DISCUSSION PAPER No.22-E-001

When free trade agreement meets competition: The impact of the EU-Korea FTA on Japanese firms' investment behavior

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2022.6

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When free trade agreement meets competition: The impact of the EU-Korea FTA on Japanese firms' investment behavior

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Abstract

This study analyzes the impact of bilateral free trade agreements (FTAs) on the investment of multinational firms located outside the FTA-covered regions. Specifically, we analyze how Japanese firms located in the European Union (EU) changed their investment behavior in response to the EU-Korea bilateral FTA concluded in 2011. By applying unique Japanese data at the affiliate level, we estimate how the EU-Korea FTA affects the performance of Japanese firms that are already operating in the EU. To mitigate the endogeneity problem due to self-selection into the region, we employed a difference-in-difference method and compared the performance variation of Japanese firms in industries where they competed the most with their Korean counterparts, with that of those with less competition, after controlling for firm and regional characteristics. We find that the EU-Korea FTA positively impacts the expected amount of foreign direct investment (FDI) by Japanese firms within the EU. Further, we show that such an impact is through the potential channel of trade, supported by the evidence that the FTA positively affects the volume of exports from Japanese affiliates to Japan, especially in industries where Japanese and Korean firms compete intensively. The study reveals that Japan's trade and FDI into the EU complement each other.

Keywords: FTA; Firm-level data; Difference-in-difference; Industry competition

JEL classification: D22; D24; F21; F23

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The contents of the study are based on the personal opinions of the authors and do not reflect the official views of the organization to which the authors belong. Financial support from JSPS KAKENHI (Grant Number JP18K12777) are gratefully acknowledged.

1 Introduction

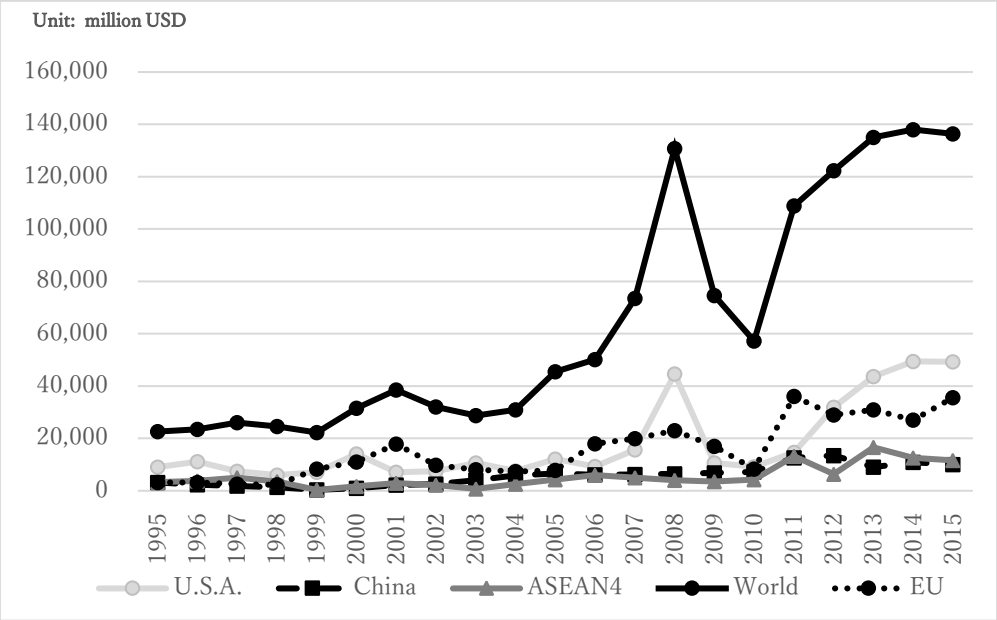
Free trade agreements (FTAs) play an important role in shaping and transforming international trade in terms of content and structure. Most existing literatures explore the impact of FTAs from the perspective of trade effect. The proliferation of FTAs leads to trade creation and trade diversion effects (Magee, 2008) and further discussion on cost and welfare analysis (Hayakawa et al., 2016; Bond et al., 2004; Plummer et al. 2010). Meanwhile, because of the close relationship between international trade and foreign direct investment (FDI), FTAs may have potential influence on FDI (Li et al., 2016). When firms are conducting vertical FDI, that is, producing intermediate goods or final goods overseas and exporting them back to their home country, FTAs will promote the import (mainly intermediate goods) from home to the host countries and increase the production capacity. Accordingly, the investment into these host countries will surge to meet the needs of the production and bring benefits to the local firms finally (Ni et al., 2017). In contrast, if firms are conducting horizontal FDI (the overseas manufacturing of products and services similar to those the firm produces at home) and observe that FDI is costlier than export in the presence of FTA, they choose export over FDI. In this case, FTAs' negative impact on FDI is observed. Most studies have theoretically and empirically investigated how FTAs affect FDI and focused on the beneficiary countries of FTAs. However, what happens if the firms' location is in the FTA beneficiary regions but their country of origin is excluded in the targeting FTA? How will the investment behavior of these firms change in response to the newly concluded FTA? Reportedly, few studies have empirically investigated these questions.

This study uses the European Union (EU)-Korea FTA[1], which commenced in July 2011, and investigates the decision-making of firms owned by Japanese multinational enterprises that are operating in the EU. Historically, the EU and Japan have been important economic partners. Recent data show that Japan's overall outward FDI in the EU increased after the end of the world economic crisis in 2010 (Figure 1). The total outward FDI of Japan in 2015 was 136.4 billion USD, with 26% investment in the EU. Despite a large investment in the EU, we observe a decrease in FDI in 2011, which coincides with the EU-Korea FTA[2].

