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Do sovereign credit ratings influence foreign direct investments in OECD countries?

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Abstract

This paper analyzes the relationship between sovereign credit ratings and FDI flows among 29 OECD countries, which act both as donors and recipients over the period of 2005 and 2017. The results suggest that sovereign credit ratings of both donor and recipient countries are significant determinants of FDI flows. There is a positive impact of these sovereign credit ratings on the FDI flows. Secondly, the analysis showed that there is a difference between the credit ratings of the euro area and non-euro area recipients and its effect on FDI. Although better ratings attract more FDI in both cases, it matters more for non-euro area recipients rather than the euro area recipients.

Keywords: sovereign credit ratings, foreign direct investments

Contents

Introduction

Foreign Direct Investment (FDI) might be referred to as the value of direct cash flows among countries. Being treated as a type of investment that is difficult to reclaim, FDI clearly has a more considerable effect in the long-term rather than in the short-term. The presence of domestic investments might raise a question if FDI is of any importance, however, while there is no need to choose one over another, both types of investments play a remarkable role in the world economy. Although domestic investments create a significantly higher amount of jobs in the host economy, FDI is superior in maximizing the benefits from the investment itself.

Studying the key determinants and effects of Foreign Direct Investment (FDI) is extremely socially relevant, because it is believed to be extremely important for both donor and recipient countries. FDI promotes social development, a stronger and more trustworthy collaboration as well as more stable economic growth when a sufficient absorptive capability of the advanced technologies is available in the host economy. Also, FDI brings significant benefits by creating high-quality jobs and introducing new management practices (Borensztein, Gregorio & Lee, 1998, OECD, 2008). Furthermore, the scientific relevance of FDI is notable. According to Kardos (2014), FDI is relevant to sectors with environmental impact, which ultimately influence and contribute to sustainable development. For these reasons, governments should create and implement new strategies in order to attract more FDI.

This research is a modified replication study of the paper "Do sovereign credit ratings matter for foreign direct investments?" written by Peilin Cai, Suk-Joong Kim and Quan Gan (2017). The main difference is that this research concentrates only on the OECD countries, whereas the mentioned paper analyzed other economies as well. Hence, the mentioned paper will be used as a starting point and as a main guideline throughout the analysis. Most of the data description and methods in this research will be similar to those applied in the aforementioned empirical paper.

In order to analyze the effects of sovereign credit ratings on Foreign Direct Investments among the OECD countries, the following research questions have to be answered:

Do sovereign credit ratings of both donor and recipient countries impact bilateral FDI flows?

Is there any difference between euro area and non-euro area recipients with regards to their sovereign credit ratings' influence on FDI?

The findings of this paper are summarized as follows. Firstly, it was found that sovereign credit ratings of both donor and recipient countries are significant determinants of FDI flows. There is a positive impact of these sovereign credit ratings on the FDI flows. Secondly, the analysis showed that there is indeed a difference between the credit ratings of the euro area and non-euro area recipients and its effect on FDI. Although better ratings attract more FDI in both cases, it matters more for non-euro area recipients rather than the euro area recipients.

The remainder of this paper is organized as follows. To start with, existing literature section presents relevant concepts and previous literature. Data and methodology parts describe the type of data used, the analysis that is performed and different methods applied to perform the research. In the results section, empirical findings are discussed and evaluated. Lastly, the conclusion section answers the research questions, discusses the possible limitations of this study and provides suggestions for future research.

Existing literature

Previous literature on the Foreign Direct Investment, its determinants, effects on emerging and developed economies and its role in the global economy as a whole is substantially broad, yet allowing for various questions to be raised.

Regarding the sources of FDI, most of it originates from the private sector and a significantly smaller fraction comes from the public sector. First, by analyzing survey data from European Round Table of Industrialists on investment conditions in 28 developing countries, Nunnenkamp (2002) found that traditional market size variables are still the main determinants of FDI. Similarly, by researching stock inflows in 7 major OECD economies, it was found that market size, as measured by the level of GNP, is an important determinant of FDI stock (Barrell & Pain, 1996).

Second, some studies have found a relationship between trade openness and FDI. According to Adhikary (2011), who investigated the linkage between FDI and trade openness in Bangladesh using time series analysis of 13 years, and Aizenman & Noy (2006), who examined the linkages between FDI and disaggregated measures of international trade, there is a positive

relationship between the two variables. Likewise, research by Liargovas and Skandalis (2012) concluded that in the long run, trade openness contributes positively to the inflow of FDI in developing economies.

