# Exchange Rates, FTAs and Intra and Inter Firm Trade

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# Exchange Rates, FTAs, and Intra- and Inter-firm Trade[*]

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**Abstract**

This paper examined the effects of exchange rate changes and FTAs on intra- and inter-firm trade using data of the overseas affiliates of the Japanese manufacturing firms during the period 2009-2016. We estimated procurement of overseas affiliates of Japanese manufacturing firms from their parent firms and other firms in Japan, applying the Poisson pseudo maximum likelihood method to firm level export data. Our results revealed that procurement of the overseas affiliates from the parent firms increases as the Japanese yen appreciates while that from non-parent Japanese firms are not responsive to exchange rate changes. FTAs are negatively related to import from Japan. These findings give us some implications in discussion about relations between exchange rates, FTAs and supply chains networks.

Keywords: Exchange Rate Changes, FTAs, Intra-firm Trade, Supply Chains
JEL Classification Code: F14, L11

## 1. Introduction

Exchange rates changes have been thought to have considerable impacts on trade. In practice, a sharp appreciation of the Japanese yen significantly reduced Japan's export following the global financial crisis. On the other hand, its export resurged as the yen depreciated because of quantitative ease in Japan since 2013. It means that large fluctuation of exchange rates seems to significantly affect performance of exporting firms. Many people such as businesspersons, policy makers, and academic researchers have,

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therefore, paid attention to the effects of exchange rate changes on trade.

In general, a depreciation of a currency is thought to increase in exports because it improves the price competitiveness of exporters. Some believe that exchange rate manipulation is used as a policy tool to encourage exporters to increase in their exports, and amplified trade imbalances. Thus, exchange rates have provoked trade conflicts between the countries with trade surpluses and deficits, such as Japan and the US in the 1980s, or China and the US since the early 2000s. On the other hand, some believe that such a traditional view on the relations between exchange rates and export has been less explainable as the multinational enterprises (MNEs) have their cross-border supply chain networks to mitigate external demand and price shocks and make their production processes more efficient. In addition, the Bank of Japan (BOJ) mentioned that exchange rate changes have less affected real export because 'exports of Japanese firms have shifted to higher value-added goods, and thus they are less likely to get involved in price competition to secure market shares'[1]. So, there are still some different views how exchange rate changes affect trade.

As well as exchange rates changes, free trade agreements (FTAs) have also been paid attention to as an important factor to affect trade. In general, policymakers promote FTAs to encourage firms to increase in export to the FTA partner countries. But the actual statistics unveiled that FTAs do not always increase in export in the short run even though FTAs possibly stimulate the activities of MNEs in the FTA partner countries. So, it is strongly required to examine what effects FTAs have on export, import and foreign direct investment (FDI).

In this paper, we would like to provide additional statistical evidence on such issues. We

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[1] The BOJ (2018).

examine the effects of exchange rate changes and FTAs on intra- and inter-firm import of the overseas affiliates of the Japanese manufacturing MNEs. It is important to separately examine both intra- and inter-firm import because it gives some insights on the supply chain networks where intra-firm trade has got important as global value chains of MNEs developed[2]. We also examine if the BOJ's report is true, including markup of the parent firms in our estimation. It may shed light on the role of the parent firms in the supply chain networks.

Many existing papers examined the effects of exchange rate changes on trade. Thorbecke and Kato (2012) found that an appreciation of yen reduced Japan's export of consumption goods while Kato (2015) revealed that Japan's export of the medium skill and technology intensive products is not responsive to exchange rate changes. Thorbecke and Kato (2018) found that exchange rates don't affect Swiss exports, particularly, pharmaceuticals and watches because Switzerland exports most sophisticated products all over the world. It looks supportive to the BOJ's view that high value-added exports are less influenced by exchange rate fluctuations.

Some papers examined the effects of exchange rate changes on firm level trade[3]. But empirical papers discussing the effects of exchange rate changes on intra-firm trade are few because of data availability. Among those papers, Ando and Kimura (2013) found that exchange rate changes affect intra-firm exports of the Japanese manufacturing MNEs more. Song (2015) also examined the effects of external environment changes on Korean MNEs. On the other hand, Kato (2019) concluded that an appreciation of yen increases in intra-firm trade of the Japanese MNEs unlike previous papers. Thus, the results are

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[2] Lanz and Miroudot (2011).