[1] Korea here refers to South Korea. Until the EU-Korea FTA formal ratification in December 2015, it had been in provisional application since July 2011; it was the EU's first trade agreement with an Asian country (European commission).

[2] People might argue that this can also be caused by 2011 Tohoku earthquake. In the robustness check, we also consider the location of these affiliates' parent firms in Japan, namely the firms from most-affected regions versus those from less-affected regions, which does not change our

Figure 1 Japan's outward FDI by region



Source: Prepared by JETRO from Ministry of Finance Balance of Payments Statistics and Bank of Japan foreign exchange rates.

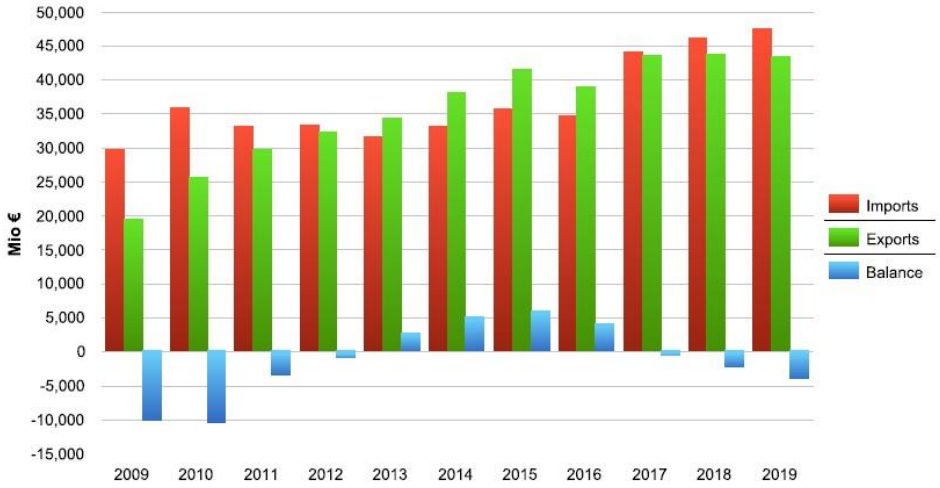
To explore the direct impact of the EU-Korea FTA, we collect data on Korea and Japan's trade with the EU, respectively. As shown in Figure 2-a and 2-b, Korea's trade with the EU in terms of both flow and balance has increased since 2011, and peaked in 2015. In contrast, we observe an increasing trend in Japan's trade with the EU in the long run but a drop in imports around 2011, and the total trade volume was not as high as that of Korea. In the following analysis, we will consider the interaction between international trade and FDI and examine the details of how the EU-Korea FTA might affect Japanese affiliates' behavior.

From the macro data above, we observe the correlation between the conclusion of the EU-Korea FTA and decrease in Japan' FDI in the EU. However, the causality between them cannot be determined without further investigation. Moreover, Figure 1 shows Japan's new FDI flow into the EU (extensive margin); however, incumbent firms may react (intensive margin) in different ways. Thus, in this study, we adopt the microeconomic approach by exploring each Japanese firm's behavior relative to the EU-Korea FTA. As we focus on the Japanese affiliates that are already operating in the EU before the conclusion of the EU-Korea FTA, in the baseline estimation, we will conduct the standard difference-in-difference (DID) analysis by comparing the investment of

qualitative prediction. The results are available upon request.

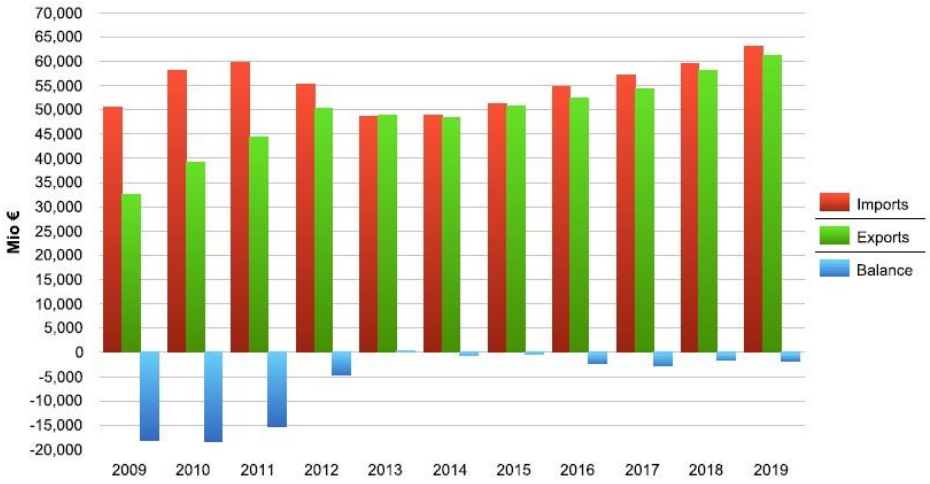
Japanese affiliates located in the EU with that of Japanese firms based elsewhere, before and after the year 2011.

Figure 2-a South Korea's trade with the EU



Source: Eurostat Comext, European Comission

Figure 2-b Japan's trade with the EU



Source: Eurostat Comext, European Comission

To further mitigate the endogeneity issue that might arise due to firms' self-selection into the EU, we will consider the competition mechanism between Japanese and Korean firms that belong to the same industry. Specifically, depending on the competitive intensity between Japanese and Korean counterparts (e.g., firms from these two countries compete intensely in automobile industry than those in the agricultural industry), we divide industries into highly competitive and less competitive ones. Then, we compare

Japanese affiliates in highly competitive industries with those in less competitive industries after controlling for the pre-FTA characteristics (assuming that firms in these two types of industries react differently to the EU-Korean FTA). Thus, the effect of the EU-Korean FTA on Japanese affiliates' behavior can be ascertained.

