KEO Discussion Paper No. 153

Japan's Outward FDI Potential

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March 8, 2020

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Abstract

While Japan's outward FDI stock is historically high, it is not necessarily clear whether there is untapped growth potential, given the economic size of Japan and that of partner countries. This paper examines whether Japan's actual outward FDI stock is high or low relative to the FDI predicted by the gravity model using the outward FDI patterns of all OECD nations, which we call counterfactual FDI. The results indicate that the ratio of Japan's actual to counterfactual FDI is the highest among the OECD countries as of the year 2015. The regional distribution of Japan's actual to counterfactual FDI favors Southeast Asian nations, South Africa and the US. These results imply that Japan has no unrealized potential for outward FDI.

Key Words: Outward foreign direct investment, gravity model, Japan
JEL Classifications: F14, F21, F23

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† Kozo Kiyota was a Visiting Scholar at the University of Hawai'i when this research was undertaken. Kiyota also acknowledges the financial support received from the JSPS Grant-in-Aid (JP18KK0348, JP19H00598) and a grant-in-aid from Zengin Foundation for Studies on Economics and Finance.

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1. Introduction

Politicians sometimes rally nationalistic support around the concept of "fairness" by asserting that other countries either under-perform or over-perform relative to some standard that they determine.[1] While standards setting by policymakers is necessary for international agreements on mutual defense (e.g., the North Atlantic Treaty Organization, NATO) or climate change (e.g., the Paris Agreement) so that each participating country has a target to meet, these results-based approaches have been rejected in favor of rules-based approaches in the arenas of international trade and investment under the World Trade Organization (WTO). Nevertheless, results-based approaches often are adopted by policymakers seeking public support and negotiating leverage so economists are often tasked with determining standards for distinguishing unusual trade and investment patterns. For example, many studies have addressed the accusations that Japan exports too much, imports too little, and hosts too little inward foreign direct investment (FDI).[2] Most recently President Trump pressed Japanese business leaders to do more outward FDI, specifically into the US.[3] This environment prompts our research question: Does Japan do enough outward FDI?

Japan's outward FDI has been expanding rapidly from the early 2000s. Figure 1 indicates the value of Japanese outward FDI stock from 1996 to 2018. In 2018, Japanese outward FDI stock was historically high, reaching 181.7 trillion Japanese yen, which is about six times the level it was in 1996 (30.6 trillion yen). In 2014, the level of Japan's outward FDI stock was the 4th largest among the OECD countries.[4]

=== Figure 1 ===

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[1] President Trump's 'America First' ideology and Prime Minister Boris Johnson's 'Get Brexit Done: Unleash Britain's Potential' campaign slogan provide recent examples.

[2] For example, see Lawrence (1993) and Saxonhouse (1993) regarding market access issues in Japan, Saxonhouse (1996) for a history of trade-related allegations against Japan, Greaney (2001) on Japan's import expansion policies, and Hoshi and Kiyota (2019) on Japan's inward FDI.

[3] "Trump urges greater Japanese investment in the U.S., criticizes trade advantage", Reuters, May 24th, 2019. Trump also urged Korean businesses to invest more in the US during a speech in Seoul on July 29, 2019. (Source: https://www.whitehouse.gov/briefings-statements/remarks-president-trump-korean-business-leaders/)

[4] The list of countries and their abbreviations are presented in Table A1. Table A2 presents the outward FDI stocks for OECD countries, obtained from the OECD International Direct Investment Statistics database. We will come back to the relative importance of the Japanese outward FDI stocks among OECD countries in Section 3.2.

Is Japan's outward FDI unusually high or low? This question is important from the home as well as the host countries' viewpoints. From the home country's perspective, whether outward FDI accelerates or not can be a major concern for policy makers because it may result in the hollowing out of domestic industries, even though it is a rational choice for firms for their survival. On the other hand, from the host countries' perspective, whether foreign firms expand their activities or not is an essential concern for the local economy.[5] In particular, local economies often spend large amounts of public resources to attract FDI inflows with an expectation of positive economic returns.[6] These issues involving FDI are not limited to Japan but are commonly observed in many advanced countries.[7]

Questions regarding the appropriate size of FDI are nontrivial due to the many stakeholders involved in both home and host countries. In addition to policy incentives, FDI can be affected by both home and host countries' factors such as economic size. Figure 2 presents the ratio of outward FDI stock to GDP for Japan, the United States, and the average of the OECD countries from 1985 to 2015.[8] Figure 2 indicates that the ratio of outward FDI stock to GDP for Japan was 28.3 percent in 2015, which was comparable to the United States (27.6 percent) but lower than the OECD average of 44.5 percent. Figure 2 also indicates that the ratios for Japan and the United States have been smaller than that for the average of the OECD countries for the last three decades between 1985 and 2015. This comparison implies that Japan's outward FDI may actually be somewhat low once one accounts for the size of the

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[5] For example, many media outlets in the UK reported the announcement by Japanese car manufacturer Nissan that it was scrapping plans to build a new model in the English city of Sunderland, citing uncertainty over Brexit (e.g., "Nissan Blow Leads to Regret and Defiance in a Brexit Heartland" Bloomberg, February 5th, 2019).

[6] For example, one study estimated that the states of Mississippi and Tennessee have given $1.6 billion and $1.3 billion, respectively, in subsidies to Toyota, Nissan and Volkswagen ("Factbox: US states woo automakers with $17 billion in subsidies since 1976", Reuters, August 4th, 2017).

[7] For example, US President Trump criticized Harley Davidson for the shift of its production abroad ("Trump encourages boycott against Harley-Davidson", CNN, August 12th, 2018). Similarly, it was widely featured by the media when Dyson, which makes high-end appliances such as vacuums and hair dryers and is working on an electric car, announced plans to relocate its headquarters from the UK to Singapore in January 2019.

[8] Table 1 presents the original data for Figure 2, which is computed from Tables A2 (outflow FDI stocks data) and A3 (GDP data). Section 2 presents a more detailed description of the data.

Japanese economy and the growth of other countries.

=== Figure 2 ===

To evaluate whether Japanese outward FDI is unusually high or low, a reference value is necessary. Previous studies have established that the gravity model works well not only for international trade but also for FDI (e.g., Anderson, 2011).[9] Accordingly, some studies such as Egger (2010) and Hoshi and Kiyota (2019) estimated counterfactual FDI, which is defined as the FDI predicted by the gravity model, and utilized it as the reference value. These studies then estimated the unexhausted FDI potential that is defined as the gap between the counterfactual and actual FDI stock. If the counterfactual FDI exceeds the actual FDI, this means that the gravity model predicts much larger FDI than the actual FDI. This in turn suggests that there is a potential for more FDI according to the gravity variables.

There are several studies such as Eaton and Tamura (1994) and Head and Ries (2005, 2008) that examined Japan's outward FDI in a gravity model framework. However, to the best of our knowledge, only Head and Ries (2005) addressed the above question directly.[10] Head and Ries (2005) estimated the gravity model, using the data for 181 countries between 1980 and 2002. Their analysis found that Japan's actual outward FDI is *smaller* than the counterfactual FDI except for the period from the late 1980s to the early 1990s. While their study has important policy implications, their analysis did not cover the recent period when the Japanese outward FDI stock grew rapidly (Figure 1).[11]

Based on this background, this paper examines whether Japan's outward FDI still has untapped growth potential or not. To do so, we estimate a gravity model and compare Japan's actual outward FDI stock with the counterfactual FDI stock. In addition to covering a more recent period than the previous studies, our paper introduces a methodological improvement on the studies of Japanese outward FDI, many of which estimated a log linear form of the gravity model. A problem is that many country pairs have no FDI between them. Taking a log

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[9] Felbermayr and Yotov (2019) demonstrate that the gravity model also works well in predicting bilateral trade balances by resolving the "mystery of the excess trade balances" identified in Davis and Weinstein (2002).

[10] Kiyota (2015) provides a comprehensive literature review on outward and inward FDI in Japan. A recent study by Hoshi and Kiyota (2019) also estimated a gravity model of FDI but their focus is on inward FDI, not outward FDI.

[11] In addition, Head and Ries (2005) did not provide detailed explanations about the estimation method. It thus is not clear how the analysis took into account gravity estimation issues such as multilateral resistance and observations of zero bilateral FDI.

linear form implies that the analysis drops the country pairs with zero FDI. However, throwing away the observations with zero FDI results in inconsistent parameter estimates. To solve this problem, we employ the Pseudo-Poisson Maximum Likelihood estimator proposed by Santos Silva and Tenreyro (2006). An additional contribution of our research is that we supplement our analysis of aggregate outward FDI stock with an examination of the regional distribution of Japan's actual versus counterfactual FDI stock.

Our results show that Japan's actual outward FDI exceeded its counterfactual FDI from 2013, and the ratio between the two is the highest among OECD countries as of 2015. The host countries with the highest actual-to-counterfactual ratios for Japanese FDI are Asian countries involved in Japanese supply chains (i.e., Indonesia, the Philippines, Thailand and Vietnam) but also include South Africa and the United States. Although President Trump recently pressed Japanese business leaders to invest more in the US, our research shows that the US hosted 1.7 times more Japanese FDI than the value predicted by the gravity model as of 2015. Our results imply that Japan has no unrealized potential for outward FDI at the aggregate level, nor at the country-level for the US in particular.

The paper is organized as follows. The next section introduces a gravity model of bilateral FDI. The section also describes the estimation method and the data that we use in this paper. Section 3 reports the estimation results and discusses their implications, while Section 4 presents robustness checks. Section 5 includes our conclusions and discussion of results.

2. Methodology and Data

2.1. Gravity model of foreign direct investment

Our analysis follows Egger (2010). Letting i and j denote the origin and the destination of FDI respectively, the gravity equation for FDI stock is:

$$FDI_{ij} = \exp\left(\mathbf{O}_i'\alpha + \mathbf{D}_j'\beta + \mathbf{w}_{ij}'\gamma\right) \times \varepsilon_{ij}, \qquad (1)$$

where exp(•) denotes exponential function; $\mathbf{O}_i$ and $\mathbf{D}_j$ are the vectors of the origin- and destination-country dummies to capture the fixed effects; [12] $\mathbf{w}_{ij}$ is the vector of characteristics of the origin-destination pair (such as distance); and ε_{ij} is an error term.

We estimate the gravity model directly by employing the Pseudo-Poisson Maximum Likelihood (PPML) estimation proposed by Santos Silva and Tenreyro (2006). Although the estimation can be done by non-linear least squares, the PPML estimator is more efficient than

[12] The origin and destination country fixed effects are analogous to the "multilateral resistance terms" in the gravity model of trade (Anderson and van Wincoop, 2003).

non-linear least squares estimator (Santos Silva and Tenreyro, 2006).[13]

Since our dataset involves panel data, we introduce a time dimension to get:

$$FDI_{ijt} = \exp\left(\mathbf{O}_i'\alpha + \mathbf{D}_j'\beta + \mathbf{w}_{ij}'\gamma + \mathbf{x}_{ijt}'\lambda + \mathbf{y}_{it}'\delta + \mathbf{z}_{jt}'\zeta\right) \times \varepsilon_{ijt}, \quad (2)$$

where $\mathbf{x}_{ijt}$ is the vector of time-variant country-pair specific factors; $\mathbf{y}_{it}$ and $\mathbf{z}_{jt}$ are the vectors of origin- and destination-country-year specific variables respectively. The origin- and destination-country-year specific variables that we consider are per capita GDP and population. In this paper, we estimate equation (2) using PPML estimation. In one variation of our specifications, we add origin-country-specific time trends to equation (2) to capture heterogeneity in investor country time trends. In another variation, we additionally include destination-region-specific trends to capture time trend differences across destination regions.[14] Other model variants are discussed in our section on robustness checks.

