ECONOMIC IMPACT OF SOVEREIGN DEBT CREDIT RATING REVISION

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FEP 2017 33

ECONOMIC IMPACT OF SOVEREIGN DEBT CREDIT RATING REVISION

By

REZA TAHMOORES POUR

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirements for the Degree of Doctor of Philosophy

November 2017

DEDICATION

This thesis is dedicated
to

My Mother
For being my first teacher

My Father
For endless support and encouraging me to believe in myself

My Wife
For her infinite care and patience

And My Little Ashkan
The only reason that I can pass all the hard journeys ahead; life is meaningful with you

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Doctor of Philosophy

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November 2017

Chairman : Professor Mohamed Ariff, PhD
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Sovereign rating is a key element of how investors perceive the relative risk of investing in Treasury securities of a foreign country. Numerous scholars have studied rating change impacts on a given economy and on the financial performance of capital markets to news of rating changes. Hence, a continuing study of rating changes is worthy of further study using data from multiple countries in one study on the response of share markets using data from most recent years after the Global financial crisis. The gaps in literature are (i) lack of study on how sovereign rating changes affect (bond and) share markets of G20 countries, (ii) lack of research to examine the significance of sovereign rating changes before and after a crisis such as the recent global financial crisis. There is no theory for measuring economic sustainability of debt, so (iii) there are no studies on what factors are related to sustainability of debt taking by sovereign borrowers.

The aim of this study is to fill such gaps in the sovereign rating literature by (a) adopting a new method of analysis to (b) study selected countries not yet studied and (c) find how financial markets react to sovereign rating revisions over recent years. We measure the change in market prices to each unit change in sovereign rating, and then proceed to find some key economic variables that are the drivers of the rating changes. The methods for this study are: (i) the widely used event study method to find out the significant impact on market prices from sovereign rating changes before and after the event rating change dates and (ii) using the panel regression to examine the factors affecting the sovereign rating changes after controlling the country heterogeneity using a latest econometric method. To estimate the probability of the different events, we run a probit regression for sovereign rating changes relating to some common determinants.

Results of the study are interesting, and could contribute to the literature significantly. It is found that sovereign rating changes significantly affect share market prices. It seems that there is information leakage prior to sovereign rating announcement dates as released by the S&P: there are some negative price effects as well on mixed-type rating change effects, such as ‘rating watch’ announcements. Among the various economic variables, Gross National Saving has the biggest positive impact on sustainability of debt taking and on sovereign rating changes: it has the biggest probability of affecting the outcome. Debt serviceability has also the highest probability of changing sovereign rating grade by 0.096. These are new findings that may help to extend the sovereign rating literature in terms of findings from multiple countries, and on sustainability of debt taking. The methodology we have adopted promises to improve the existing use of research methods on this topic.

Abstrak tesis yang dikemukakan kepada Senate Universiti Putra Malayasia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

KESAN HUTANG KERAJAAN TERHADAP EKONOMI DARI SEGI PENARAFAN KREDIT

Oleh

REZA TAHMOORES POUR

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Pengerusi : Profesor Mohamed Ariff, PhD
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Penarafan kedaulatan adalah elemen utama bagaimana pelabur meneliti risiko relatif melabur dalam sekuriti Perbendaharaan negara asing. Banyak cendekiawan telah mengkaji kesan perubahan penarafan terhadap ekonomi tertentu dan prestasi kewangan pasaran modal kepada berita perubahan penarafan. Oleh itu, kajian lanjutan mengenai perubahan penarafan adalah manafaat dengan menggunakan data daripada pelbagai negara dalam satu kajian mengenai tindak balas pasaran saham dengan menggunakan data dari tahun-tahun kebelakangan selepas krisis kewangan Global. Jurang dalam kesusasteraan adalah (i) kekurangan kajian tentang bagaimana perubahan rating berdaulat mempengaruhi pasaran saham dan bon negara G20, (ii) kekurangan penyelidikan untuk mengkaji kepentingan perubahan penarafan berdaulat sebelum dan selepas krisis seperti yang baru-baru ini Krisis kewangan global. Selama ini, tidak ada teori untuk mengukur kemampanan ekonomi hutang, jadi (iii) tidak ada kajian tentang apa faktor yang berkaitan dengan keberlanjutan hutang yang diambil oleh peminjam berdaulat.

