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Kazunobu HAYAKAWA, Han-Sung KIM, and
Taiyo YOSHIMI[#]

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Keywords: Free trade agreement; Exchange rates; Exchange rate pass-through; Rules of origin
JEL classification: F13; F15; F31; F36

[#]Corresponding author, Department of Economics, Nanzan University (yoshimi@nanzan-u.ac.jp)

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INSTITUTE OF DEVELOPING ECONOMIES (IDE), JETRO
3-2-2, WAKABA, MIHAMA-KU, CHIBA-SHI
CHIBA 261-8545, JAPAN

FTA in International Finance: Impacts of Exchange Rates on FTA Utilization[§]

Kazunobu HAYAKAWA

Bangkok Research Center, Institute of Developing Economies, Thailand

Han-Sung KIM

Department of Economics, Ajou University, Korea

Taiyo YOSHIMI[#]

Department of Economics, Nanzan University, Japan

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[#] Corresponding author: Taiyo Yoshimi; Address: Department of Economics, Nanzan University, 18 Yamazato-cho, Showa-ku, Nagoya-shi, Aichi-ken 466-8673, Japan; Tel.: +81-52-832-3111, fax: +81-52-835-1444; Email: yoshimi@nanzan-u.ac.jp

1. Introduction

Free trade agreements (FTAs) have received little attention in the context of international finance. Traditionally, studies on FTAs have been conducted in the field of international trade. A typical study is to examine the effects of FTAs on trade between FTA member countries or trade with non-member countries. Examples include Baier and Bergstrand (2007), Caporale et al. (2009), Magee (2008), Medvedev (2010), Roy (2010), and Vicard (2009). Additionally, as listed below, there are several papers on the determinants of actual FTA utilization in trading. These studies have found that the FTA schemes are likely to be chosen when exporting products with a larger tariff margin (i.e. a larger difference between general tariff rates and FTA rates) or larger shipments. On the other hand, there are fewer studies examining FTAs in the field of international finance.[1] In order to deepen our understanding of FTAs, it is important to consider FTAs from this viewpoint.

In this paper, we shed light on the role of exchange rates, one of the main variables in international finance, in determining firms' FTA utilization. When exporting to FTA partner countries, exporters can use either FTA rates or others such as most favored nation (MFN) rates. Since FTA rates are lower than MFN rates, the quantity of the export product demanded by importers under the FTA scheme always becomes larger than that under the MFN scheme. Thus, without any additional costs of FTA utilization, excess profits from exporting under FTA schemes (i.e., the difference between export profits under FTA and MFN schemes) always become positive. However, when utilizing FTA rates, exporters have to prove that their products meet the so-called rules of origin (RoOs). Namely, they need to certify that their export products are produced (i.e. originate) in FTA member countries. To do that, they must collect several kinds of documents, including a list of inputs, production flow chart, production instructions, invoices for each input, contract documents, and so on. Such documentation becomes the non-trivial amount of fixed costs of FTA utilization. Thus, improving excess profits from and lowering fixed costs of FTA utilization play important roles in encouraging the utilization of FTA schemes.[2]

In the trade literature, as mentioned above, a large number of studies have empirically investigated what kinds of elements affect firms' FTA utilization. Although Hayakawa et al. (2014) examined such utilization for the Association of South East

[1] For example, to our best knowledge, there is a study on how the FTA's entry into force affects exchange rate pass-through (Marmolejo, 2011).

[2] The role of the documentation fixed cost for RoOs, which is the important part of fixed costs for FTA utilization, in a small-open economy is theoretically examined by Demidova and Krishna (2008).

Asian Nations (ASEAN)-Korea FTA (AKFTA) by employing the same dataset used in this paper, most previous studies have investigated the utilization of unilateral tariff schemes. For example, Bureau et al. (2007) examined the utilization of the Generalized System of Preferences (GSP) granted by the European Union (EU) and the United States (US) to developing countries in the agri-goods sector, while Cadot et al. (2006) focused on the trade of the EU and the US with their preferential trading partners. Francois et al. (2006) and Manchin (2006) examined the preferential trade relations of the EU and non-least-developed African, Caribbean, and Pacific (ACP) countries under the Cotonou Agreement, while Hakobyan (2015) examined US GSP utilization by 143 GSP-eligible countries. These studies consistently found that the utilization of preferential schemes is higher for products with a larger tariff margin, larger volumes, and less restrictive RoOs. However, no studies have examined the role of exchange rates in FTA utilization.

The changes in exchange rates of exporters' currency against importers' currency affect FTA utilization through at least two channels. One is by changing above-mentioned excess profits from FTA utilization. As theoretically demonstrated in the next section, the depreciation of an exporter's currency against the importer's expands the excess profits from FTA utilization. Namely, it increases export quantities and thus export profits under FTA schemes more greatly than those under MFN schemes, due to the lower tariff rates in FTA schemes. The other is related to compliance with RoOs. As mentioned above, when exporting under FTA schemes, exporters need to comply with RoOs. There are several types of RoOs including the regional value content (RVC) rule, change-in-tariff classification (CTC) rule, technical requirement/specific process (TECH) rule, and wholly-obtained (WO) rule. For example, the RVC rule determines the country of origin of goods by examining whether the total values of the inputs imported from non-member countries (called "non-originating inputs") occupy less than a certain share (e.g. 40%) of prices in export products. Such a ratio of input prices to export product prices is called the "value-added ratio." The CTC rule requires export products to have a different tariff classification from non-originating inputs. Any of these rules or a combination of them are set for each product as RoOs under each FTA scheme.[3]

Exchange rates play a significant role in compliance with RoOs. For example, the depreciation of the exporter's currency against the importer's currency makes it easier for exporters to comply with the RVC rule by raising unit export prices in terms of the

[3] Later, we will present the distribution of RoOs in our empirical sample FTA, which shows that RoOs related to RVC and CTC are set for more than 90 percentages of our sample.

exporters' currency, thus improving the value-added ratio.[4] Even in complying with the CTC rule, there is the possibility that export prices and the total values of non-originating inputs become crucial. In the case of CTC, the so-called "De Minimis" rule is often available as a bailout measure, which allows non-originating inputs to have the same tariff classification if those inputs occupy only a certain small share in prices of export products (e.g. 10%). As a result, for both the RVC rule and CTC rule, the export prices and the values of non-originating inputs are crucial in determining compliance with RoOs. The depreciation of exporters' currency against importers' currency is supposed to improve the value-added ratio, ensuring compliance with RoOs, and thus enhancing FTA utilization.

In this paper, we empirically investigate the above relationship between exchange rates and FTA utilization. To do this, we employ the rich tariff-line level data on FTA utilization of ASEAN countries exporting to Korea during the period of 2007-2011. In this trade flow, ASEAN countries can use AKFTA schemes. AKFTA on trade in goods entered into force on 1 June 2007 between Korea and ASEAN member countries.[5] As a result, we find that depreciation of the exporter's currency against the importer's currency enhances FTA utilization, as is consistent with the above expectation. Furthermore, we show that such effects of exchange rates become smaller when exporting products with higher degrees of product differentiation. This relation is interpreted by bargaining between exporters and importers on exchange rate pass-through (ERPT), implied by recent questionnaire studies such as Friberg and Wilander (2008) and Ito et al. (2012). In addition, when producing goods exported to Korea, ASEAN countries will input some intermediate goods imported from non-AKFTA member countries. Therefore, we also examine the effects of exchange rates of ASEAN country currencies against non-member countries' currencies on AKFTA utilization in ASEAN countries. These theoretical and empirical analyses contribute to deepening our understanding of how macro-economic conditions (i.e. exchange rates) can affect micro-economic policy effects (i.e. firms' FTA utilization).

The rest of this paper is organized as follows. Section 2 provides our theoretical predictions on the relationship between firms' FTA utilization and exchange rates. In Section 3, we specify our empirical equations to examine such a relationship and report our empirical results. Section 4 examines the effect of product differentiation on the

[4] In this sense, changes in exchange rates may seriously affect the utilization of GSP in the U.S., in which RoOs are set to 35% RVC rules.

[5] Indonesia, Malaysia, Myanmar, Singapore, and Vietnam were the first group of signatories to give effect to AKFTA on 1 June 2007. This was followed by the Philippines (1 January 2008), Brunei (1 July 2008), Laos (1 October 2008), Cambodia (1 November 2008), and Thailand (1 January 2010).

impacts of exchange rates on FTA utilization. After examining several additional investigations by employing exchange rates against the US dollar (USD) in Section 5, Section 6 concludes the paper.

2. Exchange Rates and FTA Utilization

This section proposes two potential channels through which exchange rates affect FTA utilization. We summarize the two hypotheses to be empirically tested in the next section.