2.2. Data

The data for outward bilateral FDI stock (FDI_{ijt}) from 1996 to 2015 are obtained from the OECD International Direct Investment Statistics database. In the database, the outward FDI stock is defined as the nominal value of the origin country's investors' equity and net loans to enterprises resident in the destination economy. In 2015, the dataset covers outward FDI from 29 OECD origin countries to over 200 destination countries. We use the World Bank classification to group destination countries into seven regions when using destination-region-specific time trends.[15]

In the OECD database, zeros and missing values are distinguished, so we follow the distinction of the database. For a small number of countries, outward bilateral FDI stocks are negative. This can happen if the total amount of foreign parent companies' borrowings from

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[13] Similarly, the use of negative binomial estimates depends on the units of the measurement for the dependent variable. For more detail, see Bosquet and Boulhol (2014).

[14] We also have tried to add a destination-country-specific trend to the model but the estimation fails to converge for this specification due to the large number of destination countries. Instead, the countries are groups into seven regions, as described in our Data section. The authors thank an anonymous referee for suggesting these alternative specifications.

[15] The regions are East Asia and Pacific, Europe and Central Asia, Latin America and Caribbean, Middle East and North Africa, North America, South Asia, and Sub-Saharan Africa.

their subsidiaries in the country exceeds the total amount of foreign companies' investments and loans to the subsidiaries. For the analyses in this paper, we replace the negative FDI outflow observations with missing values.

There are two types of origin countries reported in the OECD database: immediate counterpart and ultimate counterpart. Although only immediate counterpart is available for many countries, we use ultimate counterpart as our origin country when available. If ultimate counterpart is not available, we use immediate counterpart as the origin country.

The OECD database changed its benchmark definition from the 3rd to the 4th edition in 2013. In the 4th edition, more detailed classifications of entity types are available. The database distinguishes the difference between special purpose entities (SPEs) and non-SPEs. SPEs are used by multinational enterprises to channel investments through several countries before reaching their final destinations. We exclude investments by foreign SPEs from outward FDI stock when the data allow.

For time-invariant country-pair specific variables ($\mathbf{w}_{ij}$), we use a standard set of gravity variables such as distance and dummy variables for common language, colonial relationship and contiguity. These variables are obtained from the CEPII (Centre d'Etudes Prospectives et d'Informations Internationales) gravity data.

The time-variant country-pair variables ($\mathbf{x}_{ijt}$) are dummy variables to indicate the existence of a Regional Trade Agreement (RTA), joint WTO membership, and a common currency. We use the Mario Larch's Regional Trade Agreements Database (Egger and Larch, 2008) to judge if a country pair belongs to a common RTA. The RTAs in this database include customs unions (e.g., European Union), free trade agreements and economic integration agreements (e.g., North America Free Trade Agreement and Japan-Singapore economic partnership agreement), and partial scope agreements (e.g., South Asian Preferential Trade Arrangement). The WTO and common currency dummies take the value of 1 if both countries are members of the WTO and a common currency union respectively. Both come from the CEPII gravity data.

We also include a dummy variable that takes the value of 1 if the two countries have bilateral investment treaties (BIT) (Egger and Pfaffermayr, 2004; Neumayer and Spess, 2005; Busse, Königer, and Nunnenkamp, 2010). The BIT data are obtained from the World Bank Database of Bilateral Investment Treaties. The database reports the signature date and implementation date. We use the implementation date to construct the BIT dummy.

Population (POP_{it} and POP_{jt}) and per-capita GDP ($PGDP_{it}$ and $PGDP_{jt}$) are the origin- and destination-country-year-specific characteristics ($\mathbf{y}_{it}$ and $\mathbf{z}_{jt}$). GDP is measured in current thousand US dollars and the population is measured in thousands. These variables are also obtained from the CEPII gravity data.

Although our dataset has a time dimension, we do not examine the dynamics of FDI. This

is consistent with the approach of Head and Ries (2008), who use a static model to motivate the gravity model of FDI. Thus, our regression analysis ignores some factors such as exchange rate fluctuations that mostly influence the timings of FDI. We are not concerned with the lag-lead relationship between FDI and its determinants, either. One may argue that FDI responds to the future (expected) levels of population and GDP, but examining this is beyond the scope of this paper.

We choose to use FDI stocks rather than FDI flows as dependent variables for the same reason: we do not attempt to explain the dynamics. By using FDI stocks, we also avoid the problem that FDI flows often have negative values. Nonetheless, we estimate the gravity model using FDI flows (and dropping the observations with negative values) as a robustness check.[16]

Data on FDI often include outliers, which are presumably caused by the lumpiness of FDI. For example, Table 1 indicates that the outward FDI stock to GDP ratio for Ireland increased by 66.4 percentage points from 2014 to 2015. To prevent estimation results from being driven by outliers, we drop observations for which the changes in bilateral outward FDI stock from the previous year fall into the top 1 percent or the bottom 1 percent of all observed annual changes in the estimations below.

=== Table 1 ===

Table 2 provides summary statistics for the data used in this paper. Note that the 25th percentile of outward bilateral FDI stock is zero. This suggests that econometric decisions regarding how to treat these observations with zero values can influence the estimation results.

=== Table 2 ===

3. Estimation Results

3.1. Regression results

Table 3 shows the estimation results of the gravity model (equation (2)) for the period between 1996 and 2015. We consider four versions of the gravity model that differ in their treatment of fixed effects and time trends. The model in column 1 does not include origin- and destination-country fixed effects, but the model in column 2 does include those fixed effects to control for multilateral resistance. For country fixed effects, we set the United States as the reference country. The model in column 3 includes origin-country-specific time trends

[16] The data used for outward FDI flows appears in Table A4.

in addition to the origin- and destination-country fixed effects. The model in column 4 adds destination-region-specific trends onto model 3 as described in the previous section.

=== Table 3 ===

We first examine whether the estimated models are adequate or not. Following Santos Silva and Tenreyro (2006), we perform a heteroskedasticity-robust RESET test. This is a test for the correct specification of the conditional expectation, which is performed by investigating the significance of an additional regressor constructed as the square of the fitted value. Table 3 reports the corresponding *p*-values. The test does not reject the hypothesis that the coefficient on the test variable is zero for all specifications, implying that the RESET test provides no evidence of misspecification of the gravity equations estimated using PPML.

To select the best model out of these four to use for our inference, we perform the HPC test proposed by Santos Silva, Tenreyro, and Windmeijer (2015) for selection between alternative models for non-negative observations with many zeros such as the dataset that we examine. The HPC test is built on the tests of non-nested hypotheses developed by Davidson and MacKinnon (1981). The HPC test in essence examines whether the prediction of the dependent variable generated by a model can be improved by using the predictions from an alternative model. If that is found to be the case, it is considered to be evidence against the original model. We test each model taking each of the other models as the alternative. The *p*-value for the null hypothesis (the null model is better than the alternative model) for each alternative is presented at the bottom of each column. The HPC tests clearly reject model 1 against models 2, 3, and 4, model 2 against models 3 and 4 and model 3 against model 4 at the 1 percent level. Therefore, we select model 4 as the most preferred model, which we call our "baseline model". Including both fixed effects for origin and destination countries and time trends for origin countries and destination regions seem important.

Model 4 is also attractive in that many of the estimated coefficients take the signs that are considered *a priori* plausible. Having a BIT, common language, and colonial relationship all have significantly positive effects on outward FDI whereas distance has a significantly negative effect. The per-capita GDP of both origin and destination countries has significantly positive effects on outward FDI. This implies that outward FDI is more likely to be observed between high-income countries. The size of the destination countries, measured by population, also matters as the population coefficients are significantly positive. Somewhat surprisingly, we find statistically insignificant coefficients for the RTA and WTO membership dummies, common currency dummies, and population of origin countries. Since model 4 outperforms the other models in terms of the specification test and provides estimated coefficients with expected signs for most variables, we use this model as our baseline model

to generate the counterfactual FDI.

3.2. Actual versus counterfactual outward FDI stock

Based on model 4 in Table 3, we obtain the counterfactual outward FDI stock. Figure 3 presents the actual and counterfactual outward FDI stock for Japan as a percentage of GDP over our study period. This figure indicates that the actual FDI was almost the same as or smaller than the counterfactual FDI until 2012. After 2012, however, the actual FDI exceeded the counterfactual FDI. This in turn suggests that there is no unrealized outward FDI potential for Japan after 2012.

=== Figure 3 ===

While Japan's actual FDI exceeded its counterfactual FDI from 2013, one may be concerned that the gap between the two is rather small for Japan. To address this concern, we compute the outward FDI potential for all OECD countries. Figure 4 presents the ratio of actual to counterfactual outward FDI stocks for all OECD countries in 2015. If the ratio exceeds 1, this means that the actual FDI exceeded counterfactual FDI and vice versa. Figure 4 indicates that the ratio is the highest for Japan at 1.28, followed by Ireland at 1.18. Ireland's high ratio of actual to counterfactual FDI may largely be explained by SPE activities but this explanation likely plays only a minor role in explaining Japan's high ratio.[17] Damgaard et al. (2019) estimated that SPEs accounted for 74.7 percent of Ireland's outward FDI stock in 2015 but only accounted for 14.0 percent of Japan's outward FDI stock in the same year.[18] The Figure 4 results imply that the untapped potential for outward FDI stock is the smallest in Japan among the OECD countries as of 2015. In other words, these results imply that Japan has no unrealized potential for outward FDI.

=== Figure 4 ===

Note that Figure 4 does not reflect the scale of the FDI stock. Although Figure 4 indicates a large gap for Japan, it may not be important if the relative scale of Japanese outward FDI is

[17] OECD (2015, p. 2) defines SPEs as "entities that have little or no employment, physical presence, or operations in a country but that provide important services to the MNE, such as holding assets and liabilities or raising capital."

[18] SPEs, which Damgaard et al. (2019) refer to as "phantom FDI", are established with no apparent activities aside from holding and financing, and hence are strongly linked to corporate tax avoidance strategies.

small. To reflect the scale of the FDI stock, Figure 5 plots the actual FDI on the vertical axis while the counterfactual FDI is plotted on the horizontal axis. If the actual FDI exceeds the counterfactual FDI, the country lies above the 45-degree line and vice versa. The distance from the 45-degree line indicates the gap of the ratio presented in Figure 4. Figure 5 indicates that both actual and counterfactual FDIs for Japan are large compared with other OECD countries. This confirms the relative importance of Japan's outward FDI compared with that of other OECD countries. These results imply that Japan has no unrealized potential for outward FDI.

=== Figure 5 ===

3.3. Origin-country specific effects

In our regression analysis, we include origin- and destination-country fixed effects. Unlike the study by Head and Ries (2005), our estimated ratio of actual to counterfactual FDI excludes the effect of time-invariant Japan-specific factors. In that sense, our comparison is in relative terms rather than absolute terms. One may ask whether the Japan-specific effect is large in absolute terms as well as relative terms. This can be seen by comparing the estimated coefficients on origin-country dummies.

Table 4 presents the estimated coefficients where the United States is the reference value (i.e., the US = 0). Japan's coefficient is significantly negative at -2.738. This means that Japan's predicted outward FDI stock would be about 6.5 percent (i.e., $\exp(-2.738) = 0.0647$) of the US outward FDI stock holding other gravity factors equal. Compared with the United States, Japanese outward FDI is small. However, the results in Table 4 imply that Japanese outward FDI is larger than that of the other (non-US) OECD countries since Japan's coefficient is the largest origin-country-specific coefficient. This means that the Japan-specific effect is large compared with other OECD countries in absolute terms.

