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Do Credit Ratings Matter? An Examination of the Relationship Between Sovereign Ratings and Capital Flows Pre and Post Financial Crisis

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December 3, 2016

Abstract

This paper examines the relationship between sovereign credit ratings and international capital flows to emerging market economies (EMEs). More specifically, it analyzes how ratings impact capital flows (FDI and portfolio investment) before and after the 2007-2008 financial crisis. This study breaks the data into two samples, pre-crisis (1995-2006), and the post crisis (2007-2015). After using a System GMM method for 20 EMEs, the paper compares the pre- and post- financial crisis credit rating coefficients. The results indicate that the ratings have become more impactful overtime, for both FDI and portfolio investment, although the coefficients are not statistically different. Interestingly however, the coefficients for FDI grew much larger than portfolio investment, indicating bond investors may have become more reluctant to trust sovereign credit ratings after the financial crisis.

JEL Numbers: F34, O16, N20

Keywords: Sovereign Credit Ratings, Capital Flows, Emerging Market Countries, Foreign Direct Investment, Portfolio Investment

Introduction

Sovereign credit ratings, which assess the riskiness of an investment in a particular country, are a key indicator in evaluating the risk attached to an asset. By rating different types of entities and financial instruments, credit ratings give investors a good idea of where their money is safe and where it is not. Typically, investors pay close attention to these ratings before making investment decisions. However, are sovereign credit ratings as important as previously thought? The practices of the agencies that assign credit ratings have been questioned, especially during the financial crisis. My paper looks for changes in the impact sovereign credit ratings have on capital flows to emerging market economies (EMEs) in the post great recession environment. Emerging market economies are generally defined as economies that are progressing, but are not yet as advanced as the developed world.¹

In recent years, there has been a dramatic increase in capital flowing to emerging markets. In the form of portfolio investment, capital flows have increased from around \$6 billion annually in 1988 to almost \$34 billion by 1992 (Emara and El Said, 2015). More recent data from the Wealth of Nations dataset (Lane and Milesi-Ferretti, 2012) also shows large increases in capital flows from 1970 to 2011. For example in Brazil, one of the largest emerging market countries, foreign direct investment (FDI) inflows, which are

¹The World Bank classifies economies based on their GNI per capita, calculated using the World Bank Atlas method. They define low-income economies as economies with a GNI per capita under \$1,025. Lower middle-income economies have a GNI per capita between \$1,026 and \$4,035. Upper-middle income economies are those with a GNI per capita between \$4,036 and \$12,745. These three groups of economies are used in this study and considered as “emerging market.”

private investments from non-residents, increased from \$3.8 billion in 1970 up to \$695 billion by 2011. Over this same period the number of rated EMEs grew from 12 to 100 (Emara and El Said, 2015). Therefore, one can argue that this drastic increase in capital flows is related to the recently published credit ratings. In general, investments in emerging markets offer a higher rate of return but also carry much more risk. To assess the particular level of risk, investors normally look at the ratings themselves before making any final decisions. Without any ratings, it would be very difficult for a country to attract capital. This could explain the fact that as the number of rated countries increased, so did the amount of capital flows.

Although credit ratings are essential for investors' access to emerging markets, there has been some doubt cast upon ratings agencies in recent years. One criticism is that ratings are often sticky. In the mid 1990's, credit rating agencies were unable to predict financial crises in Mexico and Asian by failing to downgrade their sovereign ratings. (Emara and El Said, 2015). A study by Mora (2006) showed that predicted ratings were lower than actual ratings in the period leading up to a crisis. Mora also noted that ratings do not contribute much information that is not already publically known to the market. Another important point to note is the high level of competition between ratings agencies. As agencies began charging fees to evaluate debt, the competition between them grew and so did the ratings. The so-called "ratings shopping" became a well-known practice and led to rating agencies handing out inflated evaluations to attract business. Also, through difference of opinion or differences in risk tolerance, ratings have become more variable and less transparent. Cantor and Packer (1994) state that Standard and Poor's and Moody's are often in disagreement when assessing junk bonds, or other high risk

securities. This discord between the top two credit rating agencies could cast doubt on the reliability of sovereign ratings. If there is in fact some distrust regarding credit ratings agencies, then it must be reflected in the data. The purpose of this paper is to empirically evaluate the importance of the sovereign ratings.