2.1. Excess Profits

The first channel is related to the excess profits gained from FTA utilization. In this channel, fixed costs of FTA utilization play a key role. Suppose that, by inputting some intermediate goods imported from AKFTA non-member countries, ASEAN firms produce final goods and then export them to Korea (an AKFTA member country). The export profit of each ASEAN exporter under the FTA scheme is defined as

$$\pi^F \equiv (P^X - P^I)d^F - C - C^F,$$

where P^X is the unit price of final goods exported to Korea. P^I is the total cost of non-originating inputs, i.e. imports from AKFTA non-member countries, to produce one unit of each export good. C is the sum of fixed costs of production and exporting, and C^F is the additional fixed cost of FTA utilization. The documentation costs associated with RoOs can be interpreted as a part of C^F. All of these terms are denominated in ASEAN final-good exporters' currency. d^F is the total demand of those final goods, which is defined as

$$d^F = \frac{P^*}{P^{X*}}\bar{d},$$

where P^* represents the import price index in Korea, which is assumed to be exogenous and is denominated in Korean won (KRW). $\bar{d}$ is the exogenous term of demand. P^{X*} is the unit export price in terms of KRW. We assume that zero tariff rates are applied under the FTA scheme. On the other hand, if exporters utilize MFN rates, denoted by τ, rather than FTA rates, the export profit can be rewritten by

$$\pi = (P^X - P^I)d - C, \qquad \text{where} \qquad d = \frac{P^*}{(1+\tau)P^{X*}}\bar{d}.$$

Each exporter decides to utilize the FTA scheme if it realizes larger profits than the MFN scheme. The excess profit from FTA utilization is obtained by

$$g \equiv \pi^F - \pi = (P^X - P^I)\frac{\tau}{1+\tau}\frac{P^*}{P^{X*}}\bar{d} - C^F.$$

Thus, each exporter is more likely to utilize the FTA scheme when $g > 0$; otherwise, they will utilize the MFN scheme. Note that if the exporter does not need to bear fixed costs of FTA utilization (i.e., $C^F = 0$), the excess profit is always positive; and thus exporters always utilize the FTA scheme. Further, if MFN tariff rates are the same as FTA rates (i.e., $\tau = 0$), the excess profit is always negative because of the existence of fixed costs of FTA utilization, and thus the MFN scheme is always chosen.

We simply formulate the likelihood of choosing the FTA scheme by a function, $U_g\ (g)$ and assume that $U'_g\ (g) \equiv u_g > 0$, where u_g is a positive constant term. Let ε^X represent the nominal exchange rates of the ASEAN exporter's currency against KRW (the final-good importer's currency in our context). We call these exchange rates "exchange rates in exporting." The partial derivative of $U_g\ (g)$ with respect to logged nominal exchange rates in exporting ($\ln \varepsilon^X$) is obtained as follows:

$$\frac{\partial U_g(g)}{\partial \ln \epsilon^X} = u_g\{\eta^X P^X - (P^X - P^I)\eta^{X*}\}\frac{\tau}{1+\tau}\frac{P^*}{P^{X*}}\bar{d}. \quad (1)$$

η^X and η^{X*} represent degrees of ERPT into the unit export price denominated in the ASEAN exporter's currency and the currency of the destination country (i.e., KRW), respectively. These are defined as

$$\eta^X \equiv \frac{\partial \ln P^X}{\partial \ln \epsilon^X}, \qquad \eta^{X*} \equiv \frac{\partial \ln P^{X*}}{\partial \ln \epsilon^X}.$$

Given the fact that $0 \le \eta^X \le 1$ and $-1 \le \eta^{X*} \le 0$, we can identify the sign of the effect of the exchange rates in exporting on FTA utilization through the first channel as

$$\frac{\partial U_g(g)}{\partial \ln \epsilon^X} > 0. \quad (2)$$

Equation (2) states that the depreciation of the exporter's currency against the importer's currency enhances the likelihood of FTA utilization by improving the excess profits from FTA utilization. This improvement is caused by two paths. One is through the rise of unit export prices denominated in the exporter's currency. When each ASEAN currency depreciates to the KRW, the unit export prices denominated in the former currency rise. Furthermore, given that the quantity demanded by importers is always larger under FTA schemes due to their lower rates compared to MFN, the impact of exporter currency depreciation on the total export profit is larger for FTA schemes. As a result, the exporter currency depreciation leads to the expansion of excess profits from utilizing FTA tariff schemes, due to the rise of unit export prices denominated in the exporter's currency.

The other path is the increase in the quantity demanded by importers. Regardless of tariff schemes, the depreciation of each ASEAN country's currency leads to an increase in the demand because the export price denominated in KRW (P^{X*}) falls. Furthermore, such an effect of (logged) exchange rates on demand is larger for FTA schemes than MFN schemes, as is implied by the following relationship:

$$\frac{\partial d^F}{\partial \ln \epsilon^X} = -\eta^{X*} \frac{P^*}{P^{X*}} \bar{d} > 0, \qquad \frac{\partial d}{\partial \ln \epsilon^X} = \frac{1}{1+\tau} \frac{\partial d^F}{\partial \ln \epsilon^X} < \frac{\partial d^F}{\partial \ln \epsilon^X}.$$

This consequence depends on a natural assumption that the elasticity of demand to the price paid by importers decreases with rising tariff rates. Given the degree of ERPT to KRW export prices (η^{X*}), the depreciation of each ASEAN currency against the KRW more greatly increases the demand under FTA schemes than under MFN schemes. As a result, this depreciation improves the excess profits of FTA utilization through the increase of the quantity demanded by importers.

We summarize the prediction for the sign of the effect of the exchange rates in exporting on the firm-level likelihood of FTA utilization from the view of the excess profit for FTA utilization as follows:

Prediction 1. *Depreciation (appreciation) of final-good exporters' currencies against a currency in the export destination country (i.e., Korean won) enhances (lowers) the firm-level likelihood of FTA utilization through improving (worsening) the excess profit to cover the fixed costs of FTA utilization.*

ASEAN exporters are supposed to import intermediate inputs from AKFTA non-member countries including Japan, the US, and EU countries. This motivates us to examine the effects of exchange rates of ASEAN currencies against ones of these countries. We call those exchange rates "exchange rates in importing." Then, the partial derivative of U_g (g) with respect to logged nominal exchange rates in importing ($\ln \varepsilon^I$) is obtained as follows:

$$\frac{\partial U_g(g)}{\partial \ln \epsilon^I} = -u_g \left\{ \left(1 - \frac{\partial \ln P^{X*}}{\partial \ln P^I} \right) + \frac{P^X}{P^I} \frac{\partial \ln P^{X*}}{\partial \ln P^I} \right\} P^I \eta^I \frac{\tau}{1+\tau} \frac{P^*}{P^{X*}} \bar{d}. \quad (3)$$

η^I is the degree of ERPT into the costs of non-originating inputs denominated in the ASEAN exporters' currency and is defined as

$$\eta^I \equiv \frac{\partial \ln P^I}{\partial \ln \epsilon^I} \quad (1 \geq \eta^I \geq 0).$$

We assume that the costs of non-originating inputs P^I are elastic only to ε^I, and that the export price P^X is elastic not only to ε^X but also to ε^I through its effect on P^I , because P^I

is part of the marginal cost of final-good production.

Furthermore, since the costs of non-originating inputs are just a limited portion of the whole export price, one percent change in P^I brings less than one percent change in P^{X*} (i.e., $0 < \partial \ln P^{X*} / \partial \ln P^I < 1$). As a result, we obtain a negative sign for the effect of the exchange rates in importing on the likelihood of FTA utilization through the excess profit as follows:

$$\frac{\partial U_g(g)}{\partial \ln \epsilon^I} < 0. \tag{4}$$

Equation (4) states that the depreciation of exchange rates in importing lowers the likelihood of FTA utilization. This is because increases in the costs of non-originating inputs caused by depreciation of exporter's currency against the exchange rates in importing worsens the excess profit to cover fixed costs of FTA utilization.

As a result, we can summarize a prediction for the sign of effects of exchange rates in importing on the firm-level likelihood of FTA utilization from the view of the excess profit from FTA utilization as follows:

Prediction 2. *Depreciation (appreciation) of final-good exporters' currencies against the currencies of intermediate-good producers in FTA non-member countries lowers (enhances) the firm-level likelihood of FTA utilization through worsening (improving) the excess profit to cover the fixed costs of FTA utilization.*

2.2. Rules of Origins (RoOs)

The second channel is compliance with RoOs. As we noted in the previous section, the so-called value-added ratio plays a significant role in complying with RoOs and thus in utilizing FTA schemes. Practically, there are two kinds of formulation on value-added ratio *R*. One is build-down method (R^{D}), which is defined as

$$R^{\mathrm{D}} \equiv \frac{P^X - P^I}{P^X} = 1 - n.$$

Here, notations are the same as those in the previous subsection. *n* represents the share of costs of non-originating inputs in export prices (i.e., $n \equiv P^I / P^X$). The other is the build-up method (R^{U}) and is equal to *n*. Final-good exporters are allowed to utilize AKFTA preferential rates only if R^{D} reaches a given level (e.g., 40% in the case of RVC) or if R^{U} falls below a given level (e.g., 60% in the case of RVC). Importantly, in either method, *n* is negatively associated with the firm-level likelihood of FTA utilization.[6]

[6] In our empirical sample for AKFTA, the build-down method is employed.

