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Keywords: Rules of origin; ASEAN; Regional Trade Agreements

JEL Classification: F15; F53

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Determinants of the Rules of Origin in Regional Trade Agreements in Asia

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1. Introduction

In negotiating regional trade agreements (RTAs), countries determine tariff reduction schedules and rules of origin (RoOs) for each product[1]. RoOs are necessary to prevent indirect exports from countries that do not qualify for preferential status, that is, trade deflection. Exporters can only use preferential tariff treatment if their products comply with the RoOs. Various types of RoOs have been adopted. For example, the change-in-chapter rule (CC) requires exported products to have different tariff classification codes at the two-digit level on a harmonized system (HS) than non-originating inputs. The change-in-subheading rule (CS) requires such transformation at the HS six-digit level, which is less restrictive than the case of CC. The restrictiveness of RoOs is important when applying for preferential tariffs; no exporter can comply with RoOs that are prohibitively restrictive (see, e.g., Hayakawa et al., 2014; 2021). Although tariff reduction schedules receive more public attention, RoOs established in RTAs also play a crucial role in RTA performance.

This study empirically examines the determinants of RoOs in RTAs concluded by the Association of Southeast Asian Nations (ASEAN). ASEAN was established in 1967 among Indonesia, Malaysia, the Philippines, Singapore, and Thailand. Brunei Darussalam joined ASEAN in 1984, followed by Viet Nam in 1995, Lao PDR and Myanmar in 1997, and Cambodia in 1999. As of 2022, ASEAN has five "ASEAN-plus-one" RTAs (hereafter, ASEAN+1 RTAs), which are the RTAs between ASEAN and one or two non-ASEAN countries. They include the RTA with Australia and New Zealand (ASEAN–Australia–New Zealand Free Trade Area, AANZFTA), the one with China (ASEAN–China Free Trade Area, ACFTA), the one with India (ASEAN–India Free Trade Area, AIFTA), the one with Japan (ASEAN–Japan Comprehensive Economic Partnership, AJCEP), and the one with South Korea (ASEAN–Korea Free Trade Area, AKFTA). We explore how specific RoOs are chosen in these RTAs (except for AIFTA[2]) based on the economic characteristics of the RTA member countries, such as export competitiveness or most favored nation (MFN) import tariff rates.

RoOs tend to reflect the bargaining power among RTA member countries. There is a key difference between negotiations on tariff schedules and RoOs when RTAs include many countries. Unlike the case of tariff schedules, RoOs for each product must be set common to all member countries. Suppose there are two importing countries and several exporting countries, and one of the importing countries (country A) cares about the domestic producers more than the other importing country (country B). Country A prefers higher tariffs and more restrictive RoOs than country B. In the negotiations on tariff schedules, each member individually sets its tariff reduction schedule for each product. Therefore, the tariff

[1] Product-specific rules (PSRs) of origin are the RoOs that are set for each product. Although "RoOs" encompasses other issues such as cumulation, we use the terms RoOs and PSRs interchangeably in this paper.

[2] In AIFTA, there are no variations in RoOs across products. All products are subject to change-in-subheading and value-added rules.

schedule is negotiated mainly between each importing country and the exporting countries. Country A can offer a less liberalized tariff schedule than Country B without the consent of Country B. By contrast, member countries must set a common RoO for each product. Therefore, the two importing countries with different preferences on RoOs are involved in the negotiation on RoOs. In this case, the conflicts of interest occur not only between the exporting countries and each importing country but also among the importing countries. The determined RoO for each product takes into account the interests of all importing and exporting countries of that product. Besides that, with many importing countries, each exporting country considers not only the effect of RoOs on the exports to a particular country but also their effects on exports to all the destination countries. Therefore, exporting countries may become more eager to achieve less restrictive RoOs as the number of importing countries increases. Analyzing the negotiations on RoOs is useful to examine how the different interests among RTA member countries are balanced out, how multiple destinations of export products affect the bargaining powers of exporters, and which country has a higher bargaining power than the others in setting a common rule in the RTA.

Although the fundamental role of RoOs is to prevent trade deflections (i.e., non-members exports to member countries via the member with the lowest tariff), RoOs can also be used to protect domestic industries. Indeed, Felbermayr et al. (2019) show that for most country pairs and products, trade deflections do not yield positive gains even in the absence of RoOs, indicating the prevalence of political influences in determining RoOs. Stimulated by a seminal paper by Grossman and Helpman (1994), many theoretical studies investigate political influences in determining trade policies. Some of them consider how lobbying groups' political contributions to governments affect the formation of RTAs or members' tariffs against non-member countries (Grossman and Helpman, 1995; Ornelas, 2005; Mukunoki and Tachi, 2006; Stoyanov, 2009). Producers' political lobbies may also try to influence the stringency of RoOs. In this political economy literature, some studies consider the political determinants of RoOs (Cadot et al., 2006; Chase, 2008; Portugal-Perez, 2011; Kaufman, 2014). For example, highly competitive countries prefer less restrictive RoOs to gain preferential market access, whereas less competitive countries prefer more restrictive RoOs to avoid a sharp increase in preferential imports. Similarly, countries that protect their domestic industries with higher MFN tariffs choose more restrictive RoOs. The restrictiveness of RoOs is determined by the negotiations among member countries with varying political preferences.

