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(Asymmetric) Tariff driven Foreign Direct Investment: Evidence from Korean firm-level data*

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Keywords: FDI; Multinational enterprises; Tariff asymmetry; Extensive margin; Intensive margin; Productivity; Korean firm-level data
JEL Classification: F13, F14

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1. Introduction

Tariff-jumping foreign direct investment (FDI) (e.g., Belderbos, 1997; Blonigen and Feenstra, 1997) has been examined, as multinational enterprises (MNEs) began locating production facilities abroad to avoid high tariffs, particularly prior to the era of globalization. As rapid globalization generally leads to tariff reduction, it is interesting to examine whether MNEs' tariff-jumping FDI mechanism continue to operate in periods of tariff reduction. Few prior studies investigate the effect of comprehensive tariff shocks on MNEs' FDI patterns. Since MNEs' various strategic internationalization options, such as export, FDI, etc., are interlocked, this study aims to understand the true effect of both tariff increase and decrease shocks on MNEs' FDI patterns.

Our research questions are fourfold. What is the effect of a significant tariff decrease in a destination on a firm's FDI to that destination? Do identified tariff shocks (considerable increases or decreases) lead to FDI expansion or reduction, and if so, in what direction? Is there a tariff effect on the number of subsidiaries (extensive margin) in the destination or the average investment volume on the existing subsidiaries (intensive margin)? What is the role of firm-specific assets such as productivity in the relationship between tariff shocks and firm FDI?

To address these questions, we use Korean firm-level FDI data from 2010–2018. Figure 1 plots Korean firm's aggregate FDI inflows and outflows from 2010–2018. Korean outward FDI has been higher than inward FDI, accounting for about 2% of Korea's GDP during the sample period. This stylized fact is driven by many global firms in Korea actively investing in other destination markets. Thus, it is essential to examine the effect of tariff shocks in destination markets on Korean firms' outward FDI to understand MNEs' decision-making regarding FDI.

[Insert Figure 1]

This study analyzes the effect of identified tariff shocks on Korean firms' outward FDI into a destination. We first identify substantial tariff changes as tariff increase and decrease shocks. Then we decompose Korean MNEs' FDI flows into the number of subsidiaries (extensive margin) and average FDI for individual subsidiaries (intensive margin) in the destination. We reveal the evidence of tariff-driven FDI, particularly when a significant decrease in tariff rate occurs, in which the identified tariff reduction shock leads to a decrease in existing subsidiaries, but not tariff increase shocks. We also find that tariff shocks do not significantly affect the average FDI for existing subsidiaries. This implies that i) substantial tariff decreases (favorable to trade) render MNEs to change FDI patterns in their destinations, and ii) MNEs do not decrease FDI unilaterally from existing subsidiaries in response to substantial tariff decreases, but deploy their resources to selective subsidiaries by cutting the number of existing subsidiaries. Note that our results do not indicate MNE's complete exit from the destination but resource reallocation between subsidiaries. In terms of firms' productivity, more productive MNEs investing in developing countries reduce the number of existing subsidiaries more, prioritizing selective subsidiaries in response to tariff reduction shocks. We also find that high-productivity MNEs having wholly owned subsidiaries show tariff-jumping behavior.

Literature: Do MNEs respond to significant tariff changes by altering their FDIs? If so, why and how do tariff changes affect MNEs' FDI decision? In trade literature, the proximity-concentration tradeoff indicates that the ratio of foreign affiliate sales to exports increases with the import tariff level (trade costs) (e.g., Brainard 1997; Helpman, Melitz, and Yeaple 2004). For example, a tariff increase may lead to a decrease in exports; thus, firms may pursue different internationalization

strategies such as horizontal FDI, rather than export. Consequently, tariff increases are expected to lead to increased FDI, or vice versa, based on cost-saving motives.[1]

Specifically, previous studies introduce the idea of MNEs' tariff-jumping FDI behavior to examine the possibility that firms increase FDI to avoid the threat of protection. Moreover, some empirical studies focus on the response of aggregate FDI (e.g., Blonigen and Feenstra, 1997; Barrell and Pain 1999) to only exogenous tariff increases, such as anti-dumping duties. Blonigen and Feenstra (1997) demonstrate a positive correlation between anti-dumping duties and the amount of industry FDI, supporting the existence of a proximity-concentration tradeoff. However, their findings relied on industry-level FDI data, but did not examine firm-level FDI decisions (due to a lack of more detailed firm-level data).

Belderbos (1997) and Blonigen (2002) investigated the effect of anti-dumping investigations on firm and product-level FDI decisions. Focusing on Japanese firms' responses to anti-dumping trade protection in the United States (US) and the European Union (EU), Belderbos (1997) finds that anti-dumping duties have considerably increased the occurrence of manufacturing investment by Japanese electronics firms in the US and EU. Blonigen (2002) examines the tariff-jumping behavior of foreign firms resulting from anti-dumping measures in the US in the 1980s, finding that a significant effect of anti-dumping duties on FDI probability is conditional—tariff jumping's magnitude is quite modest and only significant for MNEs from industrialized nations. While these two studies utilize firm and product-level data, their analysis is

[1] One may argue that a decrease in tariff would not lead to a decrease in FDI due to sunk cost, particularly MNE's exit from a destination (a la hysteresis, see Hahn and Pyun (2022)). We emphasize that we do not focus on the effect of tariff changes on MNE's entry and exit, but on resource reallocations among subsidiaries in the destination.

an event study for only the firms that were exposed to anti-dumping duties. Also, they focus on a tariff increase as a threat of protection.

Some studies use more detailed firm or transaction-level data to answer similar questions regarding the correlations between tariff changes and FDI. Hayakawa and Tsubota (2014) emphasize the role of tariff rates in determining MNEs' location choice in Asian countries. Hayakawa and Matsuura (2015) find that trade cost (tariff) reductions decrease the productivity cutoff for vertical FDI, and relatively productive domestic firms can afford to conduct vertical FDI. Using washing machine data, Flaaen et al. (2020) examine the relocation of production to third markets as export platforms in response to the US tariff changes against Korea and China. Although their focus is more on estimating tariff elasticity in terms of consumer prices, they find that safeguard tariffs are also related to MNEs' production relocation.

The contribution of this study is twofold. First, while the studies above examine tariffs and firm FDI decisions using disaggregated data, they do not address the asymmetric effects of tariff increases and decreases in shaping tariff-driven FDI. Also, since tariff changes exhibit a decreasing trend during the era of globalization, we identify significant tariff changes and assess their impact on MNEs' FDI behavior. Second, tariff-driven FDI can vary according to firm,[2] industry, or country-level characteristics. In addition, tariff shocks can affect MNE subsidiaries' complex deployment in that destination (concentration or diversification). Considering the decomposition of FDIs and individual firms' productivity, this study investigates heterogenous tariff shock effects

[2] Note that previous studies demonstrate that firm productivity may influence exporters' determination in setting price, markup, and exports to external shocks (i.e., Berman et al. 2012; Li et al. 2016).

on decomposed firm outward FDI, including extensive margins (the number of subsidiaries in the destination) and intensive margins (average FDI volume to the existing subsidiaries).