The effects of exchange rates on the firm-level likelihood of FTA utilization through compliance with RoOs can be simply shown as follows. As mentioned above, n is negatively associated with the firm-level likelihood of FTA utilization. Therefore, we formulate its likelihood by a function, $U_n(n)$. We assume that $U'_n(n) \equiv -u_n$, where u_n is a positive constant term. Then, the partial derivative of $U_n(n)$ with respect to logged nominal exchange rates in exporting ($\ln \varepsilon^X$) and importing ($\ln \varepsilon^I$) are, respectively, obtained as follows:

$$\frac{\partial U_n(n)}{\partial \ln \epsilon^X} = u_n \frac{P^I}{P^X} \eta^X > 0, \tag{5}$$

$$\frac{\partial U_n(n)}{\partial \ln \epsilon^I} = -u_n \frac{P^I}{P^X} \left[1 - \frac{\partial \ln P^X}{\partial \ln P^I}\right] \eta^I < 0. \tag{6}$$

Equation (5) implies that the depreciation of exchange rates in exporting enhances the likelihood of FTA utilization by raising the unit export price denominated in exporters' currency, thus improving the value-added ratio. Therefore, we can derive a theoretical prediction on the effect of exchange rates in exporting through compliance with RoOs in the following manner:

Prediction 3. *Depreciation (appreciation) of final-good exporters' currencies against a currency in the export destination country (i.e., Korean won) enhances (lowers) the firm-level likelihood of FTA utilization by improving (lowering) the value-added ratio to comply with RoOs.*

In contrast, equation (6) states that the depreciation of exchange rates in importing lowers the likelihood of FTA utilization as the increase in costs of non-originating inputs caused by the depreciation of an exporter's currency against exchange rates in importing lowers the value-added ratio. Thus, we obtain the theoretical prediction on the effects of exchange rates in importing through compliance with RoOs as follows:

Prediction 4. *Depreciation (appreciation) of final-good exporters' currencies against the currencies of intermediate-good producers in FTA non-member countries lowers (enhances) the firm-level likelihood of FTA utilization by lowering (improving) the value-added ratio to comply with RoOs.*

2.3. Testable Hypotheses

Given the above two potential channels through which exchange rates affect FTA

utilization, we simply define the aggregated likelihood function U as the sum of U_g (g) and U_n (n) in the following manner:

$$U \equiv U_g(g) + U_n(n).$$

Thus, signs of partial derivatives of U with respect to logged exchange rates in exporting and importing are, respectively, obtained as

$$\frac{\partial U}{\partial \ln \epsilon^X} > 0, \quad \text{and} \quad \frac{\partial U}{\partial \ln \epsilon^I} < 0. \tag{7}$$

In sum, based on predictions 1 and 3, we obtain a testable hypothesis on the effect of the exchange rate of each ASEAN currency against KRW on FTA utilization as follows:

Testable Hypothesis 1. *Depreciation (appreciation) of final-good exporters' currencies against a currency in the export destination country (i.e., Korean won) enhances (lowers) the firm-level likelihood of FTA utilization.*

Furthermore, based on predictions 2 and 4, we obtain a testable hypothesis on the effect of the exchange rate when importing on FTA utilization in the following manner:

Testable Hypothesis 2. *Depreciation (appreciation) of final-good exporters' currencies against currencies of intermediate-good producers in FTA non-member countries lowers (enhances) the firm-level likelihood of FTA utilization.*

In the following sections, we empirically examine how exchange rates affect FTA utilization. Before proceeding, we need to fill the gap and define the extent of FTA utilization between this theoretical section and the proceeding empirical sections. In this section, we identify FTA utilization at the firm-level by examining the likelihood of FTA utilization. In the empirical sections, on the other hand, we identify it at the product-level by examining FTA utilization rates, which are defined as the share of trade values under the FTA scheme in total trade values of FTA eligible products. We assume that the likelihood of FTA utilization in each firm is positively associated with the FTA utilization rates at the product-level. Then, examining the product-level FTA utilization rates, we investigate the empirical validity of the above testable hypotheses.

3. Impacts of Exchange Rates on FTA Utilization

This section specifies the empirical framework we adopted to examine the above testable hypotheses and presents the main results. Then, we present the robustness

checks performed on the main results.

3.1. Empirical Framework and Data

In the empirical analyses, we examine the utilization of AKFTA in Korea's imports from ASEAN countries. We exclude Singapore from our sample export countries because Singapore has not only multilateral, but also bilateral FTAs with Korea. In this case, firms' decisions on FTA use will be qualitatively different; firms will choose their tariff scheme from among MFN rates, bilateral FTA rates, and multilateral FTA rates rather than simply from between MFN rates and FTA rates. Since our aim is not to examine such complicated decisions on tariff schemes, we chose not to examine the FTA utilization in exporting from Singapore to Korea.

Our analysis was conducted for the period of 2007-2011 at Korea's tariff-line level (nine-digit level). For this period, the common version of harmonized system (HS) is used (HS 2007 version). The sample products are restricted to those having lower FTA rates than MFN rates. The usual specifications in the previous studies, which are listed in the introductory section, are as follows.

$$\text{Utilization}_{ict} = \alpha \text{Margin}_{ict} + \gamma \ln \text{Monthly Trade}_{ict} + \mathrm{u}_c + \mathrm{u}_i + \mathrm{u}_t + \varepsilon_{ict},$$

where Utilization_{ict} represents the FTA utilization rates (i.e., the share of trade values under FTA schemes in total trade values) in exporting product *i* from country *c* in year *t*. Margin_{ict} denotes the preference margin for exporting product *i* from country *c* in year *t*. $\text{Monthly Trade}_{ict}$ is the average of monthly exports of product *i* from country *c* in year *t*. This variable controls for the role of firm-level transaction sizes in FTA utilization.[7] An export country dummy variable (u_c), a product dummy variable (u_i), and a year dummy variable (u_t) are also included. The product dummy variable is defined at an HS nine-digit level, and is expected to control for the effects of RoOs, which are defined at an HS six-digit level in the case of AKFTA.

We extend this model so as to be able to examine the role of exchange rates. We use two kinds of variables for exchange rates. One is the exchange rates of each ASEAN country's currency against KRW (i.e., against the currency of the export destination

[7] As theoretically demonstrated in Demidova and Krishna (2008), even if the tariff margin is trivial, more productive firms are more likely to use FTA schemes in exports because such firms have larger outputs and thus obtain larger tariff savings through the use of FTA schemes. From an empirical point of view, as a proxy for this variable, most of the previous studies (e.g., Hakobyan, 2015) used the product-country-level annual trade values. Obviously, such values are too large to use as a proxy for firm-level transactions. Therefore, Keck and Lendle (2012) employed the product-customs district-level monthly trade data and called these data "pseudo-transaction-level" trade values. Due to the availability of the data, this paper uses the product-country-level monthly trade values, which meet a medium level of accuracy as a proxy for firm-level transaction sizes between product-country-level annual trade values and pseudo-transaction-level trade values.

country). This variable (Exchange^X) is used for exploring the role of exchange rates on export product prices and corresponds to exchange rates in exporting in our theoretical section. The other is the variable which is defined similarly to the effective exchange rate of each ASEAN country's currency (Exchange^I). Using this variable, which corresponds to exchange rates in importing in our theoretical section, we examine the role of exchange rates on prices for non-originating inputs.

To construct the latter variable, we first identify inputs for producing each HS six-digit level product by referring to the 2005 Japan's Input–Output Table (Ministry of Internal Affairs and Communications). Although Japan is not included in our sample countries, the use of the data for Japan enables us to identify such codes more precisely because of its fineness. This implies our assumption that ASEAN countries have the same production structures as Japan. Second, due to our focus on *non-originating* inputs, we compute the value of each ASEAN country's inputs from each non-AKFTA member country.[8] Third, we aggregate the exchange rates of each ASEAN country's currency against non-AKFTA member countries' currencies by using such import values as a weight. As a result, our variable of exchange rates in importing differs by export country, six-digit HS code, and year.