Considering the amount of uncertainty surrounding these ratings, this paper empirically tests if there has been a decrease in the impact that ratings have on capital flows in the pre- and post- financial crisis period. The results would tell whether investor reliance on sovereign credit ratings has changed over time. Available evidence suggests that ratings agencies have engaged in questionable practices, such as ratings shopping, and have made it hard to trust their products. This was especially evident during the recent recession. Because of investors' increasing skepticism regarding these ratings, I hypothesize that over time there has been a decrease in the overall level of reliance on them.

Literature Review

As previously mentioned, there exists extensive literature regarding the questionable nature of credit ratings. Bolton, Freixas, and Shapiro (2010) find evidence of conflicts of interest in the credit rating industry. Because of the current incentives to inflate ratings for more business they suggest the market would be more efficient as a monopoly instead. The oligopolistic market that currently exists for credit rating agencies provide more opportunities for the issuer to shop for inflated ratings and mislead trusting investors. As a result of the competitive nature of the industry, methodological

differences between agencies, and sticky ratings, there are many investors who distrust the rating agencies.

However, the question of ratings reliability is far from settled. While Mora (2006) found that ratings do not include information that is not already known, Moon and Stotsky (1993) found that credit ratings include additional information on default risk that is not openly available in the markets. Artus, Garrigues, and Sassenou (1993) report that a direct relationship between bond yield and the credit ratings from the largest French credit rating agencies is either weak or nonexistent, meaning that ratings changes do not impact bond yields as much as previously thought. Normally, when a bond or any type of fixed income security, is downgraded, there is a resulting increase in the yield of the bond since the investment has become riskier. However, Reinhart (2002) finds that ratings do well at predicting defaults but also goes on to note that “ratings would not have anticipated the nearly certain defaults that would have taken place in several recent crises absent large-scale bail-outs by the international community.” The present study contributes to this debate by studying the sovereign rating’s impact on capital flow investment in EMEs.

There have also been more general studies on the relationship between sovereign credit ratings and capital flows. These studies are important to consider before attempting to answer my main question because they provide useful background information. Reinhart (2002), the study on the role of sovereign ratings during financial crises, concludes that the probability and magnitude of a credit downgrade are significantly higher for EMEs compared to the developed world. Since my tests are limited to emerging markets, I too expect to see large changes in the credit ratings over time. Cantor

and Packer (1994) find that the impact of announcements by credit ratings agencies have a stronger impact on spreads for noninvestment grade bonds, similar to emerging market debt, than for investment grades, which is the debt of high credit rated issuers. If bond yields are sensitive to ratings changes in the noninvestment grade markets, then one could argue that the emerging market capital flows will also be highly responsive to ratings changes. This is shown in a study conducted by Körner and Trautwein (2014) who find that higher ratings lead to higher portfolio investment inflows for non-investment grades, while finding a weaker effect for investment grade, meaning investors are more reactive when dealing with lower rated debt. The literature points to the responsiveness of emerging market capital flows to their corresponding credit ratings. With this in mind, I predict that the volatility of this market should lead to high ratings coefficients initially.

Previous papers that attempt to find the determinants of capital flows are too numerous to be referenced here, I will focus only on the few most relevant to my sample. Alfaro, Kalemli-Ozcan, and Volosovych (2008) find that institutional quality, which measures the social and political stability of a country, is the leading determinant of capital flows. Emara and El Said (2015) disaggregate capital flows into FDI and portfolio investment while controlling for several independent variables including sovereign credit ratings. They find that the sovereign ratings have a statistically significant impact on both FDI and portfolio investment capital flows.

In a similar paper , Byrne and Fiess (2016) also attempts to find the determinants of capital flows to emerging markets. The results show that the most important factor in determining capital flows is the real US interest rate, in contrast to Emara and El-Said

(2015), who find no statistical significance in global interest rates' effect on portfolio investment in emerging markets.

Other factors that were significant determinants in these papers were financial openness, current account balances, and GDP growth, which are all included in this paper.

Empirical Model and Data Description

The following models will form the benchmark of the empirical analysis below:

$$\begin{aligned} \text{CapitalFlows}(FDI_{it}) = & \beta_0(\text{LaggedFDI}_{it-1}) + \beta_1(\text{CreditRating}_{it-1}) + \\ & \beta_2(\text{USInterestRate}_{t-1}) + \beta_3(\text{GDP}_{it-1}) + \beta_4(\text{InflationRate}_{it-1}) + \\ & \beta_5(\text{GDPperCapitaGrowth}_{it-1}) + \beta_6(\text{InterestRate}_{it-1}) + \beta_7(\text{FinancialOpenness}_{it-1}) + \\ & \beta_8(\text{StateStability}_{it-1}) + \beta_9(\text{CurrentAccountBalance}_{it-1}) + \varepsilon_{it-1} \end{aligned}$$