Existing studies empirically identify the role of political economy factors in accounting for RoO rigor. The majority of research focuses on RoOs in the North American Free Trade Agreement (NAFTA). For example, Cadot et al. (2006) empirically showed that the more restrictive RoOs are set in products with the higher U.S. MFN tariffs or lower Mexican MFN tariffs. Furthermore, in NAFTA, Portugal-Perez (2011) found that more restrictive RoOs are set in products with less competitive U.S. products or more competitive Mexican products. He interpreted this robust relationship as evidence of asymmetric bargaining power of these

countries when it came to setting RoO. In NAFTA, Chase (2008) further investigated the roles of returns to scale, offshore assembly, non-tariff barriers, size concentration (i.e., the share of four-largest firms), and geographical concentration.

Compared with these existing studies, our study has a unique feature: ASEAN as a whole negotiates with a plus-one country. The establishment of ASEAN was motivated by strengthening the position of the member states and protecting themselves against big power rivalry (Khoman, 1992). Indeed, although each of the ten ASEAN countries is a small- or medium-sized economy, the total economic size of ASEAN becomes closer to or larger than the size of plus-one countries. In 2000, for example, the total GDP of ASEAN member countries was 614 billion USD, which was smaller than GDP of China (1,211 billion USD) and Japan (4,968 billion USD) but larger than GDP of Australia (416 billion USD), South Korea (576 billion USD), and New Zealand (53 billion USD). Therefore, negotiation by ASEAN as a whole may strengthen its bargaining power and result in realization of ASEAN's preference in RoOs.

On the other hand, ASEAN consists of ten countries with different levels of economic development. For example, GDP per capita in 2010 was 47,237 USD in Singapore, 786 USD in Cambodia, and 747 USD in Myanmar. When such countries negotiate RoOs as a group, conflicts of interest arise among the group members. For instance, Chiou (2010) examined the ASEAN Free Trade Area (AFTA) and suggested that while ASEAN countries benefit from making collective decisions when negotiating with other countries, the benefits are not distributed evenly. Individual members' interests are protected by excluding some "sensitive products" from trade liberalization or giving options to take some protective measures when necessary, and the unequal distribution of benefits may cause conflicts among ASEAN countries. However, there are neither exceptions nor exclusions in setting the common RoO of each product. These arguments imply that, even if ASEAN countries collectively agree to sign an RTA with a plus-one country, their interests may conflict in setting the common RoO. It is an intriguing question which country's interest is reflected in the realized RoOs.

To provide theoretical context, we apply the settings of Portugal-Perez (2011) and Kaufman (2014) to the case where multiple countries negotiate with the other country as a group. Although some studies explore a group bargaining, such as Jun (1998), Segendorff (1998), Chaea and Heidhues (2004), and Vidal-Puga (2012), none of them considered group bargaining in the context of RoOs. A group could potentially prioritize the majority opinion or the opinion of the least or most competitive country. Our study on ASEAN+1 RTAs will be useful to explore which members' preferences or characteristics in the group tend to be reflected in RoOs.

Our findings are summarized as follows. We found a robust result that the more restrictive RoOs are set in the products where plus-one countries are less competitive against most ASEAN countries. The results in competitiveness of plus-one countries against the most competitive ASEAN country or the least competitive ASEAN country are not

always significant. These results may indicate that plus-one countries tend to claim their preference more strongly when they have higher competitiveness against most ASEAN countries than against a specific country. This behavior appears to be reasonable because plus-one countries have the opportunity to export to a greater number of countries with preferential tariffs, increasing their benefits from setting less stringent RoO. However, it is also important to note that the less restrictive RoOs are not set in products where plus-one countries outperform the least competitive ASEAN country. The strong opposition of the least competitive ASEAN country may be balanced by the preference of plus-one countries, yielding an insignificant result.