=== Table 4 ===

3.4. Regional distribution of Japan's actual to counterfactual outward FDI stock

Having established that Japan's actual outward FDI stock well exceeded its counterfactual outward FDI stock in recent years, we next ask which countries are hosting above (or below) gravity-model-predicted amounts of Japan's FDI? Figure 6 presents the regional distribution of Japan's actual to counterfactual outward FDI stock in 2015 for 31 countries or territories.[19] Countries hosting 2 or more times the predicted level of Japan's

[19] These destinations represent all of the countries or territories hosting positive amounts of

outward FDI stock include Thailand, Vietnam, the Philippines, South Africa and Indonesia, followed by countries hosting 1.7 to 1.6 times the predicted level, namely the United States, Australia, Malaysia and Saudi Arabia. Countries that host much lower amounts of Japan's FDI than is predicted by the gravity model include the UAE, Spain, Russia, Luxembourg, and Switzerland. Production supply chains may help to explain Japan's regional pattern of "over" and "under" investment, but exploring these issues goes beyond the scope of this paper. We simply conclude that the regional distribution of Japan's actual to counterfactual FDI favors Southeast Asian nations, South Africa and the US.

=== Figure 6 ===

4. Robustness Checks

4.1. Outward FDI flows

Our analysis has focused on stocks rather than flows despite the fact that the gravity model of international trade focuses on trade flows. One may thus be concerned that our results may change if we use FDI flows rather than stocks. To address this concern, we estimate the gravity model replacing outward FDI stocks with outward FDI flows.

Figure 7 presents the results of the actual and counterfactual outward FDI flows as percentages of GDP using model 4. Figure 7 indicates that flows are more volatile than stocks in Figure 3. Otherwise, the results are quite similar to those of stocks. That is, there is no unrealized potential for Japan's outward FDI flows over the most recent several years. Our main message thus does not change if we focus on FDI flows rather than stocks.

=== Figure 7 ===

4.2. Alternative models

While our baseline model, model 4, outperformed three alternative specifications, we also consider whether our results are sensitive to our selected model or selected time span. As shown in Table 5, model 5 drops the origin- and destination-country fixed effects and the origin-country-specific and destination-region-specific trends in favor of adding origin- and destination-country-period fixed effects. We divide our 20-year panel into four periods of five years each to capture the period before China's WTO entry (i.e., 1996-2000), the initial years

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Japanese outward FDI in 2015 in our dataset after excluding three destinations for which our data source does not provide the GDP data needed for the gravity estimation (i.e., the Cayman Islands, Iran and Yugoslavia).

following China's WTO entry (i.e., 2001-2005), the years immediately surrounding the global financial crisis (i.e., 2006-2010), and the years of continuing adjustment to the financial crisis (i.e., 2011-2015). This approach captures heterogeneity across the four periods in the multilateral resistance factors affecting each origin and destination country.[20] HPC tests are inconclusive in ranking models 4 and 5, but model 5 fails to generate origin-country-period coefficients for Japan for two out of the four periods so we chose model 4 as the baseline model in order to present the origin-country specific coefficients in Table 4. Nevertheless, as a robustness check we use model 5 to generate Japan's counterfactual FDI as a percentage of GDP, as shown in Figure 8. While model 5 reduces the recent gap between Japan's actual and counterfactual FDI compared with model 4, it does not completely eliminate the gap.

=== Table 5 ===

Alternatively, we might improve our counterfactual predictions of outward FDI by shortening our study's time span to acknowledge that global production patterns and accompanying FDI have changed tremendously following China's accession to the WTO in 2001. In Fig. 8 we use our baseline model to create counterfactuals for Japan's outward FDI stock over the shorter period of 2001-2015. We refer to this shorter time span specification as model 6 in both Fig. 8 and Table 5. The advantage of considering a shorter time span to generate the counterfactual FDI with model 6 is potentially capturing more similar economic conditions by using origin-country-specific and destination-region-specific trends over shorter time spans. We find that the counterfactual values for Japan's outward FDI are closer to the actual values in 11 out of 15 years when switching from a 20-year (i.e., model 4)to a 15-year time span (i.e., model 6), but we still find no unrealized potential for Japan's FDI over the most recent years. We therefore conclude that our main result does not change by using a shorter time span.[21]

=== Figure 8 ===

4.3. Outward FDI stock value

The advantage of showing Japan's outward FDI stock as a percentage of GDP in Figures 3 and 8 is that we can control for exchange rate changes that inflate or deflate a given year's

[20] The authors thank an anonymous referee for suggesting this specification.

[21] We also checked a 10-year version of the baseline model, covering 2006-2015, which provides a tighter fit for Japan but not overall as judged by the R-squared statistic relative to models 5 and 6. Our main result still holds using the 10-year specification.

FDI stock relative to other years. However, a disadvantage is that our actual FDI trend line reflects changes in both outward FDI stock and GDP. As shown in Table A3, Japan's GDP declined from 2012 to 2015 in US dollar terms, so the strong upward trend in actual outward FDI stock as a share of GDP after 2012 shown in Fig. 3 may be caused as much by the GDP declines as by FDI increases. To examine the trend for outward FDI stock alone, we show actual versus counterfactual outward FDI stock values for Japan in Fig. 9. We include both our baseline model and the two alternative models described in the previous section as counterfactuals. This figure shows that the trend for actual outward FDI stock for Japan does not shift in 2012 in US dollar terms but rather continues the strong upward trajectory started from about 2005. All three counterfactual models under-predict Japan's actual outward FDI stock over the most recent years, again leaving our main result unchanged.

=== Figure 9===

5. Discussion and concluding remarks

While Japan's outward FDI stock is historically high, it is not necessarily clear whether there is untapped growth potential, given the economic size of Japan and that of partner countries. This paper asks whether Japan's outward FDI is unusually high or low. To answer this question, we examine whether Japan's actual outward FDI stock is high relative to the FDI predicted by the gravity model using the outward FDI patterns of all OECD nations, which we call counterfactual FDI. Using data from 1996 to 2015, we found that Japan's actual FDI exceeded its counterfactual FDI from the year 2013 onward and the ratio of Japan's actual to counterfactual FDI is the highest among the OECD countries as of 2015. These results imply that Japan has no unrealized potential for outward FDI. Additionally, on a regional basis, we find that the countries hosting above-gravity-model-predicted amounts of Japanese FDI include several Southeast Asian economies, South Africa, and the US.

We note that our research results naturally lead to the question: Why does the gravity model under-predict Japan's outward FDI stock from 2013 onward? We believe that FDI data issues and several factors not fully captured by gravity determinants play a role. Damgaard et al. (2019) estimate the large role played by SPEs or "phantom FDI" in recent years as multinational firms seek to limit their worldwide tax payments. They estimate that the explanatory power of the gravity model can be improved by about 25 percent by dropping phantom FDI and focusing on "real FDI" alone. Additionally, some recent Japan-specific factors may not be fully captured by gravity determinants: exchange rates, demographic

factors, and the Great East Japan Earthquake in 2011. The Japanese yen was particularly strong from mid-June 2010 to mid-Jan. 2013, then weakened sharply over the first two quarters of 2013. Both the yen's strength and its volatility prompted Japanese firms to invest overseas. Additional motivation came from a shrinking and aging market in Japan, both in terms of consumers and workers. Japanese firms increasingly look abroad for future market growth and our static gravity model does not capture forward-looking demographic factors. Lastly, domestic firms may have accelerated their plans for overseas investment in the aftermath of the 2011 earthquake because Japan suspended operations at its nuclear power plants, which meant domestic firms faced electricity shortages and price hikes. While all of these factors played a role in accelerating Japan's actual outward FDI stock beyond its gravity-model-predict level, determining the relative contributions of each factor is beyond the scope of this study. [22]

It is also important to note that whether such huge outward FDI stocks are beneficial for the Japanese economy as a whole ultimately depends upon how much profits are repatriated from the Japanese foreign affiliates. As Hasegawa and Kiyota (2017) argued, it thus is important to design international tax policies to facilitate the repatriation of profits.

[22] JETRO (2012, 2013, 2014) surveys of Japanese firms' overseas activities provides survey evidence on the relative importance of these factors for responding firms.

References

Anderson, James E. (2011) "The Gravity Model," *Annual Review of Economics*, 3: 133-160.

Anderson, James E. and Eric van Wincoop (2003) "Gravity with Gravitas: A Solution to the Border Puzzle," *American Economic Review*, 93(1): 170-192.

Bosquet, Clément and Hervé Boulhol (2014) "Applying the GLM Variance Assumption to Overcome the Scale-Dependence of the Negative Binomial QGMPL Estimator," *Econometric Review*, 33(7): 772-784.

Busse, Matthias, Jens Königer, and Peter Nunnenkamp (2010) "FDI Promotion through Bilateral Investment Treaties: More than A Bit?" *Review of World Economics*, 146(1): 147-177.

Damgaard, Jannick, Thomas Elkjaer and Niels Johannesen (2019) "What Is Real and What Is Not in the Global FDI Network?" IMF Working Paper WP/19/274.

Davidson, Russell, and James G. MacKinnon (1981) "Several Tests for Model Specification in the Presence of Alternative Hypotheses," *Econometrica*, 49(3), 781-793.

Davis, Donald R. and David E. Weinstein (2002) "The Mystery of the Excess Trade (Balances)," *American Economic Review* 92(2): 170-174.

Eaton, Jonathan and Akiko Tamura (1994) "Bilateralism and Regionalism in Japanese and U.S. Trade and Direct Foreign Investment Patterns," *Journal of the Japanese and International Economies*, 8(4): 478-510.

Egger, Peter (2010) "Bilateral FDI Potentials for Austria," *Empirica*, 37(1): 5-17.

Egger, Peter and Mario Larch (2008) "Interdependent Preferential Trade Agreement Membership: An Empirical Analysis," *Journal of International Economics*, 76(2): 384-399.

Egger, Peter and Michael Pfaffermayr (2004) "The Impact of Bilateral Investment Treaties on Foreign Direct Investment," *Journal of Comparative Economics*, 32(4): 788-804.

Felbermayr, Gabriel and Yoto V. Yotov (2019) "From Theory to Policy with Gravitas: A Solution to the Mystery of the Excess Trade Balances," CESifo Working Paper No. 7825.

Greaney, Theresa M. (2001) "Promoting Imports to Appease Trade Partners: Japan's New Trade Policies," *Journal of the Japanese and International Economies* 15: 253-270.

Hasegawa, Makoto and Kozo Kiyota (2017) "The Effect of Moving to a Territorial Tax System on Profit Repatriation: Evidence from Japan," *Journal of Public Economics*, 153: 92-110.

Head, Keith and John Ries (2005) "Judging Japan's FDI: The Verdict from A Dartboard Model," *Journal of the Japanese and International Economies*, 19(2): 215-232.

Head, Keith and John Ries (2008) "FDI as An Outcome of the Market for Corporate Control: Theory and Evidence," *Journal of International Economics*, 74(1): 22-20.

Hoshi, Takeo and Kozo Kiyota (2019) "Potential for Inward Foreign Direct Investment in Japan," *Journal of the Japanese and International Economies*, 52: 32-52.

JETRO (2012, 2013, 2014) "Fiscal Year Survey of the International Operations of Japanese Firms," Japan External Trade Organization (JETRO), available online at https://www.jetro.go.jp/en/reports/survey/biz.html .

Kiyota, Kozo (2015) *Kakudai-suru Chokusetsu Toushi to Nihon Kigyo* (*Expanding FDI and Japanese Firms*). Tokyo: NTT Shuppan. (In Japanese)

Lawrence, Robert (1993), "Japan's Different Trade Regime: An Analysis with Particular Reference to Keiretsu," *Journal of Economic Perspectives* 7: 3-19.

OECD (2015) "How Multinational Enterprises Channel Investments Through Multiple Countries," February 2015.

