

The Influence of Public Sentiment on FDI is Analyzed by Extending Payphone's Gravity Model

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Abstract. Since Trump initiated the trade war against China, the impact of politics on the economy has significantly increased. In recent years, as China's economic power has grown, diplomatic conflicts between China and Japan, as well as China and South Korea, have become more frequent and intense. From the diplomatic level, to expand the interests of countries, foreign trade is an indispensable part of every country's diplomacy. A very important index of foreign trade is foreign direct investment. Foreign direct investment (FDI) has been crucial to China's rapid economic growth since the 1980s. As China's key trade partners in East Asia, Japan and South Korea have invested over \$1.5 trillion in FDI in China. National sentiment reflects people's views on politics from the perspective of the people and can also reflect political changes to a certain extent. Therefore, this study reflects the change of political change to economic development to a certain extent through the impact of national sentiment on economy. This article uses the gravity model to estimate how national sentiment affects the inward FDI flows from Japan and South Korea. This study highlights the national sentiment in both Japan and South Korea. While research shows a positive correlation between public sentiment towards China in these two countries, the coefficient results indicate that the overall impact of national sentiment on FDI is limited. This article mainly analyzes the relationship between national sentiment and FDI in South Korea and Japan and subdivides the different foreign policies of these two countries. Additionally, countries demonstrate different levels of sensitivity to sentiment, suggesting further-segmented policies should be taken into consideration. Investigating these different sensitivities is useful for China's different national policies towards its own country.

Keywords: FDI, Public sentiment, Relation.

1. Introduction

In recent years, China's diplomatic approach has shifted toward a more aggressive stance, exemplified by the so-called 'wolf warrior' diplomacy [1]. This strategy, particularly visible in East Asia, involves assertive and sometimes confrontational rhetoric and actions aimed at defending China's interests on the global stage [2]. Such aggressive diplomacy has raised concerns among neighboring countries and global powers, creating a complex geopolitical environment where sentiment toward China has become increasingly polarized. China's strong performance in international politics will be reported and amplified by other countries, which will affect popular sentiment in other countries. Such amplification and reporting may cause disgust and panic among the public to a certain extent, especially in Japan and South Korea, which are closer to China. Internationally, these factors are mutually influencing. This polarization of sentiment in China is not completely without influence, it has caused a certain degree of impact on China's FDI.

On the other hand, Foreign Direct Investment (FDI) has been instrumental in China's rapid economic development. Borenstein, De Gregorio, & Lee have indicated that FDI brings both capital and technology, contributing to growth in developing countries by increasing technological transfer and productivity improvements [3]. China has kept an open attitude since 1980s. Deng Xiaoping highlighted China will open its doors to foreign investment as part of its reform and opening-up policy in the Southern speech. The 'dual circulation' policy proposed by Xi Jinping exhibited similar attitude toward FDI.

This paper mainly analyzes the influence of public sentiment on FDI in South Korea and Japan, and uses a gravity model. Through the specific data analysis of these two countries and the reaction

was not limited to those two countries. From this data analysis, this paper can deduce the foreign policies of these two countries.

2. Literature review

2.1. Diplomacy and national sentiment

2.1.1. Aggressive diplomacy

Aggressive diplomacy, characterized by coercive measures and hostile rhetoric, often triggers strong national sentiment, intensifying nationalism and affecting public opinion. Studies regarding U.S.-Cuban relations and U.S.-Russian relations has exhibited that diplomatic tensions, lead to heightened nationalist sentiment in both countries, influencing public perception [4, 5]. It has been generally accepted that adopting aggressive diplomacy would negatively influence the citizens' opinion of the other country. Moreover, Reichberg and Syse indicated media coverage and political rhetoric further amplify these effects, framing diplomatic actions in ways that shape emotional and economic responses [6].