Furthermore, more stringent RoOs are likely to be imposed in products that plus-one countries protect with higher MFN tariffs. This result confirms the realization of the preference of plus-one countries. Conversely, in products where the majority of ASEAN countries or the most protective ASEAN country has higher MFN tariffs, the negotiation powers may be balanced between ASEAN and plus-one countries. Furthermore, we found contrasting results between intermediate and final products. When plus-one countries have higher export competitiveness or the majority of ASEAN countries have higher MFN tariffs, RoOs are likely to be less restrictive in intermediate products and more restrictive in final products. These results suggest that ASEAN's claim is stronger in the negotiation of RoOs on final products than that on intermediate products. ASEAN countries may protect downstream industries while accepting preferential trade in upstream industries, similar to tariff escalation, which aims to develop industries that produce final products.

The rest of this study is organized as follows. The next section provides our theoretical framework on the choice of RoOs. Section 3 then presents our empirical framework for examining their choice in ASEAN+1 RTAs. Section 4 provides an overview of RoOs in ASEAN+1 RTAs. Section 5 shows our estimation results. Finally, Section 6 concludes the paper.

2. Negotiating Rules of Origins: A Conceptual Framework

This section provides a theoretical foundation for how member countries determine the stringency of RoOs on each product. Because a common RoO must be established, its severity is determined through negotiations among participating countries. Following in the footsteps of previous studies such as Cadot et al. (2006), Chase (2008), and Portugal-Perez (2011), we consider politically motivated governments that prioritize producer profits over benevolent governments that maximize social welfare. As member countries impose more stringent RoOs, exporters must bear a higher cost of compliance and are less likely to use RTA tariffs. Therefore, it hurts exporters while benefiting producers competing with imported goods in importing countries. Although a stringent RoO harms consumers in importing countries, governments may be politically motivated and place a greater

emphasis on producer profits in relation to social welfare.[3]

2.1. Setup of the Model

We consider an economy based on a quasi-linear utility function with which consumption of non-numeraire goods is free from income changes. Let $p_{hl}^{x}(k)$ be the export price of good k exported from country h to country l and $p_{hl}^{m}(k)$ be the tariff-inclusive consumer price of good k imported from country l in country h. If good k is exported from country l to country h, the consumer price becomes $p_{hl}^{m}(k) = \{1 + t_{hl}(k)\}p_{lh}^{x}(k)$, where $t_{hl}(k)$ is the tariff rate country h imposed on good k imported from country l. If these two countries form an RTA and a country l's exporter complies with RoOs, the RTA tariff is applied, and $t_{hl}(k) = t_{hl}^{RTA}(k) = 0$. Otherwise, the MFN tariff is applied, and $t_{hl}(k) = t_{h}^{MFN}(k) > 0$. Good k can be exported and imported simultaneously for each country, depending on the market structure.[4] Besides that, we define $R(k)$ $(\geq \underline{R})$ as the stringency of an RoO in good k, which is common across member countries. $\underline{R}$ is the lowest level of the RoO stringency that is necessary to prevent tariff circumvention. For simplicity, we assume $\underline{R}$ is common across products.

Suppose that country h is a member of an RTA. The objective function for the government of country h (government h) is given by:

$$V_h = W_h(\boldsymbol{p_h^x}, \boldsymbol{p_h^m}, \boldsymbol{R}) + \gamma_h^d \Pi_{\mathrm{h}}^{\mathrm{d}}(\boldsymbol{p_h^m}) + \gamma_h^x \Pi_{\mathrm{h}}^{\mathrm{x}}(\boldsymbol{p_h^x}, \boldsymbol{R}), \tag{1}$$

where $\boldsymbol{p_h^x}$ is the price vector of exported goods and $\boldsymbol{p_h^m}$ is the (tariff-inclusive) price vector of imported goods in country i. The prices of the same good may differ depending on where they are exported/imported. These vectors contain the prices of every good in all trading countries. $\boldsymbol{R}$ is the vector of the stringency of RoOs. $W_h(\boldsymbol{p_h^x}, \boldsymbol{p_h^m}, \boldsymbol{R})$ is country h's welfare that consists of consumer surplus, $CS_h(\boldsymbol{p_h^m})$, tariff-revenues, $TR_h(\boldsymbol{p_h^m})$, and the following producers' profits (producer surplus). $\Pi_{\mathrm{h}}^{\mathrm{d}}(\boldsymbol{p_h^m})$ is the sum of the domestic profits and $\Pi_{\mathrm{h}}^{\mathrm{x}}(\boldsymbol{p_h^x}, \boldsymbol{R})$ is the sum of the profits earned from exporting. The sum of the exporters' profits is a function of R because exporters need to bear the cost of meeting RoOs to enjoy preferential exports. By contrast, RoOs have an impact on domestic profits through changes in import prices. The parameter $\gamma_h^d(\geq 0)$ captures the government h's weight on domestic producer profits, and $\gamma_h^x(\geq 0)$ captures the government h's weight on exporter profits.