The remainder of the paper is organized as follows. Section 2 describes our data and empirical research design. Section 3 presents our empirical results, and Section 4 concludes the study.

2. Data and empirical strategy

2.1. Data

We use South Korean firm-level data from 2010 to 2018 obtained from the *Survey of Business Activities*, Statistics Korea. These micro-data are collected annually from all enterprises in manufacturing and services industries operating in South Korea with at least 50 regular workers and a capital of 0.3 billion Korean won since 2006. Industries are classified based on the two-digit level of Korea Standard Industrial Classification. This dataset also provides detailed information on firm financial statements (e.g., sales, export activity, employees, wages, material costs, foreign capital share, foreign subsidiaries, intellectual property, and related documentation).

Our main variable of interest is FDI. This dataset covers annual investment flows to firms' foreign subsidiaries and firms' capital share of foreign subsidiaries, which are reported by individual firms. First, we collect the industry capital price deflator from the Bank of Korea, dividing FDI value by this deflator to elicit real FDI volume. Two firm-level FDI variables are constructed: the number of foreign subsidiaries (extensive margin) in each destination and the log of the average real investment to foreign subsidiaries (intensive margin) in that destination. Note that by multiplying these two margins, we restore real FDI volume in the destination. Our dataset

does not reveal firms' explicit subsidiary entry into and exit from the destination but reports firms' execution of FDI during the period. Thus, we focus on firms' existing FDI flows by disaggregating them into these two margins. In particular, we observe that MNEs increase and decrease the number of subsidiaries in a destination (i.e., examining the number of subsidiaries in the destination based on firms' reported FDI), but no case is evident in which MNEs completely remove all subsidiaries from a destination.

Another caveat is that zero observations of FDI in our dataset do not mean that firms' subsidiaries depart the destinations, but represents a zero-valued investment. For example, firm A's FDI value to a specific destination was reported in 2011 and 2013, but its FDI observation in 2012 could be zero. Specifically, only about 10% of the FDI observations are zero. We later compare and contrast wholly owned subsidiaries (WOS), referring to firms' capital share for foreign subsidiaries being 100% and joint ventures (JV), with capital shares of less than 100%. Our sample shows that over 50% of FDI is related to WOS.

For the tariff data, we use (average) tariff rates that are applied by industry that Korean exporters face (2010–2018, annual), which are obtained from World Integrated Trade Solution (WITS). We use a simple average of all tariffs at a harmonized system six-digit level by industry and destination countries.[3] After collecting tariff rates on Korean exports to each destination, we compute changes in tariff rates and examine their distribution.

Figure 2 plots our main variables, including FDI's extensive margins, total FDI volume, and tariff rate changes. Panel A of Figure 2 illustrates changes in the number of foreign subsidiaries for Korean firms and changes in destination tariff rates for 2010–2018. While the range of average

[3] We are grateful to Kazunobu Hayakawa for sharing the tariff data for Korea.

tariff rates is between 5.35% and 8.09%, their average is 6.83%, revealing a decreasing trend, on average (differences in the tariff rates are below zero during the sample period), consistent with the evolution of globalization (Korea also has been actively engaged in free trade agreements). Notably, there is also a decreasing trend in the number of foreign subsidiaries, with a huge decrease occurring in 2015. Panel B plots Korean firms' FDI flows to world destination countries and the associated destinations' tariff rates. As tariff rates continuously decreased and FDI flows rose in 2013 and 2018, countering the idea of tariff-jumping FDI, the relationship between tariff rates and FDI flows remains unclear. Given a decreasing trend of FDI flows, it is conjectured that tariff decreases (on average) can be associated with FDI decreases, supporting a positive relationship between FDI and tariff rates.

[Insert Figure 2]

Panel A of Table 1 presents statistics of FDI and tariff variables between advanced and developing countries. Countries for which the International Monetary Fund country code is less than 199 are considered advanced countries (mostly North America and European developed countries, except for Malta and Turkiye). We then add Singapore, Hong Kong, China, and Slovenia, which the World Bank endorsed as developed countries earlier than Korea. Korean firms are more likely to invest more in developing countries than advanced countries in terms of real FDI volumes and the number of total foreign subsidiaries. Yearly tariff rate differences are also reported between the two destinations. The means of yearly changes in tariff rates are both negative (tariff decrease), revealing a higher negative figure for developing countries ($= -0.443$). We also provide distributional information regarding the changes in tariff rates for the two groups of countries, demonstrating that 47% and 61% of tariff change observations are negative (tariff decrease), and 93% and 90% of observations of tariff changes are equal to zero or negative for advanced and

developing countries, respectively. However, positive tariff changes (tariff increases) are still observed in the sample. For example, the maximum tariff increase is 9.65% for developing countries.

[Insert Table 1]

Due to the persistent nature of tariffs, previous studies on tariffs and FDI use the anti-dumping tariff, not the tariff rate itself, to identify exogenous tariff shocks. We also consider the decreasing tariff rate trends during the sample period (2010–2018): To extract trends from our raw tariff data and identify more exogenous components of tariff rate changes, we use distribution information for the tariff changes in each industry; in particular one standard deviation from the industry mean of tariff changes (16^{th} percentile and 84^{th} percentile),[4] coding them as -1 and 1 for tariff decrease shock and tariff increase shock, respectively. For the robustness of the results, we introduce alternative tariff shock measures. First, we use the 10th and 90th percentiles of the changes in tariff rates in each industry and pool them over the whole sample. Second, we code tariff changes below the 16^{th} percentile and above the 84^{th} percentile of the full sample (not industry by industry) as -1 and 1, respectively. Finally, we use continuous tariff change information in both tails of the distribution below the 16^{th} percentile and above the 84^{th} percentile in each industry, referencing actual tariff changes rather than binary values of -1 and 1.

We introduce firm-level characteristics that can influence a firm's FDI decision, such as firm productivity. First, we estimate firm-level productivity by industry (assuming that production functions differ across industries), referencing Wooldridge's (2009) method to control for the endogeneity of input choices influenced by productivity shocks. Since total factor productivity

[4] In a normal distribution, a score that is one standard deviation below the mean is equivalent to the 16th percentile.