The contributions of this study are as follows: First, it pioneers in examining the impact of a bilateral FTA on the third-party behavior. Second, it applies detailed Japanese overseas affiliate-level data to quantify the decision-making of each firm, as there is a lack of evidence from the micro perspective regarding this. Finally, we evaluate the impact by exploring the variations in the competition intensity between Japanese and Korean firms in different industries, which will further enhance the robustness of our findings.

The study is structured as follows: Section 2 discusses the previous literature and how we position the current study. Section 3 introduces the data and methodology used for the analysis, and Section 4 presents the estimation results and robustness checks. We explore competition mechanism in Section 5 and conclude in Section 6.

2 Literature review

Despite a large literature that investigate the relationship between FTA and international trade, only a few studies have examined the impacts of FTAs on FDI. The verification by different countries and channels present heterogeneous results. Most of them show a positive impact of FTA on FDI (Yeyati et al., 2003; Medvedev, 2012; Li et al., 2016; Duong et al., 2021). For example, Duong et al. (2021) used Vietnamese panel data and focused on the 17 countries[3] that have signed FTA with Vietnam and found that FTA promotes the prevalence of vertical FDI in Vietnam. Li et al. (2016) examined the ASEAN-China FTA (ACFTA) and showed that ACFTA promotes inward FDI into China. Meanwhile, Busse et al. (2010) found that the results of the estimation are not stable and they differ by the methods of estimation. When the gravity model is applied, the results turn out to be positive and statistically significant in the case of GMM but insignificant in the PPML estimation.

Even though the evidence mentioned above supports the causality between FTA and FDI, there is limited research on how an FTA affects firms that are in FTA-covered regions, when their country of origin is outside such FTA regime. In our context, we

[3] 17 countries: Malaysia, Singapore, Thailand, China, Japan, Korea, Canada, the United States, Hong Kong, Taiwan, France, Germany, Italy, the Netherlands, the United Kingdom, Sweden.

explore how the Japanese affiliates who are operating in the EU respond to the EU-Korea FTA. Reportedly, there are two studies that are relatively close to this perspective. Antràs and Foley (2011) targeted ASEAN Free Trade Area (AFTA) and found that the US affiliates who base their activities in ASEAN increase the number of partners, revenue as well as other performances. In addition, Hwang and Lee (2014) showed that Korean firms located in regions covered by the European Economic Area, AFTA, and North American Free Trade Agreement tend to choose the mixed pattern of FDI—both horizonal and vertical FDI. However, no comprehensive research has been undertaken to further explore the mechanism due to data restrictions. This study fills the gap by exploring this mechanism.

Furthermore, Yoshii (2016) and JETRO (2015) mentioned the impact of the EU-Korea FTA. Yoshii (2016) stated that it cannot be speculated whether Korea's export to the EU has increased because of the EU-Korea FTA. In contrast, JETRO (2015) summarized the detailed impact of the EU-Korea FTA. The statistics show that during the third year after the implementation of the FTA (July, 2013-June, 2014), the EU's commodity export to Korea was 41.4 billion Euros, a 35.3% increase compared to that of 1 year prior to FTA （July, 2010 – June, 2011). Meanwhile, Korea's commodity export to the EU during the same period was 37.9 billion Euros, which was the same level as before[4]. According to the JETRO (2015), the main reason for the sluggish growth in imports from Korea was the slow demand from the EU due to the debt crisis and other macroeconomic factors. However, the growth in exports from the EU to Korea in the third year after the provisional application of the FTA was 46% and 37% higher for fully liberalized goods and partially liberalized goods, respectively, than before the provisional application. Moreover, the service trade from the EU to Korea increased by 24.7%, and the amount from Korea to the EU increased by 21.7%.

From the academic point of view, Felbermayr et al. (2019) used yearly data and showed that since the inception of the EU-Korea FTA, both the EU exports and imports to and from Korea have outperformed Japanese trade with the EU as well as overall EU trade. However, rigorous study on the impact of the EU-Korea FTA is scarce. To further evaluate the influence of the EU-Korea FTA from the third-party perspective, this study focuses on Japanese affiliates' behavior while considering the competition between Japanese and Korean counterparts in industries such as automobile and electronic devices.

[4] Such phenomenon was defined in Baier et al. (2019) as asymmetric effects of FTAs.

3 Data and methodology

3.1 Data

As for firm-level micro data, we apply the Basic Survey on Overseas Business Activities (BSOBA) conducted by the Corporate Statistics Office, Research and Statistics Group and Ministry of Economy, Trade, and Industry to record the overseas operations of Japanese companies. The data used in the analysis ranged from 1995 to 2017. The detailed firm[5] characteristics and the information on investment are included. In addition, we collect the country-level macroeconomic data, such as gross domestic product (GDP), gross domestic product per capita (GDPPC), exchange rate, and trade data, to control for market conditions at the investment destinations. GDP and GDPPC data are collected from the Penn World Table version 10.0. Exchange rates are taken from OECD, and we use trade volume between Japan and Korea from the "World Integrated Trade Solution (WITS)." The details of the variables used in the estimation are explained in Table 1.