Third, literature indicates sovereign credit rating as an important factor of FDI. It has been shown that the long-term currency ratings of the recipient countries have a positive impact on the capital flows in the emerging markets (Kim & Wu, 2008). Moreover, the study of sovereign credit ratings of both donor and recipient countries are highly relevant since international trade theory suggests that markets with better economic environment tend to attract more funds from abroad. However, if the donor is highly rated itself, then investors in that country are willing to keep their money in their own country. This implication of capital flows is discussed in the papers of Reinhart and Rogoff (2004) and Lucas (1990).

Fourth, corruption in the host country is an important factor determining levels of FDI. It involves comprising bribes, bureaucratic inefficiency, and political instability. The research by Habib & Zurawicki (2002) discovered that corruption is a serious obstacle to investments from abroad. The results suggest that foreign investors generally avoid corruption because it is considered wrong and it can create operational inefficiencies.

Existing literature identifies euro area as a key investor and recipient of FDI. One-fifth of the global inward FDI stock was directed to the euro area in 2015 and in contrast to other industrial economies (such as the US or Japan), euro area continues to be more dependent on the FDI (Dellis, Sondermann & Vansteenkiste, 2017). Additionally, Petroulas (2007) provides two reasons, why Eurozone countries could be more attractive in terms of trade and international investments. Firstly, euro eliminates the uncertainty that intimidates investors and countries, which are willing to trade. Secondly, adopting a single currency brings an advantage of lowering transaction costs that would occur otherwise and shows a reliable commitment to exchange rate stability. This paper analyzes the effects of euro, where possible explanations of the results might be the aforementioned ones.

Sovereign credit ratings play a crucial role in controlling countries' access to international capital markets. The revisions of these ratings might be associated with changes in country risk and net capital flows. Subsequently, this causes the risk-free rate and the risk premium to vary. Hence, country’s cost of capital may change as well. To be precise, countries experience

significant inclines in their private investment and FDI following upgrades in sovereign ratings. However, the effect exists only in the upgrade year and in the first year after the upgrade (Reinhart, 2002, Chen, Chen, Chang & Yang, 2013). Sovereign credit ratings provide investors with risk levels in different spheres of country's environment including fiscal and monetary policy, debt and liquidity, economic structure, political environment and balance of payments. Both economic and political factors have a significant impact on sovereign ratings. Some of the most important variables that determine these credit ratings involve per capita income, GDP growth, government income, changes in the real exchange rate, inflation, external debt, level of economic development, and default history (Cantor & Packer, 1996, Mellios & Paget-Blanc, 2006). These measures are widely used in various empirical papers (e.g. Afonso, Gomes & Rother, 2011; Reusens & Croux, 2017).

Data

For this research, various data sources are employed. First, OECD International Direct Investment Statistics database is used to obtain bilateral FDI data from 2005 to 2017 between OECD countries, which serve both as donors and recipients. FDI data is supplied in millions of US dollars. Overall, this paper investigates 29 out of 36 OECD countries, which have data coverage of at least 50%. These countries are listed in Table 1.

Table 1. List of countries.

Countries
Austria, Belgium, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Luxembourg, Netherlands, New Zealand, Poland, Slovakia, Slovenia, Sweden, Switzerland, Turkey, United Kingdom, United States

Second, the data of sovereign credit ratings are collected from Bloomberg terminal. Three representative credit rating agencies for this analysis are Moody's, Standard & Poor's, and Fitch Ratings. Generally, the agencies report both long-term and short-term credit ratings with specific outlooks, which give investors a view about the future of the country. Long-term foreign currency ratings and outlook information are used in the research process. These ratings are then further processed in two steps:

1. The numerical values are assigned to different ratings and outlooks. The highest sovereign credit rating is AAA and it goes until the lowest D. The outlook might be negative, stable or positive. This analysis provides each rating with a number from 20

to 0 and each outlook with the following numerical values: 0.5 (positive), 0 (stable) and -0.5 (negative). Then the credit ratings and outlooks from each agency are added up to arrive at the aggregate score of a country. The summary of the explanation of the sovereign credit ratings and the values assigned are visible in Table 2.

2. Subsequently, we compute the average of the aggregate score to arrive at the average sovereign credit rating of the three agencies. This research only uses the foreign currency long-term sovereign credit ratings.

Table 2. Values assigned for sovereign credit ratings.