(TFP) is not comparable across industries, we standardize the estimated TFP for each industry by differencing the TFP from the industry mean and scaling it at the mean. Then, we pool the rescaled TFP across industries: $STFP_{jit} = \frac{\ln TFP_{jit} - \overline{\ln TFP_{jt}}}{\overline{\ln TFP_{jt}}}$, where $\ln TFP_{jit}$ is the log of estimated TFP for firm *i* in industry *j* in year *t*. $\overline{\ln TFP_{jt}}$ is the mean of log TFP in industry *j*.[5]

Other firm-level characteristics are added, including employment after taking the log as a proxy for firm size. Export ratio (= Export/sales) represents the annual total export divided by total sales. Intermediate import ratio (= Intermediate imports/cost) is a firm's imported intermediate input cost divided by its total cost. Debt to assets ratio is also included. We also include industry level controls. Industry import competition is defined as total imports relative to total absorption in industry *j* in year *t*, where the total absorption is calculated as (production value$_j$) − (export value$_j$) + (import value$_j$), capturing industry *j*'s dependence on foreign imports. We also include a country level variable. We include advanced country dummy (see Appendix Table 1). We compute the bilateral real exchange rate between Korea and other destination countries[6] using the purchasing power parity adjusted exchange rate published by World Development Indicators (WDI) database. Finally, our data from 2010 to 2018 consists of 1,450 firms in 58 destinations (see Appendix Table 1). Panel B of Table 1 presents descriptive statistics.

2.2. Empirical specifications

Empirical specifications for MNEs and their FDI decisions are as follows:

[5] Choi and Pyun (2017) also employ the same standardized TFP measures to evaluate the effect of FDI on productivity at various TFP quantiles.
[6] Our firm-level dataset also provides the destination country that FDI goes into.

Extensive margin

$$\Delta(\#\ of\ Subsidiaries_{jikt}) = \alpha + \alpha_1 TS_{jkt} + \alpha_2 TS_{jkt} \times STFP_{jit-1} + X_{jikt-1}\gamma + FE + e_{jikt} \quad (1)$$

Intensive margin

$$\Delta(Avg.FDI_{jikt}) = \beta + \beta_1 TS_{jkt} + \beta_2 TS_{jkt} \times STFP_{jit-1} + W_{jikt-1}\delta + FE + \varepsilon_{jikt} \quad (2)$$

where *i* indicates a parent firm, *j* denotes the industry to which the firm belongs, *k* is the destination country, and *t* is the time (year) descriptor. In equation (1) of the extensive margin, the dependent variable is a yearly change (one-year difference) in the number of foreign subsidiaries for firm *i* in *k* destination at time *t*. For the intensive margin, equation (2), $Avg.FDI_{jikt}$ is the (log of) average real investment from parent firm *i* to all subsidiaries in destination country *k* plus one. We then compute the one-year difference of this log variable (growth rate). *Tariff shock* (*TS*) indicates tariff shock indicators. Our main *TS* variable is a binary indicator if a tariff change is greater or lower than one standard deviation from the mean in each industry: tariff increase shock (TIS) above the 84th percentile (upper 16%) as 1 and tariff decrease shock (TDS) below the 16th percentile (lower 16%) as -1. For a robustness check, we consider upper and lower 10% tariff changes in the tariff change distribution of each industry as exogenous tariff shocks, and also include the real value of changes in $Tariff_{jkt}$ in both 16% tails, rather than binary indicators. $STFP_{jit-1}$ is standardized parent firm productivity (Wooldridge, 2009).

We also control for various firm-level characteristics, including firm size, export ratio, intermediate import ratio, and debts/assets, along with industry controls, including import competition measures. We include destination-specific factors, such as bilateral exchange rate, destination real GDP, and destination GDP growth. We then include an advanced country dummy. Finally, to capture FDI inertia, we include years of FDI execution, for which we count the years

of FDI continuation since 2006 when the survey began; thus, the maximum value of this variable is 13 (a firm continued FDI from 2006 to 2018). Please see Section 2.1 for more detailed data construction.

To control for possible endogeneity between variables, we apply a simple approach of using lagged values on the right-hand side and an array of fixed effects (FEs): We begin our analysis using destination, industry, firm, and year fixed effects. We then include destination-industry, destination-year, and firm-year FEs. e_{jikt} and ε_{jikt} are error terms. We derive robust cluster errors at destination and industry levels.

3. Empirical results

3.1. Main results

Table 2 illustrates the effect of tariff increase and decrease shocks on FDI, considering possible firm and country-level heterogeneity. In our main specification, we include a heavy array of FEs to control for omitted variable bias and reduce possible endogeneity. As this research is accounting for a general decreasing pattern of tariff changes, we must investigate whether our results are driven by tariff-jumping FDI, as previous studies propose, or whether lowered tariffs deter FDI but promote exports. To examine the possible asymmetry in tariff effects, Table 2 divides tariff shocks into tariff increase shocks (TIS) and tariff decrease shocks (TDS).

Table 2 presents the results with asymmetric tariff shocks. Panel A begins to examine the extensive margins of FDI (changes in the number of foreign subsidiaries) in response to tariff shocks, revealing that the coefficients of TDSs on changes in the number of existing subsidiaries are only significant and positive for extensive margins in columns (1)–(3). This indicates that a

decrease in tariff rates leads to a decrease in the number of existing foreign subsidiaries in a destination (notice that the TDS dummy takes a value of -1). In particular, column (3), with destination-industry, destination-year, and firm-year FEs confirms that TDSs are likely to lower the number of existing subsidiaries, implying that lower trade barriers, which are intended to increase trade, may lead MNEs to lower the number of subsidiaries (extensive margin) and to prioritize investing in selective subsidiaries. We argue that this observation can be summarized as "(lowered) tariff-driven divestment."

However, in columns (1)–(3), the estimated coefficients for TISs in the extensive margins are statistically insignificant. This insignificant average effect of TISs reflects tariff asymmetry in our sample period, 2010–2018. In columns (4)–(5), we examine the subsample results according to the level of development for destination countries: advanced countries and developing countries (see Appendix Table 1). The results demonstrate that only TDS is positively related to a lower number of existing subsidiaries in developing countries, but not in advanced countries. This implies that Korean MNEs investing in developing countries decrease the number of subsidiaries more flexibly in response to a significant decrease in tariff rates than those in advanced countries.

[Insert Table 2]

Columns (1)–(5) of Panel B present the results for the intensive margin, revealing that estimated coefficients of both tariff decrease and increase shocks are statistically insignificant, unlike the extensive margin results for tariff decrease shock. This indicates that a (substantial) tariff decrease favorable to trade does not significantly affect average FDI volumes to existing subsidiaries. Notably, the coefficient of TIS of advanced country destinations in column (2) is marginally significant at the 10% level, implying weak evidence of tariff-jumping FDI. In summary, both extensive and intensive margin results suggest that TDSs influence MNEs' FDI

decisions via changes in the number of subsidiaries and not average FDI volumes to each subsidiary. Thus, in response to TDS, MNEs are not likely to decrease FDI evenly, but concentrate resources on core subsidiaries and maintain average FDI volumes.