3.2 Estimation strategy

This study aims to clarify how the EU-Korea FTA affects the behavior of investors from Japan, which is not subject to the current FTA of interest. The specification used in this study is as follows:

$$Y_{fict} = \beta_1 EU_{dummy} \times post2011 + EU_{dummy} + post2011 + \boldsymbol{X}_{fict} + \boldsymbol{Z}_{ct} + Y_{fic(t-1)} + \alpha_f + \alpha_t + \varepsilon_{fict}. \quad (1)$$

The period of analysis spans from 1995 to 2017. The dependent variable, Y_{fict}, is the expected amount of FDI (in millions of yen) for affiliate f belonging to industry *i*. We use the expected amount instead of the actual one because FTA usually takes time to effectuate. Thus, the forward-looking decision can better capture the impact of FTA by avoiding the time lag between the conclusion of the FTA and the time when it begins to influence[6]. *c* denotes the country where the affiliate is located and *t* stands for year. In

[5] Since BSOBA is designed to collect information solely on overseas Japanese affiliates, when describing an affiliate, we will use the term "affiliate" and "firm" interchangeably.

[6] In the robustness check, instead of using the expected amount of FDI, we used the actual amount of FDI to confirm. Thus, we could clarify the differences between the forecasted and actual decision-makings in response to the EU-Korea FTA.

practice, we take the logarithm of the dependent variable.

The main variable of interest is an interaction term of two dummy variables. EU_{dummy} is a dummy that takes 1 if the Japanese affiliate is in the EU region and 0 otherwise. $post2011$ is a dummy variable that takes 1 if the year of data used is 2011 or later, and 0 if the year is before 2011[7]. Our DID method attempts to mitigate the endogeneity issue by exploring the variations between the treatment and control groups. The treatment group refers to the Japanese affiliates located in the EU, and the control group refers to those located outside the EU. Then, we compare the difference in the expected amount of investment before and after the FTA conclusion, for both the treatment and control groups. The method relies on the assumption that the difference between the treatment and control group affiliates due to factors other than the EU-Korea FTA is always constant. To better serve this purpose, we control for affiliate-level and country-level attributes to make the treatment and control group comparable. In the vector $\boldsymbol{X}_{fict}$, we employ variables such as the number of workers in the affiliate, total sales of the affiliate, R&D expenditures of the affiliate, productivity of the affiliate, the affiliate's age, and a dummy for exports to Japan. Further, assuming that the investment decision in the previous year will affect the behavior in the following year, we include the expected amount of FDI in the previous year, $Y_{fic(t-1)}$, as the additional explanatory variable. Moreover, the country-level variables are included in the vector $\boldsymbol{Z}_{ct}$, which consists of destination country's GDP, GDPPC, and exchange rate[8]. Furthermore, we control for affiliate, year, country, and industry fixed effects. The variables and descriptive statistics used in this estimation are shown in Tables 1-a and 1-b.

Table 1-a Variable definitions

		Variable name	Definition
Explained variables	Y_{FDI_esti}	Expected amount of foreign direct investment	Log of planned capital expenditures (millions of yen)
	Y_{FDI}	Actual amount of foreign direct investment	Log of capital expenditures (millions of yen)
Explanatory variables	EU_{dummy}	EU dummy	Dummy of whether the affiliate is located in the EU
	$post2011$	Post 2011 dummy	
	$\boldsymbol{X}$	Labor	Number of employees
		Total sales	Total sales of affiliate
		R&D	R&D expense of affiliate
		Productivity	Total sales of affiliate /Number of laborers of affiliate

[7] In 2011, the EU and Korea started applying the FTA.

[8] Based on US Dollars.

	Age	Firm's age （Survey year - Year of the affiliate's establishment）
	Square of age	
	Export to Japan dummy	Dummy of whether exporting to Japan
$\boldsymbol{Z}$	GDP	Gross domestic product of each country
	GDPPC	Gross domestic product per capita for each country
$Y_{fic(t-1)}$	Lag of (expected/actual) amount of foreign direct investment	

Table 1-b Statistics

	Obsavations	Mean	Standard deviation	Minnimum	Maximum
Expected amount of foreign direct investment	195,673	2.54	2.58	0	14.27
Actual amount of foreign direct investment	256,456	2.70	2.53	0	14.43
Labor	362,334	3.75	2.02	0	11.30
Total sales	348,046	6.90	2.50	0	16.00
R&D	195,264	0.60	1.59	0	11.78
Productivity	320,508	3.26	1.63	0	13.18
Age	410,170	13.77	10.62	1	896
Square of age	410,170	302.43	1,342.41	1	802,816
Export to Japan dummy	209,623	0.64	0.48	0	1
GDP	407,631	29.84	0.59	29.11	30.84
GDPPC	407,631	11.08	0.30	10.46	12.23

4 Estimation results

4. 1 **Baseline model**

Table 2 Result of base line estimation

	Expected amount of foreign direct investment (log)			
	(1)	(2)	(3)	(4)
EU dummy * Post 2011 dummy	0.116***	0.115***	0.123***	0.208***
	(0.0389)	(0.0389)	(0.0389)	(0.0397)
Post 2011 dummy	-		0.137***	
			(0.0211)	
EU dummy	-0.163		-	
	(0.228)			
Labor	0.502***	0.502***	0.497***	0.498***
	(0.0767)	(0.0767)	(0.0793)	(0.0793)
Total sales	0.0560	0.0560	0.0627	0.0624
	(0.0683)	(0.0683)	(0.0714)	(0.0715)
Productivity	0.0952	0.0951	0.0955	0.101
	(0.0732)	(0.0732)	(0.0765)	(0.0768)
Age	-0.0456***	-0.0458***	-0.0378***	-0.0317***