[3] For Example, Berman et al. (2012), and Guillou (2008).

mixed both in aggregate data and firm level data.

The effects of FTAs have also been widely examined[4]. Urata and Okabe (2014) examined trade creation and trade diversion effects of FTAs using the product-level data in 67 countries. They found FTAs among developing countries were likely to cause trade diversion while there was trade creation for many products. Murakami (2023) the analyzed the causal effects of FTAs on the production networks trade in Latin American and Caribbean countries and found that the depths and breadths of FTAs have positive effects on intra regional parts and components exports. Using the firm level data, Urata and Kato (2017) also found positive effects of FTAs on imports of the overseas affiliates from Japan and the parent firms in some industries. The gravity models were applied in these papers.

Compared to those existing papers, this paper gives further discussion about the relations between the exchange rate changes, FTAs and the supply chain networks adding the markup of the parent firms and the depths and breadths of FTAs. In addition, we depart from the gravity model because it is not always reasonable to apply it to an analysis of the supply chain networks using the firm level data. So, the value-added of this paper is not to provide a novel finding of this issue, but to examine if the findings in the existing papers and implications from them are robust even in a different approach.

The outline of this paper is as follows. Section 2 describes the methodology and the details of the data that we used. Empirical results are discussed in Section 3. And the last section gives a concluding remark.

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[4] In this paper, we denote regional trade agreements (RTAs) as FTAs as well because RTAs are considered as parts of FTAs.

## 2. Methodology and Data

In this section, we explain the empirical model and data used in this paper. We estimated a simple import model to examine the effects of exchange rate changes and FTAs on both intra- and inter-firm trade of overseas affiliates of the Japanese manufacturing firms. Imports from the parent firms and non-parent Japanese firms are intra- and inter-firm imports, respectively. Our model also includes markup of the parent firm because it is reasonable to add this variable to discuss the behavior of the overseas affiliates. In our model, we also add several variables to control firm characteristics and market conditions because those factors varying across the overseas affiliates are considered to give large effects on their behaviors. Our estimation models are, therefore, represented as follows,

$$\text{Import}_{ipt} = \beta_0 + \beta_1 lnMarkup_{pt} + \beta_2 lnEXR_{jht} + \beta_3 FTA_{jht} + \sum \delta X_{ht} + \sum \rho Z_{it} + u_{it} \quad (1)$$

$$\text{Import}_{int} = \gamma_0 + \gamma_1 lnMarkup_{pt} + \gamma_2 lnEXR_{jht} + \gamma_3 FTA_{jht} + \sum \varphi X_{ht} + \sum \theta Z_{it} + v_{it} \quad (2)$$

where EXR is the exchange rate index that a rise of this index means an appreciation of yen and vice versa, and X is a control variable. Subscripts i, and t demote the individual overseas affiliates and time where h, j, o and n are respectively the host country of the overseas affiliates, Japan, the parent firm, and the non-parent firm. So, $\text{Import}_{ipt}$ and $\text{Import}_{int}$ are imports from the parent firm and non-parent firms. X is the set of market conditions consisting of GDP and the level of human capital in the country where the overseas affiliates locate. Z is the set of the characteristics of the overseas affiliates. They are the firm age, labor productivity, the 1st generation subsidiary dummy, the firm size, and the finished goods dummy.

In this paper, we estimated equations 1 and 2 by the Poisson pseudo maximum likelihood method (PPML) developed by Santos and The Log of Gravity Tenreyro (2006) to control lots of zeros in import data. Many existing papers assume that an appreciation of yen decreases in export of Japan. It means that an appreciation of yen decreases in imports from the parent firm and the non-parent firms in Japan. On the other hand, Kato (2019) found that an appreciation of yen increases in import from the parent firms. We, therefore, examine which EXR is estimated positively or negatively without a prior expectation. We can expect both positive and negative estimates for FTA indices as well. In general, FTA are expected to have a positive estimate because FTA is a policy tool to encourage firms to export their products to the trade partners. But Japan's FTAs are not just FTAs, but Economic Partnership Agreements (EPAs) that largely support activities of MNEs in the partner countries. Thus, FTAs may increase in the local procurement of the overseas affiliates rather than imports from Japan. We, therefor, examine which FTA is estimated positively or negatively as well.