Definition	Moody's	S&P	Fitch	Value
Investment-grade ratings				
Highest credit quality	Aaa	AAA	AAA	20
High credit quality	Aa1	AA+	AA+	19
	Aa2	AA	AA	18
	Aa3	AA-	AA-	17
Strong payment capacity	A1	A+	A+	16
	A2	A	A	15
	A3	A-	A-	14
Adequate payment capacity	Baa1	BBB+	BBB+	13
	Baa2	BBB	BBB	12
	Baa3	BBB-	BBB-	11
Speculative-grade ratings				
Speculative	Ba1	BB+	BB+	10
Credit risk developing	Ba2	BB	BB	9
Due to economic changes	Ba3	BB-	BB-	8
Highly speculative,	B1	B+	B+	7
credit risk present,	B2	B	B	6
with limited margin safety	B3	B-	B-	5
High default risk	Caa1	CCC+	CCC+	4
	Caa2	CCC	CCC	3
	Caa3	CCC-	CCC-	2
Default-grade ratings				
Near or in bankruptcy	Ca	CC	CC	1
or default	C	SD	D	0

Third, regressions in this paper are controlled for three groups of variables, namely: bilateral linkage (common language and distance), economic and financial development measures (population and bank credit), and degree of economic openness (total trade). These control variables are relevant to account for other factors that influence FDI besides the effect of sovereign credit ratings.

Data for language are collected using the World Factbook of Central Intelligence Agency (CIA). It is converted into a dummy variable indicating whether a pair of recipient and donor

countries are sharing the same official or business language. Distance is a variable, which requires some calculations. The longitude and latitude of each country are extracted from the CIA. Following this, by applying certain formula in Excel the distance between a pair of countries is computed.

All the economic and financial development measures data are gathered from World Bank's World Development Indicators (WDI) database. Population indicates the market capacity of a country. Bank credit refers to the financial resources to the private sector provided by financial institutions.

Finally, direction of trade data are obtained from IMF and it may be explained as the sum of exports and imports as a percentage of Gross Domestic Product (GDP). Each year Transparency International develops Corruption Perceptions Index (CPI). This index informs us about how corrupt countries' public sectors are seen to be. This research uses these values to measure corruption.

Appendix A.1 provides brief descriptions of all variables that are used in this research. Moreover, Table 3 displays the correlation of all control variables (language, distance, population, bank credit, total trade) with FDI, Corruption Perceptions Index and sovereign credit ratings of both donor and recipient countries. This is done in order to confirm that excluding these variables would result in Omitted Variable Bias (OVB) in the models. What is important to notice is that the recipient's sovereign credit rating variable is highly correlated with CPI. This issue is further addressed in the later sections of this paper.

Table 3. Correlation matrix of variables.

	SCR_Don	SCR_Rec	Lang	Dist	Popu	BankCred	Trade	CPI
SCR_Don	1.000							
SCR_Rec	-0.006	1.000						
Lang	0.133	0.139	1.000					
Dist	-0.030	-0.030	-0.117	1.000				
Popu	0.055	0.056	0.048	0.213	1.000			
BankCred	0.275	0.277	0.120	0.304	0.238	1.000		
Trade	0.047	0.048	0.066	-0.410	-0.326	-0.278	1.000	
CPI	-0.015	0.728	0.106	0.050	-0.030	0.381	0.045	1.000

Methodology

The data, which is used in this paper, has both time-series and cross-sectional dimensions. Thus, panel data regression models are relevant to conduct empirical research. Different

techniques were performed in order to create a dataset that would be convenient and correct for panel data investigation. Hausman test is employed to account for exogeneity assumption and to distinguish between fixed versus random effects. Random effect model is chosen, because some of the explanatory variables (distance and language) are time-invariant and Hausman test results in such outcome in 23 out of 29 countries. The research is performed using clustered standard errors because data used is multi-dimensional and observations in the dataset are related to each other.

Furthermore, aforementioned correlation problem between CPI and recipient's credit rating is approached. Because the latter is one of our variables of interest in this research, two separate regressions are investigated. These are the same except for CPI and recipient's sovereign credit rating (one with CPI, one with rating). Moreover, comments are provided on the commonalities and differences of these models in this way selecting the more appropriate variable for further analysis.