	(0.00647)	(0.00648)	(0.00462)	(0.00451)
Square of age	0.000487***	0.000488***	0.000470***	0.000473***
	(7.72e-05)	(7.70e-05)	(7.79e-05)	(8.13e-05)
Export to Japan dummy	0.0739***	0.0739***	0.0872***	0.0957***
	(0.0193)	(0.0193)	(0.0195)	(0.0196)
GDP	0.128	0.132	0.0586	0.137
	(0.0853)	(0.0835)	(0.0912)	(0.0907)
GDPPC	-0.315*	-0.323**	0.0758	0.0686
	(0.166)	(0.163)	(0.211)	(0.212)
Lag of expected amount of foreign direct investment (log)	0.218***	0.218***	0.215***	0.216***
	(0.00827)	(0.00827)	(0.00818)	(0.00815)
Observations	97,349	97,349	97,342	97,342
R-squared	0.828	0.828	0.827	0.826
Affiliate fixed effect	y	y	y	y
Year fixed effect	y	y	n	n
Country fixed effect	n	n	y	y
Industry fixed effect	n	n	y	y

Note: Robust Standard Errors are in parentheses. ***, **, * show statistical significance of the coefficients at the 99%, 95%, and 90% levels, respectively.

Table 2 shows the estimation results verifying Equation (1). In Table 2, the difference between the first two columns is that column (1) includes the respective dummy variables used to generate the interaction term—the EU dummy and post-2012 dummy, while column (2) excludes them from the estimation. In both columns, we include subsidiary and year fixed effects only. In columns (3) and (4), we repeat the same practice as in the previous two but include subsidiary, country, and industry fixed effects.

As the results indicate, the interaction term is always positive at 1% significance level for all the specifications, which means that the FTA signed between the EU and Korea has a positive impact on the expected amount of FDI by the Japanese affiliates located in the EU after we control for the other affiliate- and country-level factors that might have affected the investment behaviors. The EU-Korea FTA tends to increase the expected FDI of Japanese affiliates located in the EU by 11.5%-20.8% compared to that of the affiliates located outside the EU. Meanwhile, the one-period lag of the dependent variable, the number of workers, the affiliate's age, and the dummy for exports to Japan also present significant results. The finding revealed that the Japanese affiliates located in the EU increased their future investment within the region compared to their counterparts located in other countries after the EU-Korea FTA. We cannot conclude further without considering the channels through which the EU-Korea FTA affects the affiliates investment decisions, and how firm and industry heterogeneity matters for our results.

4. 2 Robustness check

Despite the consistent results obtained in the baseline estimation, firms' decisions can vary across different industries and be sensitive to different measurements of our main variable of interest, for instance. Thus, we conduct several additional estimations to confirm our findings. First, we test the model by changing the dependent variable from Y_{FDI_esti}, which is the expected amount of FDI (log), to Y_{FDI}, which is the actual amount of FDI (log). Therefore, we examine how FTA affected Japanese affiliates' ongoing investment activities rather than the future expectation. Second, we include exchange rate in the estimation since currency difference can lead to the change in the decision of FDI. Third, we follow Arellano and Bond (1991), and employ generalized method of moments (GMM) to consider the reverse causality issue. Finally, when Japanese affiliates foresee the conclusion of the EU-Korea FTA, they take precautionary steps in advance. Such selection mechanism will contaminate the estimation of β_1. To alleviate such bias, we conduct a placebo test using a dummy variable representing the time from 2006 onward instead of post-2011 to elude the potential selection bias of the timing of the FTA implementation.

Table 3 shows the estimation results with the explained variable changed from the expected amount of FDI (log) to actual amount of FDI (log).

Table 3 Using the actual amount of FDI as the dependent variable

	Actual amount of foreign direct investment (log)	
	(1)	(2)
EU dummy * Post 2011 dummy	-0.0404	-0.0405
	(0.0640)	(0.0640)
EU dummy	-0.0345	
	(0.219)	
Labor	0.523***	0.523***
	(0.101)	(0.101)
Total sales	0.117	0.117
	(0.0925)	(0.0925)
Productivity	0.0709	0.0708
	(0.102)	(0.102)
Age	-0.0370***	-0.0370***
	(0.00609)	(0.00608)
Square of age	0.000354***	0.000355***
	(7.56e-05)	(7.54e-05)
Export to Japan dummy	0.0938***	0.0938***
	(0.0173)	(0.0173)

GDP	-0.0497	-0.0488
	(0.0740)	(0.0728)
GDPPC	-0.142	-0.144
	(0.139)	(0.137)
Lag of Actual amount of foreign direct investment (log)	0.191***	0.191***
	(0.0105)	(0.0105)
Observations	129,951	129,951
R-squared	0.805	0.805
Affiliate fixed effect	有	有
Year fixed effect	有	有

Note: Robust Standard Errors are in parentheses. ***, **, * show statistical significance of the coefficients at the 99%, 95%, and 90% levels, respectively.

Column (2) in Table 3 shows the result by including only the interaction term. In both cases, the interaction term is negative but not significant. Specifically, the application of the EU-Korea FTA has a positive impact on the estimated amount of FDI by Japanese affiliates in the EU, but it has no impact on their amount of investment during the same period. As FTA takes time to effectuate, we assume this seems plausible.

Second, we examine the results considering the influence of exchange rates. The data are obtained from OECD and based on US Dollars. Table 4 presents the results.

