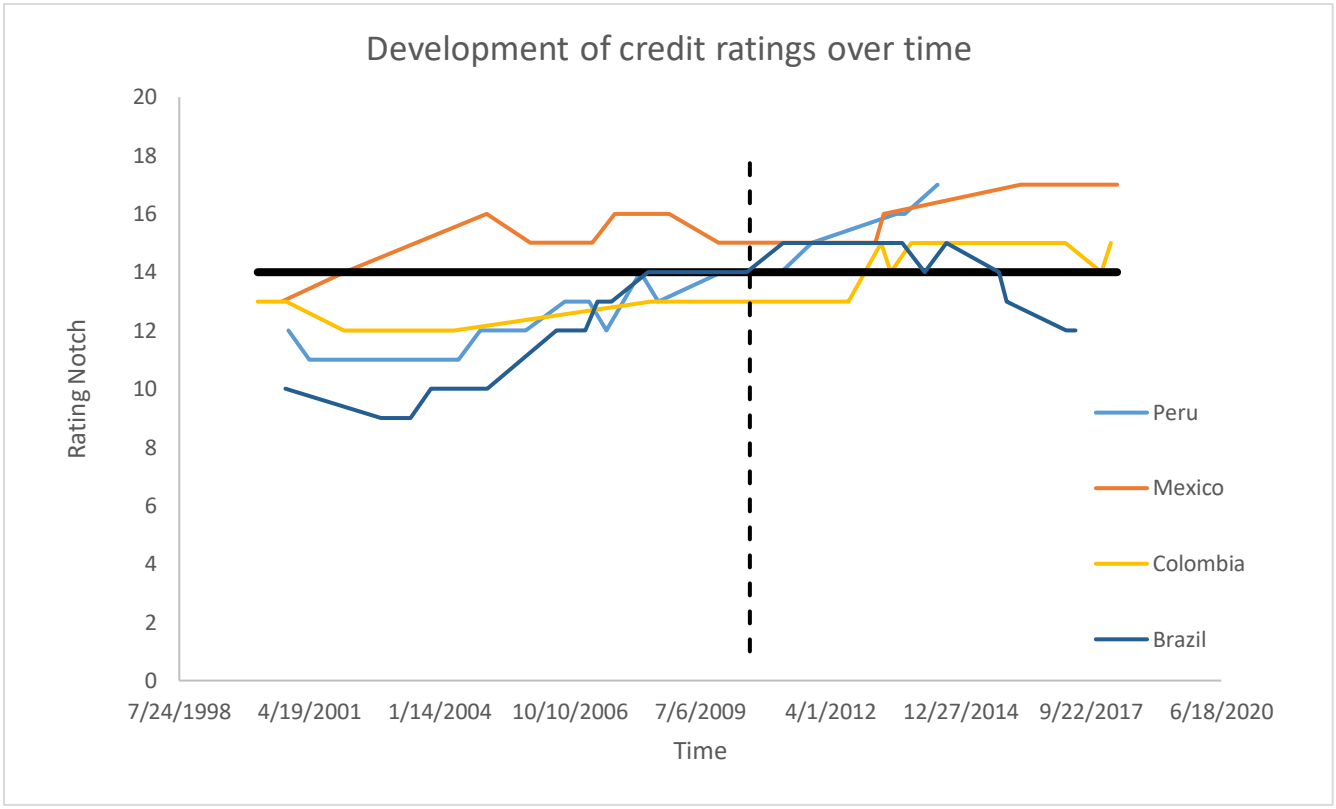


Figure 5: The Comparison and Description of Credit Ratings by Mood's, Standard and Poor's, and Fitch

Standard and Poor's	Moody's	Fitch	Notch	Grade
AAA	Aaa	AAA	23	Prime
AA+	Aa1	AA+	22	High grade
AA	Aa2	AA	21	
AA-	Aa3	AA-	20	
A+	A1	A+	19	Upper medium grade
A	A2	A	18	
A-	A3	A-	17	
BBB+	Baa1	BBB+	16	Lower medium grade
BBB	Baa2	BBB	15	
BBB-	Baa3	BBB-	14	
BB+	Ba1	BB+	13	Non-investment grade (speculative)
BB	Ba2	BB	12	
BB-	Ba3	BB-	11	
B+	B1	B+	10	Highly speculative
B	B2	B	9	
B-	B3	B-	8	
CCC+	Caa1	CCC+	7	Substantial risks
CCC	Caa2	CCC	6	
CCC-	Caa3	CCC-	5	
CC	Ca	CC	4	Extremely speculative
			3	
SD		RD	2	In default with little prospect of recovery
D	C	D	1	In default

Figure 6: The development of credit ratings over time



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