$$\begin{aligned} \text{CapitalFlows}(\text{PortfolioBond}_{it}) \\ = & \beta_0(\text{LaggedFDI}_{it-1}) + \beta_1(\text{CreditRating}_{it-1}) + \beta_2(\text{USInterestRate}_{t-1}) + \beta_3(\text{GDP}_{it-1}) \\ & + \beta_4(\text{InflationRate}_{it-1}) + \beta_5(\text{GDPperCapitaGrowth}_{it-1}) + \beta_6(\text{InterestRate}_{it-1}) \\ & + \beta_7(\text{FinancialOpenness}_{it-1}) + \beta_8(\text{StateStability}_{it-1}) + \beta_9(\text{CurrentAccountBalance}_{it-1}) \\ & + \varepsilon_{it-1} \end{aligned}$$

This study focuses on the relationship between sovereign credit ratings and capital flows, captured by the coefficient β_1 . Capital flows generally refer to the movement of money in the form of capital transactions, such as stocks and bonds. There exist many different types of capital flows; for the purposes of this paper, I focus only on FDI (direct equity investment in which the investor attains ownership or controlling power in a foreign entity) and portfolio bond investment (the total amount of a countries' portfolio bond flows). My choice for these two types of capital flows is based on the previous literature in which Emara and El Said (2015) disaggregate capital flows into FDI and portfolio investment. It will be particularly interesting to compare the impact of sovereign credit ratings on each type of capital flows.

As often done in the literature, explanatory variables can be broken up into two categories. The first called “pull factors,” includes country specific factors that attract capital into a country: sovereign ratings, inflation rate, GDP growth per capita, GDP, real interest rate, and an index of financial openness and institutional quality. GDP growth per capita captures the future potential of an economy while nominal GDP is used to control for country size (since larger countries should generally attract more capital). Financial openness captures the severity of a country’s capital controls and the extent of its capital transaction history (Byrne and Fiess, 2016). As mentioned in the studies by Lucas and Alfaro (1990), and Kalemli-Ozcan, and Volosovych (2008), institutional quality plays a significant role in capital flow determinations and thus should be included in this study. Institutional quality is a variable that will take into account the quality of a country’s political structure and is essentially a measure of how democratic a state is. Higher democratic ratings encourage free markets and foreign investment, so this variable should exhibit a positive relation with capital flows.

The variable of interest, sovereign credit ratings, is taken from Standard and Poor’s ratings agency; its values range from 1 (default rating) to 21 (AAA rating).

The other group of variables that are included in this model are called “push factors”. These are global forces that “push” capital out of developed into developing countries and thus are not country specific. Representing this group of variables in my model is the real US interest rate and US GDP. The reason that these variables are important to consider is that in many cases, capital flows could be attributed to factors outside of the country into which they are flowing. For example, the coefficient β_2 on the US real interest rate should be negative for both forms of capital flows because as the

interest rate falls in the developed markets, investors look for higher returns elsewhere and begin to invest in emerging markets.

All the explanatory variables in the model are lagged by one period, which in this study is equal to one year, to eliminate any reverse causality from capital flows to other country-specific macro indicators. By lagging the independent variables, the model should avoid this problem and be able to produce more accurate results.

The study focuses on the following 20 emerging market countries: Argentina, Brazil, China, Colombia, Costa Rica, Ecuador, Honduras, India, Indonesia, Kenya, Malaysia, Mexico, Morocco, Panama, Peru, Philippines, Romania, South Africa, Thailand, and the Ukraine.

The time span considered is 1995-2015. By using the most current data available, I am able to study the effects after the recent financial crisis in greater detail. I carefully selected each sample country by considering both their status as an emerging market country, and their data availability. Most of the data I acquire comes directly from the World Bank Indicators database. Financial openness index is obtained from the Chinn and Ito database (Chinn and Ito, 2006). The measurement of state stability is taken from an index prepared by the Political Instability Task Force. The dataset is called Polity IV levels and measures the political systems in place for each country. And the credit ratings are attained from Standard and Poor's sovereign ratings history.

Empirical Methodology

Before proceeding with estimation, I first study the matrix of correlations between all variables in the model to detect possible instances of multicollinearity. High

correlation can be problematic because it has the potential to skew regression results: highly correlated independent variable could absorb some of the statistical significance from other variables of interest. I found the only two variables with a sizeable correlation (of above 0.8 or below -.08) were US interest rate and US GDP. Therefore I chose to drop U.S. GDP from the model and use the U.S. interest rate as the only external push factor.