Table 4 Estimation with consideration of exchange rates

	Expected amount of foreign direct investment (log)			
	(1)	(2)	(3)	(4)
EU dummy * Post 2011 dummy	0.157***	0.157***	0.165***	0.250***
	(0.0393)	(0.0393)	(0.0394)	(0.0401)
Post 2011 dummy	-		0.127***	
	-		(0.0227)	
EU dummy	-0.0776		-	
	(0.267)		-	
Labor	0.474***	0.474***	0.471***	0.471***
	(0.0788)	(0.0787)	(0.0820)	(0.0818)
Total sales	0.0760	0.0760	0.0818	0.0807
	(0.0699)	(0.0699)	(0.0740)	(0.0741)
Productivity	0.0617	0.0616	0.0645	0.0698
	(0.0744)	(0.0744)	(0.0785)	(0.0786)
Age	-0.0523***	-0.0525***	-0.0480***	-0.0432***
	(0.00775)	(0.00776)	(0.00583)	(0.00582)
Square of age	0.000594***	0.000595***	0.000589***	0.000599***
	(9.46e-05)	(9.42e-05)	(9.91e-05)	(0.000103)
Export to Japan dummy	0.0756***	0.0756***	0.0909***	0.0986***
	(0.0218)	(0.0218)	(0.0220)	(0.0220)
GDP	0.247***	0.250***	0.223**	0.319***
	(0.0913)	(0.0897)	(0.106)	(0.105)

GDPPC	-0.233	-0.237	0.0795	0.0424
	(0.209)	(0.204)	(0.234)	(0.233)
Exchange rate	-2.02e-06	-1.78e-06	-7.41e-06	-3.22e-06
	(1.25e-05)	(1.25e-05)	(1.30e-05)	(1.31e-05)
Lag of expected amount of foreign direct investment (log)	0.225***	0.225***	0.222***	0.223***
	(0.00931)	(0.00931)	(0.00921)	(0.00919)
Observations	77,346	77,346	74,322	74,322
R-squared	0.764	0.764	0.828	0.828
Affiliate fixed effect	y	y	y	y
Year fixed effect	y	y	n	n
Country fixed effect	n	n	y	y
Industry fixed effect	n	n	y	y

Note: Robust Standard Errors are in parentheses. ***, **, * show statistical significance of the coefficients at the 99%, 95%, and 90% levels, respectively.

The interaction term between the EU dummy and post-2011 is positive at 1% significance level for all results, when the exchange rate is considered. The point estimates are larger than those in the baseline model. Meanwhile, the control variables have similar signs as in the baseline estimation, that is, the robustness of the results confirms that the EU-Korea FTA has a positive impact on the expected amount of FDI by Japanese firms within the EU.

Third, Table 5 shows the results of the analysis by GMM to address the possibility of simultaneity bias due to omitted variables. Similarly, the results show that our variable of interest, the interaction term between the EU dummy and post-2011 dummy, is positive at 1% significance level.

Table 5 GMM model

	Expected amount of foreign direct investment (log)
EU dummy * Post 2011 dummy	0.312***
	(0.0624)
Post 2011 dummy	-0.0730***
	(0.0245)
EU dummy	36.55
	(41.90)
Labor	0.153
	(0.0937)
Total sales	0.224***
	(0.0786)
Productivity	-0.105
	(0.0894)
Age	-0.0729***
	(0.0105)

Square of age	0.000601***
	(0.000193)
Export to Japan dummy	0.0346
	(0.0255)
GDP	0.706***
	(0.231)
GDPPC	0.289
	(0.402)
Lag of expected amount of foreign direct investment (log)	0.143***
	(0.0475)
Observations	71,956

Note: Robust Standard Errors are in parentheses. ***, **, * show statistical significance of the coefficients at the 99%, 95%, and 90% levels, respectively.

Table 6 Placebo test

	Expected amount of foreign direct investment (log)	
	(1)	(2)
EU dummy * Post 2006 dummy	-0.00751	0.0124
	(0.0388)	(0.0391)
EU dummy	-0.140	
	(0.229)	
Labor	0.502***	0.502***
	(0.0766)	(0.0777)
Total sales	0.0553	0.0593
	(0.0682)	(0.0700)
Productivity	0.0950	0.0994
	(0.0732)	(0.0751)
Age	-0.0452***	-0.0198***
	(0.00650)	(0.00467)
Square of age	0.000482***	0.000444***
	(7.77e-05)	(8.75e-05)
Export to Japan dummy	0.0740***	0.0922***
	(0.0193)	(0.0198)
GDP	0.0976	0.128
	(0.0867)	(0.0909)
GDPPC	-0.348**	0.299
	(0.164)	(0.220)
Lag of expected amount of foreign direct investment (log)	0.218***	0.216***
	(0.00826)	(0.00817)
Observations	97,349	97,342
R-squared	0.827	0.827
Affiliate fixed effect	y	y
Year fixed effect	y	y

Note: Robust Standard Errors are in parentheses. ***, **, * show statistical significance of the coefficients at the 99%, 95%, and 90% levels, respectively.

Finally, Table 6 demonstrates the estimation results of the placebo test. We change the time of the FTA conclusion from 2011 to 2006 and conduct the test by including the interaction term—the dummy showing whether it is within the EU* post-2006 dummy. The interaction term is not significant in both columns. This indicates that the timing of the FTA conclusion is important for the decision-making of Japanese affiliates. It confirms our previous finding that the actual start time for the EU-Korea FTA to effectuate does have a significant impact on Japanese affiliates' investment in the EU[9].