2.1.2. Existing studies

Existing studies regarding influence of national sentiment on bilateral trade mainly focuses on the impact of national sentiment between different countries, with relatively little discussion on how national sentiment affects FDI from a specific home country across different host countries, suggesting the rise of animosity in host country would decrease the FDI outflow to home country and the rise of affinity in host country would increase the FDI outflow to home country [7, 8]. Nevertheless, the difference of marginal utility between developed country and developing country was overlooked, which leads to bias in explaining emerging economies. Also, researches considering interaction between single home country and multiple host countries remains less-explored. The study intends to measure the different importance of foreign national sentiment toward FDI inflow of China, suggesting varying national sentiment across host countries. Moreover, in connection with positive correlation between aggressive diplomacy and increasing animosity, the article sheds light on how government can adopt more flexible diplomatic approaches, based on the specific economic and political dynamics of each country, seeking to offer practical guidance for balancing diplomatic objectives with economic growth.

2.2. Gravity Model

Gravity model has been considered as one of the most applicable models in explaining bilateral trade flows. Tinbergen proposed the fundamental gravity model under the influence of classical physics [9]. The linear expression of the fundamental gravity model can be described as follows:

$$\ln FDI_{ijt} = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 \ln Dis_{ij}, \quad (1)$$

Notation is defined as follows:

i – host country

j – home country

t – time

FDI_{ijt} – FDI inflow from host country i to home country j

GDP_{it} – Gross Domestic Product of host economy at time t

GDP_{jt} – Gross Domestic Product of home economy at time t

Dis_{ij} – Geographical distance between capital of host and home economy

ε_{ijt} – residual

The malleability of gravity model has been generally accepted and variations with added variables has been proposed [9]. Existing work has proved the practicality of incorporating sentiment-related variables into gravity model [10]. However, current researches tend to focus on political factors such

as geopolitical risk, with limited interest in public opinion [11]. Few existing researches mainly pay attention to EU enlargement. By introducing public opinion to analyzing FDI flow between China and East Asia countries, we hope to explore the purview of the gravity model further.

In the study, we extend the gravity model by adding the Animosity variable as below:

$$\ln FDI_{ict} = \beta_0 + \beta_1 \ln FGDP_{it} + \beta_2 \ln CGDP_{Ct} + \beta_3 \ln Dis_{iC} + \beta_4 Animosity_{iCt} + \beta_5 Dummy_{it} + \beta_6 Dummy_{it} * Animosity_{iCt} + \xi_1 IN_{it} + \xi_2 \ln FPCI_{it} + \xi_3 \ln PCIdif_{iCt} + \xi_4 GE_{Ct} + \varepsilon_{iCt}, \quad (2)$$

Since the research explores between home country China and different host countries, we use C to replace j in the original formula. We collected data of public opinion from Cabinet Office of Japan and Pew Research Center. Due to the lack of data, we cannot obtain consecutive data for all nations. In both surveys, responds were recorded as percentage. In survey of Cabinet Office of Japan, respondents were asked to choose from: Very favorable, somewhat favorable, somewhat unfavorable, very unfavorable, DK/Refusal. In Pew Research Center's report, some nations were recorded in the same form as above, while others were simply asked if they are Favorable or Unfavorable. For more accurate estimation, data from Cabinet Office of Japan were rearranged into the same form: Favorable = Very favorable + somewhat favorable and Unfavorable = Very unfavorable + somewhat unfavorable. Given the special attribute of national sentiment, we directly adopt percentage of respondents as parameter [12].

Moreover, we introduce dummy variable to control country-fixed effects. Since the research mainly focus on China FDI inflow from Japan and Korea, only one dummy variable is required, and dummy variable for Korea is labeled as '1'. The $[Dummy]_{it} * [Animosity]_{iCt}$ variable measures the difference of animosity between different Korea and other countries, which is Japan in this study.