In order to find whether the reliance on sovereign ratings has changed over time, I run the regression over different time intervals. By considering the whole dataset, I will be able to determine the main drivers of the different types of capital flows. Then I split the datasets in half into the pre-crisis period of 1995-2006 and the post-crisis period of 2007-2015. The reliability of the rating agencies was heavily questioned because of their role in the crisis and therefore I expect the pre- and post- crisis results to differ. More specifically, I am interested in how the credit ratings coefficient, β_1 , changed from pre-crisis to post-crisis, and whether this change is statistically significant.

Since this study aims to find how the ratings have changed over time, it uses time series data to measure the changes over a certain interval instead of measuring the effects at one particular point in time. Therefore this paper implements a System GMM (“General Method of Moments”) approach instead of OLS, to correct for several potential shortfalls. The model suffers from serial correlation and endogeneity. Specifically in this case, the dependent capital flows variables would be highly serially correlated. Intuitively, it stands to reason that capital flows into a country at time t depend partly on the capital flows from $t-1$. System GMM will correct for these issues by using lags.

Results

Table 1: FDI and Sovereign Rating
 Dependent Variable: FDI (in millions of current \$USD)
 Estimation Method: System GMM

	Full Sample			Pre-Crisis			Post-Crisis		
	1	2	3	1	2	3	1	2	3
FDI _{it-1}	.567 (0.00)***	.569 (0.00)***	.594 (0.00)***	.539 (0.00)***	.539 (0.00)***	.535 (0.00)***	.283 (.009)***	.393 (0.00)***	.417 (0.00)***
Credit Ratings_{it-1}	1,319 (0.00)***	1,342 (0.00)***	1,217 (0.00)***	79.07 (.683)	75.67 (.694)	8.35 (.963)	3371.85 (.024)**	4496.64 (.003)***	4282.23 (.005)***
Inflation _{it-1}	-35.87 (.67)	-44.5 (.6)	-3.99 (.96)	56.24 (.081)*	56.86 (.076)*	63.54 (.044)*	-89.72 (.878)	-377.87 (.534)	-445.45 (.460)
GDP Growth _{it-1}	287.93 (.111)	289.82 (.108)	341.56 (.057)*	168.39 (.067)*	170.74 (.063)*	170 (.064)*	651.96 (.206)	423.3 (.429)	438.54 (.413)
GDP _{it-1}	1.14e-08 (0.00)***	1.14e-08 (0.00)***	1.13e-08 (0.00)***	2.58e-08 (0.00)***	2.58e-08 (0.00)***	2.68e-08 (0.00)***	9.82e-09 (.004)***	1.25e-08 (0.00)***	1.24e-08 (0.00)***
Interest Rate _{it-1}	79.11 (.344)	64.56 (.435)	124.5 (.115)	6.2 (.873)	6.31 (.87)	15.57 (.679)	1857.2 (0.00)***	1575.6 (0.00)***	1621.75 (0.00)***
Current Account _{it-1}	1.12e-07 (0.00)***	1.68e-07 (0.00)***	1.17e-07 (0.00)***	1.47e-07 (0.00)***	1.46e-07 (0.00)***	1.44e-07 (0.00)***	-3.47e-08 (.465)	8.92e-08 (.027)**	1.01e-07 (.009)**
US Interest Rate _{t-1}	-740.1 (.055)*	-649.9 (.087)*	-698.37 (.067)*	124.95 (.554)	128.88 (.535)	171.96 (.679)	-1356.6 (.372)	-555.3 (.725)	-778.3 (.619)
Financial Openness _{it-1}	-2650.99 (0.23)**	-2702.56 (.02)**		-757.85 (.243)	-752.07 (.245)		-1589.56 (.706)	-4149.77 (.34)	
State Stability _{it-1}	159.3 (.158)			3.79 (.09)*			-5879.83 (0.00)***		
Observations	335	335	335	175	175	175	142	142	142

Notes: a.) *P*values, ***<.01, **<.05, *<.1 (reported in parentheses)
 b.) Regression 1-includes all explanatory variables
 Regression 2-drops state stability for robustness check
 Regression 3-drops state stability and financial openness for robustness check
 c.) Pre-crisis refers to 1995-2006
 Post-crisis refers to 2007-2015

Regression results are broken up by type of capital flow, and then further by the time period. The full sample regressions illustrate what drives capital flows into the developing world. The pre and post-crisis results show how each coefficient changes over time. The first capital flow variable, FDI, offers some interesting results, presented in Table 1.