Neumayer, Eric and Laura Spess (2005) "Do Bilateral Investment Treaties Increase Foreign Direct Investment to Developing Countries?" *World Development*, 33(10): 1567-1585.

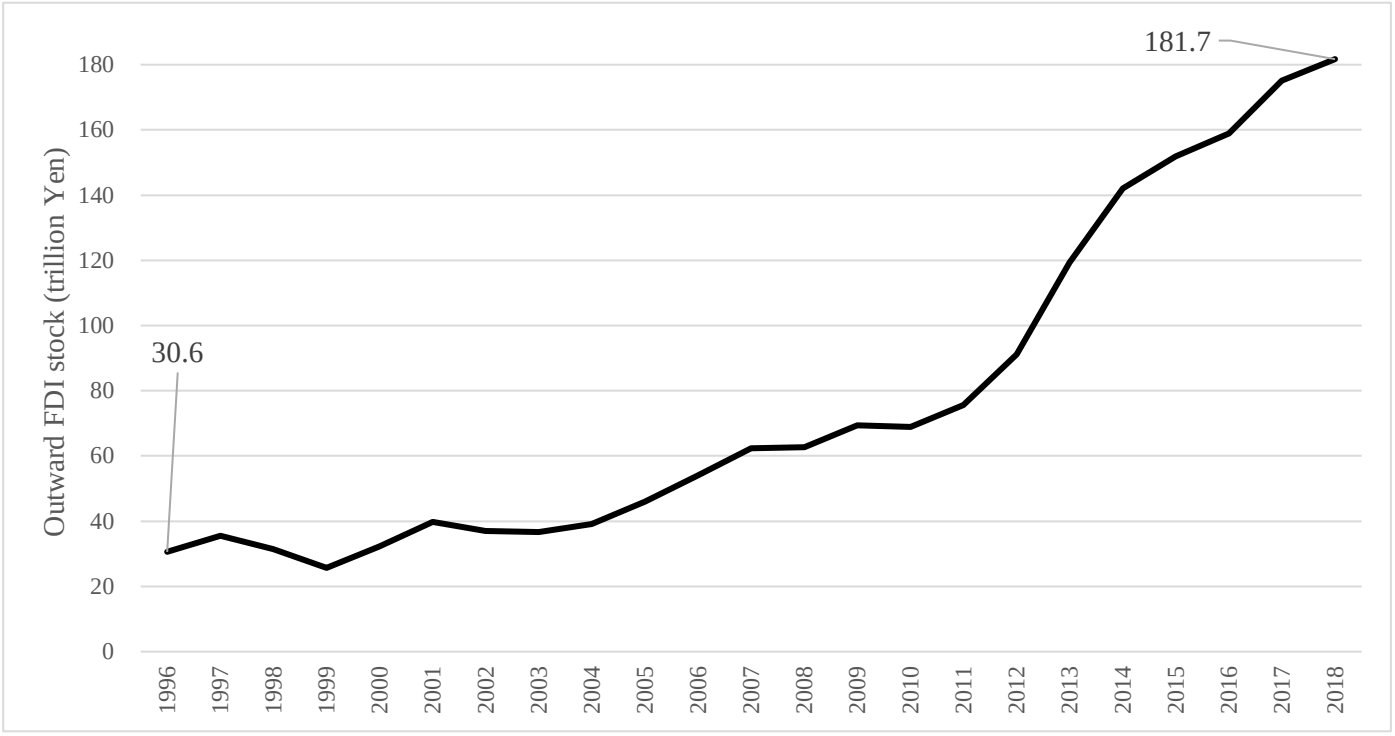
Santos Silva, Joao M.C. and Silvana Tenreyro (2006) "The Log of Gravity," *Review of Economics and Statistics*, 88(4): 641-658.

Santos Silva, Joao M.C., Silvana Tenreyro, and Frank Windmeijer (2015) "Testing Competing Models for Non-negative Data with Many Zeros," *Journal of Econometric Methods*, 4 (1): 29-46.

Saxonhouse, Gary R. (1996) "A Short Summary of the Long History of Trade Allegations Against Japan," in Jagdish N. Bhagwati and Robert E. Hudec (eds.) *Fair Trade and Harmonization*, Cambridge: MIT Press, pp. 471-513.

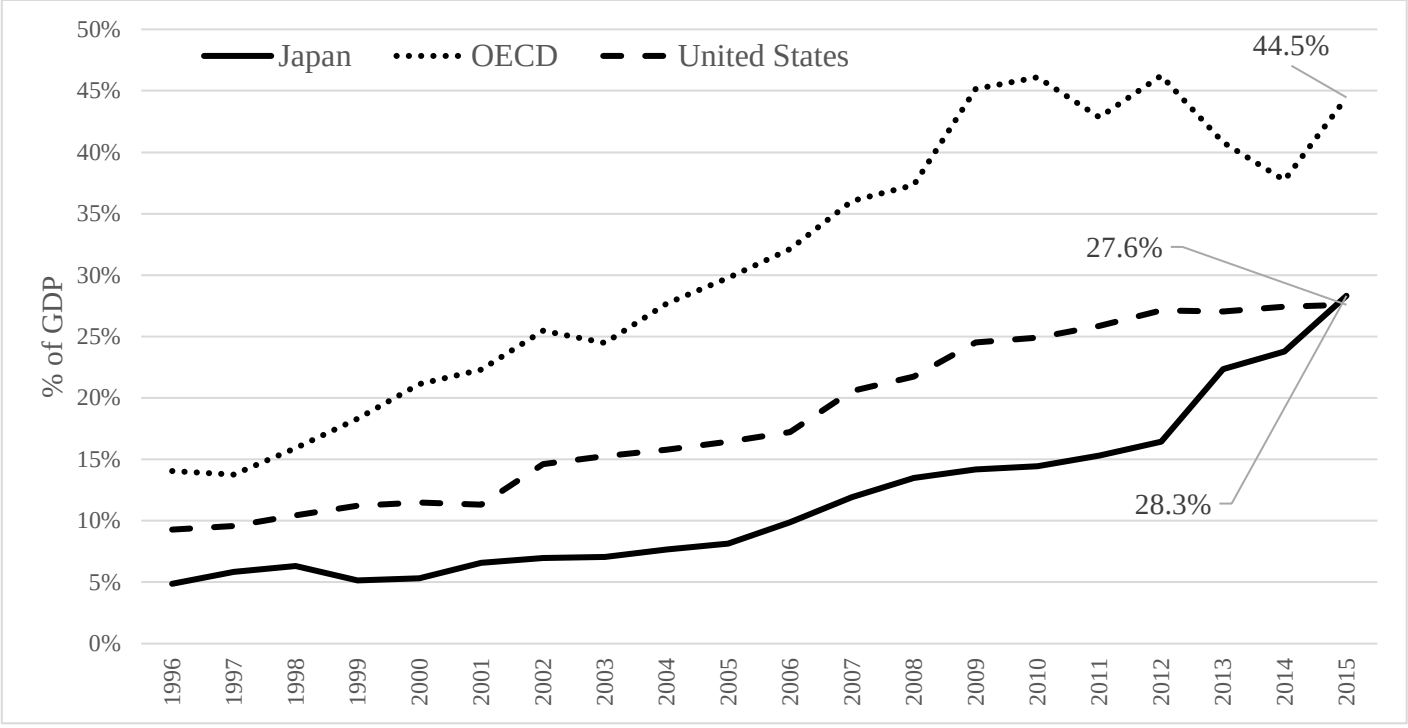
Saxonhouse, Gary R. (1993) "What Does Japanese Trade Structure Tell Us About Japanese Trade Policy?" *Journal of Economic Perspectives* 7: 21-43.

Figure 1. Outward FDI Stock for Japan, 1996-2018



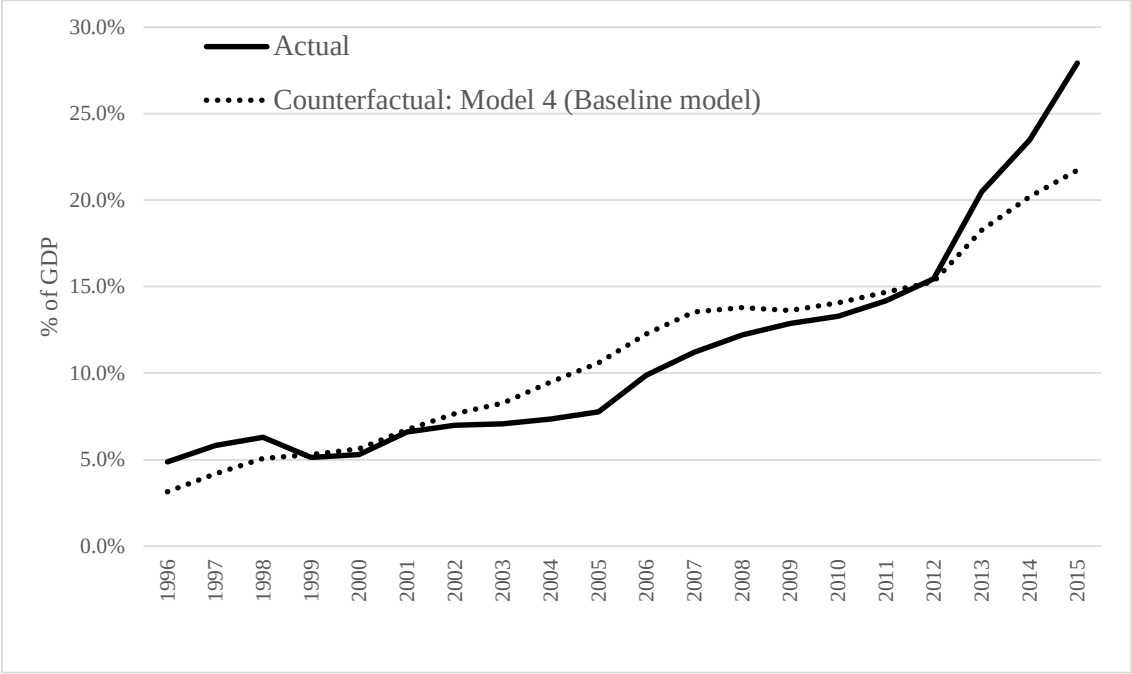
Source: Ministry of Finance (2019) International Investment Position (Historical Data).

Figure 2. Share of Outward FDI Stocks to GDP for Japan, the United States, and OECD Average



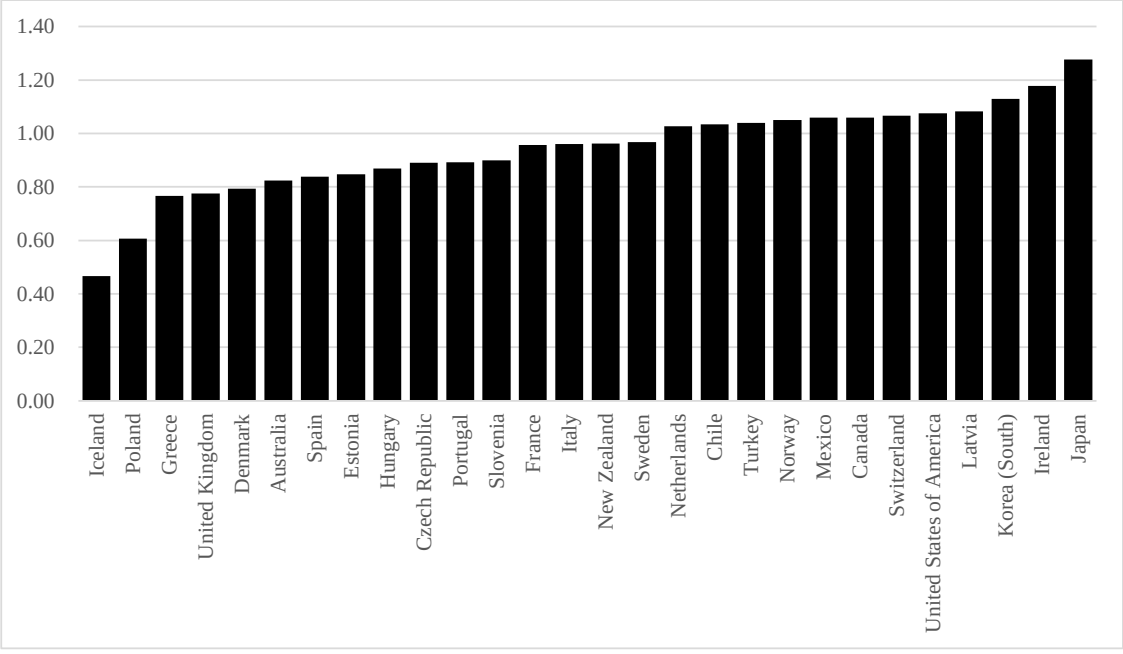
Sources: Outward FDI stock data are obtained from the OECD International Direct Investment Database. For other data, see main text.