Tujuan kajian ini adalah untuk mengisi kekosongan dalam literatur penarafan kedaulatan dengan (a) mengamalkan kaedah analisis baru untuk (b) mengkaji negara-negara terpilih yang belum dikaji dan (c) melihat bagaimana pasaran kewangan bertindak balas terhadap semakan penilaian berdaulat sejak kebelakangan ini. Kami mengukur perubahan harga pasaran kepada setiap perubahan unit dalam penarafan berdaulat, dan kemudian meneruskan untuk mencari beberapa pembolehubah ekonomi utama yang menjadi pemandu perubahan penilaian. Kaedah untuk kajian ini adalah: (i) kaedah kajian peristiwa yang digunakan secara meluas untuk mengetahui kesan yang signifikan terhadap harga pasaran dari perubahan rating berdaulat sebelum dan selepas tarikh perubahan rating peristiwa dan (ii) menggunakan regresi panel untuk memeriksa faktor-faktor yang mempengaruhi Perubahan kedudukan berdaulat

selepas mengawal heterogeneity negara menggunakan kaedah ekonomi terkini. Untuk menganggarkan kebarangkalian kejadian yang berlainan, kami menjalankan regresi probit untuk perubahan penarafan kedaulatan yang berkaitan dengan beberapa penentu umum.

Keputusan kajian menarik, dan boleh menyumbang kepada literatur dengan ketara. Adalah didapati bahawa penarafan berdaulat berubah dengan ketara menjejaskan harga pasaran saham. Nampaknya terdapat kebocoran maklumat sebelum tarikh pengumuman pengadaran berdaulat seperti yang dikeluarkan oleh S & P: terdapat beberapa kesan harga negatif serta kesan perubahan rating jenis campuran, seperti pengumuman penarafan 'watch rating'. Di antara pelbagai pemboleh ubah ekonomi, Tabungan Negara Kasar mempunyai kesan positif yang besar terhadap kelestarian pengambilan hutang dan perubahan penarafan berdaulat: ia mempunyai kebarangkalian terbesar untuk menjejaskan hasilnya. Kebolehpercayaan hutang juga merupakan kebarangkalian tertinggi untuk mengubah gred penarafan kedaulatan oleh 0.096. Ini adalah penemuan baru yang boleh membantu untuk melanjutkan literatur penarafan kedaulatan dari segi penemuan dari pelbagai negara, dan tentang keberlanjutan pengambilan hutang. Metodologi yang telah kami guna janji untuk meningkatkan penggunaan kaedah penyelidikan yang ada pada topik ini.

ACKNOWLEDGEMENTS

I would like to express my gratitude and appreciation to all those who helped me accomplish this study. I am deeply indebted to my supervisory committee, Professor Dr. Mohamed Ariff, Dr. Alireza Zarei, Associate Professor Dr. Cheng Fan Fah, Professor Dr. Zulkornanin B Yusop, all of whose help, their stimulating suggestions and encouragement led to the completion of this thesis.

I would also like to acknowledge my family who provided me constant encouragement and continued support for this achievement.

I certify that a Thesis Examination Committee has met on …………. **2017** to conduct the final examination of REZA TAHMOORES POUR on his thesis entitled "**ECONOMIC IMPACT OF SOVEREIGN DEBT CREDIT RATING REVISION**" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The committee recommends that the students be awarded the Doctor of Philosophy.

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This is to confirm that:

- the research conducted and the writing of this thesis was under our supervision;
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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 Background

This doctoral thesis aims to provide original findings on a current topic of interest namely how share markets react to revisions of credit ratings of sovereign issues of debt. Sovereign debt has grown sharply during the last five decades: it is 93 per cent of Gross Domestic Product (GDP) in recent years compared to 39% of GDP in 1970 (M. Ariff, 2012). Deregulation and financial innovation, e.g. securitisation, derivatives, etc., have made financial markets larger and more concentrated, thus attracting more borrowers being engaged in capital markets to raise money until, in a sort of way, when the Global Financial Crisis occurred. Debt-takers including sovereigns have started to pull back so they are taking less debt form about year 2010. Appetite of governments to borrow more in previous years has been facilitated by the simplified liquid markets ready to lend to any and sundry.

