

Do Sovereign Credit Ratings Matter? The Relationship between Ratings and Capital Flows Before and After the Great Recession

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Abstract

We examine the relationship between sovereign credit ratings and international equity and bond inflows pre- and post-Great Recession using 1996–2016 annual data for 53 countries. The ratings are statistically significant for both equity and debt inflows in the full sample. After splitting the data into pre- and post-crisis periods, we find that ratings go from being significant in the 1996–2007 subsample to insignificant in the 2010–2016 period. These results support the hypothesis that adverse reputational effects weakened the value of rating agencies in investors' decision-making process after the Great Recession.

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1 Introduction

Researchers have identified sovereign credit ratings (SCRs), which assess the riskiness of investing in a particular country, as a determinant of international capital flows (Binici and Hutchison, 2018; Kiff et al., 2012). By combining publicly available data with their financial expertise, rating agencies add value to the financial markets by reducing the amount of asymmetric information and by certifying and classifying securities (Kiff et al., 2012). However, in addition to the lack of consensus among the existing studies on the direction and magnitude of SCR impact on flows, the practices of the rating agencies have come into question following the 2007–2009 recession (deHaan, 2017). The agencies’ output has been criticized for being biased (Fuchs and Gehring, 2017; De Moor et al., 2018) and over-inflated in the agencies’ competition to attract "ratings shoppers" (Bolton et al. 2012); for being unable to predict financial crises (Mora, 2006; Reinhart, 2002); and for amplifying and even precipitating such crises (Bolton et al., 2012).

We reassess the impact of SCRs issued by Standard and Poor’s, Moody’s, and Fitch on financial inflows using panel data from 53 economies for the 1996–2016 period. More importantly, we study whether the increased level of criticism of the rating agencies after the 2007–2009 recession affected the estimates of SCR impact. We find that SCRs have a positive effect on both equity and debt inflows in the full sample. However, the statistically significant impact of SCRs on both types of inflows during the 1996–2007 period disappears in the 2010–2016 subsample. Our findings support the hypothesis that adverse reputational effects weakened the value of rating agencies in investors’ decision-making process post-Great Recession.

2 Empirical Model and Data Selection

We estimate the regression

$$F_{i,t} = \alpha_i + \gamma SCR_{i,t} + \delta' \mathbf{X}_{i,t} + \varepsilon_{i,t} \tag{1}$$

where $F_{i,t} \in \{EI, BI\}$ captures equity and bond inflows, respectively, into a country i , $SCR_{i,t}$ is the sovereign credit rating, $\mathbf{X}_{i,t}$ is a vector of control variables, and α_i captures country-level and time-invariant effects.

Both equity and bond inflows are likely autoregressive, and SCRs may be endogenous. The difference GMM estimator (Holtz-Eakin, Newey, and Rosen, 1988; Arellano and Bond, 1991) is robust to these complications. In order to achieve consistent estimates, difference GMM uses higher-order lags as instruments for any potential non-exogenous variable. Because the model is differenced in the first step, the instruments are deeper first differences of potentially all independent variables. For this reason, difference GMM is typically over-identified. Arellano and Bover (1995) and Blundell and Bond (1998) amend this technique by adding a second, undifferenced equation to the estimation process, with the resulting pair of equations referred to as a system GMM (SGMM). Compared to the one-equation difference GMM model, SGMM estimates are more efficient. In addition, either GMM technique can correct standard errors for within-panel heteroskedasticity via Windmeijer (2005).

The abundance of instruments in SGMM may create bias due to over-identification. Hansen (1982) outlines an over-identification test with the null hypothesis of jointly valid over-identifying equations, although its statistical power can be weakened if too many instruments are used. Therefore, we use the second lags as instruments for the differenced equation and the first lags as instruments for the undifferenced equation.

2.1 Data

The annual dataset covers the 1996–2016 period and contains 53 countries (listed in Appendix A together with data descriptions, sources, and summary statistics). A typical study of international capital flows includes "push" and "pull" factors as controls. The former (global liquidity and growth measures) determine the willingness of investors to send capital to developing economies. The latter (national macroeconomic and political indicators) guide investors in their choice of capital flow destination. Since our sample includes a mix of advanced and developing economies, we set aside the "push"- "pull" distinction and focus on individual country characteristics.