Figure 3. Actual versus Counterfactual Outward FDI Stock for Japan



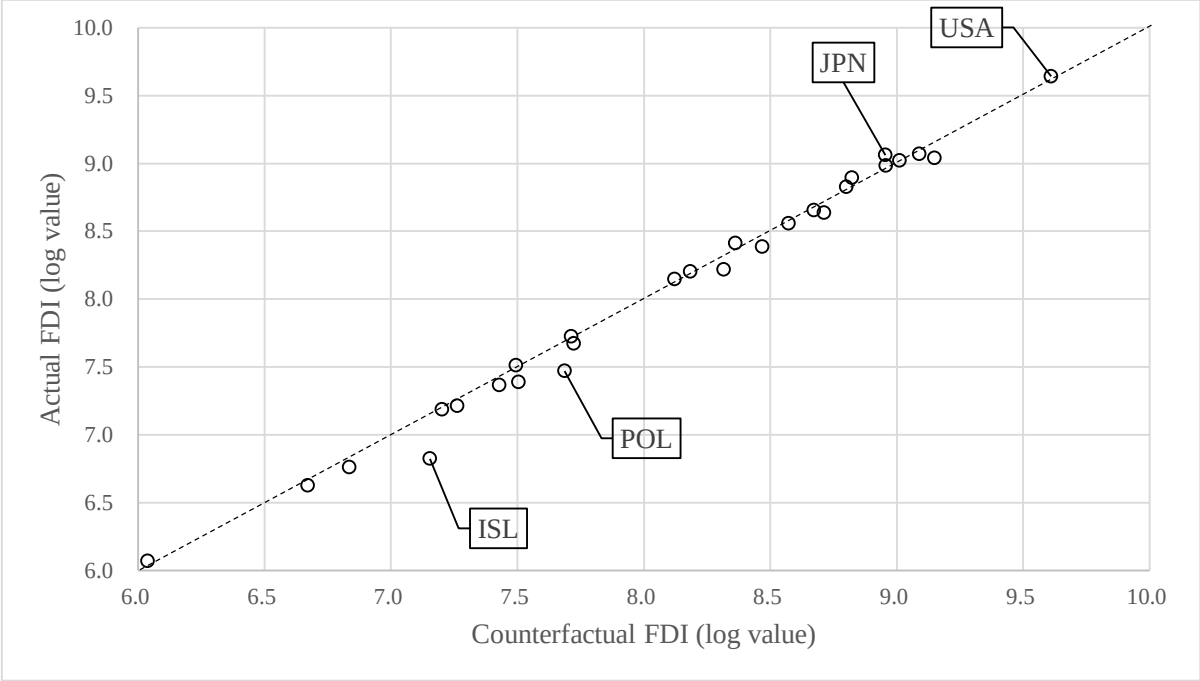
Sources: Outward FDI stock data are obtained from the OECD International Direct Investment Database. For other data, see main text.

Figure 4. Ratio of Actual to Counterfactual Outward FDI Stock for OECD Countries in 2015



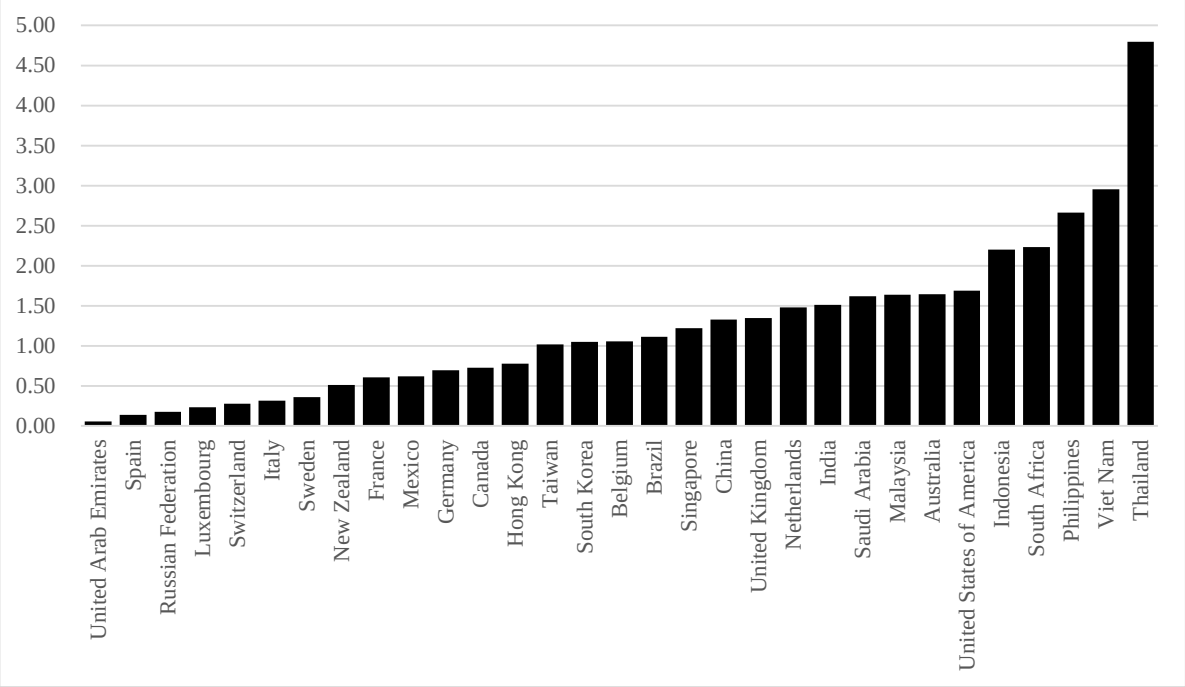
Sources: Outward FDI stock data are obtained from the OECD International Direct Investment Database. For other data, see main text.

Figure 5. Actual and Counterfactual Outward FDI Stock for OECD Countries in 2015



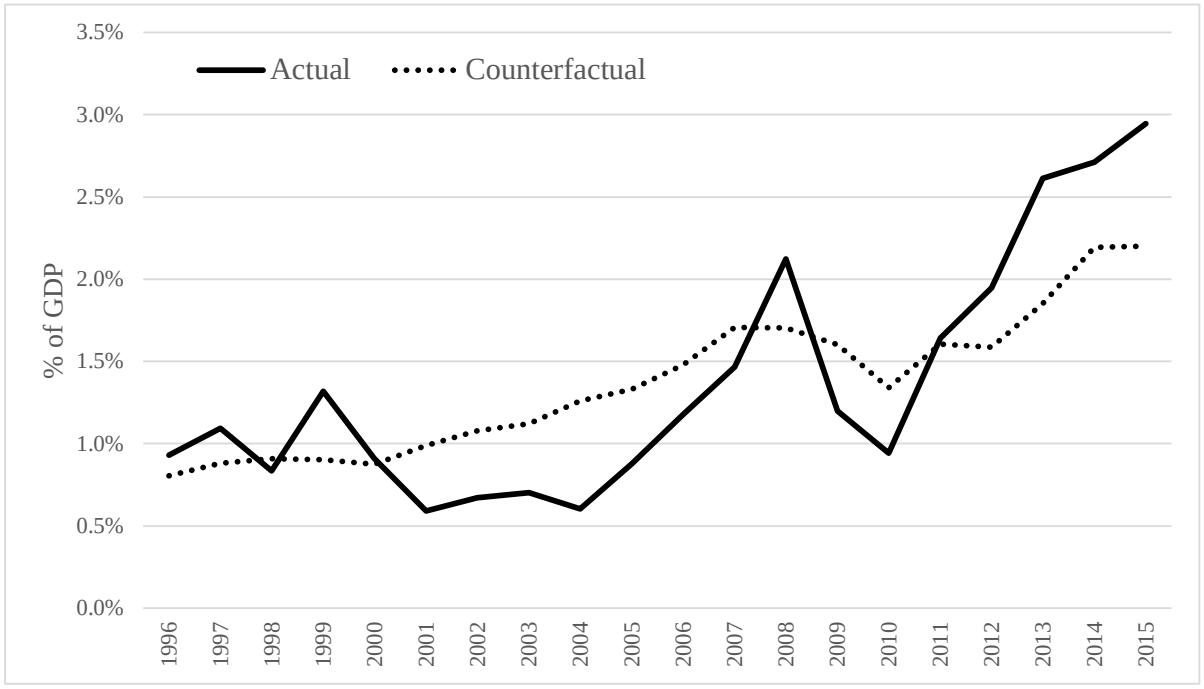
Note: Dotted line indicates the 45-degree line.
Sources: Outward FDI stock data are obtained from the OECD International Direct Investment Database. For other data, see main text.

Figure 6. Ratio of Actual to Counterfactual Japanese Outward FDI Stock in 2015, by Country



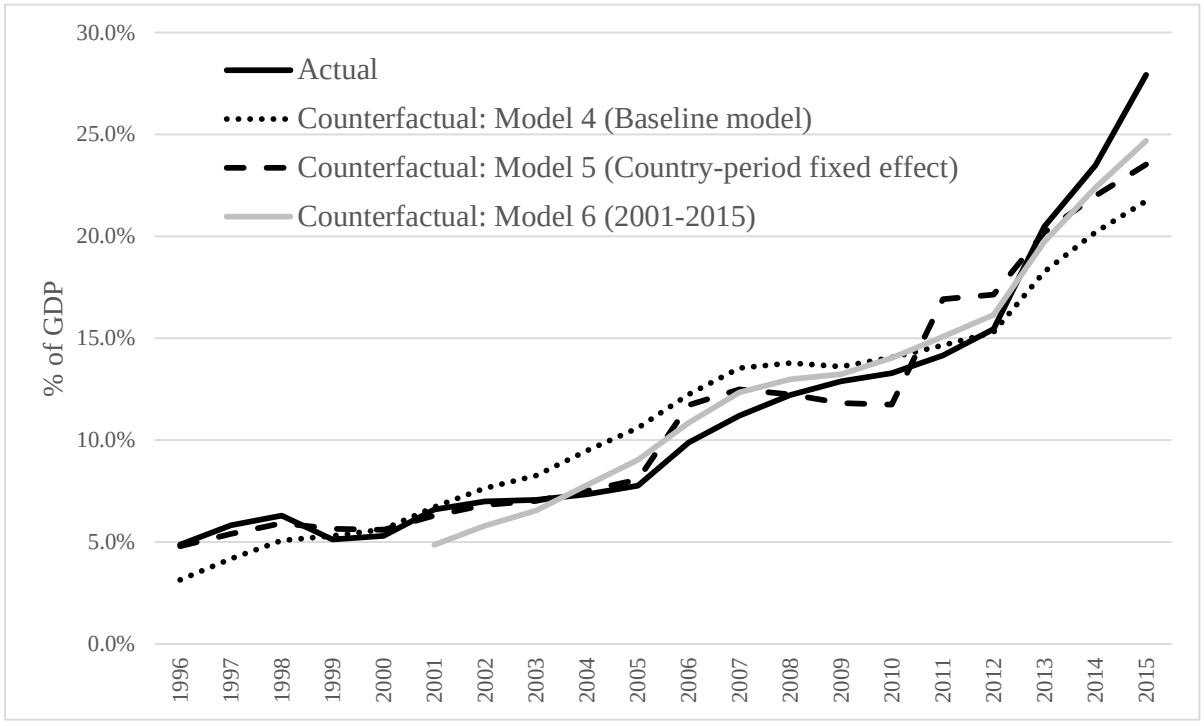
Sources: Outward FDI stock data are obtained from the OECD International Direct Investment Database. For other data, see main text.