In terms of pull variables that attract FDI to the developing nations, GDP growth, GDP, current account balance, state stability and financial openness are all found to be statistically significant over different intervals. The financial openness index has an unexpected negative sign while both GDP variables and current account balance have a positive relationship with FDI. State stability, contrary to the results in Byrne and Fiess (2016), is statistically insignificant for the full panel and is dropped after the first regression as a robustness check. Inflation and country-specific interest rates are also insignificant in the full sample results but are significant in the smaller pre-and post-crisis samples. Inflation is inversely related to FDI while interest rates are positively related. A somewhat surprise result is the pre and post crisis insignificance of the U.S. interest rates, which nonetheless has an expected negative sign indicating that decreases in U.S. rates pushes capital to the emerging markets. It is possible that both interest rates are insignificant because the dependent variable is foreign direct investment, which captures long-term mergers and acquisitions, decisions rather than shorter-term purchases of interest bearing bonds.

This study's main variable of interest, credit ratings, is significant at the 1% level and has a positive relationship with FDI capital inflows. The estimated value of the coefficient implies that a one point credit rating upgrade increases FDI by 1.3 billion

dollars. Since the main question of this paper is to see how the importance of credit ratings has changed over time, we are ultimately interested in the pre- and post- crisis results. In the pre-crisis sample, the coefficient β_1 is positive but insignificant, indicating a 79 million dollar increase in FDI for each 1-point increase in rating. When using post-crisis data, the sovereign ratings coefficient regains its statistical significance. Here, a 1-point ratings upgrade produces a 3.37 billion dollar increase in FDI, which is a huge jump from the pre-crisis level of 79 million. In this case, credit ratings have actually gained importance and lead to bigger changes in FDI. It appears that the initial hypothesis-that ratings have become less important after the crisis-is incorrect. This could be partially attributed to the large number of financial crises in the 1990s, which Reinhart (2002) and Cantor and Packer (1994) suggest doubt on the rating agencies practices and point to their inconsistencies. Thus, the concerns surrounding credit ratings may have hit financial markets beginning in the mid-1990's, rather than during the 2007-2009 financial crisis, which could explain the increasing coefficients post-crisis. Another possible explanation for the change in the coefficient value is the nature of the dependent variable. It is possible that since FDI captures private equity investment, credit worthiness is not as much of a driving factor. FDI investors might be more concerned with growth potential and external market trends instead. This could also explain the insignificance of the coefficient on variables like country-specific interest rate and the U.S. interest rate.

Although the pre- and post- crisis coefficients are visually different, it is important to test if they are statistically different. Using the statistical method for comparing regression coefficients developed by Clogg, Petkova and Haritou (1995), I ran

a quick z-test to compare the two credit rating coefficients. The results indicate a z-score of 1.95, which means credit ratings are not statistically different for FDI.

Table 1: Portfolio Bond Investment and Sovereign Rating
 Dependent Variable: Portfolio Investment (in millions of current \$USD)
 Estimation Method: System GMM

	Full Sample			Pre-Crisis			Post-Crisis		
	1	2	3	1	2	3	1	2	3
Portfolio Bonds _{it-1}	.653 (0.00)***	.654 (0.00)***	.655 (0.00)***	-.162 (.054)*	-.153 (.066)*	-.176 (.028)**	.635 (0.00)***	.636 (0.00)***	.640 (0.00)***
Credit Rating_{it-1}	378.82 (.064)*	376.45 (.064)*	411.77 (.039)***	495.64 (.005)***	401.72 (.011)**	341.96 (.024)**	1081.61 (.055)*	1077.21 (.055)**	1181.5 (.031)***
Inflation _{it}	-92.94 (.215)	-94.46 (.201)	-98.07 (.184)	106.43 (.038)**	79.47 (.087)*	76.13 (.091)*	-213.6 (.511)	-205.86 (.508)	-254.68 (.407)
GDP Growth _{it-1}	-90.29 (.368)	-91.35 (.360)	-84.88 (.394)	244.11 (.001)***	233.1 (.001)***	208.99 (.003)***	-137.31 (.589)	-136.6 (.585)	-171.05 (.489)
GDP _{it-1}	6.90e-10 (.151)	6.79e-10 (.151)	6.40e-10 (.175)	-2.29e-10 (.913)	-5.19e-10 (.803)	-1.19e-09 (.552)	-6.3e-10 (.693)	-7.19e-10 (.464)	-9.24e-10 (.335)
Interest Rate _{it-1}	-10.19 (.839)	-10.36 (.838)	-6.9 (.890)	-2.29e-10 (.067)*	-5.19e-10 (.052)*	-1.19e-09 (.072)*	82.67 (.671)	87.58 (.649)	86.93 (.650)
Current Account _{it-1}	4.78e-09 (.663)	4.70e-09 (.667)	4.50e-09 (.680)	-8.19e-08 (.002)***	-8.34e-08 (.001)***	-7.67e-08 (.002)***	6.41e-08 (.066)*	6.26e-08 (.020)***	6.14e-08 (.022)**
US Interest Rate _{it-1}	-455.49 (.032)**	-463.66 (.022)**	-440.24 (.028)**	-13.03 (.936)	-66.46 (.667)	-82.11 (.584)	-2409.73 (.001)***	-2421.84 (.001)***	-2300.58 (.001)***
Financial Openness _{it-1}	509.24 (.421)	512.11 (.417)		-1175.88 (.016)**	-1087.9 (.022)**		1972.87 (.298)	1961.18 (.297)	
State Stability _{it-1}	28.08 (.899)			284.21 (.195)			-71.65 (.947)		
Observations	278	278	278	158	158	158	105	105	105