For the robustness of the results, Table 3 introduces the alternative measures of TSs. In columns (1) and (4), we include a binary variable for each industry's tariff changes below the 10^{th} percentile and above the 90^{th} percentile (TIS1 and TDS1). Columns (2) and (5) introduce a binary variable of tariff changes below the 16^{th} percentile and above the 84^{th} percentile (one standard deviation) in the whole sample (TIS2 and TDS2). Columns (3) and (6) use the continuous tariff shock indicator, for which we use the actual tariff rates below the 16^{th} percentile and above the 84^{th} percentile in each industry (TIS3 and TDS3). The results confirm that the coefficient of TDS is positive and significant for the extensive margins (changes in the number of foreign subsidiaries), supporting the main results in Table 2.

[Insert Table 3]

To consider possible heterogeneity in our results in Table 2, Table 4 adds the interaction terms of tariff shocks and firm TFP measures in Table 2. We also implement subsample analysis in Table 4, including i) advanced vs. developing countries and ii) JV vs. WOS. Columns (1)–(5) present the extensive margin results with tariff increase and decrease shocks, and columns (6)–(10) show the intensive margin results. Consistent with the results in Table 2, columns (1)–(5) reveal that the coefficients of TDS are all positive. More interestingly, in column (1), the interaction term of the TDS and firm TFP is significantly positive at the 5% level, indicating that the positive relationship between TDS and a decrease in the number of existing subsidiaries is more pronounced for more productive MNEs (higher TFP). This implies that more productive MNEs are likely to reallocate resources more proactively in response to TDSs by reducing the number of

existing subsidiaries. It is also conjectured that a significant decrease in tariff rates allows MNEs to choose exports rather than using FDI to enter a foreign market.

Columns (2) and (3) divide the full sample into advanced and developing destination samples. In column (3), TDS is significantly positive only for the developing destination sample, indicating that the result of a positive sign of the interaction term in the developing sample seems to drive the main results in column (1). Columns (4) and (5) divide our full sample into the previously introduced WOS and JV delineations; however, no clear distinction is evident between two subsamples, and the coefficients of tariff increase and decrease shocks on changes in the number of existing subsidiaries are insignificant in all cases.

Columns (6)–(10) provide clear insights into different tariff effects between extensive and intensive margins. The average effects of both tariff increase and decrease shocks on the intensive margin are insignificant in columns (6)–(10), with the exception of column (7). The results considering firm, destination, and FDI heterogeneity indicate that tariff effects on average FDI volume in each destination do not vary in terms of firm heterogeneity. However, the intensive margin results in columns (7) and (9) show that the coefficients of the interaction terms of TDSs and TFP are positive and significant at the 10% level. This suggests that more productive MNEs investing in advanced countries or choosing JV decrease average FDI volumes in existing subsidiaries more, rather than the number of existing subsidiaries, in response to TDSs. Column (7) shows weak evidence of tariff-jumping FDI, in which TIS leads MNEs to raise FDI volume for existing subsidiaries in the destination. In summary, Table 4 demonstrates that lowered tariffs drive MNEs to halt investment via extensive margins, particularly for more productive firms investing in developing countries.

[Insert Table 4]

To reinforce the robustness of the result in Table 4, Table 5 introduces the alternative continuous TS measures, TIS3 and TDS3. Again, the results in Table 5 remain consistent with those in Table 4. First, tariff decrease shocks induce MNEs to decrease the number of foreign subsidiaries in their destination but not to reduce average FDI volumes to remaining subsidiaries. This tariff-driven divestment is more pronounced for more productive firms investing in developing countries in particular. Another interesting observation is that by allowing for the magnitude of tariff changes in our TS measures, we find tariff-jumping FDI via extensive margins of FDI, especially for productive firms in columns (1), (3), and (5), indicating that TISs raise productive MNEs' FDI by expanding the number of foreign subsidiaries. This tariff-jumping FDI also seems to be more pronounced for more productive firms investing in developing countries or choosing WOS (see columns (3) and (5)). Finally, column (7) indicates that more productive MNEs investing in advanced countries decrease average FDI volumes in existing subsidiaries more (instead of changing the number of foreign subsidiaries) in response to TDSs, which is consistent with column (7) of Table 4.

In sum, we find evidence of tariff decrease-driven divestment, particularly for more productive firms investing in developing countries. It is arguable that productive MNEs entering developing countries respond to TDSs more flexibly by reducing the number of subsidiaries and deploying resources to selective core subsidiaries.

4. Conclusion

This study examines how identified tariff shocks in a destination affect firms' outward FDI in that destination, using novel Korean firm-level data for 2010–2018. The study decomposes multinational enterprises' (MNEs') FDI flows to examine the number of subsidiaries (extensive

margin) and average FDI for individual subsidiaries (intensive margin) in the destination in response to tariff increase shock (TIS) and tariff decrease shock (TDS). We find an asymmetric tariff shock effect on FDI, revealing that during our sample period of advancing globalization, identified tariff "decrease" shock only led to a decrease in the number of MNEs' existing subsidiaries. Moreover, this reduction shock did not reduce the average FDI volumes in the existing subsidiaries. The results of the two margins imply that MNEs focus on core subsidiaries rather than evenly decreasing FDI for all subsidiaries in response to TDS.

When considering firms' productivity, we find interesting evidence of the heterogeneous effects of tariff shocks on FDI. We also find both tariff-jumping FDI and tariff-driven divestment for productive firms. TDSs cause more productive firms to exhibit tariff-driven FDI changes via a decrease in the number of foreign subsidiaries. In particular, significant TDSs cause more productive firms investing in developing countries to decrease the number of existing subsidiaries in that destination but maintain average FDI volumes in existing subsidiaries. However, TDSs render more productive firms investing in advanced countries to reduce average FDI volume in existing subsidiaries but preserve the number of existing subsidiaries. Lastly, tariff-jumping FDI seems to be more pronounced for more productive firms investing in developing countries or choosing WOS.

In the period of trade protection, scholars and policymakers investigated the effect of high tariffs on MNEs' behavior. Indeed, MNEs recognized this trade barrier, pursuing more efficient internationalization by relocating production facilities (e.g., tariff-jumping FDI). However, we find that in the era of globalization (a constant and gradual decreasing trend of tariffs), MNEs respond to trade policy changes by reallocating resources not only between their internationalization strategies (i.e., instead of subsidiaries' sales, they may use exporting due to

lower trade barriers) but also among their subsidiaries (i.e., deploying resources to selective subsidiaries). In this regard, our study provides interesting evidence of how global firms address trade policy by altering FDI allocation. Consequently, policymakers must understand how trade policy shapes the behavior of not only domestic firms (exporters) but also MNEs in the international market.

Another notable point is that the return of protectionism is now evident, and many scholars and policymakers question the future direction of the world economy. Our findings demonstrate asymmetric effects of tariffs on MNEs' behavior. In the era of globalization, when all nations agree to decrease tariffs, MNEs respond to such TDSs more significantly than TISs. However, if resurging protectionism reverses the current expectations of globalization's trajectory, whether this tariff asymmetry can be maintained or how the asymmetric tariff shock effects on MNEs will change must be further examined.