Figure 7. Actual versus Counterfactual Outward FDI Flow for Japan



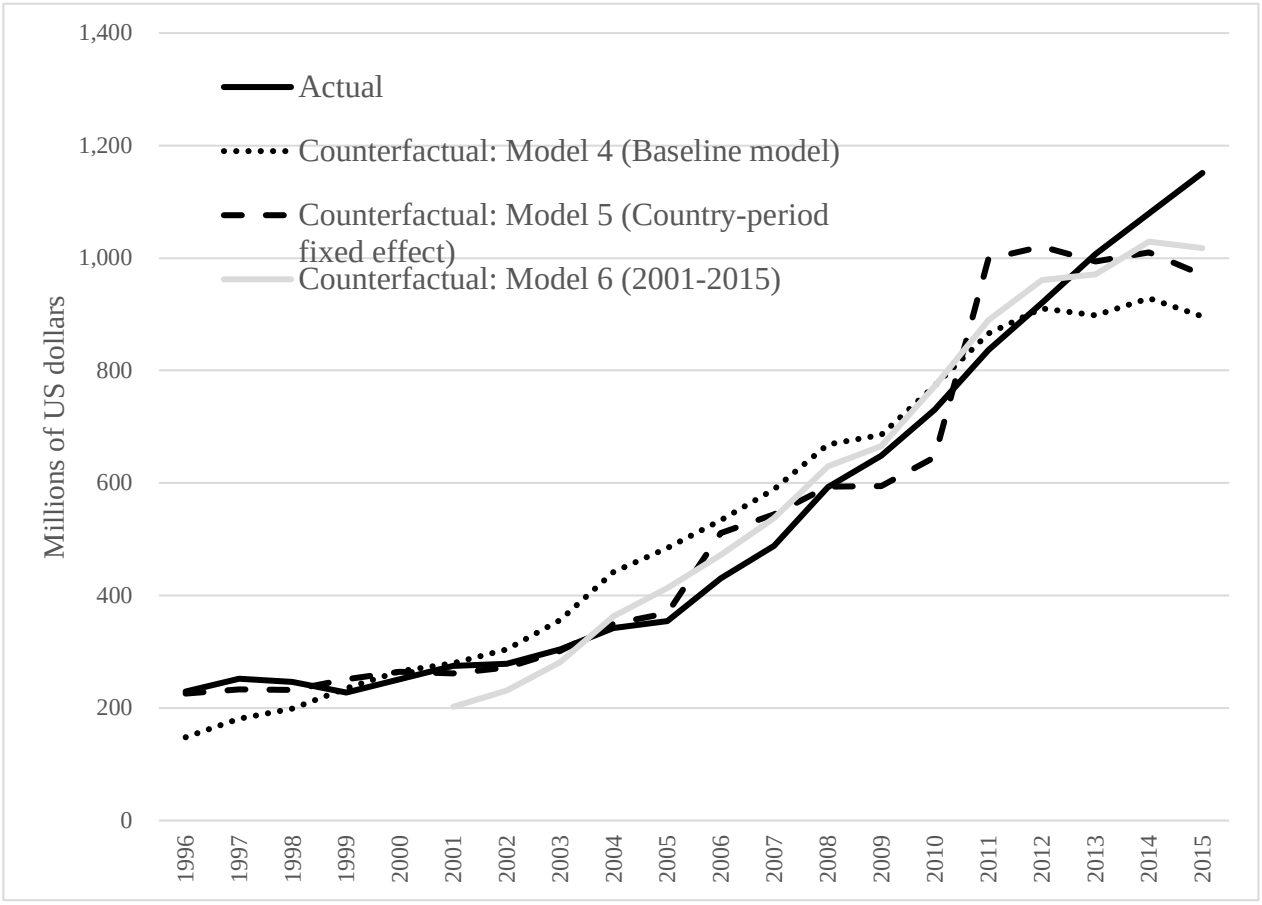
Sources: Outward FDI flow data are obtained from the OECD International Direct Investment Database. For other data, see main text.

Figure 8. Actual versus Counterfactual Outward FDI Stock for Japan: Robustness Check



Sources: Outward FDI stock data are obtained from the OECD International Direct Investment Database. For other data, see main text.

Figure 9. Actual versus Counterfactual Outward FDI Stock for Japan: Value



Sources: Outward FDI stock data are obtained from the OECD International Direct Investment Database. For other data, see main text.

Table 1. Ratio of Outward FDI Stock to GDP for OECD Countries, 1996-2015

	OECD	AUS	AUT	BEL	CAN	CHE	CHL	CZE	DEU	DNK	ESP	EST	FIN	FRA	GBR	GRC	HUN	IRL
1996	0.181	0.130	0.053	.	0.199	0.365	.	.	0.210	.	.	.	0.123	0.134	0.230	.	.	.
1997	0.169	0.115	0.063	.	0.198	0.499	.	0.007	0.112	.	.	.	0.149	0.154	0.224	.	.	.
1998	0.184	0.169	0.076	.	0.230	0.534	.	0.009	0.138	0.178	.	.	0.209	0.186	0.281	.	0.011	.
1999	0.216	0.190	0.082	.	0.252	0.564	.	0.009	0.165	0.237	.	.	0.235	0.219	0.405	.	0.014	.
2000	0.239	0.206	0.118	.	0.273	0.709	.	0.009	0.225	0.293	0.031	0.001	0.412	0.323	0.490	.	0.023	.
2001	0.269	0.203	0.138	.	0.330	0.734	.	0.008	0.258	0.327	.	.	0.400	0.364	0.465	0.045	0.019	0.207
2002	0.286	0.202	0.183	.	0.352	0.778	.	0.001	0.298	0.405	0.061	.	0.463	0.386	0.563	0.051	0.020	0.245
2003	0.295	0.312	0.190	.	0.346	0.747	.	0.022	0.293	0.385	0.264	0.094	0.441	0.408	0.579	0.050	0.033	0.258
2004	0.305	0.313	0.205	.	0.355	0.783	.	0.026	0.281	0.487	0.285	0.107	0.387	0.418	0.520	0.048	0.049	0.314
2005	0.288	0.234	0.208	.	0.331	0.855	.	0.025	0.274	0.484	0.259	0.133	0.384	0.280	0.469	0.036	0.056	0.286
2006	0.329	0.254	0.285	.	0.326	1.049	0.154	0.030	0.327	0.513	0.340	0.200	0.427	0.354	0.494	0.052	0.086	0.370
2007	0.361	0.299	0.358	.	0.346	1.092	0.160	0.043	0.360	0.567	0.389	0.259	0.435	0.377	0.521	0.080	0.106	0.377
2008	0.409	0.155	0.316	1.543	0.335	1.039	0.161	0.048	0.315	0.538	0.357	0.263	0.406	0.318	0.523	0.082	0.094	0.453
2009	0.531	0.252	0.337	1.927	0.433	1.286	0.151	0.061	0.325	0.648	0.413	0.314	0.516	0.416	0.650	0.109	0.134	1.052
2010	0.551	0.265	0.410	1.747	0.387	1.447	0.154	0.066	0.336	0.670	0.450	0.281	0.553	0.441	0.645	0.116	0.141	1.254
2011	0.520	0.176	0.403	1.747	0.355	1.341	0.152	0.053	0.321	0.660	0.434	0.208	0.490	0.434	0.604	0.138	0.133	1.184
2012	0.582	0.183	0.432	1.791	0.371	1.491	0.178	0.079	0.364	0.740	0.446	0.265	0.534	0.470	0.608	0.134	0.175	1.634
2013	0.537	0.209	0.459	0.892	0.397	1.465	0.211	0.088	0.400	0.566	0.366	0.269	.	0.468	0.429	0.125	0.196	2.051
2014	0.514	0.195	.	0.824	0.394	1.258	0.232	0.080	0.353	0.488	0.346	0.237	.	0.435	0.378	0.105	0.191	2.196
2015	0.594	0.185	.	.	0.466	1.440	0.285	0.088	.	0.565	0.361	0.258	.	0.491	0.400	0.131	0.191	2.860

	ISL	ISR	ITA	JPN	KOR	LUX	LVA	MEX	NLD	NOR	NZL	POL	PRT	SVK	SVN	SWE	TUR	USA
1996	0.032	.	0.070	0.049	0.020	0.203	.	.	0.369	0.144	0.133	0.004	0.028	.	.	0.219	.	0.093
1997	0.036	.	0.070	0.058	0.026	0.241	.	.	0.412	0.156	0.097	0.003	0.038	0.006	.	0.266	.	0.096
1998	0.042	.	0.084	0.063	0.047	0.345	.	.	0.425	0.155	0.099	0.004	0.089	0.004	.	0.334	.	0.104
1999	0.044	.	0.090	0.051	0.040	0.318	.	.	0.590	0.168	0.135	0.004	0.085	0.010	.	0.374	.	0.112
2000	0.056	.	0.120	0.053	0.038	0.313	.	.	0.733	0.194	0.141	0.004	0.144	0.012	.	0.455	.	0.115
2001	0.077	.	0.121	0.066	0.045	0.345	.	.	0.777	0.208	0.085	0.005	0.158	0.014	.	0.490	0.016	0.113
2002	0.089	.	0.117	0.070	.	0.601	.	.	0.850	0.216	0.070	0.006	0.139	0.014	.	0.524	0.024	0.146
2003	0.099	.	0.148	0.071	0.042	0.212	.	.	0.912	0.239	0.064	0.009	0.139	0.018	.	0.552	0.019	0.153
2004	0.215	.	0.152	0.077	0.052	0.742	.	.	0.908	0.297	0.074	0.012	0.183	0.019	.	0.551	0.018	0.158
2005	0.595	.	0.155	0.082	.	0.787	.	.	0.915	0.298	.	0.019	0.165	0.014	.	0.520	0.016	0.164
2006	0.794	.	0.191	0.099	0.053	0.792	.	.	1.104	0.332	0.085	0.030	.	0.020	0.086	0.598	0.016	0.172
2007	1.230	0.274	0.197	0.119	0.065	1.025	.	.	1.124	0.362	0.090	0.047	0.214	0.024	0.114	0.653	0.018	0.205
2008	0.658	0.246	0.181	0.135	0.098	1.560	.	.	0.931	0.294	0.066	0.043	0.175	0.030	0.108	0.613	0.023	0.217
2009	0.732	0.228	0.215	0.142	0.128	1.705	.	0.099	1.065	0.398	0.092	0.061	0.218	0.033	0.121	0.802	0.034	0.245
2010	0.736	0.240	0.221	0.144	0.132	1.617	.	0.110	1.091	0.430	0.110	0.091	0.215	0.033	0.119	0.747	0.030	0.249
2011	0.798	0.227	0.220	0.153	0.143	1.163	.	0.095	1.064	0.330	0.091	0.099	0.240	0.040	0.106	0.664	0.035	0.259
2012	0.856	0.231	0.246	0.164	0.165	0.876	.	0.118	1.170	0.393	0.102	0.114	0.212	0.047	0.113	0.708	0.037	0.271
2013	0.610	0.210	0.242	0.224	0.181	.	0.044	0.107	1.318	0.331	0.094	0.059	0.246	0.047	0.106	0.704	0.081	0.270
2014	0.468	0.189	0.222	0.238	0.170	.	0.038	0.110	1.165	0.317	0.071	0.061	0.194	0.019	0.095	0.678	0.048	0.274
2015	0.423	.	0.250	0.283	0.197	.	0.044	0.123	1.446	0.423	0.089	0.062	0.237	.	0.099	0.729	0.047	0.276

Sources: Outward FDI stock data are obtained from the OECD International Direct Investment Database. GDP data are obtained from the CEPII gravity data.