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[3] A more stringent RoO is likely to decrease the collective welfare of the RTA countries. Since its positive effects on the domestic producers are generated at the expenses of exporters' profits in the other RTA countries, its benefit and cost are cancelled out among producers within the RTA. As a result, only consumer losses and the costs of meeting RoOs are relevant to the overall welfare. In this case, benevolent governments will choose the lowest level of RoO stringency that prevents tariff evasion by non-RTA members in order to maximize the RTA countries' collective welfare.

[4] For example, if the market for good j is characterized by monopolistic or oligopolistic competition, we observe two-way trade of the same good.

2.2. Each Country's Preference of RoOs

Let us first calculate each country's individually optimal RoO for good k. A pre-existing group of countries and one country form an RTA. Let G denote the pre-formed group's set of countries, and country i $(\in G)$ denote a group member. The other country is denoted by Country j.

Given the trade relationship between country i and country j, government i maximizes V_i with respect to $R(k)$ to determine the individually-optimal level of the RoO for good k in the RTA. By the first-order condition, we have

$$\frac{\partial V_i}{\partial R(k)} = \left[\frac{\partial CS_i(\boldsymbol{p_i^m})}{\partial p_{ij}^m(k)} + \frac{\partial TR_i(\boldsymbol{p_i^m})}{\partial p_{ij}^m(k)}\right]\left(\frac{\partial p_{ij}^m(k)}{\partial R(k)}\right) + \left(1+\gamma_i^d\right)\frac{\partial \Pi_i^{\mathrm{d}}(\boldsymbol{p_i^m})}{\partial p_{ij}^m(k)}\left(\frac{\partial p_{ij}^m(k)}{\partial R(k)}\right)$$
$$+(1+\gamma_i^x)\left[\frac{\partial \Pi_i^{\mathrm{x}}(\boldsymbol{p_i^x}, \boldsymbol{R})}{\partial R(k)} + \frac{\partial \Pi_i^{\mathrm{x}}(\boldsymbol{p_i^x}, \boldsymbol{R})}{\partial p_{ij}^x(k)}\left(\frac{\partial p_{ij}^x(k)}{\partial R(k)}\right)\right] = 0. \quad (2)$$

An increase in R_k raises both $p_{ij}^m(k)$ and $p_{ij}^x(k)$ because the increased cost of exporting is passed through to trade prices. The increased $p_{ij}^m(k)$ reduces both consumer surplus and tariff revenues for good k. Therefore, the sign of the first term is negative.

By contrast, the second term is positive because an increase in $p_{ij}^m(k)$ raises the domestic profits. This term becomes more significant as $t_i^{MFN}(k)$ is higher. More stringent RoOs induce some exporters in partner country j to disregard RoOs, and tariffs are not eliminated for these exporters. As a result, as MFN tariffs rise, so will the trade-reducing effects of RoOs. Besides that, as exporters in country j become relatively more competitive, the increased imports due to the tariff elimination reduce the domestic profits more, increasing the protective effects of RoOs.

Concerning the last term, we have $\partial \Pi_i^{\mathrm{x}}(\boldsymbol{p_i^x}, \boldsymbol{R})/\partial R(k) < 0$ since an increase in R_k raises the cost of exporting. Although an increase in the export price offsets a part of the profit decreases, $\partial \Pi_i^{\mathrm{x}}(\boldsymbol{p_i^x}, \boldsymbol{R})/\partial p_{ij}^x(k) > 0$, the overall effect should be negative because the increased cost due to RoOs is not fully passed through to the price, and also the price-increase decreases demand in the destination country. The last term becomes more important as the partner country's tariff on product k, $t_i^{MFN}(k)$, is higher. A higher $t_i^{MFN}(k)$ increases the gains from meeting RoOs by imposing a higher tariff on exporters who do not comply with RoOs. Therefore, exporters' loss from more stringent RoOs becomes larger as $t_i^{MFN}(k)$ becomes higher.

By solving (2) with respect to $R(k)$, we have country i's individually-optimal stringency of the RoO for good k, which is denoted by

$$\hat{R}_i(k) = f\left(t_i^{MFN}(k), t_j^{MFN}(k), \alpha_i(k), \alpha_j(k), \gamma_i^d, \gamma_i^x\right), \quad (3)$$

where $\alpha_i(k)$ captures the competitiveness of producing k in country i relative to the world average competitiveness of that product, such as higher productivity or lower fixed costs of exporting.[5] $\alpha_j(k)$ captures the corresponding competitiveness in county j. As $\alpha_i(k)$ becomes higher, country i prefers a lower $\hat{R}_i(k)$ because higher competitiveness implies that the negative effect of RoOs on the export profits becomes larger compared to the positive effect on the domestic profits of the import-competing producers. Conversely, a higher $\alpha_j(k)$ will increase $\hat{R}_i(k)$. Similarly, country i prefers a lower (higher) $\hat{R}_i(k)$ as $t_i^{MFN}(k)$ is lower (higher) and $t_j^{MFN}(k)$ is higher (lower). $\hat{R}_i(k)$ is increasing in γ_i^d and decreasing in γ_i^x because a larger weight on the domestic producers' profits (exporters' profits) makes the government prefer a stronger (weaker) RoO.