Sovereign Credit Rating's Impact on FDIs

Paper firstly analyzes if sovereign credit ratings have an effect on FDI flows. This is done by including the ratings of both donor and recipient countries. In addition, control variables will be incorporated into the regression:

$$FDI_t = \beta_1 SCR\_Don_t + \beta_2 SCR\_Recpt_t + \beta_a Lang_t + \beta_b Dist_t + \beta_c Popu_t + \beta_d BankCred_t + \beta_e Trade_t + \varepsilon_t;$$

where FDI_t represents annual bilateral FDI flow from a donor country to a recipient country in year *t*, measured in million US Dollars. SCR_Don_t and SCR_Recpt_t are sovereign credit ratings of, respectively, donor country and recipient country in year t. $Lang_t$ is a dummy variable indicating bilateral linkage between donor and recipient countries in year t. $Dist_t$ is a continuous variable that specifies the distance between two countries in kilometers in year t. $Popu_t$ is a continuous variable, which refers to an overall effect of population in the pair of countries in year t. $BankCred_t$ is a continuous variable that indicates the overall effect of bank credit in two countries in year t. Finally, $Trade_t$ is a continuous variable, which specifies the overall effect of degree of openness among two countries in year t. In total, the panel data of this research involves 29 x 28 pairs of countries.

Sovereign Credit Rating effect on euro area and non-euro area recipients' FDI

The point that FDI has a significant effect in the euro area raises questions about the role of sovereign credit ratings in attracting FDI among OECD countries that have the euro as their currency and countries that do not. In order to evaluate these margins, the following two models are implemented:

$$FDI_t = \beta_1 SCR\_Don_t + \beta_2 Euro\_SCR\_Recpt_t + \beta_a Lang_t + \beta_b Dist_t + \beta_c Popu_t + \beta_d BankCred_t + \beta_e Trade_t + \varepsilon_t;$$

$$FDI_t = \beta_1 SCR\_Don_t + \beta_2 NonEuro\_SCR\_Recpt_t + \beta_a Lang_t + \beta_b Dist_t + \beta_c Popu_t + \beta_d BankCred_t + \beta_e Trade_t + \varepsilon_t;$$

where $Euro\_SCR\_Recpt_t$ is a sovereign credit rating of a recipient country, which is a member of euro area at time t. $NonEuro\_SCR\_Recpt_t$ is a sovereign credit rating of a recipient country, which is not part of euro area at time t. All controls remain the same.

Empirical results

The analysis begins by running two separate regressions (one with CPI and one with recipient's sovereign credit ratings). Looking at the obtained output (Table 5, model 1a and 1b) it is visible that the effect of recipient's credit rating (64.777) is much stronger than that of CPI (22.512). Both coefficients are statistically significant even at 1% significance level and coefficients of the other variables were not impacted that much. Sovereign credit ratings represent many more variables including political environment, which might also be associated with corruption. CPI concentrates on a specific topic, while credit rating involves different subjects that allow for a deeper investigation. Based on this economic story and that the recipient's rating has a stronger effect on FDI, this variable is included in the latter models. What is more, this stronger effect is consistent with the international capital flows theory described in the existing literature section. In short, it says that the better the economic environment in the country, the more attractive it is to investors.

The effect of Sovereign Credit Ratings on FDIs

This research continues by running Granger causality test. This is done to check the causal relationship between sovereign credit ratings and FDI. One lag is used for all variables while

running the tests. The results are presented in Table 4. Overall, unidirectional flow was expected, where sovereign credit ratings granger cause FDI. However, there is evidence that in our dataset donor's rating granger causes FDI. This might imply that there is reverse causality problem between these two variables, however, it is unlikely that it should cause an issue in this paper. Sovereign credit rating is dependent on various factors that do not include FDI and it is obvious, that investors rely on the rating to decide whether they are going to invest in a country. On the contrary, credit rating agencies rely on many more factors rather that FDI to determine the credit rating.

Table 4. Granger Causality Test results. This paper uses 1 lag of all variables and 5% significance level for conducting this test.

	Granger causality test			
	H0: Recipient's rating does not cause FDI	H0: FDI does not cause recipient's rating	H0: Donor's rating does not cause FDI	H0: FDI does not cause donor's rating
Result	H0 rejected	H0 could not be rejected	H0 rejected	H0 rejected