In control variables, the market size and the level of human capital are expected to have positive coefficients because the overseas affiliates need and use the differentiated products from Japan more if the market size is large and the level of human capital is high. In the firm characteristics, we expect that the firm size has a negative estimate because the order the overseas affiliates are, the more localized they are. The other variables are expected to be positive. The overseas affiliates of high labor productivity possibly use imported differentiated parts and components from Japan more. The 1$^{st}$ generation subsidiaries are directly connected with their parent firms in the supply chain networks. The larger the overseas affiliates are, the more imports from Japan they use. The finished goods produced in the overseas affiliates are considered to more rely on the differentiated

products imported from Japan.

The data used in this paper are as follows. The panel data of overseas affiliates of the Japanese manufacturing firms are constructed from the Survey of Oversea Business Activities collected by the Ministry of Economy, Trade and Industry (METI). Markup of the parent firms is estimated by de Loecker (2012) using and the data of the Basic Survey of Japanese Business Structure and Activities, and then integrated with the panel data[5]. Exchange rates and the local GDP are downloaded from the website of the United Nation Conference on Trade and Development (UNCTAD) statistics. Both data are deflated by GDP deflators. As the FTA indices, we construct the depths and the breadths of FTAs following Limão (2016) as well as Jinji et al. (2022) and Murakami (2023)[6]. As Murakami (2023) briefly explains, 'the depth evaluates the level of economic policy cooperation, while the breadth evaluates the width of its coverage'. Comparing the degrees of the depths and breadths seems to be important because the differences of the characteristics of FTAs may give different effects of the procurement behavior of the overseas affiliates. The data of the METI are compiled following the Japanese fiscal year (April-March) while the data from the other sources are recorded by the calendar year (January-December). We think that this one quarter gap partly captures the time of decision marking for firms. Our data covers the period between 2009 and 2016.

The descriptive statistics of our data are in the following figures and tables. Figure 1

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[5] These two surveys share the firm ID numbers.

[6] The World Bank provides the dataset of Regional Trade Agreements (RTAs) as WTO plus (WTO+) and WTO extra (WTO-X) that are used to construct the depths and the breadth indices. The WTO+ covers the policy areas falling under the current mandate of the WTO while WTO-X covers issues falling outside the current WTO mandate. The list of WTO+ and WT-X is presented in Horn et al. (2010). The details of calculation of the depth and the breadth are in their papers.

illustrates the number of the overseas affiliates in our data. It is obvious that the overseas affiliates of the Japanese manufacturing MNEs are concentrated to the countries concluding the bilateral FTAs with Japan, the neighboring countries, and the US. ASEAN in the countries with the bilateral FTAs and China in the neighboring countries are particularly the larger (Appendix presents Japan's FTAs before 2017). It means that our estimation actually examined the effects of FTAs on imports from Japan by the overseas affiliates in ASEAN.

Figure 2 shows the procurement behavior of the overseas affiliates of the Japanese manufacturing firms and export from Japan to each region during the period 2015-2017. It is clear that import from Japan by the overseas affiliate (it is equivalent to export from Japan to the overseas affiliates) is much smaller than total export from Japan to each region[7]. Thus, our estimation examined the effects of exchange rate changes and FTAs on only a limited part of Japan's export. But this analysis is still meaningful, to discuss industrial policies based on the cross-border supply chain networks.

To further discuss effective industrial policies in the supply chain networks, Table 1 presents the average markup of the parent firms by region and industry. It says that the markup of the parent firms is not always high for the overseas affiliates in ASEAN. Rather, it is relatively lower in machinery and transportation industries that account for a lion's share of Japan's export. On the other hand, markup of the parent firms is relatively higher in the other countries concluding bilateral FTAs with Japan. Thus, it seems to be important to examine the effects of exchange rate changes and FTAs on import of the overseas affiliates from Japan and consider the results of estimation.