For country j that is not a member of the pre-formed group, the stringency of RoO affects trade with all countries of the pre-formed group. Therefore, its first-order condition is given by

$$\frac{\partial V_j}{\partial R(k)} = \sum_{i\in G}\left[\frac{\partial CS_j(\boldsymbol{p_i^m})}{\partial p_{ji}^m(k)} + \frac{\partial TR_j(\boldsymbol{p_i^m})}{\partial p_{ji}^m(k)}\right]\left(\frac{\partial p_{ji}^m(k)}{\partial R(k)}\right) + \left(1+\gamma_j^d\right)\sum_{i\in G}\frac{\partial \Pi_j^d(\boldsymbol{p_i^m})}{\partial p_{ij}^m(k)}\left(\frac{\partial p_{ji}^m(k)}{\partial R(k)}\right)$$

$$+\left(1+\gamma_j^x\right)\sum_{i\in G}\left[\frac{\partial \Pi_j^x(\boldsymbol{p_i^x}, \boldsymbol{R})}{\partial R(k)} + \frac{\partial \Pi_j^x(\boldsymbol{p_i^x}, \boldsymbol{R})}{\partial p_{ji}^x(k)}\left(\frac{\partial p_{ji}^x(k)}{\partial R(k)}\right)\right] = 0. \quad (4)$$

By solving (4) with respect to $R(k)$, we have country j's individually-optimal stringency of the RoO for good k as

$$\hat{R}_j(k) = f\left(t_j^{MFN}(k), \boldsymbol{t_G^{MFN}(k)}, \alpha_j(k), \boldsymbol{\alpha_G(k)}, \gamma_j^d, \gamma_j^x\right), \quad (5)$$

where $\boldsymbol{t_G^{MFN}(k)}$ is the vector of the MFN tariffs and $\boldsymbol{\alpha_G(k)}$ is the vector of the competitiveness of the pre-formed group. As in $\hat{R}_i(k)$, $\hat{R}_j(k)$ is increasing in $t_j^{MFN}(k)$, $\alpha_j(k)$, and γ_j^d, and decreasing in $t_i^{MFN}(k)$, $\alpha_i(k)$, and γ_j^x. We have the following proposition.

Proposition 1. *The government of an RTA-member country prefers the more stringent RoO on a product when its MFN import tariff is higher, the partner country's MFN import tariff is lower, the relative competitiveness of the product is higher in the partner country, and the weight on domestic producers' profits is greater than the weight on exporters' profits.*

[5] We can also define $\alpha_{ij}(k)$ as the competitiveness of producing k in country i relative to country j. In this case, $\alpha_{ij}(k) = 1 - \alpha_{ji}(k)$ holds. Indeed, in our empirical analysis, we measure competitiveness against both the world and partner countries.

2.2. Negotiations of RoOs

Negotiations of RoOs take two steps. The first step is for countries in the pre-formed group to negotiate their joint preference for the RoOs. The group and the other country then engage in Nash bargaining to determine the RoOs in the second step.

Let us begin with the first step. The governments belonging to the group of the countries (i.e., ASEAN) determine their joint preference on the stringency of RoOs, $\hat{R}_G(k)$. We do not specify how countries decide on their joint preference within the group. The joint preference would have several outcomes.:

1. $\hat{R}_G(k)$ reflects the preference of the country with the highest competitiveness in the negotiated product, $\bar{\alpha}_G(k)$. In this case, the group values the exporters' profits of that country.
2. $\hat{R}_G(k)$ reflects the preference of the country with the lowest competitiveness in the negotiated product, $\underline{\alpha}_G(k)$, or that of the country with the highest MFN tariff, $\overline{t}_G^{MFN}(k)$. In this case, the group values the damages to the import-competing producers of that country.
3. $\hat{R}_G(k)$ reflects the median of the competitiveness or the MFN-tariff rates among the countries in the group, which are denoted by $\tilde{\alpha}_G(k)$ and $\tilde{t}_G^{MFN}(k)$. In this case, the group balances out their heterogeneous interests in the stringency of RoOs.
4. $\hat{R}_G(k)$ reflects the median, $\tilde{\gamma}_i^d$, the maximum, $\overline{\gamma}_i^d$, or the minimum, $\underline{\gamma}_i^d$, of the governments' weights on the domestic producers' profits. It also reflects those of the governments' weights on the exporters' profits: $\tilde{\gamma}_i^x$, $\overline{\gamma}_i^x$, and $\underline{\gamma}_i^x$.