Subsequently, the controlled effect of sovereign credit ratings on FDI is analyzed looking at the panel regression including control variables (Table 5, model 1a). Model 1a include all 29 donor countries in aggregate setting panel regressions. Using random effects GLS (Generalized Least Squares) estimation it is possible to observe that the coefficients of both sovereign credit ratings are statistically significant (p-value donor: 0.000 and recipient: 0.001) in the presence of control variables. One tier incline in a sovereign credit rating of a donor country, increases FDI flows to the recipient economy by 77.120 million US dollars. The same increase in a recipient's credit rating enhances foreign investments by 63.777 million US dollars. These findings offer slightly different results from what Cai, Kim and Gan (2017) found in their empirical research. Consistent with the existing literature described earlier, the coefficient of the credit rating of a recipient is positive (63.777). This is in line with international flows theory, which states that investments move to countries that have the best economic conditions (Reinhart, 2002, Chen, Chen, Chang & Yang, 2013, Kim & Wu, 2008). However, the coefficient of the credit rating of a donor is also positive (77.120), which objects the aforementioned rule. There are two possible explanations for this phenomenon. Firstly, this paper includes only 29 countries that are developed economies and all of them offer more or less equally favorable economic conditions to invest abroad. In the work of Cai, Kim and Gan (2017), their sample consists of 31 OECD donor countries

and 72 OECD and non-OECD recipient countries, which have a much broader spectrum of economic circumstances. Secondly, highly rated countries usually include a bigger number of large institutions that want to expand, hence, they consider various possibilities to do that in foreign countries.

Table 5. Results for aggregate panel data regressions.
$FDI_t = \beta_1 SCR\_Don_t + \beta_2 SCR\_Recpt_t + \beta_a Lang_t + \beta_b Dist_t + \beta_c Popu_t + \beta_d BankCred_t + \beta_e Trade_t + \varepsilon_t$ (1a);
$FDI_t = \beta_1 SCR\_Don_t + \beta_2 CPI_t + \beta_a Lang_t + \beta_b Dist_t + \beta_c Popu_t + \beta_d BankCred_t + \beta_e Trade_t + \varepsilon_t$ (1b);
$FDI_t = \beta_1 SCR\_Don_t + \beta_2 Euro\_SCR\_Recpt_t + \beta_a Lang_t + \beta_b Dist_t + \beta_c Popu_t + \beta_d BankCred_t + \beta_e Trade_t + \varepsilon_t$ (2a);
$FDI_t = \beta_1 SCR\_Don_t + \beta_2 NonEuro\_SCR\_Recpt_t + \beta_a Lang_t + \beta_b Dist_t + \beta_c Popu_t + \beta_d BankCred_t + \beta_e Trade_t + \varepsilon_t$ (2b).
The dependent variable FDI_t represents annual bilateral FDI flow from a donor country to a recipient country in year t, measured in million US Dollars. SCR_Don_t and SCR_Recpt_t are sovereign credit ratings of, respectively, donor country and recipient country in year t. CPI_t is a corruption perceptions index taking values from 1 to 100. $Euro\_SCR\_Recpt_t$ is a sovereign credit rating of a recipient country, which is a member of euro area at time t. $NonEuro\_SCR\_Recpt_t$ is a sovereign credit rating of a recipient country, which is not part of euro area at time t. $Lang_t$ is a dummy variable indicating bilateral linkage between donor and recipient countries in year t. $Dist_t$ is a continuous variable that specifies the distance between two countries in kilometers in year t. $Popu_t$ is a continuous variable, which refers to an overall effect of population in the pair of countries in year t. $BankCred_t$ is a continuous variable that indicates the overall effect of bank credit in two countries in year t. Finally, $Trade_t$ is a continuous variable, which specifies the overall effect of degree of openness among two countries in year t.

	Model 1		Model 2	
	1a	1b	2a	2b
SCR_Don	77.120***	81.569***	97.063***	62.280***
SCR_Rec	63.777***			
Euro_SCR_Rec			36.855	
NonEuro_SCR_Rec				129.958***
Control variables				
Lang	1915.303***	1891.799***	2547.675**	1471.05*
Dist	-127.624	-157.657	67.873	-182.125
Popu	0.000037***	0.000038***	0.000029**	0.000039***
BankCred	0.015	0.007	0.044	0.015
Trade	7.600***	7.154***	6.144**	9.414**
CPI		22.512***		

Additionally, country-by-country analysis is conducted and the output for every donor country is reported in Appendix A.2. Most of the coefficients in this setting are insignificant, however, it is important to analyze directions of the effects. Concentrating exclusively on the variables of interest - sovereign credit ratings, this model is dominated by positive coefficients (23-6) of both donors and recipients ratings. These findings are basically similar to the ones presented in Table 5. Again, while we expected recipient's ratings to have positive coefficients, donor's coefficients should have been negative, thus the same explanation discussed in the previous paragraph applies here.