Figure 3 is the structure of the sales of the overseas affiliates by region. It reveals that

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[7] The mean might be affected by leakage of data for large overseas affiliates.

the structure of the sales of the overseas affiliate vary across regions. Within the countries with bilateral FTAs, ASEAN and the other countries are very different. In ASEAN, exports to Japan and the third countries account for relatively larger shares while the local sales account for more than 60 percent of the sales in the other bilateral FTA countries. Thus, the roles of the overseas affiliates in the supply chain networks are very different between ASEAN and the other bilateral FTA countries. It should also be considered in interpreting our empirical results.

## 3. Empirical Results

In this section, we show our empirical results and discuss them[8]. Table 2 present the results of estimation of equations 1 and 2 for both the depths and the breadth. It reveals that the different features of FTAs do not always give different effects on the procurement behavior of the overseas affiliates. Unlike expectations by policy makers or economists, FTA indices have statistically significantly negative estimates in all regressions. Thus, the deeper and the wider FTA is, the less import from Japan the overseas affiliates of the Japanese manufacturing firms rely on. This result possibly coincides with the findings by Hayakawa (2020) which revealed that the FTAs of Japan increased in the local procurement of the overseas affiliates. Note that this result does not always mean that FTAs decrease in Japan's exports to the partners at the aggregate level. As we mentioned above, trade with the overseas affiliates account for a part of Japan's total trade. In addition, MNEs often have various choices among the schemes which help their

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[8] Some suggest that we include the earthquake dummy in 2011 because the Great East Japan Earthquake is thought to give heavy negative impacts on the supply chains of Japanese firm. We examined the regression with that dummy and found similar results. Therefore, we rely on the results without that dummy in this paper.

international transactions in developing countries, for example, special economic zones[9].

It means that FTAs are not always the first choice for MNEs in constructing their supply

chain networks. It might affect the results of estimation.

Exchange rate changes have statistically significantly positive coefficients for the intra-

firm trade while statistically insignificant for inter-firm trade. It implies that an

appreciation of yen increases in export from the parent firms to their overseas affiliates

unlike usual expectations of the relations between exchange rates and trade. The reason

of it is considered as follows. The overseas affiliates possibly import some differentiated

and irreplaceable products from the parent firms and their transactions are recorded in

terms of yen. If so, an appreciation of yen doesn't reduce the volume of imports from the

parent firms while the value of those imports increases. This result may reveal that the

parent firms in Japan still play important roles in their supply chain networks although

the hollowing out have been seriously concerned.

The different results between intra- and inter-firm import may reflect the difference in

invoice currencies. Unlike intra-firm trade, the Japanese MNEs may use the local

currency or the USD as the invoice currency in inter-firm trade, to mitigate the risks of

exchange rate fluctuations[10].

The markup is statistically positively estimated both in intra- and inter-firm import. It

means that it is important for the parent firms to produce differentiated goods to increase

in import of the overseas affiliates from Japan. It also supports the view that the parent

firms in Japan sill play important roles in the supply chain networks of the Japanese

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[9] For example, Japanese overseas affiliates in Vietnam use the license of the export
processing enterprises (EPE), to reduce their trade cost with their parent firms.

[10] Ito et al. (2016) revealed that the Japanese firms have largely use the yen and the USD as
their invoice currencies.

MNEs, regardless the networks are more diversified or not.

The estimated coefficients for control variables also give various insights on import of the overseas affiliates. Among the market conditions, the levels of human capital are statistically significantly positively estimated for the intra-firm import while statistically insignificant for inter-firm import. It possibly means that the overseas affiliates need high-level human capital to use more differentiated products imported from the parent firms while they use more standardized products imported from the non-parent Japanese firms. For the latter, the overseas affiliates may prefer to lower wages of workers than higher skills. The estimates of real GDP say that the market size is negatively related to import from Japan with the statistical significance. It implies that the overseas affiliates increase in their local procurement as the local economies are large.