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

Three major RAs are Moody's Investors Service, Standard & Poor's, and Fitch Ratings. These agencies often use alphabetical combinations for risk classifications. For example, rating of bonds in S&P starts with group A: Triple A (AAA), double A (AA), and single A (A); group B: Triple B (BBB), double B (BB), and single B (B); group C: Triple C (CCC), double C (CC), and single C (C); and group D: Single D (D). In general, bonds with grade BBB and higher are referred to as investment-grade bonds, which carry relatively lower default risk. Bonds with grade below BBB are called non-investment-grades, speculative-grades, or junk bonds that have higher chances of default. Table 1.1 provides a description on S&P and Moody's different rating classes.

Table 1.1 : Rating Classes of Moody's and S&P

Moody's	S&P	Description
Aaa	AAA	Highest rating of bonds: Ability of borrower to pay interest and principal is very strong.
Aa	AA	High-grade of bonds: Ability of borrower to pay interest and principal is strong.
A	A	Although the borrower has the capacity to pay interest and principal, there are some possibilities that change in economic conditions adversely affects the bonds.
Baa	BBB	Medium-grade of bonds: Borrowers has enough capacity to pay interest and principal.
Ba	BB	Investors consider these bonds as riskier compare to the higher ratings of bonds. They consider these bonds as speculative; BB has the lowest level of speculation while CC indicates the highest level.
B	B	
Caa	CCC	
Ca	CC	
C	C	No interest in going to pay for bonds in grade C.
D	D	Default bond: Payment of interest and principal is in arrears.

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

The ratings are specifically important for emerging markets. S.-J. Kim and Wu (2008) have found that rating changes affect the capital flows from G7 countries to the emerging markets. Hence, investors pay close attention to sovereign rating changes in emerging markets when it comes to investment. In addition, investors consider the currency denomination of the bond issuing countries. The reason is that the ratings on domestic denominated currency are less significant than the ones in foreign currencies, meaning that a capital flow to emerging markets is more prone to affect foreign currency rating than the local one.

When the state of an economy changes and financial markets fluctuate, the financial strength of companies will change accordingly. Hence, given the prevailing market condition, there is a strong possibility of rating changes from what was initially reported by the RAs e.g. the rating for a unit downgrades from AAA to AA. In this case, the RAs will place the unit on credit watch. In general, placing a unit on credit watch will result in further downgrade of rating. Moreover, the RAs often reveal certain statistics on the number of times these ratings change over periods. Such information is provided in a so-called "ratings transition matrix".

When investors want to purchase any bond security, they need to know about the risk of that particular bond. The main and the most important risk is the *default* risk which is the likely failure of an issuer to meet 'promised' obligations. The ratings provided by the RAs basically address the default risk of a bond. The main difference between the United States (U.S.) Treasury bond and other non-Treasury bonds is the higher default risk. There is another risk for bond investors, which is known as the *call* risk. Call risk is a special type of risk associated with bonds with callable options. Callable bonds provide the right to the borrower to buy back the bonds before its maturity at a specific price that is call price. Thus, it is important for investors to know whether a bond is callable before investment. The right to call the bond is an advantage to the borrowers especially in markets having low interest rates. In order to compensate the holders, call price generally is higher than the face values (e.g. call price is $1100 for face of $1000 with 10 per cent coupon). However, what is to the advantage of the issuer is to the disadvantage to the holders. Although investors are compensated with amounts higher than the face value, the call dates might not match the investment horizon. Therefore, investors will need to reinvest the fund at lower rates, according to the market condition. This risk is known as *reinvestment* risk.