Our empirical specification becomes as follows.

$$\begin{aligned}\text{Utilization}_{ict} = {} & \zeta_1 \ln \text{Exchange}^X_{ct} + \zeta_2 \ln \text{Exchange}^I_{ict} + \alpha \text{Margin}_{ict} \\ & + \gamma \ln \text{Monthly Trade}_{ict} + \delta \ln \text{ GDP per Capita}_{ct} + \text{u}_c + \text{u}_i + \text{u}_t + \varepsilon_{ict}. \quad (8)\end{aligned}$$

We also include the exporter's GDP per capita, which approximately represents the unit cost of domestic labor force. We expect that a higher cost of labor force is conducive to higher export prices and higher value-added ratio, implying a positive sign of the coefficient δ. As demonstrated in the previous section, coefficients for exchange rates, ζ_1 and ζ_2, are related to testable hypotheses 1 and 2, respectively. We estimate these models by the ordinary least square (OLS) method.[9]

As pointed out in Hakobyan (2015), the coefficient for Monthly Trade might suffer from endogeneity biases because unobserved shocks may have an influence on both average monthly trade values and the dependent variable (particularly its

[8] In order to avoid our inclusion of an endogeneity source, we consistently use import values in 2006.

[9] Since our dependent variable lies in the unit interval, i.e., [0, 1], a fractional logit estimation technique proposed by Papke and Wooldridge (1996) is more appropriate method to estimate our model. However, we employed the OLS method because of the following two reasons. First, we were not able to obtain the convergence of pseudo log-likelihood in our fractional logit estimations due to the existence of a large number of dummy variables (especially HS nine-digit code dummy). Second, in Sections 4 and 5, we interacted some variables with a variable of exchange rates. As pointed out in Ai and Norton (2003), however, we need to be cautious of marginal effect issues in interaction terms in non-linear models, including the fractional logit model.

denominator). Thus, we also use the instrumental variable (IV) method in our robustness checks. As an instrument for monthly trade, following Hakobyan (2015), we used a binary variable with a value of 1 if Korea imported a concerned product from any other ASEAN countries and zero otherwise (Rest of ASEAN).

Our data sources are as follows. The data on FTA utilization and tariff margin were obtained from Korea Customs and Trade Data Institute (KCTDI). We collected the data on export countries' exchange rates against KRW from ASEAN stats[10] (average of period). The data on Monthly Trade were obtained from World Trade Atlas. Before showing our estimation results, we take a brief overview of our sample. Figure 1 depicts the changes in nominal exchange rates against KRW. In the figure, data from 2006 is set to 100 for each sample country. All sample export countries experienced appreciation until 2009. Except for Vietnam, their currencies were stable against the KRW afterwards. Vietnam's currency depreciated by nearly 35% from 2009 to 2011.

=== Figure 1 ===

Figure 2 shows the changes in AKFTA utilization rates when exporting from each ASEAN country to Korea, defined as the share of the exports under the AKFTA scheme in total exports of AKFTA eligible products. Based on the year of entry into force, the starting year differs by country in this figure. Overall, these rates seem to change in a complicated manner. All countries do not necessarily show a rise in their utilization rates over time. For example, while Thailand, Laos, and Malaysia have low rates (around 35% in 2011), the utilization rates are relatively high when exporting from Myanmar, Brunei, and Vietnam (around 75%-95%).

=== Figure 2 ===

Table 1 reports the distribution of RoOs in AKFTA. In AKFTA, the major RoOs are "Change-in-Heading (CH) or RVC", followed by "Change-in-Chapter (CC) or RVC" and WO. In AKFTA, the build-down method was applied for RVC. Most of the RVC rules set either 40% or 50% as a cutoff for the necessary value-added shares of originating inputs. Additionally, the cutoff in De Minimis in AKFTA is 10%. Thus, in the case of AKFTA, it is possible that the compliance of RoOs in exporting products with RVC- or CTC-related RoOs is affected by exchange rates. Namely, except for products with WO (just 9% of all products), all products are categorized as such.

[10] http://aseanstats.asean.org/

However, we need to pay some attention to the rule that the De Minimis for HS50-63 products is weight-based, not value-based.[11]

=== Table 1 ===

3.2. Baseline Results

This subsection reports our main empirical findings. The basic statistics for the estimation sample are provided in Table 2. Our baseline estimation results are reported in Table 3. In column (I), we estimate the simple equation without exchange rate variables. As is consistent with the results of the previous studies listed in the introductory section, the coefficients for tariff margin and monthly trade are estimated as significantly positive. Namely, products with the larger tariff margins and shipments have higher rates of FTA utilization. The coefficient for GDP per capita is insignificant perhaps because our inclusion of export country dummy variables absorbed most of the variation in this variable.

=== Tables 2 and 3 ===

Our analysis of the impacts of exchange rates on FTA utilization starts from column (II), in which the exchange rates for exporting (i.e. KRW exchange rates) and those for importing are added into the specification in column (I). From this column, we find that the coefficient for exchange rates when exporting is positively significant, indicating that a ten percent depreciation of the exporter's currency against KRW leads to a two percent point rise in FTA utilization rates. This result implies that the depreciation of ASEAN currencies against KRW improves the export profit and value-added ratio evaluated in ASEAN currencies and thus significantly encourages ASEAN exporters to utilize AKFTA scheme. In other words, this empirical result supports Testable Hypothesis 1. Although we cannot separately identify the two channels summarized in Predictions 1 and 3 due to the limitation of the data, we can at least state that those two potential channels work significantly in aggregate. The results for the tariff margin and monthly trade are qualitatively unchanged. The coefficient for the exporter's GDP per capita turns out to be significantly positive.

Next, we discuss the effect of exchange rate in importing on FTA utilization. The

[11] Rule 10-1-(a) of Annex 3 in the AKFTA legal text says that *for a good provided for in Chapters 50 through 63 of the Harmonized System, the weight of all non-originating materials used in its production that do not undergo the required change in tariff classification does not exceed ten (10) percent of the total weight of the good*.

coefficient for exchange rates in importing was not significant. In other words, Testable Hypothesis 2 is not supported in our estimation. This insignificant result can be interpreted from the viewpoint of ERPT. Equation (3) suggests that exchange rates in importing affect the likelihood of FTA utilization only when their changes are passed onto the costs of non-originating inputs denominated in ASEAN exporters' currencies. In other words, if changes in exchange rates in importing are never passed through into the costs of non-originating inputs denominated in ASEAN exporters' currencies, η^I becomes zero, and thus the effects of exchange rates in importing on FTA utilization vanish.

It is well known that bargaining between exporters and importers over the exchange rate risk is closely related to the degrees of ERPT.[12] For example, Ito et al. (2012) identify the determinants of currency invoicing among Japanese exporting firms with firm-level data. They find that Japanese firms which export highly differentiated products tend to invoice in the yen, and prevent yen-prices from exposure to exchange-rate fluctuations. This fact suggests that exporters might avoid the exchange-rate risk by shifting it to importers when they supply highly differentiated products and have strong bargaining power over the decisions of trade prices.[13] In our context, imports of ASEAN producers from AKFTA non-member countries are intermediate inputs. In such transactions, buyers (ASEAN producers) may have stronger bargaining power in pricing than sellers (intermediate good suppliers in AKFTA non-member countries). If so, it is more likely that changes in exchange rates in importing are passed onto prices in terms of the currencies of AKFTA non-member countries, and that prices denominated in ASEAN currencies are saved from exposure to exchange rate fluctuations. Following the implications of Ito et al. (2012), we will consider this aspect more carefully by examining the interaction effects of the degrees of product differentiation on the impacts of exchange rates on FTA utilization in the next section.

3.3. Robustness Check

[12] On the determinants of ERPT, many authors have examined both theoretical and empirical research not only from a macroeconomic point of view but also from a microeconomic one. See, for instance, Campa and Goldberg (2005), Choudhri and Hakura (2006), Ito and Sato (2008), and Taylor (2000) for macroeconomic determinants. Amiti, Itshoki and Konings (2014), Berman, Martin and Mayer (2012), and Cook (2014) examine the relation between firms' productivity and ERPT from a microeconomic point of view. Burnstein and Gopinath (2013) give a comprehensive review of the literature.

[13] Friberg and Wilander (2008) also point out the importance of negotiation in determining prices and the invoice choice. Goldberg and Tille (2013) theoretically figure out the role of bargaining over invoicing and ERPT.