The estimated results of the control variables of the firm characteristics are as follows. Labor productivity and the firm size are positively estimated at the one percent significance level in all regressions. It simply means that the overseas affiliates increase in import from Japan as their capacity of production enlarges. On the other hand, the other control variables of the firm characteristics give somewhat complicated results. The firm age is statistically insignificant for the intra-firm import while statistically significantly positive for inter-firm import from Japan. It implies that the overseas affiliates reduce their dependence on the parent firms as their history becomes longer. The $1^{st}$ generation subsidiary dummy is statistically significantly positive for intra-firm import while statistically insignificant for inter-firm import. The finished goods dummy is statistically significantly positive for intra-firm import while statistically significantly negative for inter-firm import. These results seem to coincide with the view that the earlier and the shorter supply chains are highly dependent on the parent firms while more developed and

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longer supply chains are more open to other firms.

We also estimated the model with one-year lag in explanatory variables as a robustness check of our results. The results of this estimation are very similar as Table 3 presents. So, our findings are robust even though we consider a longer time for the overseas affiliates to response to external issues such as exchange rate fluctuations or FTAs. The effects of exchange rate changes and FTAs on the supply chains may last longer because the estimated coefficients for those variables are larger in regression with one-year lag.

According to our estimation results, we obtain some policy implications. First, the BOJ's view on the relations between exchange rates and trade is possibly true for intra-firm trade while not confirmed for inter-firm trade. It is difficult to say that an appreciation of yen is not harmful for Japan's export because intra-firm export to the overseas affiliates explains only a small part of total export of Japan. Second, FTAs do not increase in export to the overseas affiliates. It means that FTAs don't work as effective policy tools to increase in export from Japan within the supply chain networks of the Japanese MNEs. Thus, we should carefully consider aims and effects of FTAs in the further study. It is useful to encourage firms to make their products more differentiated in the cross-border structural changes through constructing supply chain networks.

## 4. Concluding remarks

This paper examined the effects of exchange rate changes and FTAs on intra and inter-firm import using the data of the overseas affiliates of the Japanese manufacturing firms. Our estimation confirmed the findings in Kato (2019) that an appreciation of yen increased in intra-firm imports of the overseas affiliates (=intra-firm exports of the parent firms), using an alternative approach. On the other hand, inter-firm import of the overseas

affiliates is not responsive to exchange rate changes. The FTAs are negatively related to import from Japan. So, it is difficult to think the FTAs are effective policy tools to increase in Japan's export through the supply chain networks of the Japanese MNEs. Our estimation also found that markup of the parent firms is positively related to both intra and inter-firm import of the overseas affiliates. These findings imply that the parent firms providing differentiated products have certain roles in the supply chain networks. From these findings, we conclude that we should carefully revise industrial policies. If the purpose of the policy is to increase in export from the parent firms to their overseas affiliates in the supply chain networks, a depreciation of yen and FTAs are not always helpful. It is helpful for that purpose to help the parent firms to provide differentiated products. But our results don't mean that a depreciation of yen and FTA reduce Japan's export at the aggregate level because the weight of intra-firm trade has decreased as the statistics shows. FTAs may be useful for encouraging the MNEs to explore foreign market through their overseas affiliates. We need further investigation of the effects of exchange rate changes and FTAs on the supply chain networks both at the firm and aggregate levels.

**Appendix: Japan's FTAs**

| Partner(s) | Enter into Force | Type | Amendment |
|---|---|---|---|
| Singapore | 2002.Sep | EPA | 2008.Sep |
| Mexico | 2005.Apr | EPA | 2007.Apr, 2014.Apr |
| Malaysia | 2006.Jul | EPA | |
| Chile | 2007.Sep | EPA | |
| Thailand | 2007.Nov | EPA | |
| Indonesia | 2008.Jul | EPA | |
| ASEAN | 2008.Dec | EPA | |
| Philippines | 2008.Dec | EPA | |
| Switzerland | 2009.Sep | EPA | |
| Vietnam | 2009.Oct | EPA | |
| India | 2011.Aug | EPA | |
| Peru | 2012.Mar | EPA | |
| Australia | 2015.Jan | EPA | |
| Mongolia | 2016.Jun | EPA | |
| TPP11 | 2018.Dec | Trade Agreements | |
| EU | 2019.Feb | EPA | |
| United States | 2020.Jan | Trade Agreements | |
| United Kingdom | 2021.Jan | EPA | |
| RCEP | 2022.Jan | EPA | |

Data source: Free Trade Agreement (FTA) / Economic Partnership Agreement (EPA) and Related Initiatives | Ministry of Foreign Affairs of Japan (mofa.go.jp)

Note: The green cells are in our data period while the yellow cells are out of our data period.