Equity inflows (EI) combine foreign direct investment with smaller-scale portfolio investment. Bond inflows (BI) measure the amount of domestic debt (across all issuers) purchases by foreign investors. As in de Araujo et al. (2015), we measure flows in gross terms rather than as percent of GDP. Otherwise, we would

risk overstating the importance of small financial hubs such as Luxembourg or Malta (both in our sample) in the patterns of global capital flows.

For brevity, we report the effects of Standard and Poor’s (S&P) SCRs; our results are robust when we instead use Moody’s or Fitch ratings (see Appendix B). The S&P ratings of government securities are ordinal, ranging from AAA (highest) to CC (lowest) and including "selective defaults" (SD) and instances of not being rated (NR). We convert these ratings into a numerical scale (Appendix A) such that NR corresponds to zero and AAA corresponds to 21. The ratings are issued at irregular intervals. For years with multiple ratings for a given country, we use the weighted average of the SCRs, with weights equal to the portion of year spent in each score category.

If investors rely exclusively on SCRs when making their portfolio decisions, then other indicators of national economic health will carry little statistical significance. Alternatively, investors may use key macroeconomic variables in conjunction with—or even instead of—SCRs. Our list of controls includes current account balance (CA) as a measure of a country’s external position stability, and trade volume ($Trade$), the sum of imports and exports relative to GDP. From the balance of payments identity, trade volume corresponds to larger international financial flows. The growth of real per capita GDP ($rGDP_{pp}$) represents the level of macroeconomic development as well as points to a country’s future potential. Inflation rate ($INFL$) measures consumer price stability. Population (POP) controls for country size, since larger countries generally attract more financial capital. The Heritage Foundation’s Index of Economic Freedom (HFI) measures economic freedom of a country based on its rule of law, government size, regulatory efficiency, and market openness.

3 Estimation Results

3.1 Full sample results

Columns 2 and 3 of Table 1 presents SGMM estimates for the full sample using the natural log of each dependent variable. The results are robust to the inclusion of a lagged dependent variable.

	Full sample		Pre-crisis		Post-crisis	
	ln(EI)	ln(BI)	ln(EI)	ln(BI)	ln(EI)	ln(BI)
SCR_S	0.0317** (0.0133)	0.0221*** (0.0068)	0.0245*** (0.0086)	0.0128*** (0.0044)	0.0267 (0.0402)	0.0012 (0.0148)
CA	-0.0038 (0.0049)	-0.0059* (0.0032)	-0.0007 (0.0050)	-0.0050* (0.0028)	-0.0009 (0.0108)	-0.0005 (0.0050)
Trade	0.0022** (0.0010)	-0.0001 (0.0003)	0.0009 (0.0011)	-0.0003 (0.0004)	0.0034** (0.0014)	-0.0000 (0.0005)
rGDPpp	0.0055 (0.0049)	0.0011 (0.0029)	0.0114* (0.0043)	0.0009 (0.0022)	-0.0123 (0.0231)	-0.0019 (0.0091)
INFL	0.0009 (0.0019)	0.0006 (0.0008)	0.0010 (0.0011)	0.0004 (0.0005)	-0.0057 (0.0043)	0.0003 (0.0015)
POP	0.1443*** (0.0431)	0.0462* (0.0275)	0.1336*** (0.0390)	0.0473** (0.0230)	0.1770*** (0.0569)	0.0138 (0.0285)
HFI	0.0061 (0.0059)	0.0001 (0.0050)	0.0171*** (0.0063)	0.0076** (0.0034)	-0.0266 (0.0248)	0.0051 (0.0101)
Constant	7.5535*** (0.8728)	10.7437*** (0.7094)	7.1969*** (0.9402)	10.3932*** (0.5912)	9.2815*** (1.9472)	11.2350*** (0.8252)
Hansen	(0.358)	(0.253)	(0.071)	(0.389)	(0.071)	(0.141)

Table 1: Effects of S&P SCRs on international capital flows. ***, **, and * indicate statistical significance at $\alpha \leq 0.01$, $\alpha \leq 0.05$, and $\alpha \leq 0.1$, respectively. Standard errors in parentheses. P-values displayed for Hansen tests.