Group *G*'s optimal stringency of the RoO for good *k* is denoted by

$$\hat{R}_G(k) = f\left(t_G^{MFN}(k), t_j^{MFN}(k), \alpha_G(k), \alpha_j(k), \gamma_G^d, \gamma_G^x\right), \tag{6}$$

where $t_G^{MFN}(k) \in \left\{\overline{t}_G^{MFN}(k), \tilde{t}_G^{MFN}(k)\right\}$, $\alpha_G(k) \in \{\overline{\alpha}_k^g, \underline{\alpha}_k^g, \tilde{\alpha}_k^g\}$, $\gamma_G^d \in \{\tilde{\gamma}_i^d, \overline{\gamma}_i^d, \underline{\gamma}_i^d\}$, and $\gamma_G^x \in \{\tilde{\gamma}_i^x, \overline{\gamma}_i^x, \underline{\gamma}_i^x\}$.

The second step involves group *G* and the other country *j* engaging in Nash bargaining to determine the level of restrictiveness of an RoO on product *k*, RoO_k^*, which can be expressed in the reduced form:

$$RoO^*(k) = F\left(\hat{R}_G(k), \hat{R}_j(k); \theta_G, \theta_j\right), \tag{7}$$

where θ_G and θ_j are the bargaining power of the group and the other country, respectively. On the one hand, negotiating as a group rather than as an individual country increases bargaining power by increasing the overall market size relative to country *j*, resulting in a better outcome for each group country. On the other hand, a group negotiation can make individual countries worse off than negotiating alone because the group's joint preferences do not always coincide with individual ones. Even if the group members share the same preference, they have fewer opportunities to talk in the negotiation unless every member retains the right to say. The reduced negotiation power due to the reduced rights to talk is known as "the joint negotiation paradox," originally suggested by Harsanyi (1977) and elaborated by more recent works such as Chae and Heidhues (2004) and Vidal-Puga (2012).

How MFN tariffs affect RoO_k^* depends on whether there are conflicts of interest between group *G* and country *j*. For instance, suppose that both γ_G^d and γ_j^d are large compared to γ_G^x and γ_j^x. In this case, group *G* and country *j* care more about the domestic producers' profits and less about the exporters' profits. Grossman and Helpman (1994) suggest that a higher weight on domestic profits leads to a higher MFN tariff if the country is a net importer of good *k*. If both group *G* and country *j* are net importers of good *k*, they tend to have higher MFN tariffs to protect the domestic industry. Since higher MFN tariffs reflect a large weight on the domestic producers' profits and they increase the domestic producers' loss from an RTA formation, $\partial RoO^*(k)/\partial t_G^{MFN}(k) > 0$ and $\partial RoO^*(k)/\partial t_j^{MFN}(k) > 0$ hold. Namely, higher MFN tariffs on both sides lead to more stringent RoO when they do not have comparative advantages over the non-member countries and are the importers of product *k*.

Conversely, if both group *G* and country *j* care more about export profits and they are both net exporters of product *k*, both sides prefer a lenient RoO to promote their exports. In this case, $\partial RoO^*(k)/\partial t_G^{MFN}(k) < 0$ and $\partial RoO^*(k)/\partial t_j^{MFN}(k) < 0$ hold. In these cases, the bargaining powers do not affect the sign of $\partial RoO^*(k)/\partial t_G^{MFN}(k)$ and $\partial RoO^*(k)/\partial t_j^{MFN}(k)$ but adjust the degree of changes in $RoO^*(k)$. We have the following proposition.

Proposition 2. *If both group G and country j are net importers of product k and are more concerned with the profits of domestic producers, higher MFN tariffs on product k on both sides tighten the RoO. If both group G and country j are net exporters of product k and care more about the exporters' profits, higher MFN tariffs on product k lowers the stringency of the RoO.*

If either group *G* or country *j* has a comparative advantage and is a net exporter of good *k*, while the other has a comparative disadvantage and is a net importer, their preferences conflict. Even if they are both net exporters/importers, their preferences diverge when governments emphasize relative competitiveness to the partner rather than relative competitiveness to the rest of the world. The bargaining powers then determine how tariffs

and competitiveness affect RoO restrictiveness. For instance, an increase in $t_G^{MFN}(k)$ raises $RoO^*(k)$ if the bargaining power of the group is stronger than country j, $\theta^g > \theta^j$. This is because the group prefers a stringent RoO, while country j prefers a lax RoO with a higher $t_G^{MFN}(k)$. The same argument applies to other parameters. We have the following proposition.