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**Table 1. Markup of the parent firms by industry and region of the overseas affiliates**

| Location | Light | Heavy | Machinery | Transport | Miscellaneous |
|---|---|---|---|---|---|
| Neibours | 2.799 | **1.575** | 2.271 | 2.535 | 1.978 |
| AEAN | 2.772 | 1.570 | 2.227 | 2.474 | 1.978 |
| NAFTA | 2.559 | 1.456 | 2.500 | 2.578 | 2.227 |
| EU | 2.678 | 1.316 | 2.516 | **2.611** | **2.257** |
| Bilateral FTA | **2.857** | 1.548 | **2.630** | 2.569 | 2.238 |

Note: author's own estimation and calculation.

ASEAN is not included in Bilateral FTA countries in this table.

**Table 2. Estimation Results**

| VARIABLES | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Import from Parent | | Import from Others | |
| | Depths | Breadths | Depths | Breadths |
| | | | | |
| Markup | 0.135*** | 0.134*** | 0.321*** | 0.320*** |
| | (0.0220) | (0.0220) | (0.0221) | (0.0221) |
| EXR | 0.498*** | 0.484** | -0.243 | -0.270 |
| | (0.190) | (0.192) | (0.310) | (0.306) |
| Human Capital | 0.372*** | 0.372*** | -0.780*** | -0.780*** |
| | (0.0545) | (0.0544) | (0.141) | (0.142) |
| Real GDP | -0.0638** | -0.0647** | -0.268*** | -0.268*** |
| | (0.0305) | (0.0305) | (0.0419) | (0.0410) |
| Firm Age | 0.105 | 0.104 | 0.509*** | 0.510*** |
| | (0.0771) | (0.0775) | (0.0816) | (0.0817) |
| Labor Productivity | 0.842*** | 0.844*** | 1.255*** | 1.259*** |
| | (0.0376) | (0.0379) | (0.0493) | (0.0491) |
| 1st Subsidiary | 0.221*** | 0.222*** | -0.00269 | 0.00185 |
| | (0.0677) | (0.0678) | (0.127) | (0.127) |
| Firm Size | 0.707*** | 0.708*** | 0.932*** | 0.934*** |
| | (0.0158) | (0.0158) | (0.0345) | (0.0349) |
| Finished Goods | 0.207*** | 0.208*** | -0.737*** | -0.735*** |
| | (0.0612) | (0.0610) | (0.118) | (0.118) |
| FTA | -0.863*** | -1.379*** | -1.898*** | -3.072*** |
| | (0.229) | (0.347) | (0.426) | (0.642) |
| Constant | -12.60*** | -12.56*** | -13.63*** | -13.53*** |
| | (1.187) | (1.186) | (1.588) | (1.572) |
| | | | | |
| Observations | 34,076 | 34,076 | 36,355 | 36,355 |
| R-squared | 0.268 | 0.269 | 0.438 | 0.439 |