We conducted three kinds of robustness checks on the above results. First, from our estimation sample, we dropped products that have WO criterion as RoOs or those that are categorized into HS 50-63. We thus called this a “restrictive sample”. The rationale for this is because, as mentioned before, it is possible for exchange rates to affect the compliance of RoOs only in the case of RVC- or CTC-related RoOs, and because De Minimis rules are weight-basis rather than value-basis in the case of products categorized into HS50-63. This practical fact implies that, in the dropped samples, only the first channel related to the excess profit works for the effect of exchange rates on FTA utilization. In other words, the transmission channel of exchange rates on FTA utilization might be different between the restricted and dropped samples. The results are reported in column (III) of Table 3. While the coefficient for GDP per capita turned out to be insignificant, that for exchange rates in exporting was still positively significant. The coefficient for exchange rates in importing was again found to be insignificant.

Second, we employed the IV method in order to tackle the endogeneity issues in Monthly Trade. As mentioned in the previous section, we used the variable “Rest of ASEAN” as an instrument, which takes the value of one if Korea imports the given product from any other ASEAN country (which implies that there is an import demand in Korea for the given product) and zero otherwise. The results are reported in columns (I) and (II) of Table 4, respectively, for the full and restricted samples. All models showed endogeneity of ln Monthly Trade. Both the Durbin-Wu-Hausman chi-squared test and Wu-Hausman F test rejected the null hypothesis that ln Monthly Trade is exogenous. Also, F statistics rejected the null hypothesis that our instrument was weak. In the first-stage estimation, the coefficients for this instrument were estimated to be significantly positive. In the second-stage estimation, the results were qualitatively similar to those in Table 3.

=== Table 4 ===

Third, we examined the “extensive margin” in FTA utilization. As discussed in Section 2.1., exchange rates in general affect trade values, particularly those under MFN and FTA schemes. Therefore, our results of significant association between FTA utilization rates and exchange rates might be mainly driven by the effects of exchange rates on trade values under MFN schemes (i.e., the denominator in the dependent variable). In order to address this issue, we examined the model when the dependent variable takes the value one if any positive trade values under FTA schemes are

observed when Korea imports from an ASEAN country, and zero otherwise. The extensive margin is examined by estimating the linear probability model (LPM), since our model includes a large number of fixed effects. The results are reported in columns (III) and (IV) of Table 4. Again, we estimate this model for all observations and the restricted sample separately. Although the coefficients for GDP are insignificant in the case of the restricted sample, the coefficients for all other variables except for exchange rates in importing are positively significant.

4. Product Differentiation

This section examines the role of product differentiation in determining the effects of exchange rates on FTA utilization. After setting our hypotheses, we will show the estimation results.

4.1. Bargaining View of ERPT

Recent studies on ERPT such as Amiti, Itshoki, and Konings (2014), Berman, Martin, and Mayer (2012), and Cook (2014) suggest that the degrees of ERPT differ across products and industries. Our theoretical hypotheses derived from equations (1) and (3) imply that impacts of exchange rates on FTA utilization quantitatively depend on the degrees of ERPT (i.e., η^X, η^{X*}, and η^I). As shown in recent questionnaire studies including Friberg and Wilander (2008) and Ito et al. (2012), those degrees are closely related to the degree of product differentiation. Thus, in this section, we examine how the degree of product differentiation affects the impacts of exchange rates on FTA utilization.

In our context, there are final- and intermediate-good markets. In the final-good market, the exporters are ASEAN producers, and the importers are firms and consumers in Korea. Suppose that final-good exporters in ASEAN countries have superior bargaining position compared to importers in Korea over price exposure to exchange-rate fluctuations. This situation is more likely to happen when those final goods are more differentiated as suggested by Ito et al. (2012). In this case, exporters in ASEAN countries might prevent the export prices of final goods denominated in each ASEAN currency, being exposed to exchange rate fluctuations by shifting the exposure to prices denominated in KRW. In this case, the ERPT to final-good prices denominated in KRW (η^{X*}) is more likely to be closer to minus one. Note that the degrees of ERPT to export prices denominated in each ASEAN currency and KRW, i.e. η^X and η^{X*}, respectively, are two sides of the same coin, and the sum of the absolute values of

η^X and η^{X*} always equals one ($|\eta^X| + |\eta^{X*}| = 1$). Thus, we can rewrite equation (1) as follows:

$$\frac{\partial U_g(g)}{\partial \ln \epsilon^X} = u_g\{P^X + P^I \eta^{X*}\}\frac{\tau}{1+\tau}\frac{P^*}{P^{X*}}\bar{d}.$$

In sum, the impacts of exchange rates in exporting on FTA utilization become smaller when export products are more differentiated. Thus, we obtain the following testable hypothesis on the interaction effect of the degree of product differentiation in ASEAN exports on the impacts of exchange rates in exporting:

Testable Hypothesis 3. *If export products from ASEAN countries to Korea are more differentiated, the effect of exchange rates on the firm-level likelihood of FTA utilization becomes smaller.*

In contrast, in the case of the intermediate-good market, the exporters are producers in AKFTA non-member countries and the importers are final-good producers in ASEAN countries. When exporters in the intermediate-good market are superior to importers in bargaining, intermediate-good prices denominated in ASEAN currencies are more likely to suffer from exchange-rate fluctuations. In this case, the ERPT to intermediate-good prices denominated in ASEAN currencies (η^I) is more likely to be closer to one. Such a case is more likely to happen when non-originating inputs are more differentiated. Thus, we obtain the following testable hypothesis on the interaction effect of the degree of product differentiation on the impacts of exchange rates in importing:

Testable Hypothesis 4. *If non-originating inputs that are imported by ASEAN final-good producers from AKFTA non-member countries are more differentiated, the effect of exchange rates in importing on the firm-level likelihood of FTA utilization is more likely to become negative.*

4.2. Empirical Findings

To examine above additional testable hypotheses, we add the interaction terms of the exchange rates to the degrees of differentiation in ASEAN countries' exports to Korea and ASEAN countries' imports of non-originating inputs. To proxy the degrees of product differentiation, we employ demand elasticity in export products (ExElasticity) and that in non-originating inputs (ImElasticity). They theoretically represent the elasticity of substitution, which can be interpreted as the inverse of product

differentiation in each market. In other words, higher ExElasticity and ImElasticity imply lower degrees of product differentiation in ASEAN export products and non-originating inputs, respectively.

The estimates of demand elasticity are drawn from Broda and Weinstein (2006) and are available at an HS three-digit level. We use these estimates in Korea for ExElasticity. However, these estimates are not available for most ASEAN countries (i.e. our sample export countries). Thus, we use those in Indonesia for ImElasticity because Indonesia is a median country among ASEAN nations in terms of per capita income. We need to carefully construct ImElasticity, as it captures the demand elasticity of non-originating inputs for producing export products. To do that, as in the construction of exchange rates in importing, we first identify the six-digit HS codes of inputs for producing each HS six-digit level product by employing the basic table from the 2005 Japan's Input–Output Table. Second, we obtain each ASEAN country's total import values of inputs from non-AKFTA member countries. Lastly, using the total import values of non-originating inputs as a weight, we compute the weighted average of (Indonesia's) demand elasticity. As a result, our measure on ImElasticity differs by export country and HS six-digit level.

We extend specification (8) by introducing ExElasticity and ImElasticity as interaction effects. As a result, we obtain the following specification:

$$\begin{aligned}\text{Utilization}_{ict} = {} & \zeta_1 \ln \text{Exchange}^X_{ct} + \Theta_1 \text{ExElasticity}_i \ln \text{Exchange}^X_{ct} + \zeta_2 \ln \text{Exchange}^I_{ict} \\ & + \Theta_2 \text{ImElasticity}_{ic} \ln \text{Exchange}^I_{ict} + \alpha \text{Margin}_{ict} \\ & + \gamma \ln \text{Monthly Trade}_{ict} + \delta \ln \text{GDP per Capita}_{ct} + \mathrm{u}_c + \mathrm{u}_i + \mathrm{u}_t + \varepsilon_{ict}.\end{aligned}$$

According to Testable Hypothesis 3, we expect Θ_1 to be positive. Testable Hypothesis 4 implies a positive value for Θ_2. Again, we estimate this model with the OLS method to make the interpretation on results of interaction terms simple (Ai and Norton, 2003).

The results are reported in Table 5. The effect of exchange rates in exporting is again estimated to be positive, supporting Testable Hypothesis 1. Further, coefficient Θ_1 was estimated as positive, implying that the effect of exchange rates in exporting on FTA utilization is larger when exporting involves less differentiated final products. In other words, our estimation supports Testable Hypothesis 3. These results are robust based on the restrictive sample, IV method, and the extensive margin. The effect of exchange rates in importing and the interaction effect of import elasticity, Θ_1, are insignificant in most cases. Thus, changes in exchange rates in importing do not affect FTA utilization regardless of the degree of product differentiation in non-originating inputs. In sum, we can state that the depreciation of the export country's currency against the KRW contributes to enhancing FTA utilization rates through the rise of

export product prices evaluated in the export country's currency. Furthermore, such a positive effect becomes smaller when exporting products which are more differentiated probably because export product prices evaluated in the export country's currency are exposed to fewer exchange rate fluctuations.