References

Barrell, Ray and Pain, Nigel (1999) 'Trade restraints and Japanese direct investment flows,' European Economic Review 43, 29-45.

Belderbos, Rene A (1997) 'Antidumping and tariff jumping: Japanese firms' DFI in the European Union and the United States,' Weltwirtschaftliches Archiv 133, 419-457.

Berman, Nicolas, Martin, Philippe and Mayer, Thierry (2012). How do different exporters react to exchange rate changes?. *Quarterly Journal of Economics*, *127*(1), 437-492.

Blonigen, Bruce A. (2002) 'Tariff-jumping anti-dumping duties,' *Journal of International Economics* 57, 31-50.

Blonigen, Bruce A., Tomlin, KaSaundra and Wilson, Wesley W. (2004). Tariff-jumping FDI and domestic firms' profits. *Canadian Journal of Economics/Revue canadienne d'économique*, *37*(3), 656-677.

Blonigen, Bruce A., and Feenstra, Robert (1997). Protectionist threats and foreign direct investment, in Effects of U.S. Trade Protection and Promotion Policies, ed. R.C. Feenstra (Chicago, IL: University of Chicago Press (NBER))

Brainard, S. Lael (1997). An Empirical Assessment of the Proximity-Concentration Trade-off Between Multinational Sales and Trade. *American Economic Review*, 87(4), pp. 520–544.

Choi, Boyoung, and Pyun, Ju Hyun (2017). Industry FDI and the Distribution of Plant Productivity: Analysis Using Korean Plant-Level Data. *The Developing Economies*, *55*(2), 105-129.

Flaaen, Aaron, Ali Hortaçsu, and Felix Tintelnot. (2020). The production relocation and price effects of US trade policy: the case of washing machines. *American Economic Review*, *110*(7), 2103-2127.

Hahn, Chin Hee, and Pyun, Ju Hyun (2022). Real exchange rate shocks and new product margins in the export market. *The World Economy*, https://doi.org/10.1111/twec.13316.

Hayakawa, Kazunobu and Tsubota, Kenmei (2014). Location choice in low-income countries: Evidence from Japanese investments in East Asia. *Journal of Asian Economics*, *33*, 30-43.

Hayakawa, Kazunobu and Matsuura, Toshiyuki (2015). Trade liberalization in Asia and FDI strategies in heterogeneous firms: evidence from Japanese firm-level data. *Oxford Economic Papers*, *67*(2), 494-513.

Helpman, Elhanan, Melitz, Marc J. and Yeaple, Stephen R. (2004). Export versus FDI with heterogeneous firms. *American economic review*, *94*(1), 300-316.

Levinsohn, James, and Petrin, Amil (2003). Estimating production functions using inputs to control for unobservables. *Review of Economic Studies*, *70*(2), 317-341.

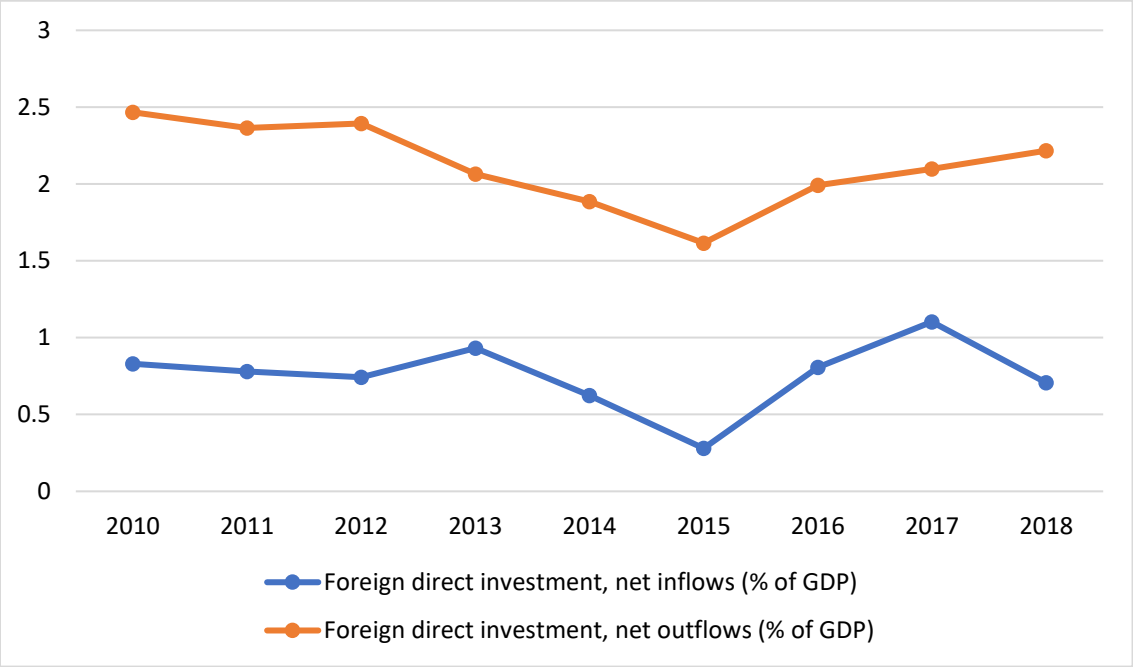
Li, Hongbin, Ma, Hong and Xu, Yuan (2015). How do exchange rate movements affect Chinese exports?—A firm-level investigation. *Journal of International Economics*, *97*(1), 148-161.

Wooldridge, Jeffrey M. (2009). On estimating firm-level production functions using proxy variables to control for unobservables. *Economics Letters*, *104*(3), 112-114.

Appendix Table 1. Destination country list (60 countries)

Advanced countries	Emerging and Developing countries	
Australia	Algeria	Poland
Austria	Bangladesh	Qatar
Belgium	Brazil	Romania
Canada	Bulgaria	Russian Federation
Denmark	Cambodia	Saudi Arabia
France	China	Senegal
Germany	Colombia	South Africa
Hong Kong SAR, China	Costa Rica	Sri Lanka
Ireland	Czech Republic	Sudan
Italy	Dominican Republic	Thailand
Japan	Egypt, Arab Rep.	Turkey
Luxembourg	El Salvador	United Arab Emirates
Netherlands	Guatemala	Uzbekistan
New Zealand	Honduras	Vietnam
Norway	Hungary	
Portugal	India	
Singapore	Indonesia	
Slovenia	Kazakhstan	
Spain	Malaysia	
Sweden	Mexico	
Switzerland	Nicaragua	
United Kingdom	Pakistan	
United States	Philippines	