Table 2. Summary Statistics

	N	Mean	S.D.	p25	Median	p75
Outward FDI stock	66,437	2,825	18,419	0	0	211
RTA dummy	66,437	0.302	0.459	0.000	0.000	1.000
Bilateral investment treaties dummy	66,437	0.145	0.352	0.000	0.000	0.000
WTO member dummy	66,437	0.796	0.403	1.000	1.000	1.000
Common currency dummy	66,437	0.036	0.187	0.000	0.000	0.000
Distance (log value)	66,437	8.562	0.885	8.096	8.837	9.176
Common official language dummy	66,437	0.095	0.293	0.000	0.000	0.000
Colonial relationship dummy	66,437	0.036	0.187	0.000	0.000	0.000
Contiguity dummy	66,437	0.025	0.156	0.000	0.000	0.000
Origin country						
Population (log value)	66,437	9.429	1.559	8.578	9.240	10.815
Per-capita GDP (log value)	66,437	3.317	0.669	2.893	3.419	3.837
Destination country						
Population (log value)	66,437	8.738	2.197	7.618	8.997	10.241
Per-capita GDP (log value)	66,437	1.527	1.593	0.234	1.523	2.877

Notes and Sources: Outward FDI stock data are obtained from the OECD International Direct Investment Database and reported in units of millions of US dollars. For other data, see main text.

Table 3. Gravity Model Estimation for Outward FDI Stock

	Model 1	Model 2	Model 3	Model 4 Baseline model
RTA dummy	-0.287*	0.082	0.074	0.082
	[0.170]	[0.091]	[0.091]	[0.091]
Bilateral investment treaties dummy	-0.300***	0.225**	0.224**	0.223**
	[0.112]	[0.097]	[0.097]	[0.097]
WTO member dummy	-0.219	0.147	0.119	0.134
	[0.337]	[0.092]	[0.090]	[0.092]
Common currency dummy	0.273*	0.144	0.118	0.105
	[0.152]	[0.134]	[0.138]	[0.141]
Distance	-0.623***	-0.480***	-0.483***	-0.482***
	[0.089]	[0.063]	[0.063]	[0.063]
Common official language dummy	0.945***	0.397***	0.396***	0.396***
	[0.144]	[0.122]	[0.122]	[0.122]
Colonial relationship dummy	0.277*	0.236*	0.232*	0.233*
	[0.167]	[0.124]	[0.123]	[0.123]
Contiguity dummy	-0.437**	0.031	0.039	0.042
	[0.183]	[0.141]	[0.141]	[0.141]
Origin country's population	0.842***	2.122**	-1.552	-1.839
	[0.046]	[0.842]	[1.287]	[1.235]
Origin country's per-capita GDP	1.429***	0.616***	0.387***	0.396***
	[0.103]	[0.099]	[0.083]	[0.081]
Destination country's population	0.559***	1.807***	1.383**	1.633**
	[0.047]	[0.562]	[0.591]	[0.699]
Destination country's per-capita GDP	1.187***	0.696***	0.572***	0.551***
	[0.069]	[0.072]	[0.059]	[0.056]
Number of observations	66,437	66,437	66,437	66,437
Origin and destination fixed effects	No	Yes	Yes	Yes
Origin-country-specific trend	No	No	Yes	Yes
Destination-region-specific trend	No	No	No	Yes
R -squared	0.552	0.806	0.819	0.821
RESET test *p* -value	0.420	0.610	0.107	0.309
HPC test *p* -values				
Column 1 as Alternative		0.162	0.175	0.170
Column 2 as Alternative	0.000		0.319	0.335
Column 3 as Alternative	0.000	0.000		0.500
Column 4 as Alternative	0.000	0.000	0.004	

Notes: **, **, and * indicate statistically significant at 1%, 5%, and 10%, respectively. Standard errors, which are clustered by country pairs, are reported in brackets. All the models are estimated by PPML. R-squared indicates the square of correlation between the dependent variable and the estimated conditional mean.

Sources: Outward FDI stock data are obtained from the OECD International Direct Investment Database. For other data, see main text.

Table 4. Origin-Country Specific Effects for OECD Countries

Country name	Abbreviations	Coefficient	Standard Errors
United States	USA	reference country	
Japan	JPN	-2.738***	[0.875]
Germany	DEU	-3.050**	[1.437]
Belgium	BEL	-3.211	[4.516]
United Kingdom	GBR	-3.497*	[1.887]
France	FRA	-4.438**	[1.926]
Italy	ITA	-5.016**	[1.983]
Spain	ESP	-5.083*	[2.683]
Canada	CAN	-6.413**	[2.813]
Netherlands	NLD	-7.030**	[3.567]
Australia	AUS	-7.119**	[3.476]
Mexico	MEX	-7.893***	[2.983]
Korea (South)	KOR	-8.513***	[2.239]
Sweden	SWE	-9.059**	[4.301]
Latvia	LVA	-9.521	[9.045]
Switzerland	CHE	-9.788**	[4.626]
Portugal	PRT	-10.765***	[4.073]
Denmark	DNK	-10.829**	[4.918]
Turkey	TUR	-10.918***	[2.371]
Finland	FIN	-10.930**	[4.919]
Israel	ISR	-11.474**	[5.446]
New Zealand	NZL	-11.614**	[5.407]
Norway	NOR	-11.941**	[5.251]
Austria	AUT	-11.981***	[4.407]
Greece	GRC	-12.302***	[4.000]
Chile	CHL	-12.503***	[4.163]
Poland	POL	-12.625***	[2.526]
Slovenia	SVN	-13.671**	[6.154]
Hungary	HUN	-14.633***	[4.087]
Czech Republic	CZE	-15.591***	[4.190]
Estonia	EST	-15.601**	[6.452]
Slovakia	SVK	-16.637***	[4.831]
Ireland	IRL	-18.216***	[6.345]
Luxembourg	LUX	-19.502**	[8.307]
Iceland	ISL	-20.390**	[8.690]

Notes: Coefficients and standard errors are obtained from the model in column 4 of Table 3. ***, **, and * indicate the coefficient estimate is statistically significant at 1%, 5%, and 10%, respectively. Standard errors, which are clustered by country pairs, are reported in brackets.

Sources: Outward FDI stock data are obtained from the OECD International Direct Investment Database. For other data, see main text.

Table 5. Gravity Model Estimation for Outward FDI Stock: Robustness Check

	Model 4	Model 5	Model 6
	Baseline model	Country-period fixed effects	2001-2015
RTA dummy	0.082	0.069	0.041
	[0.091]	[0.093]	[0.094]
Bilateral investment treaties dummy	0.223**	0.223**	0.199**
	[0.097]	[0.097]	[0.099]
WTO member dummy	0.134	-0.039	0.061
	[0.092]	[0.092]	[0.111]
Common currency dummy	0.105	0.106	0.067
	[0.141]	[0.143]	[0.153]
Distance	-0.482***	-0.487***	-0.483***
	[0.063]	[0.063]	[0.064]
Common official language dummy	0.396***	0.396***	0.336**
	[0.122]	[0.121]	[0.137]
Colonial relationship dummy	0.233*	0.231*	0.156
	[0.123]	[0.120]	[0.137]
Contiguity dummy	0.042	0.047	0.031
	[0.141]	[0.140]	[0.142]
Origin country's population	-1.839	3.064***	-0.792
	[1.235]	[0.954]	[1.542]
Origin country's per-capita GDP	0.396***	0.309***	0.354***
	[0.081]	[0.096]	[0.095]
Destination country's population	1.633**	2.615***	1.776**
	[0.699]	[0.766]	[0.843]
Destination country's per-capita GDP	0.551***	0.471***	0.526***
	[0.056]	[0.074]	[0.065]
Number of observations	66,437	65,859	58,658
Origin and destination fixed effects	Yes	No	Yes
Origin-country-specific trend	Yes	No	Yes
Destination-region-specific trend	Yes	No	Yes
Origin- and destination-country-period fixed effects	No	Yes	No
R-squared	0.821	0.831	0.825
RESET test *p*-value	0.309	0.122	0.157

Notes: **, **, and * indicate statistically significant at 1%, 5%, and 10%, respectively. Standard errors, which are clustered by country pairs, are reported in brackets. All the models are estimated by PPML. R-squared indicates the square of correlation between the dependent variable and the estimated conditional mean.

Sources: Outward FDI stock data are obtained from the OECD International Direct Investment Database. For other data, see main text.

Table A1. List of OECD Countries and Abbreviations

Country name	Abbreviations	Country name	Abbreviations
Australia	AUS	Korea	KOR
Austria	AUT	Latvia	LVA
Belgium	BEL	Luxembourg	LUX
Canada	CAN	Mexico	MEX
Chile	CHL	Netherlands	NLD
Czech Republic	CZE	New Zealand	NZL
Denmark	DNK	Norway	NOR
Estonia	EST	Poland	POL
Finland	FIN	Portugal	PRT
France	FRA	Slovakia	SVK
Germany	DEU	Slovenia	SVN
Greece	GRC	Spain	ESP
Hungary	HUN	Sweden	SWE
Iceland	ISL	Switzerland	CHE
Ireland	IRL	Turkey	TUR
Israel	ISR	United Kingdom	GBR
Italy	ITA	United States	USA
Japan	JPN		

Source: The OECD International Direct Investment Database.