=== Table 5 ===

5. Effect of USD Exchange Rates

In this section, we examine the effect of exchange rates of ASEAN exporters' currencies against the USD on FTA utilization.

5.1. Reconsidering Theoretical Predictions

It is well known that a major part of the trade by ASEAN countries is implemented under USD invoicing. For instance, according to Customs in Thailand, more than 90% of Korean imports from Thailand are implemented under USD invoicing. If import and export prices are invoiced in terms of USD, exchange rates against USD are more likely to affect export prices, as well as the costs of non-originating inputs denominated in each ASEAN currency, rather than exchange rates against the KRW or the exchange rates in importing that we defined in the previous section. This naturally motivates us to examine the effect of USD exchange rates on FTA utilization through channels related to the excess profit from FTA utilization and RoOs.

To deal with this, we reconstruct the model set up in Section 2 to examine the effects of exchange rates in exporting and importing. Let ε^{US} denote the exchange rate of each ASEAN currency against USD. The partial derivative of the likelihood function of FTA utilization through the excess profit from FTA utilization, U_g (g), with respect to logged ε^{US} is derived as follows:

$$\frac{\partial U_g(g)}{\partial \ln \epsilon^{US}} = u_g \left\{ \left(\eta^{X,U} - \eta^{I,U} \frac{P^I}{P^X} \right) P^X \frac{\tau}{1+\tau} \frac{P^*}{P^{X*}} \bar{d} \right\}, \tag{9}$$

where the degrees of USD-ERPT into the unit export price and the costs of non-originating inputs denominated in each ASEAN currency are, respectively, defined as

$$\eta^{X,US} \equiv \frac{\partial \ln P^X}{\partial \ln \epsilon^{US}} \quad \text{and} \quad \eta^{I,US} \equiv \frac{\partial \ln P^I}{\partial \ln \epsilon^{US}}.$$

We used the assumption that P^X and P^I are invoiced in USD and that both of them are affected by changes in the USD exchange rate ε^{US}. Further, we assumed that the

exchange rates of the KRW against the USD are independent of ε^{US} , and that KRW export prices P^{X*} are not affected by changes in ε^{US}. Given the ratio of non-originating inputs in the export price (P^I / P^X), equation (9) states that depreciation of each ASEAN currency against the USD enhances the likelihood of FTA utilization through the excess profit channel if the degree of ERPT of USD exchange rates into the export price is high enough to offset the effect on the costs of non-originating inputs ($\eta^{X,US} > \eta^{I,US} P^I / P^X$).

Next, we reconsider the effect through compliance of RoOs. The partial derivative of the likelihood function of FTA utilization through the compliance of RoOs, U_n (n), with respect to logged ε^{US} is written by

$$\frac{\partial U_n(n)}{\partial \ln \epsilon^{US}} = u_n \frac{P^I}{P^X}(\eta^{X,US} - \eta^{I,US}). \quad (10)$$

We find that the impacts of USD exchange rates on the unit export price relative to those on the costs of non-originating inputs determine the sign of the total effect. If the USD-ERPT into the export prices is higher than that into the costs of non-originating inputs ($\eta^{X,US} > \eta^{I,US}$), the effect of USD exchange rate on the likelihood of FTA utilization through compliance of RoOs becomes positive. In the previous sections, we found that the effect of exchange rates in importing is not significantly estimated. We noted that this result is consistent with the situation where exchange rate changes do not well reflect intermediate good prices in terms of buyers' (ASEAN producers') currencies as a result of stronger bargaining power. If this is so, in our estimation with USD exchange rates, $\eta^{X,US}$ should be higher than $\eta^{I,US}$. In short, we expect a positive relationship between ln ε^{US} and FTA utilization.

We can easily reconsider the theoretical predictions on the interaction effects of degrees of product differentiation in export products and non-originating inputs. Suppose that ASEAN export products are well differentiated and that it is easy for ASEAN exporters to prevent export prices denominated in their home currencies from being exposed to exchange rate changes through bargaining. In this situation, $\eta^{X,US}$ is supposed to become lower, and the effect of USD exchange rates on FTA utilization becomes smaller or is more likely to become negative, according to equations (9) and (10). On the other hand, for the degree of product differentiation in non-originating inputs, we expect that $\eta^{I,US}$ becomes higher when non-originating inputs imported from AKFTA non-member countries are more differentiated. Thus, the effect of USD exchange rates on FTA utilization is more likely to become negative when using more differentiated non-originating inputs.

5.2. Empirical Findings

We examine the effect of USD exchange rates (Exchange^{US}) on FTA utilization with the following specification:

$$\begin{aligned}\text{Utilization}_{ict} = {} & \Phi_1 \ln \text{Exchange}_{ct}^{US} + \Phi_2 \text{ExElasticity}_i \ln \text{Exchange}_{ct}^{US} \\ & + \Phi_3 \text{ImElasticity}_{ic} \ln \text{Exchange}_{ct}^{US} + \alpha \text{Margin}_{ict} \\ & + \gamma \ln \text{Monthly Trade}_{ict} + \delta \ln \text{GDP per Capita}_{ct} + \text{u}_c + \text{u}_i + \text{u}_t + \varepsilon_{ict}.\end{aligned}$$

According to the predictions in the previous subsection, we expect Φ_2 to be positive, reflecting the prediction that the effect of USD exchange rates is more likely to become positive when ASEAN export products are less differentiated. Φ_1 should also be positive if, consistent with the results derived in previous sections, exchange rate changes are not sufficiently passed onto the costs of non-originating inputs as a result of bargaining between exporters and importers. Furthermore, we expect Φ_3 to be positive given the prediction that the effect of USD exchange rates is more likely to become positive when non-originating inputs from AKFTA non-member countries are less differentiated.

Figure 3 depicts the changes in nominal exchange rates against the USD obtained from ASEAN stats. In the figure, data in 2006 is set equal to 100 for each sample country. Except for Vietnam and Laos, all sample export countries experienced both appreciation and depreciation of their currency during the sample period. Due to such an unstable trend, these countries may be good candidates for an examination of the role of exchange rate changes in terms of sample variation. On the other hand, Vietnam and Laos have experienced steady appreciation and depreciation, respectively. Particularly, in Vietnam's currency depreciated by nearly 30% from 2006 to 2011.

Our estimation results by the OLS method are reported in Table 6. The effect of USD exchange rates was estimated as positive, implying that exchange rate changes are reflected more in the export prices than the costs of non-originating inputs, consistently with our interpretations of the findings in the previous sections. Φ_2 was estimated to be positive, supporting our prediction. Φ_3 was positive in several cases but the positive result was not determined to be robust. This might reflect the fact that exchange rate changes are not passed onto the costs of non-originating inputs even when they are more differentiated.

=== Table 8 ===

6. Concluding Remarks

This paper investigated how exchange rates affect firms' FTA utilization. From a

practical point of view, exchange rates have an influence on FTA utilization in exporting through the excess profits gained from FTA utilization and complying with RoOs. Our theoretical and empirical analyses robustly showed that depreciation of final-good exporters' currency against the currency of the destination country enhances FTA utilization. We also revealed that such positive impacts of exchange rates are mitigated in exporting products with higher degree of product differentiation. Exchange rates in importing and the degree of product differentiation in non-originating inputs do not have robust effects on FTA utilization. This is consistent with the case where buyers have superior bargaining power compared to sellers in international transactions and the existence of pricing to market is significant in the intermediate-good market. In general, it is believed that the depreciation of domestic currency leads to an increase in exports. In addition, our findings in this paper suggest that it also encourages firms to use FTA schemes, and that the effects of exchange rates on firms' FTA utilization differ according to the degree of product differentiation.