Figure 1. Korean inward and outward FDI

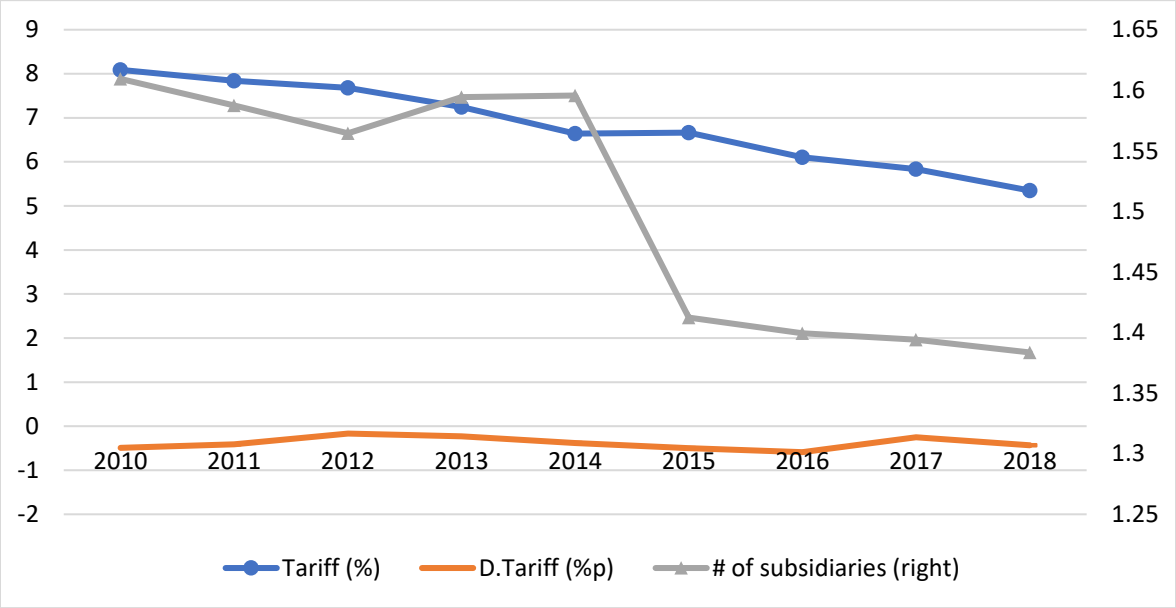


Data source: WDI

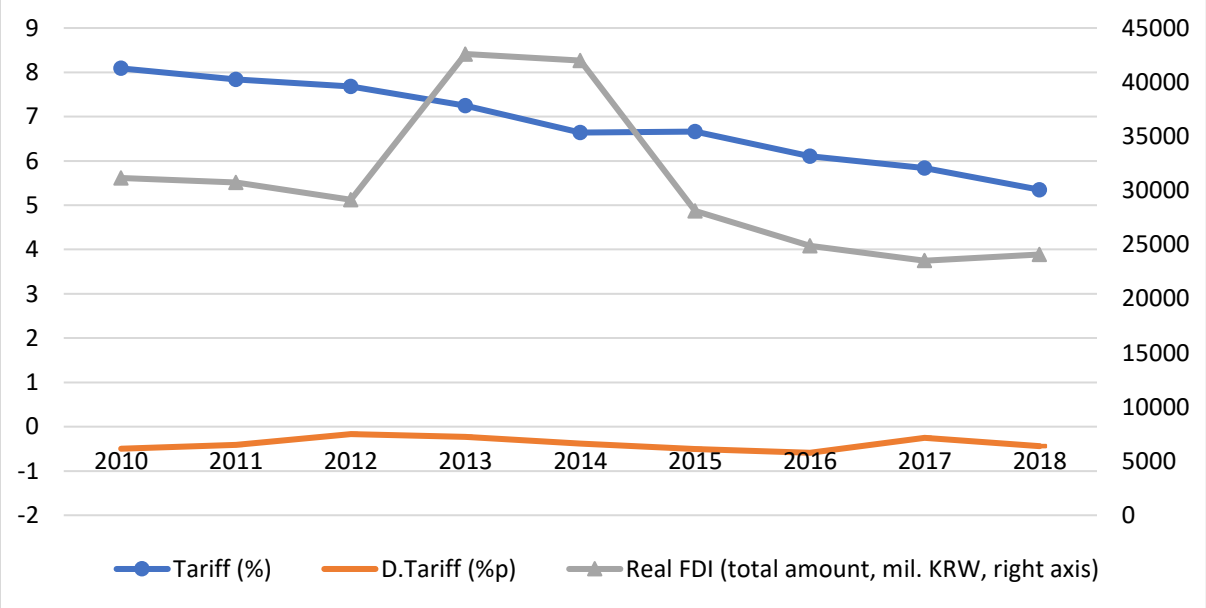
Note: Author's construction.

Figure 2. Tariff changes and FDI changes

Panel A. Industry tariffs and number of foreign subsidiaries in each destination



Panel B. Industry tariffs and FDI flows into each destination



Source: WITS and the *Survey of Business Activities*, Statistics Korea.

Note: Author's construction.

Table 1. Descriptive statistics

Panel A. Comparison of FDI and tariff changes between advanced and developing countries

	Advanced countries					Developing countries				
Variable	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
Real FDI (mil. KRW)	2,464	15,675	60057.29	0	1062353	8,951	33717.28	211877.70	0	7383060
# of subsidiaries in each dest.	2,464	1	0.382	1	5	8,951	1.597	1.318	1	21
changes in # of subsidiaries	2,464	0.004	0.254	-2	2	8,951	0.016	0.437	-10	7
# of total subsidiaries	2,427	8.543	8.679	1	85	8,866	8.078	11.029	1	100
Tariff changes (percentage points)	2,464	-0.166	0.847	-26.250	3.903	8,951	-0.443	1.387	-18.281	9.652
Negative (tariff decrease)	7%					10%				
Zero	46%					29%				
Positive (tariff increase)	47%					61%				

Panel B. Summary

Variable	Observations	Mean	S.D.	Min	Max
# of foreign subsidiaries	11,415	1.495	1.197	1	21
Real FDI (mil. KRW)	11,415	29822.74	189827.50	0	7383060
Changes in # of subsidiaries in destination	11,415	0.014	0.404	-10	7
Changes in log avg. FDI in destination	11,415	-0.059	1.929	-12.246	12.489
d.Tariff rates	11,415	-0.383	1.294	-26.25	9.651926
STFP (t-1)	11,415	0.517	0.931	-6.555	4.410
Employment (in logs) (t-1)	11,415	5.906	1.366	1	11.532
Export/Sales (t-1)	11,415	0.417	0.361	0.000	2.000
Intermediate import/Cost (t-1)	11,415	0.193	0.279	0.000	2.033
Debt/Assets (t-1)	11,415	0.481	0.223	0.022	4.245
Import competition (t-1)	11,415	0.270	0.215	0.0003	1.217
Bilateral ex rate growth	11,415	0.335	0.384	-0.743	1.283
Dest. GDP (in logs) (t-1)	11,415	29.127	1.547	23.985	30.621
Dest. GDP growth (t-1)	11,415	0.216	0.411	0	1
Advanced dummy	11,415	5.456	2.612	-4.057	25.176
Years of FDI	11,415	6.395	2.878	3	13