5 Exploring the competition mechanism

5.1 Competitive industries for Japanese and Korean firms in the EU

Does the EU-Korea FTA affect Japanese companies in the EU regardless of industry? In this section, we take a step further to investigate the different effects of the EU-Korea FTA on Japanese firms' investment through industry heterogeneity while embedding the competition mechanism between Japanese and Korean firms. To be specific, we define industries that are subject to trade competition in the EU between Japan and Korea and analyze them by classifying them into competitive and non-competitive industries. To this end, we first follow Antimiani and Henke's (2007) definition of trade competitiveness of an industry and quantify an index of competitiveness[10] based on industry-level trade volume using data from the WITS. Then, we calculate the trade competitiveness of industries by year and define industries that exceed the average as competitive industries, and industries that fall below the average as non-competitive industries. Table 7 presents the validation results of the analysis by competitive industry.

Table 7 Estimation results by competitive and less-competitive industry

	Expected amount of foreign direct investment (log)			
	Competitive Industry		Less-competitive industries	
	(1)	(2)	(3)	(4)
EU dummy * Post 2011 dummy	0.232*	0.232*	0.126	0.124

[9] We investigated the simultaneous occurrence that might affect Japanese affiliates' investment decision in the EU regions from both Japan and the EU. However, during 2011, no influential policies or events that might affect Japanese investment activity were observed.

[10] Competitive industries are defined as follows:
A = Value of exports and imports of Japanese firms in Japan within the EU
B = Value of exports and imports of Korean firms in Korea within the EU
Competitive industry = 1 - |(A-B)/(A+B)|

	(0.139)	(0.139)	(0.141)	(0.141)
EU dummy	-0.721		-1.932***	
	(0.697)		(0.467)	
Labor	0.689***	0.690***	0.506***	0.507***
	(0.138)	(0.138)	(0.149)	(0.149)
Total sales	-0.143	-0.145	0.104	0.108
	(0.151)	(0.151)	(0.132)	(0.132)
Productivity	0.357***	0.359***	0.151	0.145
	(0.132)	(0.132)	(0.148)	(0.148)
Age	-0.0252	-0.0248	-0.0378**	-0.0399**
	(0.0157)	(0.0157)	(0.0181)	(0.0184)
Square of age	0.000330**	0.000330**	0.000249	0.000266
	(0.000159)	(0.000159)	(0.000182)	(0.000182)
Export to Japan dummy	-0.0105	-0.0105	0.0623	0.0638
	(0.0500)	(0.0500)	(0.0594)	(0.0595)
GDP	-0.247	-0.239	-0.0851	-0.0486
	(0.190)	(0.191)	(0.201)	(0.199)
GDPPC	-0.761	-0.765	-0.151	-0.272
	(0.554)	(0.553)	(0.517)	(0.509)
Lag of expected amount of FDI	0.185***	0.185***	0.170***	0.170***
	(0.0181)	(0.0181)	(0.0163)	(0.0163)
Observations	19,737	19,737	13,290	13,290
R-squared	0.800	0.800	0.812	0.812
Affiliate fixed effect	y	y	y	y
Year fixed effect	y	y	y	y

Note: Robust Standard Errors are in parentheses. ***, **, * show statistical significance of the coefficients at the 99%, 95%, and 90% levels, respectively.

Columns (1) and (2) depict competitive industries, whereas columns (3) and (4) show the results of less-competitive industries. Column (1) includes the dummy variables used in the interaction term, while column (2) excludes them from the estimation. Both results indicate the rejection of the null hypothesis at 10% significance level. In contrast, the interaction term is not significant for non-competitive industry, as shown in columns (3) and (4). In addition, the point estimate for the competitive industry is larger than that for the non-competitive industry, indicating that the magnitude of the effect is larger in the case of the competitive industry. These results imply that the EU-Korea FTA has a positive impact on the expected amount of FDI by Japanese affiliates especially in the industries where the Japanese and Korean firms compete the most in trade with the EU. We further examine whether the EU-Korea FTA affects Japanese affiliates' FDI decision through the channel of trade.

Thus far, we have explored how the EU-Korea FTA affects the expected FDI of Japanese affiliates indirectly. However, since the direct impact of FTA is on the trade between the member countries, we also want to investigate how firms from non-FTA

countries will be affected by the target FTA. In this regard, we repeat the practice as in Table 7, but use alternative affiliate-level trade measurements. The values of import from Japan and export to Japan (in logarithm) are used as the dependent variables. Table 8 shows the results.

Table 8 Using trade as the dependent variable

	(1) Import from Japan(log)	(2) Export to Japan(log)	(3) Import from Japan(log)	(4) Export to Japan(log)
	Competitive Industry		Less-competitive industries	
EU dummy * Post 2011 dummy	0.00781	0.0205**	-0.00981	0.0131
	(0.0149)	(0.00907)	(0.0109)	(0.0113)
EU dummy	0.0336	0.0259	-0.271***	-0.0543
	(0.0904)	(0.0193)	(0.0561)	(0.0655)
Labor	-0.0467*	-0.00729	0.0153	0.0102
	(0.0278)	(0.0111)	(0.00986)	(0.00685)
Total sales	0.0431*	0.0148	-0.00882	-0.00570
	(0.0239)	(0.00926)	(0.00668)	(0.00471)
Productivity	-0.0456	-0.00660	0.0146	0.00940
	(0.0295)	(0.0123)	(0.00960)	(0.00686)
Age	-0.00363*	-0.00243	0.000723	-0.000422
	(0.00211)	(0.00151)	(0.00149)	(0.00116)
Square of age	8.74e-05***	4.46e-05**	-1.08e-05	1.27e-08
	(2.72e-05)	(2.20e-05)	(2.42e-05)	(1.69e-05)
Export to Japan dummy	-0.000548	0.00532	-0.0198**	-0.00489
	(0.00714)	(0.00476)	(0.00896)	(0.00560)
GDP	-0.0388	-0.0269	-0.0252	-0.0632***
	(0.0265)	(0.0165)	(0.0373)	(0.0237)
GDPPC	0.0195	0.0202	-0.0534	0.0111
	(0.0604)	(0.0451)	(0.0359)	(0.0284)
Lag of import from Japan (log)	0.748***		0.618***	
	(0.0499)		(0.0504)	
Lag of export to Japan (log)		0.715***		0.603***
		(0.0380)		(0.0275)
Observations	29,494	29,494	21,407	21,407
R-squared	0.994	0.984	0.994	0.983
Affiliate fixed effect	y	y	y	y
Year fixed effect	y	y	y	y