We find that a one-unit improvement in S&P score increases equity and debt inflows by roughly 3 and 2 percent, respectively. (Using Moody's and Fitch ratings produces similar results, although the coefficients on equity inflows are not significant.) Thus, investors are responding to the information contained in SCRs even after controlling for other measures of national economic activity.

The rest of the explanatory variables have the expected coefficient signs when statistically significant. However, since many of them have been shown to be determinants of SCRs themselves (Reusens and Croux, 2017), most of the time the estimates are not significant. Hansen tests indicate joint validity of the over-identifying equations in the majority of cases

3.2 Effects of the financial crisis

We next study whether the criticism of rating agencies' performance prior to the 2007–2009 recession affected the impact of SCRs on financial flows in the following years. We split our data into the pre-crisis (1996–2007) and post-crisis (2010–2016) periods, omitting the potentially volatile and anomalous years of the recession. Due to the now shorter time dimension, we use the second and third differences as instruments for the differenced equation and the first and second lags as instruments for the undifferenced equation to improve estimation efficiency.

Columns 4 and 6 of Table 1 (and of Tables B.1 and B.2 in Appendix B) indicate that while all three agencies' ratings have a positive and statistically significant effect on equity inflows in the earlier subsample, they lose their significance after the crisis. Instead, trade volume gained explanatory power over *EI*. Interestingly, *HFI*, another index of economic development, also became insignificant post-2009. These findings support the hypothesis that adverse reputational effects suffered by the rating agencies during and after the Great Recession caused equity investors to switch from SCRs to other measures of national economic health.

The same observation holds true for debt inflows (columns 5 and 7 of Tables 1, B.1, and B.2): SCRs are significant only in the pre-crisis years. Intriguingly, the dynamics of bond inflows became decoupled from the other explanatory variables as well. We hypothesize that many institutional investors are required to follow certain guidelines and restrictions when building and restructuring their bond portfolios and so may pay less attention to business cycle fluctuations.

4 Conclusion

The 2007–2009 recession brought renewed attention to, and more criticism of, SCRs produced by ratings agencies. Using SGMM estimation of annual data from 53 countries, we show that SCRs affect equity and bond inflows before but not after the financial crisis. Our results support the hypothesis that international investors abandoned SCRs after the 2007-2009 recession in favor of other measures of macroeconomic performance. These findings open up several avenues for follow-up research, such as splitting the data into developed versus developing countries subsamples, testing for structural breaks as a country’s SCR switches between speculative and investment grades, and studying asymmetries between the effects of rating upgrades and downgrades.

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A Data Sources and Description

A.1 Time Series and Countries

A.1.1 Capital flows

By definition, sovereign credit ratings (SCRs) measure the credit worthiness of a sovereign entity that borrows using primarily bond instruments. However, insofar as SCRs also reflect the overall stability of the economy

and may place a sovereign ceiling on credit risk assessment of other domestic entities, we also include equity inflows in our analysis.¹

The two measures of capital flows are taken from the International Monetary Fund's International Financial Statistics database, and are reported in millions of current US dollars.

Equity Inflows (*EI*) is the sum of direct and portfolio investment. The corresponding series are (1) Balance of Payments, Supplementary Items, Direct Investment, Net incurrence of liabilities (excluding exceptional financing), US Dollars; and (2) Balance of Payments, Supplementary Items, Portfolio Investment, Net incurrence of liabilities, Equity Securities (excluding exceptional financing), US Dollars.

Bond Inflows (*BI*) is taken from Balance of Payments, Supplementary Items, Portfolio Investment, Net incurrence of liabilities, Debt Securities (excluding exceptional financing), US Dollars.

A.1.2 Sovereign Credit Ratings

Ratings data are taken from the Trading Economics database. In our paper, we focus on long-term foreign currency ratings.