Proposition 3. *Assume that either group G or country j prefers a stringent RoO while the other prefers a lax RoO. If group G has more bargaining power than country j, a higher MFN import tariff on product k in group G, a lower MFN import tariff in country j, weaker competitiveness of product k in group G, and stronger competitiveness in country j increase the RoO's stringency. They relax the RoO's stringency if country j has more bargaining power over group G.*

Table 1 summarizes the results with different interests.

===== Table 1 =====

Finally, the effects of tariffs and competitiveness on the restrictiveness of RoOs may differ between final and intermediate goods. Lower competitiveness and higher MFN tariffs make the government more protectionist and prefer stricter RoO if the imported goods are final goods, as Propositions 2 and 3 suggest. However, if the imported goods are intermediate, lower competitiveness and high tariffs do not necessarily lead to a stricter RoO. This is because, although imports of intermediate goods harm domestic producers of the same intermediate goods, they lower intermediate goods prices and increase downstream industry profits. In other words, the conflict of interests in establishing RoO is more likely for final goods.

3. Empirical Framework

This section develops an empirical model to examine the determinants of RoOs in ASEAN+1 RTAs based on the conceptual framework discussed in the previous section. We study RoOs at the HS six-digit level in AANZFTA, ACFTA, AJCEP, and AKFTA. Specifically, we investigate the restrictiveness of the RoOs selected in each RTA. The dependent variable (RoO_{ipt}) is the restrictiveness index for the RoO of product p in ASEAN+1 RTA with plus-one country i, which was negotiated on the basis of the economic condition in year t. The higher the index, as explained below, the more restrictive the RoOs. We examine empirically how economic conditions in plus-one countries and ASEAN countries influence the restrictiveness of RoOs.

Our baseline model, which focuses on the role of export competitiveness, is formalized

as follows.

$$RoO_{ipt} = \alpha_1 RCA_{pt}^{Plus-one\ i} + \alpha_2 RCA_{pt}^{Median\_ASEAN} + \alpha_3 RCA_{pt}^{Min\_ASEAN} + \alpha_4 RCA_{pt}^{Max\_ASEAN} + \mathrm{u}_i + \mathrm{u}_s + \epsilon_{ipt} \quad (7)$$

Since the dependent variable is categorical, as explained below, we estimate this model by the ordered logit model. Export competitiveness is measured by the revealed comparative advantage (RCA) index. $RCA_{pt}^{Plus-one\ i}$ is the RCA index for product p in plus-one country i in year t, which is computed as follows.

$$RCA_{pt}^{Plus-one\ i} \equiv \frac{Export_{pt}^{Plus-one\ i} / \sum_p Export_{pt}^{Plus-one\ i}}{Export_{pt}^{World} / \sum_p Export_{pt}^{World}}.$$

$Export_{pt}^{k}$ is the export value of product p from country/region k to the world in year t. The higher RCA index is interpreted as indicating higher export competitiveness. For ASEAN countries, we compute an RCA index for each ASEAN country and then introduce the aggregated measures, which include the median value ($RCA_{pt}^{Median\_ASEAN}$), the minimum value ($RCA_{pt}^{Min\_ASEAN}$), and the maximum value ($RCA_{pt}^{Max\_ASEAN}$) of the RCA indices among ASEAN countries.

u_i and u_s are plus-one country-fixed effects and sector-fixed effects, respectively. The sector is defined at the HS three-digit code. The former account for the general preferences of plus-one countries on RoO types (e.g., China may prefer the value-added (VA) rule). The latter control for a general RoO type in each sector (e.g., the wholly-obtained rule (WO) may be applied to agricultural goods). We investigate how RoOs are chosen based on country pairs by controlling the role of these country-specific and product-specific characteristics in RoOs.

The RCA index assesses a country's export competitiveness in relation to the rest of the world. Considering that member countries' relative competitiveness may play a significant role in the RoO negotiation, we also examine the role of the net export ratio (*NEXR*) of a plus-one country against ASEAN. Specifically, we estimate the following equation.

$$RoO_{ipt} = \beta_1 NEXR_{pt}^{Median} + \beta_2 NEXR_{pt}^{Min} + \beta_3 NEXR_{pt}^{Max} + \mathrm{u}_i + \mathrm{u}_s + \epsilon_{ipt} \quad (8)$$

Let X_{pt}^{ij} be exports of product p from plus-one country i to ASEAN country j in year t. Similarly, M_{pt}^{ij} refers to imports of product p from ASEAN country j in plus-one country i in year t. Then, each variable is defined as follows.

$$NEXR_{pt}^{Median} \equiv \underset{j \in ASEAN}{\text{median}} \left(\frac{X_{pt}^{ij} - M_{pt}^{ij}}{X_{pt}^{ij} + M_{pt}^{ij}} \right), \qquad NEXR_{pt}^{Min} \equiv \underset{j \in ASEAN}{\min} \left(\frac{X_{pt}^{ij} - M_{pt}^{ij}}{X_{pt}^{ij} + M_{pt}^{ij}} \right),$$

$$NEXR_{pt}^{Max} \equiv \underset{j \in ASEAN}{\max} \left(\frac{X_{pt}^{ij} - M_{pt}^{ij}}{X_{pt}^{ij} + M_{pt}^{ij}} \right).$$

ASEAN is a set of the 10 ASEAN countries.