Table 2. Main results: Tariff asymmetry and FDI

Panel A. Extensive margin of FDI

Dependent variable	Changes in the number of foreign subsidiaries in a country k				
				Sub-sample	
Destination countries				Advanced	Developing
	(1)	(2)	(3)	(4)	(5)
Tariff Increase Shock (t)	-0.0117	-0.0031	-0.0334	0.0492	-0.0104
	(0.0203)	(0.0203)	(0.0288)	(0.0821)	(0.0409)
Tariff Decrease Shock (t)	0.0410***	0.0421***	0.0660***	0.0492	0.0618**
	(0.0132)	(0.0138)	(0.0207)	(0.0697)	(0.0295)
STFP (t-1)	-0.0098	-0.0125			
	(0.0087)	(0.0086)			
Employment (t-1)	0.0116	0.0203			
	(0.0203)	(0.0203)			
Export/Sales (t-1)	-0.0295	-0.0325			
	(0.0213)	(0.0211)			
Int. Import/Cost (t-1)	-0.0246	-0.0168			
	(0.0275)	(0.0270)			
Debt/Assets (t-1)	-0.0311	-0.0262			
	(0.0345)	(0.0351)			
Import competition(t-1)	-0.0411	-0.0399			
	(0.0471)	(0.0485)			
Bilateral Exchange rate	-0.0055	-0.0224			
	(0.0676)	(0.0715)			
Dest. GDP (log) (t-1)	-0.2801***	-0.3050***			
	(0.1022)	(0.1080)			
Dest. GDP growth (t-1)	0.0041	0.0042			
	(0.0043)	(0.0043)			
Years of FDI	-0.0063	-0.0070	-0.0106*	-0.0007	-0.0128
	(0.0039)	(0.0053)	(0.0064)	(0.0155)	(0.0086)
Fixed Effects	Destination, Industry, Firm, Year	Dest×Ind Firm Year	Dest×Ind Dest×Year Firm×Year	Dest×Ind Dest×Year Firm×Year	Dest×Ind Dest×Year Firm×Year
Observations	11,229	11,189	8,022	737	5,462
R-squared	0.090	0.117	0.433	0.634	0.475

Notes: Clustered standard errors are at industry and destination country levels; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Our main TS variable is a binary indicator of whether a tariff change is greater than one standard deviation from the mean in each industry: tariff increase shock (TIS) above the 84^{th} percentile as 1 and tariff decrease shock (TDS) below the 16^{th} percentile as -1.

Panel B. Intensive margin of FDI

Dependent variable	Changes in log average FDI for foreign subsidiaries (plus 1) in k				
				Sub-sample	
Destination countries				Advanced	Developing
	(1)	(2)	(3)	(4)	(5)
Tariff Increase Shock (t)	0.1180	0.1510*	-0.0003	0.6659	-0.0724
	(0.0759)	(0.0798)	(0.1127)	(0.5904)	(0.1401)
Tariff Decrease Shock (t)	0.0777	0.0994	0.0725	-0.5671	0.1345
	(0.0628)	(0.0647)	(0.1135)	(0.4513)	(0.1380)
STFP (t-1)	0.1283**	0.1353**			
	(0.0598)	(0.0593)			
Employment (t-1)	-0.1837*	-0.1612*			
	(0.0987)	(0.0974)			
Export/Sales (t-1)	0.0574	0.0803			
	(0.0914)	(0.0916)			
Int. Import/Cost (t-1)	0.0344	0.0137			
	(0.1102)	(0.1093)			
Debt/Assets (t-1)	0.0496	0.1058			
	(0.2283)	(0.2165)			
Import competition(t-1)	0.1886	0.2123			
	(0.2442)	(0.2524)			
Bilateral Exchange rate	0.3124	0.3828			
	(0.3947)	(0.4225)			
Dest. GDP (log) (t-1)	0.1056	0.1195			
	(0.4977)	(0.5241)			
Dest. GDP growth (t-1)	0.0136	0.0088			
	(0.0218)	(0.0235)			
Years of FDI	-0.0029	-0.0226*	-0.0218*	-0.0420	-0.0306*
	(0.0117)	(0.0129)	(0.0127)	(0.0880)	(0.0165)
Fixed Effects	Destination, Industry, Firm, Year	Dest×Ind Firm Year	Dest×Ind Dest×Year Firm×Year	Dest×Ind Dest×Year Firm×Year	Dest×Ind Dest×Year Firm×Year
Observations	11,229	11,189	8,022	737	5,462
R-squared	0.107	0.125	0.526	0.698	0.552

Notes: Clustered standard errors are at industry and destination country levels; *** p < 0.01, ** p < 0.05, * p < 0.1. Our main TS variable is a binary indicator of whether a tariff change is greater than one standard deviation from the mean in each industry: tariff increase shock (TIS) above the 84^{th} percentile as 1 and tariff decrease shock (TDS) below the 16^{th} percentile as -1.

Table 3. Robustness for tariff asymmetry

Destination countries	Changes in the number of foreign subsidiaries in k			Changes in log avg FDI for foreign subsidiaries (plus 1) in k		
Alternative TS shock	Below 10th percentile and above 90th percentile in each industry, TIS1	Below 16th percentile and above 84th percentile in whole sample, TIS2	Actual tariff changes below 16th percentile and above 84th percentile in each industry, TIS3	Below 10th percentile and above 90th percentile in each industry, TIS1	Below 16th percentile and above 84th percentile in whole sample, TIS2	Actual tariff changes below 16th percentile and above 84th percentile in each industry, TIS3
	(1)	(2)	(3)	(4)	(5)	(6)
Tariff Increase Shock (t)	-0.0347	-0.0257	0.0077	0.0481	0.0105	-0.0424
	(0.0313)	(0.0283)	(0.0185)	(0.1256)	(0.1147)	(0.0494)
Tariff Decrease Shock (t)	0.0767***	0.0584**	0.0113*	0.1444	0.0549	0.0021
	(0.0210)	(0.0236)	(0.0057)	(0.1339)	(0.1181)	(0.0307)
Years of FDI	-0.0105	-0.0106*	-0.0105	-0.0218*	-0.0216*	-0.0218*
	(0.0064)	(0.0064)	(0.0064)	(0.0127)	(0.0127)	(0.0127)
Fixed Effects	Dest×Ind Dest×Year Firm×Year	Dest×Ind Dest×Year Firm×Year	Dest×Ind Dest×Year Firm×Year	Dest×Ind Dest×Year Firm×Year	Dest×Ind Dest×Year Firm×Year	Dest×Ind Dest×Year Firm×Year
Observations	8,022	8,022	8,022	8,022	8,022	8,022
R-squared	0.433	0.433	0.433	0.526	0.526	0.526

Notes: Clustered standard errors are at industry and destination country levels; *** p < 0.01, ** p < 0.05, * p < 0.1. In columns (1) and (4), tariff shock is a binary variable for each industry's tariff observations below 10th percentile and above 90th percentile (TIS1 and TDS1). Columns (2) and (5) introduce a binary variable for tariff observations below the 16th percentile and above the 84th percentile in the whole sample (TIS2 and TDS2). Columns (3) and (6) use the continuous tariff shock indicator, for which we use actual changes in tariff rates below the 16th percentile and above the 84th percentile in each industry (TIS3 and TDS3).