Looking at the overall effect of control variables that are included in model 1a (Table 5), three out of five have significant coefficients with signs that could have been expected before the analysis. On the other hand, the variables representing distance between two countries and bank

credit to private sector are not significant with the p-values even higher than 0.1. Nevertheless, these variables still offer some explanatory power, hence are kept in the model as controls. Distance coefficient has a negative sign (-127.624), which is consistent with a theory that the further the countries are from one another, the less FDI flows among these countries. Because distance is measured as a natural logarithm in the dataset, the interpretation is a bit more complex. A 1% increase in distance between two countries leads to 1.27624 million US dollar decrease in FDI flows. In the future, this coefficient is expected to be way lower because of globalization.

Firstly, population has a positive impact on FDI. This is obvious, because it represents the market size of an economy. This paper takes into account the overall effect of the population, so the coefficient being relatively small (0.000037) does not mean that it barely matters. It has a highly significant effect on larger countries, thus, making them important contributors into international capital flows. Moreover, as it was expected, another control that has a positive influence on FDI is common language. This dummy variable takes value of 1, if the two countries share the same official or business language, and 0 otherwise. The coefficient of language is the highest in the regression and suggests that bilateral linkage increases FDI flows by 1915.303 million US dollars. Lastly, parallel with the literature, the coefficient of the trade variable is also positive and significant. A 1% increase in sum of imports and exports as a percentage of GDP leads to 7.600 million US dollars incline in FDI flows. Hence, in this model trade openness strongly contributes to the capital flows between the countries.

All in all, the results suggest that sovereign credit ratings have a significant effect on the size of FDI flows. This research shows that higher levels of investments are caused by higher sovereign credit ratings of both donor and recipient countries. Moreover, large population, shared language, smaller distance between the countries, more developed financial system and higher trade openness lead to more FDI.

The impact of Sovereign Credit Ratings on euro area and non-euro area hosts' FDIs

This paper also investigates the effects of sovereign credit ratings by distinguishing recipients to Eurozone and non-Eurozone nations. The outcomes of the performed regressions are reported in model 2 column of Table 5. Again, this is an aggregate setting with all 29 donor countries combined.

The findings of these two panel data regressions suggest that the coefficients of sovereign credit ratings of donor countries are statistically significant. These ratings have an even stronger positive effect on FDI flows if the recipient is Eurozone's country. An increase in a credit rating of donor by 1 brings an average incline in FDI of 93.063 million US dollars. This more substantial impact of ratings might be explained by the fact that euro area members have mutual contracts with other economies, which are usually more developed, hence, with better credit ratings. However, if the recipient country is not in the Eurozone, an increase in a credit rating of donor economy by one level, on average enhances FDI flows by 62.280 million US dollars.

Additionally, the coefficients of recipients' sovereign credit ratings have positive directions and could be interpreted in the same way. Nevertheless, the coefficient of Eurozone FDI recipients (36.855) is statistically insignificant, meaning that it does not add much explanatory value to the model. This and coefficient of distance (67.873) shows the phenomenon of the Eurozone itself. In contrast with other countries in the dataset, euro area economies are fairly close to each other and are more developed. There is no such a difference at which country to invest as the distances between them are small and human capital is roughly similar. In contrast, the coefficient of sovereign credit rating of non-Eurozone recipients is 129.958, which has much stronger influence on FDI. About half of the observations in this dataset involve investment flows from euro area countries. Thus, it makes sense that a desire to invest abroad may be limited to the cases, when a recipient country has an exceptional reputation, meaning a good sovereign credit rating.

Concentrating on the controls in the regressions, common language has a more significant impact on FDI flows in Eurozone countries (2547.675). Possible explanation is that bilateral linkages are more usual between neighboring countries, which is the case in euro area. Moreover, the development of financial system has a positive effect on FDI flows. Even though the coefficients are statistically insignificant, this variable has a positive direction that was expected (0.044 for Eurozone, 0.015 for non-Eurozone).

Finally, the trade openness variables are both statistically significant at 5% significance level and it plays a more important role when the recipient country is not in euro area. A coefficient of 9.414 signalizes that a 1% increase in direction of trade variable leads to an increase in FDI flows by 9.414 million of US dollars.

Overall, the findings of this section suggest that countries with higher sovereign credit ratings choose to invest in Eurozone countries, whose ratings are not significantly important. What is more, FDI flows to non-Eurozone economies are more depended on the recipient's country credit rating. Ratings of donors investing in these countries are not as relevant as in the previous case, however, still significant.