S&P Sovereign Credit Rating (*SCR_S*) is part of Standard and Poor's Global Ratings portfolio and represents a "a forward-looking opinion about an obligor's overall creditworthiness. This opinion focuses on the obligor's capacity and willingness to meet its financial commitments as they come due. It does not apply to any specific financial obligation, as it does not take into account the nature of and provisions of the obligation, its standing in bankruptcy or liquidation, statutory preferences, or the legality and enforceability of the obligation." "A foreign currency rating on an issuer will differ from the local currency rating on it when the obligor has a different capacity to meet its obligations denominated in its local currency, vs. obligations denominated in a foreign currency." (Descriptions are taken from S&P Global Ratings Definitions, published online on October 31, 2018 and available at https://www.standardandpoors.com/en_US/web/guest/article/-

¹Sovereign ceilings are discussed in Almeida et al. (2017). See Cantor and Packer (1996) for SCR impact on bond markets. Gande and Parsley (2014) and Swamy and Narayanamurthy (2018) document SCR effects on FDI flows.

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Moody's Sovereign Credit Rating (SCR_M): "Long-term ratings are assigned to issuers or obligations with an original maturity of one year or more and reflect both on the likelihood of a default on contractually promised payments and the expected financial loss suffered in the event of default." (Descriptions are taken from Moody's Investors Service Rating Symbols and Definitions, February 2019 edition, available at <https://www.moodys.com/sites/products/AboutMoodyRatingsAttachments/MoodysRatingSymbolsandDefinitions.pdf>)

Fitch Sovereign Credit Rating (SCR_F): "Sovereign Issuer Default Ratings (IDRs) and bond ratings are a forward-looking assessment of the capacity and willingness to honour debt obligations to private-sector creditors in full and on time. Sovereigns are assigned two IDRs: the Local-Currency (LC) IDR reflects the likelihood of default on debt issued (and payable) in the currency of the sovereign, while the Foreign-Currency (FC) IDR is an assessment of the credit risk associated with debt issued in foreign currencies." (Descriptions are taken from FitchRatings Sovereign Rating Criteria, published online on May 26, 2019 and available at <https://www.fitchratings.com/site/re/10072225>)

The ordinal SCRs from each of the three agencies are converted into the $[0, 21]$ numerical scale as described in Table A.1.

A.1.3 Other controls

Current Account balance (CA), reported as percent of GDP, is taken from International Monetary Fund's World Economic Outlook October 2017 database.

Trade volume ($Trade$) is the sum of exports and imports of goods and services, both reported as percent of GDP in World Bank's World Development Indicators database.

Real GDP per capita growth rate ($rGDP_{pp}$) is calculated from GDP per capita (*constant LCU*), reported in World Bank's World Development Indicators database.

Inflation rate ($INFL$) is taken from World Bank's World Development Indicators database, series *Inflation*,

consumer prices (annual %).

Population (*POP*) comes from World Bank's World Development Indicators database.

The Index of Economic Freedom (*HFI*) is reported by the Heritage Foundation and "measure[s] economic freedom based on 12 quantitative and qualitative factors, grouped into four broad categories, or pillars, of economic freedom: Rule of Law (property rights, government integrity, judicial effectiveness), Government Size (government spending, tax burden, fiscal health), Regulatory Efficiency (business freedom, labor freedom, monetary freedom), Open Markets (trade freedom, investment freedom, financial freedom)." The detailed descriptions of the index and its subcategories are available online at <https://www.heritage.org/index>.

In a few instances of missing observations, we supplemented the data using the following sources: International Financial Statistics (IMF), World Development Indicators (World Bank), World Economic Outlook (IMF), World Integrated Trade Solution (World Bank), EuroStat (European Commission), Bermuda Economic Statistics (Government of Bermuda), and Central Bank of Argentina. Details are available from the authors upon request.

A.1.4 Sample Countries (53)

Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, Cyprus, Czech Republic, Denmark, El Salvador, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, Indonesia, Ireland, Israel, Italy, Japan, Kazakhstan, Luxembourg, Malaysia, Malta, Mexico, Netherlands, New Zealand, Norway, Pakistan, Philippines, Poland, Portugal, Romania, Russia, Singapore, Slovak Republic, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Thailand, Turkey, United Kingdom, United States, Uruguay, Venezuela.