Notes: a.) *P*values, ***<.01, **<.05, *<.1 (reported in parentheses)
 b.) Regression 1-includes all explanatory variables
 Regression 2-drops state stability for robustness check
 Regression 3-drops state stability and financial openness for robustness check
 c.) Pre-crisis refers to 1995-2006
 Post-crisis refers to 2007-2015

When estimating this same model with portfolio bond inflows, rather than FDI, the results are quite different (see Table 2).

Different factors in the model are significant in some time frames and not in others. For example, inflation is only significant in the pre-crisis model and surprisingly has a positive coefficient. This result could be attributed to the large increases of capital flows to emerging markets during this time period, accompanied by significant price level increases (Bonizzi, 2013). Since inflation and capital inflows were both increasing at this time, it makes sense that the model predicted a positive relationship. Nominal GDP, which is used to control for country size, is surprisingly insignificant in each regression, in contrast to the results reported in Table 1. This difference could be attributed to the different drivers of capital flows, insofar as GDP levels could have a larger importance for private equity investors than bond portfolios. Bond investors' main concerns tend to be return and risk, while FDI is most likely driven by long-term business prospects. This same argument applies to GDP growth, which is positive and significant pre-crisis but not post-crisis or in the full sample.

The coefficients on country-specific interest rates exhibit interesting patterns in this model. In the full sample regressions, they are negative and statistically insignificant. While the rates are significant pre-crisis, the more recent post-crisis results also are insignificant with expected positive coefficients. After the global recession, many investors started looking for stable securities causing capital flight out of the emerging countries into the developed world. This capital flight could explain the inconsistent results as interest rates no longer were a significant factor that attracted capital while investors flocked to safe havens.

Current account balance is insignificant in the full sample but significant for the pre and post crisis series. In the pre-crisis years there is a negative relationship with portfolio bond investment and a positive relationship in the post-crisis years. In the pre-crisis sample, the model estimates that as a country increases its current account deficit, portfolio bond investment goes up in the following time period. A negative relationship between these two variables makes sense because in order to finance current account deficits, the government may need to borrow by issuing more bonds.

The estimated coefficients on the two institutional indexes, state stability and financial openness, are similar to the FDI regression results. Financial openness is significant in the pre-crisis sample, but again has a surprising negative sign. State stability is insignificant and is subsequently omitted in regressions 2 and 3 for each period considered in the paper.

The U.S. interest rate is significant in the full and the post-crisis samples. The coefficients are negative, indicating that lower rates of return in the developed world push capital to the emerging markets.

Last but not least, credit ratings are significant throughout each regression and each time series, indicating they are more important for portfolio bond investment than FDI. All coefficients are positive, similar to the FDI regressions results. Again, it looks like the importance of sovereign ratings has increased overtime. The pre-crisis coefficient states that a ratings upgrade from a year ago will lead to an increase in portfolio bond inflows by \$496 million. After the global crisis, the results show as a country's rating improves, its bond inflows will increase by about \$1.1 billion. So for portfolio bond

flows, like FDI, we can conclude that sovereign ratings have become more important which contradicts the initial hypothesis of this paper.