Table 4. Tariff asymmetry and firm specific assets

	Changes in the number of foreign subsidiaries in k					Changes in log avg FDI for foreign subsidiaries (plus 1) in k				
Sub-sample Destination	Full sample	Advanced	Developing			Full sample	Advanced	Developing		
Sub-sample Subsidiaries type				Joint venture	WOS				Joint venture	WOS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Tariff Increase Shock (TIS_t)	-0.0472	-0.0128	-0.0240	-0.0288	-0.0239	0.0544	1.0553*	-0.0290	0.1064	-0.0314
	(0.0317)	(0.0804)	(0.0451)	(0.1159)	(0.0354)	(0.1205)	(0.5519)	(0.1521)	(0.2542)	(0.1668)
TIS (t) × STFP(t-1)	0.0232	0.0770	0.0192	-0.0546	0.0182	-0.0877	-0.4806	-0.0613	0.0367	-0.1190
	(0.0242)	(0.0708)	(0.0280)	(0.0488)	(0.0222)	(0.0651)	(0.3777)	(0.0750)	(0.1122)	(0.1110)
Tariff Decrease Shock (TDS_t)	0.0276	0.0518	0.0082	0.0330	0.0297	0.1006	-1.1362***	0.0973	-0.1819	0.2113
	(0.0218)	(0.0802)	(0.0340)	(0.0701)	(0.0280)	(0.1329)	(0.4295)	(0.1653)	(0.2640)	(0.1972)
TDS (t) × STFP(t-1)	0.0609**	-0.0070	0.0799*	0.1266	0.0301	-0.0453	0.8120*	0.0541	0.2273*	-0.1148
	(0.0301)	(0.0750)	(0.0422)	(0.1019)	(0.0316)	(0.0983)	(0.4276)	(0.1163)	(0.1203)	(0.1376)
Years of FDI	-0.0105	-0.0008	-0.0128	-0.0225	-0.0119	-0.0220*	-0.0490	-0.0308*	-0.0348	-0.0183
	(0.0064)	(0.0153)	(0.0085)	(0.0243)	(0.0072)	(0.0127)	(0.0914)	(0.0164)	(0.0381)	(0.0217)
Fixed Effects	Dest×Ind Dest×Year Firm×Year	Dest×Ind Dest×Year Firm×Year	Dest×Ind Dest×Year Firm×Year	Dest×Ind Dest×Year Firm×Year	Dest×Ind Dest×Year Firm×Year	Dest×Ind Dest×Year Firm×Year	Dest×Ind Dest×Year Firm×Year	Dest×Ind Dest×Year Firm×Year	Dest×Ind Dest×Year Firm×Year	Dest×Ind Dest×Year Firm×Year
Observations	8,022	737	5,462	1,510	4,556	8,022	737	5,462	1,510	4,556
R-squared	0.435	0.637	0.477	0.620	0.501	0.526	0.701	0.553	0.707	0.561

Notes: Clustered standard errors are at industry and destination country levels; *** p < 0.01, ** p < 0.05, * p < 0.1. The TS variable is a binary indicator of whether a tariff change is greater than one standard deviation from the mean in each industry: tariff increase shock (TIS) above the 84^{th} percentile as 1 and tariff decrease shock (TDS) below the 16^{th} percentile as -1.

Table 5. Tariff asymmetry & Firm specific assets with alternative Tariff shock measures (TIS3)

	Changes in the number of foreign subsidiaries in k					Changes in log avg FDI for foreign subsidiaries (plus 1) in k				
Sub-sample Destination	Full sample	Advanced	Developing			Full sample	Advanced	Developing		
Sub-sample Subsidiaries type				Joint venture	WOS				Joint venture	WOS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Tariff Increase Shock ($TIS3_t$)	-0.0156	-0.1640	-0.0103	0.0326	-0.0125	-0.0082	0.0999	-0.0115	-0.1756*	0.0678
	(0.0161)	(0.1126)	(0.0196)	(0.0314)	(0.0152)	(0.0524)	(0.9690)	(0.0484)	(0.0959)	(0.0773)
TIS3 (t) × STFP(t-1)	0.0257**	0.0082	0.0224**	-0.0027	0.0284***	-0.0400	-0.6981*	-0.0470	0.0590	-0.0625**
	(0.0106)	(0.0364)	(0.0101)	(0.0286)	(0.0076)	(0.0266)	(0.4175)	(0.0296)	(0.0439)	(0.0302)
Tariff Decrease Shock ($TDS3_t$)	0.0020	0.0304	-0.0003	-0.0106	0.0033	-0.0054	-0.1781	-0.0206	0.0080	-0.0242
	(0.0057)	(0.0424)	(0.0080)	(0.0195)	(0.0096)	(0.0312)	(0.2524)	(0.0351)	(0.0734)	(0.0554)
TDS3 (t) × STFP(t-1)	0.0161**	0.0110	0.0169**	0.0261	0.0129	0.0129	0.6595**	0.0358	0.0728	0.0043
	(0.0065)	(0.0414)	(0.0075)	(0.0194)	(0.0094)	(0.0225)	(0.3276)	(0.0249)	(0.0502)	(0.0529)
Years of FDI	-0.0109*	-0.0010	-0.0132	-0.0221	-0.0119	-0.0213*	-0.0430	-0.0299*	-0.0340	-0.0187
	(0.0064)	(0.0159)	(0.0086)	(0.0237)	(0.0073)	(0.0127)	(0.0885)	(0.0166)	(0.0397)	(0.0216)
Fixed Effects	Dest×Ind Dest×Year Firm×Year	Dest×Ind Dest×Year Firm×Year	Dest×Ind Dest×Year Firm×Year	Dest×Ind Dest×Year Firm×Year	Dest×Ind Dest×Year Firm×Year	Dest×Ind Dest×Year Firm×Year	Dest×Ind Dest×Year Firm×Year	Dest×Ind Dest×Year Firm×Year	Dest×Ind Dest×Year Firm×Year	Dest×Ind Dest×Year Firm×Year
Observations	8,022	737	5,462	1,510	4,556	8,022	737	5,462	1,510	4,556
R-squared	0.434	0.636	0.476	0.617	0.502	0.526	0.702	0.553	0.707	0.561

Notes: Clustered standard errors are at industry and destination country levels; *** p < 0.01, ** p < 0.05, * p < 0.1. TIS3 and TDS3 are computed by including actual tariff changes in both tails above and below the 16th percentile, instead of binary indicators 1 and −1.