A.2 Descriptive Statistics

Because in our dataset equity and debt inflows are occasionally negative, we add a constant to each variable in order to ensure that all values are positive before taking logs.

The summary statistics in Table A.2 exhibit a fairly large amount of variation, particularly in equity and bond flows. This is not surprising, since the dataset includes a wide variety of economies of different sizes and at different stages of development. The SCRs also possess substantial variation both across and within countries. While some economies like Switzerland enjoy high and almost unchanging ratings throughout the sample, the majority of countries experience variation over time in their SCRs. For the 53 countries in our sample, the median gap between the highest and lowest rating is four, and only five countries have zero variation in SCRs throughout the sample.

Table A.3 presents Pearson correlation coefficients between all the control variables. From the table it is evident that multicollinearity is not, on the whole, a problem.

B Additional Estimation Results

Tables B.1 and B.2 below present the estimation results of the impact of Moody's and Fitch sovereign credit ratings, respectively, on equity and debt inflows in the full sample and the pre- and post-crisis subsamples. The aggregation of the numerical ratings to annual frequency was done identically to the S&P data described in the paper.

Numerical Scale	S&P Ratings	Moody's Ratings	Fitch Ratings
21	AAA	Aaa	AAA
20	AA+	Aa1	AA+
19	AA	Aa2, Aa	AA
18	AA-	Aa3	AA-
17	A+	A1	A+
16	A	A2, A	A
15	A-	A3	A-
14	BBB+	Baa1	BBB+
13	BBB	Baa2, Baa	BBB
12	BBB-	Baa3	BBB-
11	BB+	Ba1	BB+
10	BB	Ba2	BB
9	BB-	Ba3	BB-
8	B+	B1	B+
7	B	B2	B
6	B-	B3	B-
5	CCC+	Caa1	CCC+
4	CCC	Caa2	CCC
3	CCC-	Caa3	CCC-
2	CC	Ca	CC
1	SD	C	C
0	NR	WR	DDD, D, RD

Table A.1: Conversion of the three rating agencies' SCR letter ratings into numerical values.

	Units	Mean	StDev	Min	Max
<i>Panel A: dependent variables</i>					
Equity inflows, log (<i>EI</i>)	\$m	40,597	91,400	-45,067	973,566
Bond inflows, log (<i>BI</i>)	\$m	25,066	83,674	-126,108	981,253
<i>Panel B: control variables</i>					
S&P Rating (<i>SCR_S</i>)		15.48	4.90	1	21
Moody's Rating (<i>SCR_M</i>)		15.60	4.95	1.17	21
Fitch Rating (<i>SCR_F</i>)		15.52	4.84	0	21
Current account balance (<i>CA</i>)	% GDP	0.45	6.02	-23.30	26.06
Tade volume (<i>Trade</i>)	% GDP	92.45	76.02	1.66	442.62
Real GDP per capita growth rate (<i>rGDPpp</i>)	%	2.10	3.44	-17.55	24.76
Inflation rate (<i>INFL</i>)	%	5.61	13.23	-4.48	254.39
Population, log (<i>POP</i>)		16.77	1.69	12.51	21.04
Index of Economic Freedom (<i>HFI</i>)		67.0	9.6	33.7	90.1

Table A.2: Descriptive statistics

	SCR_S	SCR_M	SCR_F	CA	Trade	rGDPpp	INFL	POP	HFI
SCR_S	1.00								
SCR_M	0.98	1.00							
SCR_F	0.98	0.97	1.00						
CA	0.22	0.18	0.21	1.00					
Trade	0.28	0.25	0.28	0.42	1.00				
rGDPpp	-0.05	-0.04	-0.05	0.03	0.06	1.00			
INFL	-0.41	-0.39	-0.40	-0.06	-0.16	-0.18	1.00		
POP	-0.24	-0.22	-0.23	-0.01	-0.52	0.08	0.11	1.00	
HFI	0.68	0.66	0.66	0.20	0.43	-0.12	-0.39	-0.37	1.00