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Table 1. Distribution of RoOs in AKFTA at HS six-digit Level

	Number	Share (%)
CC	5	0.1
CH	12	0.2
CC/RVC	514	10
CH/RVC	3,907	77
CH/RVC/TECH	21	0.4
CS/RVC	66	1
RVC/WO	6	0.1
CC&RVC	2	0.04
CH&RVC	4	0.1
RVC	61	1
WO	454	9
Total	5,052	100

Source: Legal text of AKFTA

Table 2. Basic Statistics

	Obs	Mean	Std. Dev.	Min	Max
Utilization	34,065	0.269	0.410	0	1
ln Exchange rates in exporting	34,065	-1.087	3.585	-6.781	2.918
* ExElasticity	34,065	-5.472	46.848	-774.868	383.731
ln Exchange rates in importing	34,065	2.150	3.099	-18.333	10.400
* ImElasticity	34,065	8.435	17.985	-94.247	236.032
Margin	34,065	8.461	4.214	0.4	50
ln Monthly Trade	34,065	8.324	2.770	0.693	17.776
ln GDP per capita	34,065	7.680	0.854	5.931	10.493
ln Exchange (USD)	34,065	5.942	3.583	0	10
* ExElasticity	34,065	29.633	84.555	0	1,306
* ImElasticity	34,065	23.397	31.134	0	263
Rest of ASEAN	34,065	0.648	0.478	0	1

Table 3. Baseline Results

Sample	ALL	ALL	Restricted
	(I)	(II)	(III)
ln Exchange rates in exporting		0.2033***	0.1176*
		[0.0616]	[0.0688]
ln Exchange rates in importing		0.0004	-0.0006
		[0.0013]	[0.0014]
Margin	0.0112***	0.0110***	0.0120***
	[0.0016]	[0.0016]	[0.0020]
ln Monthly Trade	0.0684***	0.0683***	0.0644***
	[0.0008]	[0.0008]	[0.0009]
ln GDP per capita	0.0106	0.1893***	0.0712
	[0.0311]	[0.0639]	[0.0720]
Number of observations	34,065	34,065	27,640
R-squared	0.5828	0.5830	0.5714

Notes: This table reports the estimation results by OLS. The parentheses are robust standard errors. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. In all specifications, we include export country dummy variables, year dummy variables, and HS nine-digit code dummy variables. In the column “Restricted”, we drop products that have wholly-owned criterion as RoOs or those that are categorized into HS 50-63.

Table 4. Robustness Checks

Estimation	IV	IV	LPM	LPM
Sample	ALL	Restricted	ALL	Restricted
	(I)	(II)	(III)	(IV)
2nd Stage				
ln Exchange rates in exporting	0.2116***	0.119*	0.1758**	0.1447*
	[0.0569]	[0.0632]	[0.0710]	[0.0804]
ln Exchange rates in importing	0.0002	-0.0006	0.0001	0.0011
	[0.0012]	[0.0013]	[0.0015]	[0.0016]
Margin	0.0111***	0.0118***	0.0096***	0.0078***
	[0.0014]	[0.0018]	[0.0019]	[0.0024]
ln Monthly Trade	0.0605***	0.0565***	0.0858***	0.0818***
	[0.0013]	[0.0014]	[0.0009]	[0.0010]
ln GDP per capita	0.1952***	0.0697	0.1663**	0.0995
	[0.0590]	[0.0661]	[0.0724]	[0.0827]
1st Stage				
Rest of ASEAN	2.6284***	2.6503***		
	[0.0261]	[0.0297]		
Exogeneity				
Durbin-Wu-Hasuman chi2 test	50	43		
Wu-Hausman F test	42	36		
Validity of Instruments				
F Statistics	10167	8275		
Shea's Adjusted Partial R-squared	0.1662	0.1303		
Number of observations	34,065	27,640	34,065	27,640
R-squared	0.5816	0.5699	0.5785	0.5692

Notes: In columns “Restricted”, we drop products that have wholly-owned criterion as RoOs or those that are categorized into HS 50-63. In columns “IV”, we employ the instrument variable method. We use as an instrument for Monthly Trade a binary variable that takes the value one if Korea imports a concerned product from any other ASEAN countries and zero otherwise (Rest of ASEAN). Columns “LPM” report the results for the linear probability model, in which the dependent variable takes the value one in the case of positive trade values under FTA schemes and zero otherwise. The parentheses are robust standard errors. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. In all specifications, we include export country dummy variables, year dummy variables, and HS nine-digit code dummy variables.

Table 5. Product Differentiation

Estimation	OLS	IV	OLS	IV	LPM	LPM
Sample	ALL	ALL	Restricted	Restricted	ALL	Restricted
	(I)	(II)	(III)	(IV)	(V)	(VI)
2nd Stage						
ln Exchange rates in exporting	0.2041***	0.0604***	0.1198*	0.1213*	0.1769**	0.1478*
	[0.0616]	[0.0013]	[0.0689]	[0.0632]	[0.0710]	[0.0804]
* ExElasticity	0.0001**	0.2124***	0.0001**	0.0001**	0.0001**	0.0001**
	[0.0000]	[0.0569]	[0.0000]	[0.0000]	[0.0001]	[0.0001]
ln Exchange rates in importing	-0.0011	0.0001**	-0.0015	-0.0015	-0.0011	0.0002
	[0.0014]	[0.0000]	[0.0015]	[0.0014]	[0.0016]	[0.0018]
* ImElasticity	0.0005***	-0.0015	0.0002	0.0002	0.0006***	0.0002
	[0.0002]	[0.0013]	[0.0002]	[0.0002]	[0.0002]	[0.0002]
Margin	0.0111***	0.0005***	0.0120***	0.0119***	0.0097***	0.0079***
	[0.0016]	[0.0001]	[0.0020]	[0.0018]	[0.0019]	[0.0024]
ln Monthly Trade	0.0683***	0.0112***	0.0644***	0.0566***	0.0858***	0.0819***
	[0.0008]	[0.0014]	[0.0009]	[0.0014]	[0.0009]	[0.0010]
ln GDP per capita	0.1904***	0.1963***	0.0735	0.0717	0.1677**	0.1025
	[0.0639]	[0.0590]	[0.0721]	[0.0661]	[0.0724]	[0.0827]
1st Stage						
Rest of ASEAN		2.6275***		2.6511***		
		[0.0261]		[0.0297]		
Exogeneity						
Durbin-Wu-Hasuman chi2 test		51		44		
Wu-Hausman F test		43		37		
Validity of Instruments						
F Statistics		10164		8276		
Shea's Adjusted Partial R-squared		0.1662		0.1305		
Number of observations	34,065	27,640	27,640	27,640	34,065	27,640
R-squared	0.5832	0.5715	0.5715	0.5700	0.5788	0.5693

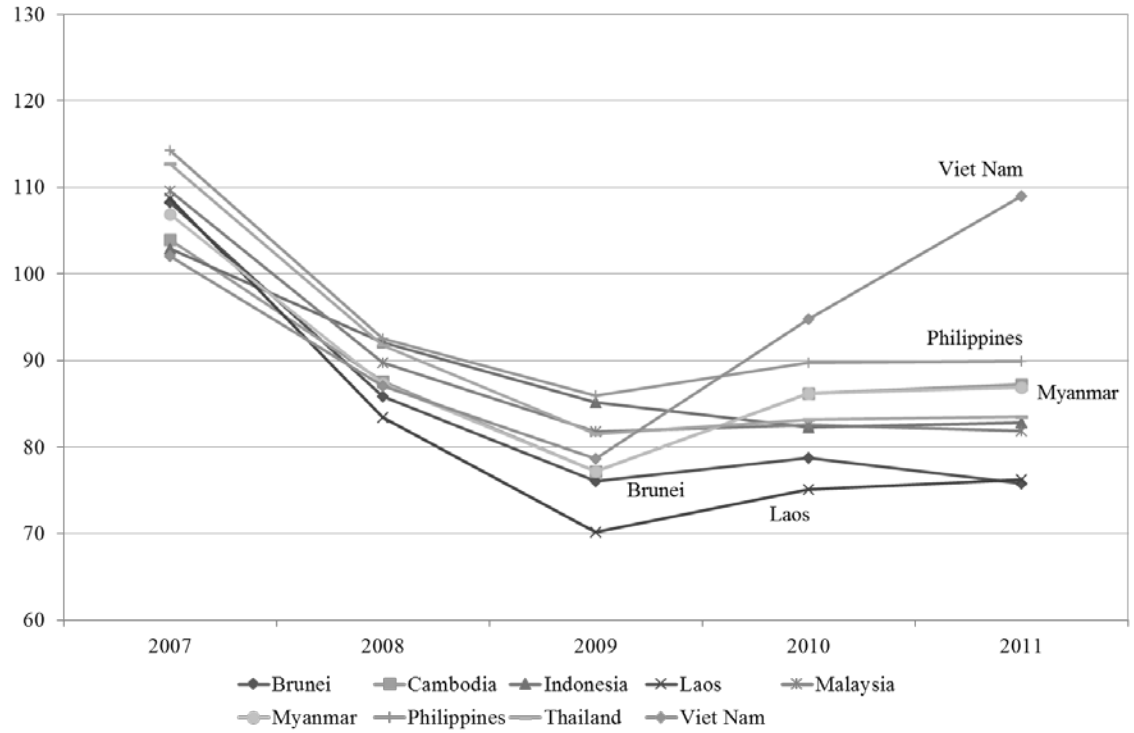
Notes: In columns “IV”, we employ the instrument variable method. We use as an instrument for Monthly Trade a binary variable that takes the value one if Korea imports a concerned product from any other ASEAN countries and zero otherwise (Rest of ASEAN). Columns “LPM” report the results for the linear probability model, in which the dependent variable takes the value one in the case of positive trade values under FTA schemes and zero otherwise. The parentheses are robust standard errors. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. In all specification, we include export country dummy variables, year dummy variables, and HS nine-digit code dummy variables. In columns “Restricted”, we drop products that have wholly-owned criterion as RoOs or those that are categorized into HS 50-63.