Note: Robust Standard Errors are in parentheses. ***, **, * show statistical significance of the coefficients at the 99%, 95%, and 90% levels, respectively.

The null hypothesis is rejected at 5% significance level (column 2) for the interaction term when we focus on export to Japan in the competitive industries. This provides

supporting evidence on the mechanism of how the EU-Korea FTA affects the FDI of Japanese affiliates—through the adjustment of export to Japan. The possible explanation is that when Japanese affiliates located in the EU face intensive competition from Korean counterparts due to the conclusion of FTA, they regress in the local market in terms of final goods and tend to shift them to Japan (or other markets). Therefore, the export to Japan increases but not the import from Japan. To further counter the deficit and keep up with Korean competitors, Japanese affiliates expect to increase their investment in future.

5.2 Other impact of the FTA on Japanese affiliates

We have verified that the EU-Korea FTA has a positive impact on the expected amount of investment by Japanese affiliates based in the EU, especially in the industries where Japanese and Korean firms compete the most. One might argue that the FTA not only affects firms' investment and trade but also labor and management indicators (sales, purchases, etc.). Here, we examine how the EU-Korea FTA might influence the other characteristics of Japanese affiliates.

Table 9 Estimation Results of management indicators of Japanese affiliates in the EU

	(1) Number of labors	(2) Total sales	(3) local sales (to Japanese firms) (log)	(4) local sales (to local firms) (log)	(5) sales (to parent firms)(log)	(6) total purchases	(7) locally procured purchases (from Japanese firms) (log)	(8) locally procured purchases (from local firms) (log)	(9) purchases (from parent firms) (log)
	Labor		Sales				Purchases		
EU dummy * Post 2011 dummy	-0.0100	-0.380***	-0.382***	-0.348***	-0.0851*	-0.367***	-0.470***	-0.203*	-0.0591
	(0.0204)	(0.0470)	(0.0843)	(0.104)	(0.0494)	(0.0498)	(0.0890)	(0.109)	(0.0580)
EU dummy	-0.411**	0.184	0.628**	-1.736	-1.018	0.263	-1.347	-0.647	-0.714
	(0.179)	(0.255)	(0.247)	(3.272)	(0.809)	(0.279)	(2.089)	(1.562)	(1.615)
Observations	355,495	341,049	66,267	71,926	80,614	314,101	51,109	68,388	79,584
R-squared	0.899	0.825	0.856	0.823	0.872	0.799	0.824	0.788	0.863
Affiliate fixed effect	y	y	y	y	y	y	y	y	y
Year fixed effect	y	y	y	y	y	y	y	y	y

Note: Robust Standard Errors are in parentheses. ***, **, * show statistical significance of the coefficients at the 99%, 95%, and 90% levels, respectively.

We use nine indicators here: number of workers, total sales, local sales (to Japanese firms), local sales (to local firms), sales (to parent firms), total purchases, locally procured purchases (from Japanese firms), locally procured purchases (from local firms), and purchases (from parent firms). We observe significant and negative signs of the interaction term on most sale- and purchase-related indicators (Table 9); however, it is not significant in the case of the number of workers and purchases from the parent firm. This suggests that the EU-Korea FTA in general has a suppressing impact on the performance of Japanese affiliates, except for investment and export back home.

6 Conclusion

This study focuses on the 2011 EU-Korea FTA and explores its effect on the behavior of Japanese affiliates based in the EU using micro data of Japanese firms. The results indicate the following: First, the EU-Korea FTA has a positive impact on the expected amount of FDI by Japanese affiliates located inside the EU. To further address potential endogenous issues, we make use of the competition mechanism between Japanese and Korean counterparts and applied a difference-in-difference estimation that validates the robustness of the results. Second, the Japanese affiliates' adjustment of investment in response to the EU-Korea FTA is through the channel of trade, namely the exports from Japanese affiliates back to Japan. Third, the FTA generally has a negative impact on many aspects of the firm performance, such as sales, procurement, etc., that indicates FTA's suppressing influence on the non-beneficiaries even if they are in the regions covered by FTA.

The current study adopts a novel approach by examining the indirect effects of the EU-Korea FTA. Despite the robust findings, we cannot make further conclusions without more rigorous verification[11], such as direct interviews with individual Japanese firms. Future research can extend this study by exploring the effect of the EU-Korea FTA in shaping the responsive decisions of firms from other destination countries.

[11] Reportedly, there are no policies or shocks between the EU and Japan that have an economic impact. However, it is possible that the author may have missed some policy impacts as they vary widely, including detailed policies.

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213(3): 15-30.

DISCUSSION PAPER　No.22-E-001

When free trade agreement meets competition: The impact of the EU-Korea FTA on Japanese firms' investment behavior

2022 年　6 月 21 日　発行
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