Control variables primarily focus on economic and institutional aspects. $[IN]_{it}$ variable indicate the annual inflation difference of host country i. Economically speaking, a stable inflation rate of 2% would stimulate economic development without resulting drastically price raising, and unstable inflation rate will lead to negative influence on the nation's economy. $[FPCI]_{it}$ indicates the host country's GDP per capita at time t, which is commonly used in estimating a country's economic performance. $[PCIdif]_{iCt}$ measures the difference of GDP per capita between host country i and home country China at time t. $[GE]_{Ct}$ evaluates a country's government effectiveness, conducted by the UN annually.

3. Analysis

The reasons we choose Japan and Korea is that Japan and South Korea have a large amount of FDI in China and China has close geographical relations with South Korea and Japan. By 2019, Japan's total investment in China is US \$115.7 billion, accounting for 6.1% of China's total foreign investment, ranking first among China's foreign investment countries [13]. From 1992 to 2020, South Korea's direct investment in China totaled 86.2 billion U.S dollars [14]. As a result, South Korea also has huge direct investment in China. Japan and South Korea are Asian countries that are relatively close to China in geography. China can only maintain a limited diplomatic relationship with South Korea because of its relationship with the United States. China demands Korea's political neutrality. South Korea wants economic ties with China, but it needs the US to protect it militarily. In recent years, due to the gradual deterioration of Sino-US relations, the political relations between China and Japan have further deteriorated and begun to influence the economic activity between two countries. Moreover, the territorial dispute between China and Japan remains unsolved, impacting public opinion of both countries constantly.

Table 1. Correlation Test

	FGDP	CGDP	Animosit y	FPCI	CGPP	Fo	Distance	IN	GE	PCIdi f
FGDP	1									
CGDP	0.21459 2	1								
Animosit y	0.67676 3	0.655587 4	1							
FPCI	0.95024 5	0.449556	0.792737	1						
CGPP	0.21222	0.995345	0.660277	0.45343 5	1					
Fo	- 0.08815 2	0.201092	-0.38781	-0.73254	0.18986 1	1				
Distance	0.95102 3	0	0.561732	0.84437	-1.6E-17	-0.94004	1			
IN	-0.0216	0.088295	0.224176	0.01493 6	0.08025 9	0.07447	0.0135	1		
GE	0.18688 8	0.875281	0.563995	0.40942 3	0.89880 1	0.12334 8	7.76E-17	0.02390 5	1	
PCIdif	0.91292 5	-0.16992	0.435869	0.77977 6	-0.17765	-0.93645	- 0.936163 1	-0.01393	- 0.1794 5	1

A correlation test is conducted to examine the strength and direction of the linear relationship between variables, which helps to identify potential associations and assess multicollinearity before proceeding linear regression.

The correlation result was provided in Table 1. As shown in Table 1, all the correlations are far beneath 5, denying the existence of multicollinearity. Moreover, only few variables are above the common threshold of 0.7, suggesting weak linear relationship among utilized variables.

Aside from traditional Ordinary Least Squares (OLS) model, Generalized Least Squares model (GLS), and Weighted Least Squares (WLS) were employed. OLS estimates relationships by minimizing squared residuals, assuming constant variance of errors. GLS adjusts for heteroscedasticity and autocorrelation, providing more efficient estimates when these assumptions are violated. WLS further addresses heteroscedasticity by assigning weights to observations, giving lower weight to those with higher variance, resulting in more accurate parameter estimates.