Conclusion

With the analysis conducted and the results obtained, it is possible to answer the research question - "*Do sovereign credit ratings of both donor and recipient countries impact bilateral FDI flows?*". The given results agree and disagree to the initial expectation of the likely effect and state that sovereign credit ratings are strong determinants of Foreign Direct Investments. The findings of Peilin Cai, Suk-Joong Kim and Quan Gan (2017) suggest that donor's rating should have a negative effect on the FDI flows to the host economy. However, as the current paper's dataset excludes the less developed economies, output shows a positive effect of donor's rating on FDI. What is more, the results of an impact of recipient's credit rating on FDI flows is similar – positive relationship. This research provided some evidence that more developed economies are willing to invest abroad more if the host economy is more advanced as well.

Another research question that needs to be answered is - "*Is there any difference between euro area and non-euro area recipients with regards to their sovereign credit ratings' influence on FDI?*". Investigation showed that Eurozone recipients are way less dependent on their sovereign credit ratings in comparison with non-Eurozone recipients. In other words, higher-rated euro area recipient countries attract more FDI flows, whereas the same applies to non-Eurozone recipients but at a more significant level. Euro area is a well-functioning union, which includes countries that have mutual trade agreements. These agreements indeed increase the attractiveness of investing in euro area.

The main limitations of this study include Omitted Variable Bias (OVB), simultaneous causality, data availability and timing. OVB is the hardest threat to overcome. There might always be a control variable that is missing, thus, it is nearly impossible to be sure that this issue is solved. The simultaneous causality problem might be considered for the relationship between the donor's sovereign credit rating and FDI. The perfect case scenario would have been to include all OECD

countries and more years of data, which requires more time and a more developed database. Regarding the first two mentioned issues, a possible solution might be to perform Two-Stage Least Squares (2SLS) regression analysis in this way including instrumental variable. They should be correlated with the independent variable but uncorrelated with the error term.

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Appendix

Appendix A.1. Descriptions of variables.

Variable	Description
FDI	Bilateral annual FDI flow from a donor country to a recipient country
SCR_Don	Sovereign credit rating of the donor country
SCR_Rec	Sovereign credit rating of the recipient country
Euro_SCR_Rec	Sovereign credit rating of the recipient country that is located in the Eurozone
NonEuro_SCR_Rec	Sovereign credit rating of the recipient country that is not located in the Eurozone
Lang	Dummy variable taking value of 1 if a pair of countries share the same official or business language, and 0 otherwise
Dist	Natural logarithm of the distance between a pair of countries
Popu_Rec	Population of the recipient country, in 10,000
Popu_Don	Population of the donor country, in 10,000
Popu	Overall effect from population (= Popu_Rec x Popu_Don)
BankCred_Rec	Domestic credit provided by financial sector of the recipient country in million US$
BankCred_Don	Domestic credit provided by financial sector of the donor country in million US$
BankCred	Overall effect of bank credit (= BankCred_Rec x BankCred_Don)
Trade_Rec	Sum of imports and exports as a share of GDP for recipient country
Trade_Don	Sum of imports and exports as a share of GDP for donor country
Trade	Overall effect from total trade (= Trade_Rec + Trade_Don)
CPI	Corruption Perceptions Index with values from 1 (most corrupted) to 100 (least)

Appendix A.2. Results of country-by-country panel data regressions. Estimated findings are obtained from the following panel regressions performed for every country in the dataset: $FDI_t = \beta_1 SCR\_Don_t + \beta_2 SCR\_Recpt_t + \beta_a Lang_t + \beta_b Dist_t + \beta_c Popu_t + \beta_d BankCred_t + \beta_e Trade_t + \varepsilon_t$. The dependent variable FDI_t represents annual bilateral FDI flow from a donor country to a recipient country in year t, measured in million US Dollars. SCR_Don_t and SCR_Recpt_t are sovereign credit ratings of, respectively, donor country and recipient country in year t. $Lang_t$ is a dummy variable indicating bilateral linkage between donor and recipient countries in year t. $Dist_t$ is a continuous variable that specifies the distance between two countries in kilometers in year t. $Popu_t$ is a continuous variable, which refers to an overall effect of population in the pair of countries in year t. $BankCred_t$ is a continuous variable that indicates the overall effect of bank credit in two countries in year t. Finally, $Trade_t$ is a continuous variable, which specifies the overall effect of degree of openness among two countries in year t.