Table 6. Effects of Changes in Exchange Rates against USD

Estimation	OLS	IV	OLS	IV	LPM	LPM
Sample	ALL	ALL	Restricted	Restricted	ALL	Restricted
	(I)	(II)	(III)	(IV)	(V)	(VI)
2nd Stage						
ln Exchange (USD)	0.2054***	0.2126***	0.1157*	0.1170*	0.1807**	0.1528*
	[0.0614]	[0.0567]	[0.0687]	[0.0631]	[0.0707]	[0.0801]
* ExElasticity	0.0001**	0.0001**	0.0001**	0.0001**	0.0001**	0.0001**
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0001]	[0.0001]
* ImElasticity	0.0002**	0.0003***	-0.00001	-0.00003	0.0003***	-0.0002
	[0.0001]	[0.0001]	[0.0002]	[0.0002]	[0.0001]	[0.0002]
Margin	0.0111***	0.0112***	0.0120***	0.0119***	0.0097***	0.0079***
	[0.0016]	[0.0014]	[0.0020]	[0.0018]	[0.0019]	[0.0024]
ln Monthly Trade	0.0683***	0.0604***	0.0644***	0.0566***	0.0857***	0.0818***
	[0.0008]	[0.0013]	[0.0009]	[0.0014]	[0.0009]	[0.0010]
ln GDP per capita	0.1910***	0.1965***	0.0713	0.0695	0.1697**	0.1045
	[0.0639]	[0.0590]	[0.0721]	[0.0662]	[0.0724]	[0.0826]
1st Stage						
Rest of ASEAN		2.6264***		2.6511***		
		[0.0261]		[0.0297]		
Exogeneity						
Durbin-Wu-Hasuman chi2 test		51		44		
Wu-Hausman F test		43		37		
Validity of Instruments						
F Statistics		10156		8278		
Shea's Adjusted Partial R-squared		0.1660		0.1305		
Number of observations	34,065	34,065	27,640	27,640	34,065	27,640
R-squared	0.5714	0.5817	0.5714	0.5699	0.5787	0.5693

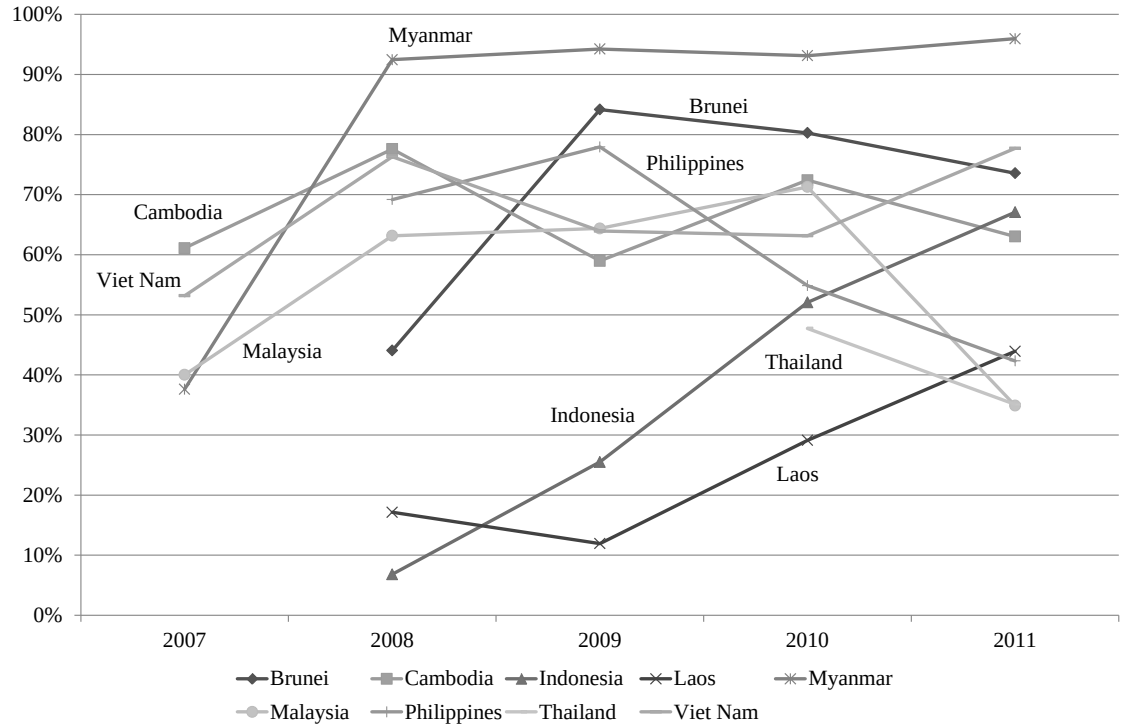
Notes: This table reports the estimation results on the effect of USD exchange rates to FTA utilization. In columns “IV”, we employ instrument variable method. We use as an instrument for Monthly Trade a binary variable that takes the value one if Korea imports a concerned product from any other ASEAN countries and zero otherwise (Rest of ASEAN). Columns “LPM” report the results for the linear probability model, in which the dependent variable takes the value one in the case of positive trade values under FTA schemes and zero otherwise. The parentheses are robust standard errors. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. In all specification, we include export country dummy variables, year dummy variables, and HS nine-digit code dummy variables. In column “Restricted”, we drop products that have wholly-owned criterion as RoOs or those that are categorized into HS 50-63.

Figure 1. Changes in Nominal Exchange Rates against KRW (2006 = 100)



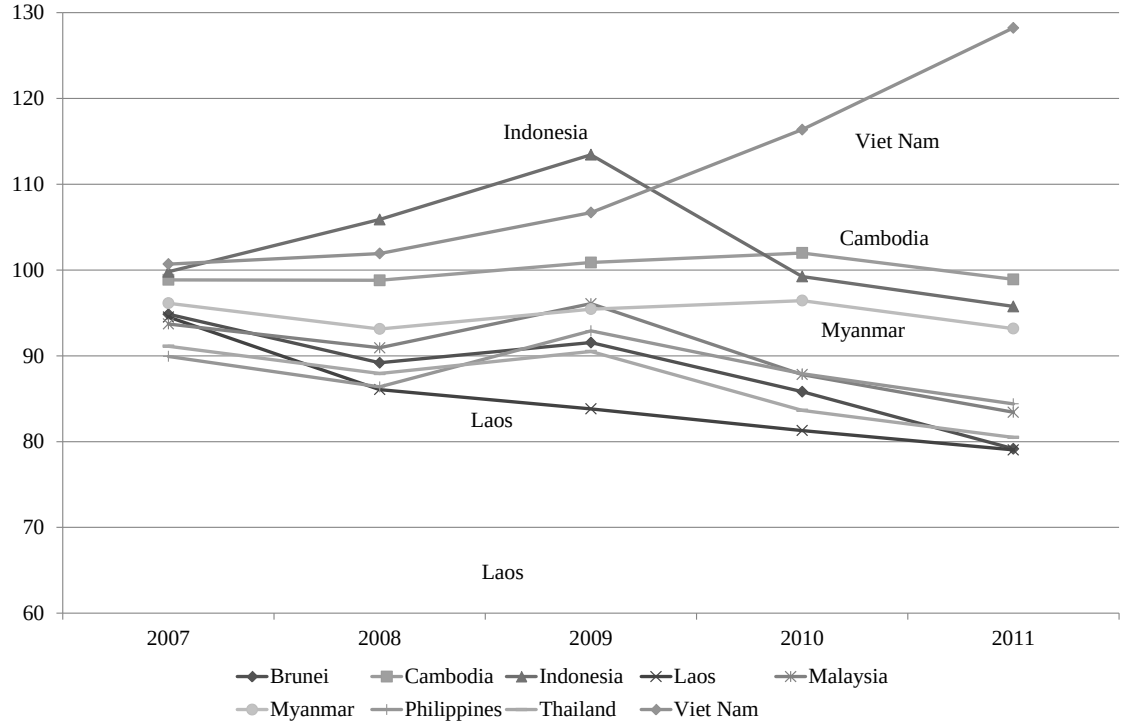
Source: ASEAN Stat

Figure 2. Changes in AKFTA Utilization Rates



Source: Authors' calculations based on data from the Korea Customs and Trade Data Institute (KCTDI).

Figure 3. Changes in Nominal Exchange Rates against US Dollar (2006 = 100)



Source: ASEAN Stat