Table A2. Outward FDI Stocks

	AUS	AUT	BEL	CAN	CHE	CHL	CZE	DEU	DNK	ESP	EST	FIN	FRA	GBR	GRC	HUN	IRL	ISL
1996	52	12	.	125	120	.	.	527	.	.	.	16	217	300	.	.	.	0
1997	50	13	.	129	143	.	0	249	.	.	.	19	225	322	.	.	.	0
1998	67	17	.	145	158	.	1	309	31	.	.	28	281	429	.	1	.	0
1999	74	18	.	170	164	.	1	362	42	.	.	32	328	631	.	1	.	0
2000	86	23	.	202	193	.	1	438	48	18	0	52	442	759	.	1	.	1
2001	77	27	.	242	204	.	1	503	54	.	.	52	503	711	6	1	22	1
2002	79	39	.	265	234	.	0	618	72	43	.	65	579	943	8	1	31	1
2003	146	49	.	307	263	.	2	732	84	239	1	75	753	1125	10	3	42	1
2004	192	61	.	362	308	.	3	790	122	304	1	76	887	1195	11	5	61	3
2005	162	66	.	385	348	.	3	783	128	300	2	78	616	1132	9	6	60	10
2006	190	95	.	427	450	24	5	980	145	430	3	92	823	1275	14	10	85	14
2007	255	138	.	504	522	28	8	1236	181	575	6	111	1004	1543	25	15	101	26
2008	163	135	802	517	573	29	11	1179	190	583	6	115	930	1460	29	15	124	12
2009	234	134	936	593	694	26	13	1109	207	619	6	130	1121	1501	36	17	246	9
2010	302	160	846	625	841	34	14	1146	214	645	5	137	1168	1553	35	18	274	10
2011	245	173	923	631	934	38	12	1206	226	649	5	134	1243	1567	40	19	281	12
2012	280	176	894	676	993	47	16	1286	238	604	6	137	1262	1590	34	22	363	12
2013	326	197	468	726	1004	59	18	1493	190	510	7	.	1314	1150	30	26	476	9
2014	284	.	438	702	884	60	17	1371	169	478	6	.	1236	1135	25	27	563	8
2015	248	.	.	723	966	69	16	.	167	433	6	.	1187	1142	26	23	811	7

	ISR	ITA	JPN	KOR	LUX	LVA	MEX	NLD	NOR	NZL	POL	PRT	SVK	SVN	SWE	TUR	USA
1996	.	92	229	12	4	.	.	163	23	9	1	3	.	.	63	.	752
1997	.	86	252	14	5	.	.	169	25	6	0	4	0	.	70	.	825
1998	.	107	247	18	7	.	.	183	23	5	1	11	0	.	89	.	949
1999	.	112	228	20	7	.	.	260	27	8	1	11	0	.	101	.	1083
2000	.	137	251	22	7	.	.	303	33	7	1	17	0	.	118	.	1180
2001	.	141	274	24	7	.	.	331	36	5	1	19	0	.	118	3	1201
2002	.	148	278	.	14	.	.	395	42	5	1	19	0	.	138	6	1607
2003	.	233	304	29	6	.	.	520	54	6	2	23	1	.	183	6	1758
2004	.	274	357	40	25	.	.	586	77	8	3	35	1	.	210	7	1937
2005	.	288	373	.	29	.	.	615	90	.	6	33	1	.	202	8	2152
2006	.	372	430	54	33	.	.	794	113	9	10	.	1	3	251	9	2385
2007	48	433	520	73	50	.	.	937	142	12	20	51	2	5	318	12	2974
2008	53	432	653	98	86	.	.	867	134	9	23	46	3	6	315	17	3201
2009	47	471	714	115	86	.	88	914	151	11	27	53	3	6	345	21	3536
2010	56	469	793	144	84	.	116	913	181	16	43	51	3	6	365	22	3725
2011	59	500	905	172	69	.	111	951	162	15	52	59	4	5	374	27	4014
2012	59	515	979	202	49	.	141	963	196	17	57	46	4	5	385	30	4384
2013	61	521	1100	236	.	1	134	1125	170	17	31	56	5	5	408	66	4532
2014	58	477	1092	240	.	1	143	1025	158	14	33	45	2	5	389	39	4768
2015	.	456	1167	271	.	1	140	1085	164	16	29	47	.	4	361	33	4975

Notes: Figures are reported in the billions of US dollars.

Sources: Outward FDI stock data are obtained from the OECD International Direct Investment Database.

Table A3. GDP

	AUS	AUT	BEL	CAN	CHE	CHL	CZE	DEU	DNK	ESP	EST	FIN	FRA	GBR	GRC	HUN	IRL	ISL
1996	401	237	281	627	330	76	67	2502	188	641	5	132	1614	1305	147	46	76	8
1997	436	212	254	651	287	83	62	2216	174	589	5	127	1461	1439	143	47	83	8
1998	399	218	260	631	295	79	66	2240	177	617	6	134	1511	1529	145	49	90	8
1999	389	217	260	674	290	73	65	2197	178	633	6	135	1500	1558	143	49	99	9
2000	415	196	237	739	272	79	61	1947	164	595	6	126	1368	1549	131	47	99	9
2001	378	197	237	733	279	72	67	1948	165	626	6	129	1382	1529	136	54	108	8
2002	394	213	258	753	301	71	82	2076	179	705	7	140	1500	1674	153	67	127	9
2003	466	261	319	888	352	78	99	2502	218	907	10	171	1848	1944	202	85	163	11
2004	613	300	370	1018	394	101	119	2816	251	1070	12	197	2124	2298	240	103	193	14
2005	693	315	387	1164	408	124	136	2858	265	1157	14	204	2204	2412	248	112	210	17
2006	747	334	411	1311	429	155	155	2998	283	1264	17	217	2325	2583	273	114	231	17
2007	853	386	472	1458	477	173	189	3436	320	1479	22	255	2663	2963	319	139	269	21
2008	1055	428	520	1543	552	180	235	3747	353	1635	24	284	2924	2792	355	157	274	18
2009	926	398	486	1371	540	172	206	3413	320	1499	20	251	2694	2309	330	129	234	13
2010	1141	390	484	1614	581	218	207	3412	320	1432	19	248	2647	2408	300	130	218	13
2011	1388	429	528	1779	696	251	227	3752	341	1495	23	274	2863	2592	289	139	238	15
2012	1534	408	499	1821	666	266	207	3533	322	1356	23	256	2687	2615	250	127	222	14
2013	1560	428	525	1827	685	277	209	3730	336	1393	25	267	2806	2678	242	133	232	15
2014	1455	438	532	1784	703	259	208	3879	346	1381	26	272	2839	2999	236	139	256	17
2015	1339	377	455	1551	671	241	185	3363	295	1199	22	232	2419	2858	195	122	284	17

	ISR	ITA	JPN	KOR	LUX	LVA	MEX	NLD	NOR	NZL	POL	PRT	SVK	SVN	SWE	TUR	USA
1996	109	1309	4706	603	22	6	397	443	160	70	157	123	28	21	288	181	8100
1997	113	1240	4324	560	19	6	481	410	158	65	158	117	28	21	264	190	8609
1998	115	1267	3915	376	20	7	502	431	151	56	173	124	30	22	267	269	9089
1999	116	1249	4433	486	22	7	579	440	159	58	168	127	30	23	271	250	9661
2000	131	1142	4731	562	21	8	684	413	168	52	172	118	29	20	260	267	10285
2001	130	1163	4160	533	21	8	725	426	171	53	191	122	31	21	240	196	10622
2002	120	1267	3981	609	23	9	742	464	192	66	199	134	35	24	264	233	10978
2003	125	1570	4303	681	29	11	713	571	225	87	218	165	47	30	331	303	11511
2004	134	1799	4656	765	34	14	770	646	260	103	254	189	57	34	382	392	12275
2005	141	1853	4572	898	37	16	866	672	304	114	304	197	63	36	389	483	13094
2006	152	1943	4357	1012	42	20	967	719	340	110	343	209	70	40	420	531	13856
2007	177	2204	4356	1123	49	29	1043	833	393	135	429	240	86	48	488	647	14478
2008	214	2392	4849	1002	55	34	1099	931	454	130	530	262	100	56	514	730	14719
2009	206	2186	5035	902	50	26	895	858	379	119	436	244	89	50	430	615	14419
2010	233	2127	5495	1094	52	24	1052	836	421	143	477	238	89	48	488	731	14964
2011	258	2278	5906	1202	59	28	1170	894	491	164	524	245	98	51	563	775	15518
2012	257	2092	5954	1223	56	28	1186	823	500	171	496	218	93	46	544	789	16163
2013	291	2149	4920	1305	60	31	1261	854	513	186	526	227	98	48	580	822	16768
2014	309	2150	4596	1411	65	31	1298	880	498	200	545	230	101	50	574	799	17393
2015	299	1821	4123	1378	58	27	1144	750	387	174	477	199	87	43	496	718	18037

Notes: Figures are reported in the billions of US dollars. Negative values are treated as missing values.

Sources: GDP data are obtained from the CEPII gravity data.

Table A4. Outward FDI Flows

	AUS	AUT	BEL	CAN	CHE	CHL	CZE	DEU	DNK	ESP	EST	FIN	FRA	GBR	GRC	HUN	IRL	ISL
1996	5	1	.	7	16	.	.	53	3	5	.	4	28	32	.	.	.	0
1997	4	2	.	12	18	.	.	43	4	14	.	6	32	58	.	.	.	0
1998	5	3	.	19	16	.	.	90	5	18	.	19	33	119	.	.	.	0
1999	5	3	.	13	29	.	0	111	12	45	.	7	95	154	.	0	.	0
2000	2	6	.	31	38	.	0	84	24	56	.	26	160	248	.	.	.	0
2001	10	4	.	24	20	.	0	75	13	32	.	9	87	63	1	0	2	0
2002	7	6	21	12	11	.	0	38	6	32	.	12	53	74	1	0	4	0
2003	16	8	48	7	15	.	0	31	3	30	0	6	63	79	0	2	3	0
2004	10	6	46	32	27	.	1	64	2	63	0	4	63	98	1	1	10	2
2005	5	10	51	24	53	.	0	90	21	45	1	7	75	94	1	2	14	7
2006	14	12	52	25	69	2	2	127	15	104	1	14	77	114	4	3	11	5
2007	14	35	100	36	50	5	2	184	27	139	2	11	128	269	5	4	15	13
2008	38	22	217	51	82	9	4	109	22	85	1	19	148	187	3	5	15	1
2009	22	13	44	21	37	6	1	90	15	43	2	8	124	67	2	3	24	5
2010	12	12	98	17	75	12	2	133	12	74	0	13	59	89	2	3	21	0
2011	25	18	140	30	67	10	0	102	17	45	0	12	98	104	3	2	25	0
2012	20	18	86	33	78	18	2	110	16	21	1	30	64	54	2	9	24	0
2013	17	21	40	25	39	14	3	74	13	21	1	.	52	44	1	2	19	1
2014	9	14	39	32	40	11	3	111	9	45	0	.	75	24	3	4	61	0
2015	5	8	45	46	130	16	3	93	12	37	0	.	51	29	3	2	153	1

	ISR	ITA	JPN	KOR	LUX	LVA	MEX	NLD	NOR	NZL	POL	PRT	SVK	SVN	SWE	TUR	USA
1996	.	4	45	4	.	.	.	27	6	4	0	1	.	.	3	.	69
1997	.	7	48	3	.	.	.	26	4	0	0	2	.	.	8	.	85
1998	.	5	33	3	.	.	.	30	2	1	0	6	.	.	17	.	119
1999	.	8	59	2	.	.	.	63	3	1	0	3	.	.	14	1	178
2000	.	9	44	2	.	.	.	79	4	1	0	7	0	.	31	1	133
2001	.	19	25	2	.	.	.	58	3	0	0	6	0	.	10	1	100
2002	.	17	28	.	126	.	.	45	5	0	0	4	0	.	12	0	144
2003	.	16	31	3	100	.	.	48	2	1	0	3	0	.	15	0	141
2004	.	20	35	6	131	.	.	36	2	0	1	7	0	.	23	1	215
2005	.	42	47	.	132	.	.	154	21	0	3	3	0	.	26	1	94
2006	.	47	54	10	131	.	.	79	19	0	9	6	1	1	15	1	232
2007	5	100	74	19	267	.	.	95	21	2	5	8	1	1	29	2	398
2008	7	109	129	18	214	.	.	85	44	1	5	4	1	1	35	3	311
2009	2	54	76	21	280	.	.	39	54	1	5	4	1	0	33	2	306
2010	5	51	56	27	93	.	.	102	25	1	10	3	1	0	25	2	317
2011	6	59	115	27	207	.	.	47	.	2	9	15	1	0	43	2	400
2012	3	42	124	28	415	.	.	30	.	0	4	2	0	0	30	4	334
2013	4	38	138	32	.	0	.	151	.	1	3	5	.	0	31	3	313
2014	4	33	131	24	.	0	.	86	.	1	6	7	0	0	23	.	319
2015	.	30	133	23	.	0	.	206	.	1	6	7	.	0	23	.	318

Notes: Figures are reported in the billions of US dollars. Negative values are treated as missing values.

Sources: Outward FDI flow data are obtained from the OECD International Direct Investment Database.