Again, for the purpose of this paper, testing the difference between the two credit rating coefficients is imperative. The results state that the statistical difference between the coefficients is 0.79, which means there was no statistically significant change after the financial crisis.

An interesting point to note however, is that the ratings coefficient grew much faster for FDI than portfolio bond investment. In Emara and El-Said's (2015) study, the results also indicate a higher coefficient for FDI than portfolio investment. Clearly, the higher coefficient for FDI means that the ratings have a larger impact for this type of capital flow. Although, as previously mentioned, FDI does not include debt instruments and does not contain the same risks of default like portfolio bond investments do. And since the ratings measure the risk of default, the ratings intuitively should have a larger impact on portfolio bond investment than FDI, which they did in the pre-crisis dataset but not after the crisis. If bad credit rating reputation did in fact affect the markets, it would make sense that the coefficients for the capital flow that is more dependent on ratings, in this case portfolio bond investment, are smaller. In other words, investors in the FDI business might have not cared about the credit rating information that became public starting in the 1990s as much as portfolio bond investors did. So although investor reliance on the ratings for both types of capital flows has grown over time, there is some showings of credit rating distrust reflected in the growth rates of the coefficients.

A final possible scenario is the overall effect of the financial crisis. The data should certainly have been impacted and a break at the time of the financial crisis was expected to produce very different coefficients. These results however, could be a product of other issues caused by the recession and not solely because of credit rating reputation. The crisis would have interrupted investor behavior from the decade leading up to it, so new investment patterns such as flight to safe havens and home biases could play a factor in post-crisis results.

A common post regression test when using system GMM is the Sargan test. The purpose of the Sargan test is to test the validity of the set of instruments used in the model. Rejecting the null hypothesis would essentially confirm the choices of the variables as a good set of instruments. After running these tests, the p-values were very low so the null could not actually be rejected. A possible explanation for these results is issues of heteroskedacity in the data.

Conclusion

The main purpose of this paper is to analyze the change in the effect of sovereign credit ratings on capital flows to EMEs. This study attempts to find the change by evaluating the coefficients attached to sovereign credit ratings when using system GMM regressions run over different time intervals. The first interval incorporates the years leading up to the financial crisis and the second interval includes the years of the crisis and the years directly after. This paper also splits capital flows into two specific subgroups, FDI and portfolio bond investment. The results show that for each type of capital flow, the coefficients of the credit ratings increase over time. This means that the

ratings have actually become more impactful in the post-crisis years (though both differences in coefficients were not statistically different). This gain in importance contradicts the initial hypothesis of this paper, that credit ratings would become less important over time due to bad reputations during the financial crisis. The results indicate that while both capital flow variables have become more dependent on ratings, their impact on FDI has outpaced the impact on portfolio bond investments.

Appendix: Data Sources and Description

Foreign Direct Investment, net inflows- Foreign direct investment refers to direct investment equity flows in the reporting economy. It is the sum of equity capital, reinvestment of earnings, and other capital. Direct investment is a category of cross-border investment associated with a resident in one economy having control or a significant degree of influence on the management of an enterprise that is resident in another economy. Ownership of 10 percent or more of the ordinary shares of voting stock is the criterion for determining the existence of a direct investment relationship. Data are in current U.S. dollars. Taken from the World Bank Development Indicators. Series Code: BX.KLT.DINV.CD.WD

Portfolio Bond Investment- Bonds are securities issued with a fixed rate of interest for a period of more than one year. They include net flows through cross-border public and publicly guaranteed and private nonguaranteed bond issues. Data are in current U.S. dollars. Taken from World Bank Development Indicators. Series Code: DT.NFL.BOND.CD

Inflation- Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used. Taken from World Bank Development Indicators. Series Code: FP.CPI.TOTL.ZG

GDP per capita growth- Annual percentage growth rate of GDP per capita based on constant local currency. Aggregates are based on constant 2010 U.S. dollars. GDP per capita is gross domestic product divided by midyear population. GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Taken from World Bank Development Indicators. Series Code: NY.GDP.PCAP.KD.ZG

GDP- GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current U.S. dollars. Dollar figures for GDP are converted from domestic currencies using single year official exchange rates. For a few countries where the official exchange rate does not reflect the rate effectively applied to actual foreign exchange transactions, an alternative conversion factor is used. Taken from World Bank Development Indicators. Series Code: NY.GDP.MKTP.CD

Current Account Balance- Current account balance is the sum of net exports of goods and services, net primary income, and net secondary income. Taken from World Bank Development Indicators. Series Code: BN.CAB.XOKA.CD

Real Interest Rate- Real interest rate is the lending interest rate adjusted for inflation as measured by the GDP deflator. The terms and conditions attached to lending rates differ by country, however, limiting their comparability. Taken from World Bank Development Indicators. Series Code: FR.INR.RINR

Polity Levels/State Stability- Polity IV Project, Political Regime Characteristics and Transitions, 1800-2015, annual, cross-national, time-series and polity-case formats coding democratic and autocratic "patterns of authority" and regime changes in all independent countries with total population greater than 500,000 in 2015 (167 countries in 2015) (SPSS and Excel data; PDF codebook) Taken from the Center of Systemic Peace.