Several scholars and regulatory agencies questioned the accuracy of presumed predictability of RAs after the Global Financial Crisis. The U.S. Congress and the President set up the Financial Crisis Inquiry Commission (FCIC) in order to investigate the impact of financial crisis and to provide Financial Crisis Inquiry Report (FCIR). In the report, it is mentioned that "The mortgage-related securities at the heart of the crisis could not have been marketed and sold without their (RAs) seal of approval. Investors relied on them, often blindly. In some cases, they were obligated to use them, or regulatory capital standards were hinged on them. This crisis could not have happened without the RAs. Their ratings helped the market soar and their downgrades through 2007 and 2008 wreaked havoc across markets and firms" (Commission, 2011). In February 2013, several private and public entities sued the rating agencies because of their wrong information and misuse of clients' trustiness. Few plaintiffs were investors from the state of Ohio ($457 million), California State employees ($1 billion), Bear Stearns Investment Bank ($1.12 billion), and the U.S. government sued S&P for $5 billion.

In addition, after the Global Financial Crisis, large number of banks with initial high ratings from RAs were either forced to shut down or be bailed out by governments (see Ariff (2012) for detailed expose of why the banks imploded). Moreover, most sovereign ratings were downgraded in 2007 and 2008 due to the impact of the Global Financial Crisis. During 2009 and later, several of them were upgraded to higher ratings. However, the significant changes in sovereign ratings are still not statistically tested.

Thus, practitioners and scholars are unaware of how serious the bonds are deteriorated. This led to huge doubt about the accuracy of RAs. Several scholars have questioned the ability of RAs to correctly rate the banks (E. Altman & Rijken, 2004; E. I. Altman & Saunders, 1998; Amato & Furfine, 2004; Levich, Majnoni, & Rinhart, 2002; Portes, 2008). All the criticisms against the RAs since the Global Financial Crisis indicate a big issue and make it an important topic for scholars to investigate rating agencies. Furthermore, there are several sovereign-related variables and country specific factors, which have to be jointly tested using advanced econometrics such as panel regression analysis with appropriate controls for stationarity, heterogeneity and cross-sectional dependence to establish robust findings that could be relied upon to shed light on this current worldwide problem. This research aims to investigate the simultaneous impact of sets of factors. Moreover, it aims to provide new results about the relationship between sovereign rating announcements and share issuance-cum-rating as well as stock market using economic models of announcement effects.

1.2 Problem Statement

To the best of our knowledge, there is no study in the literature to consider the effects of Upgrade, Downgrade, and changes in credit watch or outlook as to how these events impact on the share markets of most of the G20 countries. Moreover, there are some studies about the determinants of sovereign ratings quality (Hau, Langfield, & Marques-Ibanez, 2012). Also, there is no study to examine the significance of sovereign ratings changes before and after a crisis such as the recent Global Financial Crisis just as there is no theory for measuring economic sustainability of debt. The current study aims to fill these gaps in the literature. Despite the absence of such formal published studies, participants assume that the rating changes had effects on bond (seldom studied) and share markets!

The next issue is: There are numerous *factors* affecting the sovereign ratings. Some scholars studied the sovereign related variables and some other researchers considered country-specific factors. There are few studies that examined the impact of both sovereign-related *and* country-specific variables together in a coherent manner. Neither is there a theory on how to measure economic sustainability of government debt: at what level of debt relative to the country's resources does more debt predisposes the country to financial distress? This research aims to provide new outcomes on what factors significantly affect sovereign ratings.

In fact, governments have found it easy to borrow. Thus, the total bond issue of governments worldwide is $62 trillion (M. Ariff, Cheng, Fan Fah, Ramadili Mohd, Shamsher Mohamad, 2016). Most of the failed sovereign bonds reached high grades just before defaulting in 2008, which is a surprise to the investing public because of their reliance on credibility of rating. However, the extent of default in sovereigns is still unknown. Hence, it provides an opportunity for a higher-degree level research effort on this topic to examine (i) how sustainable is sovereign borrowing and (ii) what factors drive sovereign bonds to default. Weakness of companies can be identified by using theories such as the well-known Z-score of Altman. However, there is no significant theory for sovereign borrowers. There is no model in literature to predict the default of sovereigns similar to Z-Score of Altman for corporate. This gap in the literature offers another research problem to be studied. We hope to develop a model for sovereign ratings.