Note: Robust standard errors in parentheses

***, and ** represent 1%, and 5% significance levels, respectively

**Table 3. Esetimation Results with one-year lag (Robustness Check)**

| VARIABLES | (5) | (6) | (7) | (8) |
|---|---|---|---|---|
| | Import from Parent | | Import from Others | |
| | Depths | Breadths | Depths | Breadths |
| | | | | |
| Markup | 0.130*** | 0.129*** | 0.336*** | 0.335*** |
| | (0.0262) | (0.0260) | (0.0311) | (0.0310) |
| EXR | 1.140*** | 1.103*** | -0.289 | -0.355 |
| | (0.165) | (0.165) | (0.410) | (0.405) |
| Human Capital | 0.251*** | 0.249*** | -0.431*** | -0.430*** |
| | (0.0448) | (0.0449) | (0.122) | (0.121) |
| Real GDP | -0.0371 | -0.0368 | -0.213*** | -0.220*** |
| | (0.0263) | (0.0260) | (0.0545) | (0.0535) |
| Firm Age | 0.286*** | 0.287*** | 0.705*** | 0.706*** |
| | (0.0780) | (0.0781) | (0.127) | (0.127) |
| Labor Productivity | 0.742*** | 0.744*** | 0.987*** | 0.986*** |
| | (0.0352) | (0.0351) | (0.0688) | (0.0684) |
| 1st Subsidiary | 0.117 | 0.116 | -0.104 | -0.104 |
| | (0.0729) | (0.0727) | (0.157) | (0.158) |
| Firm Size | 0.661*** | 0.661*** | 0.782*** | 0.784*** |
| | (0.0182) | (0.0182) | (0.0488) | (0.0492) |
| Finished Goods | 0.335*** | 0.337*** | -0.669*** | -0.667*** |
| | (0.0660) | (0.0658) | (0.148) | (0.149) |
| FTA | -1.150*** | -1.797*** | -1.421*** | -2.424*** |
| | (0.210) | (0.311) | (0.533) | (0.779) |
| Constant | -14.18*** | -14.05*** | -10.81*** | -10.42*** |
| | (1.159) | (1.163) | (2.071) | (2.070) |
| | | | | |
| Observations | 25,952 | 25,952 | 27,846 | 27,846 |
| R-squared | 0.299 | 0.301 | 0.149 | 0.151 |

Note: Robust standard errors in parentheses

***, and ** represent 1%, and 5% significance levels, respectively

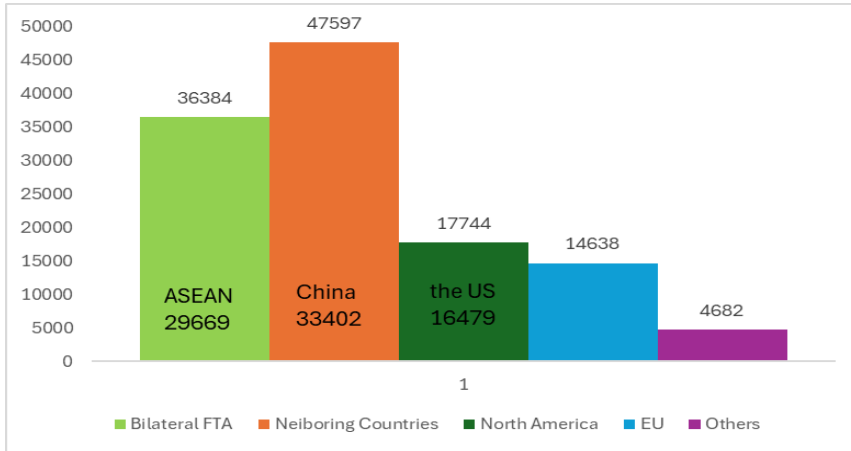**Figure 1. The number of overseas affiliates by region**



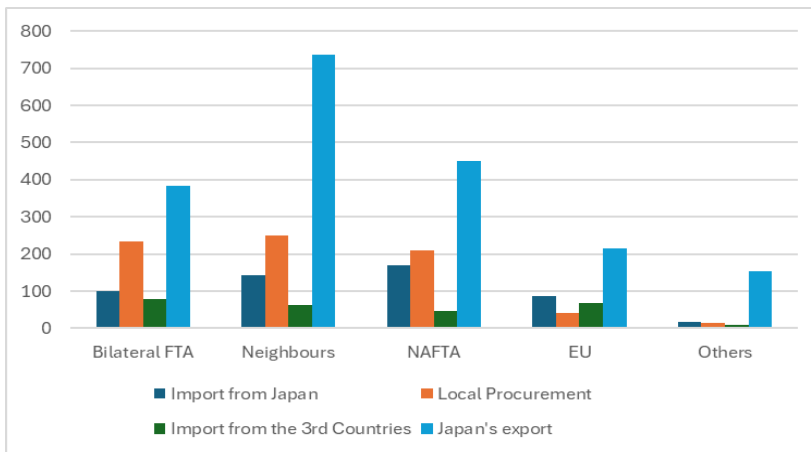**Figure 2. Procurement behavior of the overseas affiliates of the Japanese MNEs**



**Figure 3. The components of the sales of the overseas affiliate by region**