Financial Openness- The Chinn-Ito index (*KAOPEN*) is an index measuring a country's degree of capital account openness. The index was initially introduced in Chinn and Ito (*Journal of Development Economics*, 2006). *KAOPEN* is based on the binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions reported in the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER)*.

Standard and Poor's Sovereign Credit Ratings- the opinion of an entity's ability and willingness to meet all of its financial obligations on a timely basis, regardless of the currency in which those obligations are denominated and absent transfer and convertibility restrictions. Taken from S&P's historical sovereign local currency ratings.

Works Cited

- Alfaro, Laura & Kalemli-Ozcan, Sebnem & Volosovych, Vadym, 2008. " Why Doesn't Capital Flow from Rich to Poor Countries? An Empirical Investigation," *The Review of Economics and Statistics*, MIT Press, vol. 90(2), pages 347-368, 01.
- Artus, P., Garrigues, J., and Sassenou M, 1993. "Interest rate costs and issue ratings: the case of French CP and Bonds." *Journal of International Securities Markets*, vol. 7, pp. 211-218.
- Bolton, Patrick, Freixas, Xavier and Shapiro, Joel, 2011. "The Credit Ratings Game." *Journal of Finance* 67, 85-112
- Bonizzi, Bruno, 2013. "Capital market inflation in emerging markets: The case of Brazil and South Korea". *PSL Quarterly Review*, Vol. 68, No. 273, pp. 115-150, 2015
- Byrne, Joseph P. and Fiess, Norbert, 2016. "International Capital Flows to Emerging Markets: National and Global Determinants," *Journal of International Money and Finance*, Elsevier, vol. 61(C), 82-100
- Cantor, Richard and Packer, Frank, 1994. "The Credit Rating Industry." *Quarterly Review*, *Federal Reserve Bank of New York*, issue sum, pages 1-26.
- Clogg, Clifford C, Petkova, Eva, and Haritou, Adamantios. 1995. "Statistical methods for comparing regression coefficients between models." *American Journal of Sociology*, Vol 100(5), Mar 1995, 1261-129
- Chinn, Menzie D. and Ito, Hiro, 2006. "What matters for Financial Development? Capital Controls, Institutions, and Interactions," *Journal of Development Economics*, Vol 81 (1) Pages 163-192, October.
- Emara, Noha M.F & El Said, Ayah, 2015. "Revisiting Sovereign Ratings, Capital Flows and Financial Contagion in Emerging Markets," *World Journal of Applied Economics*, 1(2): 3-22. 15 Feb 2016
- Körner, Finn Marten and Trautwein, Hans-Michael, 2014. "Sovereign Credit Ratings and the Transnationalization of Finance – Evidence from a Gravity Model of Portfolio Investment. Economics Discussion Papers", No 2014-31, *Kiel Institute for the World Economy*. 16 July 2014
- Lane, Philip R. and Milesi-Ferretti, Gian M, 2012. "The External Wealth of Nations Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities, 1970-2004", *Journal of International Economics* 73, 223-250, November.
- Lucas, Robert E. Jr, 1990. "Why doesn't Capital Flow from Rich to Poor Countries?," *American Economic Review*, *American Economic Association*, vol. 80 (2) pages 92-96, May

Moon, C.-G. and Stotsky, J. G, 1993. "Testing the differences between the determinants of moody's and standard & poor's ratings an application of smooth simulated maximum likelihood estimation." *Journal of Applied Econometrics*, vol. 8(1) 51–69. Pages 51-69

Mora, Nada, 2006. "Sovereign Credit Ratings: Guilty Beyond Reasonable Doubt?," *Journal of Banking & Finance*, Elsevier, vol. 30 (7), pages 2041-2062, July.

Reinhart, Carmen M, 2002. "Default, Currency Crises, and Sovereign Credit Ratings," *World Bank Economic Review*, *World Bank Group*, vol. 16(2), pages 151-170