Table 2. Regression Results Summary

Variable	OLS Coeff	OLS Std	OLS P > t	WLS Coeff	WLS Std	WLS P > t	GLS Coeff	GLS Std	GLS P > t
const	0.4923	0.311	0.131	0.4782	0.31	0.14	0.4923	0.311	0.131
FGDP	0.888	0.403	0.041	0.8399	0.407	0.042	0.888	0.403	0.041
CGDP	-0.7124	0.288	0.024	-0.7306	0.286	0.02	-0.7124	0.288	0.024
Distance	1.1017	0.997	0.284	1.0512	0.995	0.305	1.1017	0.997	0.284
Dummy	1.5597	0.396	0.001	1.5696	0.395	0.001	1.5597	0.396	0.001
DA	-0.016	0.005	0.033	-0.0119	0.005	0.029	-0.0116	0.005	0.033
Animosity	0.0072	0.004	0.077	0.0074	0.004	0.073	0.0072	0.004	0.077
IN	0.027	0.018	0.157	0.0279	0.018	0.146	0.027	0.018	0.157
FPCI	4.6833	1.489	0.006	4.7246	1.489	0.005	4.6833	1.489	0.006
PCIdif	-3.3533	1.12	0.088	-3.3422	1.119	0.008	-3.3533	1.12	0.008
CE	-2.1144	0.752	0.012	-2.034	0.755	0.015	-2.1114	0.752	0.012

In the Regression Results Summary, R-squared values for the models are around 0.644 to 0.649, meaning that around 64-65% of the variance in FDI is explained by the independent variables. The adjusted R-squared values are slightly lower, around 0.466 to 0.474, indicating that the models have moderate explanatory power after adjusting for the number of predictors. The F-statistics are significant across all models, indicating that the overall regression models fit the data well (Shown in Table 2).

Animosity is marginally significant, suggesting a weak relationship with FDI. And the coefficient is very small, indicating limited influence on China inflow FDI. The Dummy variable is highly significant in all models. The DA (Dummy * Animosity) variable is significant. The negative coefficient suggests animosity of Korean citizens has less effect on FDI outflow to China, compare to Japanese citizens.

While Distance variable being insignificant in all models, many gravity variables are significant. The abnormality could be attribute to the small sample size. In variable, as is significant and positive, corresponding to our previous assumption. FPCI variable is positive and highly significant, which is in align with emerging market outflow theory [15]. PCIdiff variable is negative and highly significant. Oyadeyi, Ibukun & Arogundade [16] suggested higher disparities in economic development between home and host countries reduce investor confidence, leading to fewer FDI inflows, which could explain the result. Government Effectiveness is significant and negative. The negativity could be interpreted as higher government effectiveness results in more regulatory interventions that might deter foreign investors [17].

4. Conclusion

The data suggest that hostility between populations in different countries has a weak and limited impact on FDI. At the same time, the wide gap in economic development between home and host countries has reduced investor confidence and led to a decline in FDI. Moreover, the negative correlation coefficient shows that the hostility of South Korean citizens has less impact on FDI inflow to China than that of Japanese citizens.

Because of empirical findings, we suggest that an increase of animosity toward China in Korean citizen has relatively lower influence on Korean FDI outflow to China than Japan. Furthermore, the finding recommends Chinese government can take more aggressive diplomacy policy toward Korea, without resulting serious decline in Korean FDI inflow, compare to Japan FDI inflow. Moreover, the study shed light on finding the balance between political expansion and economic development. At the same time, the current study faces several limitations that must be considered when interpreting the results. On the one hand, the dataset is relatively small and was collected from multiple sources, which may lead to inconsistencies and reduce the reliability of the findings. The variables studied were also very limited, and many others were not included. The heterogeneity in data collection processes could introduce biases and limit the generalizability of the results. Future studies should aim to use larger, more homogenous datasets to enhance the robustness of the conclusions. On the other hand, this study focuses on China, a developing country, which may limit the applicability of the results to other contexts. China's unique economic and political characteristics, such as significant government intervention and rapid industrialization, may result in findings that differ from those in more developed economies. And culture is also very different between countries, which is also a relatively important factor. Because culture is very important for forming the consciousness of the people of a country, this dimension will also strongly influence the different ideologies of the people. As a result, the findings may not fully capture the broader global dynamics of national sentiment and FDI flows. Future research could benefit from a comparative analysis between developing and developed nations to explore the universality of the observed effects.

Authors Contribution

All the authors contributed equally, and their names were listed in alphabetical order.

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