Table A.3: Pearson correlations between the control variables

	Full sample		Pre-crisis		Post-crisis	
	ln(EI)	ln(BI)	ln(EI)	ln(BI)	ln(EI)	ln(BI)
SCR_M	0.0191 (0.0133)	0.0204*** (0.0061)	0.0222** (0.0094)	0.0156*** (0.0052)	0.0256 (0.0282)	0.0074 (0.0209)
CA	-0.0026 (0.0052)	-0.0051* (0.0029)	-0.0016 (0.0045)	-0.0043 (0.0035)	-0.0040 (0.0116)	-0.0019 (0.0044)
Trade	0.0026** (0.0011)	-0.0000 (0.0003)	0.0004 (0.0010)	-0.0005 (0.0004)	0.0035* (0.0018)	-0.0000 (0.0005)
rGDPpp	0.0038 (0.0045)	0.0001 (0.0030)	0.0117** (0.0050)	0.0001 (0.0024)	-0.0081 (0.0228)	0.0025 (0.0100)
INFL	-0.0021 (0.0027)	0.0004 (0.0007)	0.0008 (0.0015)	0.0005 (0.0007)	-0.0061 (0.0056)	0.0005 (0.0034)
POP	0.1348** (0.0511)	0.0528* (0.0278)	0.1230*** (0.0336)	0.0449* (0.0236)	0.1682*** (0.0553)	0.0135 (0.0282)
HFI	-0.0009 (0.0063)	0.0015 (0.0042)	0.0211*** (0.0076)	0.0075 (0.0048)	-0.0295 (0.0263)	0.0014 (0.0203)
Constant	8.3600*** (1.0803)	10.5603*** (0.6666)	7.1764*** (0.9379)	10.4113*** (0.7031)	9.6113*** (1.9392)	11.3809*** (1.5292)
Hansen	(0.374)	(0.311)	(0.053)	(0.687)	(0.134)	(0.083)

Table B.1: Effects of Moody's SCRs on international capital flows. ***, **, and * indicate statistical significance at $\alpha \leq 0.01$, $\alpha \leq 0.05$, and $\alpha \leq 0.1$, respectively. Standard errors in parentheses. P-values displayed for Hansen tests.

	Full sample		Pre-crisis		Post-crisis	
	ln(EI)	ln(BI)	ln(EI)	ln(BI)	ln(EI)	ln(BI)
SCR_F	0.0196 (0.0118)	0.0322*** (0.0092)	0.0247*** (0.0076)	0.0168*** (0.0048)	0.0309 (0.0388)	-0.0042 (0.0176)
CA	-0.0037 (0.0045)	-0.0068** (0.0034)	0.0006 (0.0039)	-0.0040 (0.0024)	-0.0030 (0.0100)	0.0004 (0.0048)
Trade	0.0028** (0.0011)	-0.0001 (0.0004)	0.0005 (0.0012)	-0.0002 (0.0004)	0.0040** (0.0016)	-0.0001 (0.0005)
rGDPpp	0.0045 (0.0040)	0.0013 (0.0032)	0.0107*** (0.0037)	-0.0014 (0.0023)	-0.0089 (0.0166)	0.0008 (0.0084)
INFL	-0.0011 (0.0020)	0.0012 (0.0010)	0.0014 (0.0011)	0.0001 (0.0006)	-0.0068** (0.0033)	0.0002 (0.0031)
POP	0.1498*** (0.0481)	0.0573* (0.0294)	0.1256*** (0.0333)	0.0475* (0.0261)	0.1770*** (0.0610)	0.0139 (0.0244)
HFI	0.0030 (0.0053)	-0.0011 (0.0065)	0.0181*** (0.0063)	0.0044 (0.0036)	-0.0363* (0.0194)	0.0051 (0.0172)
Constant	7.8165*** (0.9798)	10.4732*** (0.7700)	7.2889*** (0.8423)	10.5311*** (0.6693)	9.8121*** (1.6817)	11.3146*** (1.2329)
Hansen	(0.364)	(0.246)	(0.120)	(0.595)	(0.316)	(0.098)

Table B.2: Effects of Fitch SCRs on international capital flows. ***, **, and * indicate statistical significance at $\alpha \leq 0.01$, $\alpha \leq 0.05$, and $\alpha \leq 0.1$, respectively. Standard errors in parentheses. P-values displayed for Hansen tests.