Changes of sovereign rating have economic impact on countries. Moreover, the time of rating changes plays an important role, meaning that rating changes occur during financial crisis or not. Thus, the issue that needs to be discussed is whether the rating changes that happen during financial crisis, or before and after have differential effect on the bond and share markets. This is another research issue.

Therefore, the research problems are as follows:

1. The current study aims to fill a gap in literature that is about the significant sovereign rating changes on how these affect share markets of G20 countries during the period 2000 to 2014.
2. Another research issue that needs to be furthered is to investigate the role of Global Financial Crisis on the share market prices when sovereign rating changes were announced during that period.
3. Finally, another research problem is to identify what factors are affecting the credit rating changes. There are some studies that investigated these factors; however, there is no comprehensive model to embrace economic and sovereign related factors. By exploring a comprehensive model, we hope to develop a model similar for sovereign ratings, which is a big gap in literature.

1.3 Research Objectives and Questions

Based on the research problems, the research objectives for of the study are as follows:

1. To study the significant impacts of sovereign rating changes on the share market prices in G20 countries over a recent period not yet studied, 2000 to 2014.
2. To study the significant impacts of sovereign:
    - Rating changes
    - Outlook changes
    - No change in rating/outlook

   on the share markets of G20 countries for two categories of income classification including high income and not high income.
3. To study the factors affecting the sovereign rating changes, which require a novel approach of measuring the impact on rating by the size of the changes.

The research questions are as follows:

1. Were the rating changes and their effects statistically significant on the size of changes experienced by the stock markets around the announcement time in the G20 countries?
2. Were the rating changes and their effect statistically significant on the size of the changes in the stock markets of the G20 countries in the for upgrade, downgrade, and no change in rating?
3. What are the key factors significantly associated with and/or causing significant changes to sovereign rating changes in the G20 countries?

1.4 Significance of Study

Changes in a sovereign rating could precipitate major impacts on banking, corporations, and thus generally the whole economy. Although financial markets generate no more than 5% of the national income, malfunctioning financial markets can reduce economic growth by a huge amount, not to mention how much the economy goes down in a crisis when financial markets buckle. Banks and corporations cannot control sovereign ratings, but there are factors under their control such as country and bank or corporation-specific factors. After all, some banks did not fail while others did, so there are some intrinsic variables, which drive some not to fail. Hence, banks and firms in a country can manage their rating regardless of the sovereign rating to enhance their rating, even to levels higher than the sovereign rating. Thus, this study aims to find the major factors affecting the bank and the corporate ratings as well as the role of sovereign rating in the changes to the markets. Significance of this study may be summarized: documenting the importance of changes in sovereign rating and the way market mechanism transfers the changes to the economy, the banks, and the corporations through the markets.

The rest of the thesis followed by the literature review in Chapter 2, data and methodology in Chapter 3, event study and regression test results in Chapters 4 and 5 respectively, and summary of the study in Chapter 6.

1.5 Contribution of Study

Most of the empirical evidences of the study were collected for the period of 2004 onwards. Thus, as this study focuses on the recent literature of sovereign rating changes, the results and findings mainly contributes to the most recent body of knowledge. In addition, all the econometric and statistical tests of the regression analysis of the study were supportive for a robust results namely cross section dependence, stationary, serial correlation, and multicollinearity tests. Based on the results, all of the economic factors considered in the study are significantly affecting the rating change of sovereigns. The residuals are found to be free from any errors from serial correlation. More importantly, there is evidence of no cross-sectional correlation. There is no evidence of non-stationarity of the residuals.

Considering the results of regression analysis, the economic factors with high severity level of impact towards the sovereign rating changes have been derived from the regression analysis. Gross National Saving (GNS) is highest one among the others. We have found the key drivers of sovereign rating changes. Based on the results of ordered probit modelling, we could infer that debt serviceability is the main factor that has the highest probability of 10% causing changes of sovereign rating changes.

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