Donor country	AUT	BEL	CHL	CZE	DNK	EST
SCR_Don	93.877	577.853	43.759	10.710	93.212**	10.307
SCR_Rec	22.504	-32.737	-0.188	1.433	23.883*	1.897*
Lang	281.126	-696.781	816.868***	Omitted	Omitted	-65.737***
Dist	-106.100**	-1082.284	37.180	-23.411	-207.198*	-10.084
Popu	0.000034***	0.0000049	0.0000072	0.000002	0.000062***	0.00000084
BankCred	-0.022	0.191	0.012	0.004	-0.007	-0.001
Trade	0.497	16.195	1.473***	0.638*	-2.647**	-0.125
Donor country	FIN	FRA	DEU	GRC	HUN	ISL
SCR_Don	-304.628	145.724	203.953	4.895	25.268	11.194
SCR_Rec	2.489	158.724	167.904*	-17.203	-8.870	-3.825
Lang	589.240	4947.88	-819.965	Omitted	150.762**	Omitted
Dist	-123.632	-907.928**	-1444.901*	-21.537	35.743	-70.279***
Popu	0.000013	0.000044***	0.000028***	0.0000058**	0.000004	-0.000024
BankCred	0.041	-0.188	0.174*	-0.002	-0.016**	0.008***
Trade	1.683	-12.262	18.998*	0.042	0.342	-0.546**

Appendix A.2. (continued) Results of country-by-country panel data regressions. Estimated findings are obtained from the following panel regressions performed for every country in the dataset: $FDI_t = \beta_1 SCR\_Don_t + \beta_2 SCR\_Recpt_t + \beta_a Lang_t + \beta_b Dist_t + \beta_c Popu_t + \beta_d BankCred_t + \beta_e Trade_t + \varepsilon_t$. The dependent variable FDI_t represents annual bilateral FDI flow from a donor country to a recipient country in year t, measured in million US Dollars. SCR_Don_t and SCR_Recpt_t are sovereign credit ratings of, respectively, donor country and recipient country in year t. $Lang_t$ is a dummy variable indicating bilateral linkage between donor and recipient countries in year t. $Dist_t$ is a continuous variable that specifies the distance between two countries in kilometers in year t. $Popu_t$ is a continuous variable, which refers to an overall effect of population in the pair of countries in year t. $BankCred_t$ is a continuous variable that indicates the overall effect of bank credit in two countries in year t. Finally, $Trade_t$ is a continuous variable, which specifies the overall effect of degree of openness among two countries in year t.

Donor country	IRL	ISR	ITA	JAP	KOR	LAT
SCR_Don	-22.408	79.363	133.461	-841.975	44.196	0.211
SCR_Rec	108.104	25.435	151.901**	54.408	4.273	0.236
Lang	1858.311***	-90.063	-1426.633***	Omitted	87.554	7.759***
Dist	-805.635***	21.435	-557.240**	664.996***	409.050***	-0.359
Popu	0.00053***	0.000026***	0.00001***	0.000075***	0.000027***	0.000001***
BankCred	-0.061	-0.004	-0.028	0.046	0.016*	0.00017
Trade	7.553**	1.383	-5.408*	15.969**	3.034***	0.051***
Donor country	LUX	NLD	NZL	POL	SVK	SVN
SCR_Don	278.246	-6542.522	17.307	-246.940	25.298	0.820
SCR_Rec	563.310*	173.890*	0.077	12.033*	0.727	0.442
Lang	-3159.021	-2288.853	26.615**	Omitted	-30.087	Omitted
Dist	-3685.968**	-1727.054	37.663	0.557	-9.469	0.021
Popu	0.026***	0.000081	0.000016***	0.0000029***	0.000001	0.0000004
BankCred	0.260	-0.098	-0.001	0.010	-0.007*	-0.001*
Trade	25.715	-5.058	0.126	2.653***	0.005	0.004
Donor country	SWE	CHE	TUR	GBR	USA	
SCR_Don	54.968	-140.579	4.918	396.931	4695.822**	
SCR_Rec	71.806**	134.378*	3.503	211.546	-106.208	
Lang	-616.927**	-884.345	Omitted	2165.952**	11884.85***	
Dist	-259.349***	-361.916	-44.981	-517.706	-28718.35***	
Popu	0.000064***	0.00053***	0.000002***	0.00009***	0.000045***	
BankCred	-0.004	-0.006	0.014	-0.087	-0.012	
Trade	0.021	15.464***	0.414	1.026	115.573***	