Furthermore, to determine the relative importance of the RCA and the NEXR, we estimate the equation with both types of competitiveness variables, as shown below.

$$\begin{aligned} RoO_{ipt} = {} & \alpha_1 RCA_{pt}^{Plus-one\,i} + \alpha_2 RCA_{pt}^{Median\_ASEAN} + \alpha_3 RCA_{pt}^{Min\_ASEAN} + \alpha_4 RCA_{pt}^{Max\_ASEAN} \\ & + \beta_1 NEXR_{pt}^{Median} + \beta_2 NEXR_{pt}^{Min} + \beta_3 NEXR_{pt}^{Max} + \mathrm{u}_i + \mathrm{u}_s \\ & + \epsilon_{ipt} \qquad (9) \end{aligned}$$

As previously stated, when the plus-one country and ASEAN emphasize relative competitiveness to the partner rather than relative competitiveness to the world, their preferences on RoO are more likely to conflict because either becomes a net importer whenever the other becomes a net exporter. If this is the case, the negotiation power of the plus-one country and ASEAN determines the stringency of the RoO, as suggested in Proposition 3. If the coefficients of NEXR variables are positive, they indicate that the plus-one country has a stronger bargaining power over the ASEAN countries.

In the later estimation, based on the discussion in the previous section, we also examine the role of MFN tariffs. Specifically, we introduce three variables for MFN tariffs. The first one, denoted by $MFN_{pt}^{Plus-one\,i}$, is the MFN tariffs of product p in plus-one country i in year t. The second and third variables are MFN tariffs in ASEAN countries, which are their median rates (MFN_{pt}^{Median}) and their maximum rates (MFN_{pt}^{Max}). We do not examine the lowest MFN rate because Singapore has zero MFN rates in almost all products.

The data issues are the following. First, we classify RoOs roughly to obtain sufficient observations in each type. We specifically ignore minor requirements in the RoOs and categorize all RoOs into ten types. Furthermore, based on the estimation results obtained by Hayakawa et al. (2021) for the negative effects of RoOs on tariff regime choice, we score the restrictiveness of those types as reported in column "Score" in Table 2: 1 for CS/VA (CS or VA), 2 for CH/VA (change-in-heading or VA), 3 for CC/VA (CC or VA), 4 for CS, 5 for VA, 6 for CH, 7 for CC, 8 for CS&VA (CS and VA), 9 for CH&VA, 10 for CC&VA, and 11 for WO. Although we assign integer values for all types, the absolute difference across scores does not matter in the ordered logit model. Second, we set the negotiation year for each RTA based on the year of base tariff rates used in the negotiation, which is shown in the tariff schedule in the legal text of RTAs. It is scheduled for 2003 for ACFTA and 2005 for the other RTAs (i.e., AANZFTA, AJCEP, and AKFTA). Third, the MFN tariff data are derived from the World Integrated Trade Solution (WITS). The simple average of MFN tariffs at the HS six-

digit level is used. The trade data is obtained from the "BACI" database in the CEPII[6] (Gaulier and Zignago, 2010).

===== Table 2 =====

There are three noteworthy empirical issues. First, tariff liberalization types, such as immediate elimination or gradual elimination, might be associated with the choice of RoOs. Protecting countries, for example, may request restrictive RoOs if forced to choose immediate elimination in tariff negotiations. In contrast, if countries are successful in including their protecting products on the exclusion list and do not need to reduce tariff rates, they may be unconcerned about the RoOs for those products. Overall, the tariff liberalization and RoO types would be simultaneously determined to some extent. Although our framework above does not consider this simultaneous decision, in the later estimation, we also estimate our model by dropping products in the exclusion list. Second, if ASEAN countries already have bilateral RTAs with plus-one countries, RoOs in ASEAN+1 RTAs may be less appealing. To minimize the role of existing RTAs to some extent, we exclude AJCEP from our study in the later estimation because Japan is a typical country with bilateral RTAs with the majority of ASEAN countries. Third, because we included two types of fixed effects, the empirical identification of each variable is primarily based on its variation across HS six-digit codes within an HS three-digit code. Although our framework includes a time dimension, the variation due to time difference will be very small because our study years are only two, namely 2003 and 2005.

4. Data Overview

This section compares the patterns of RoOs among the four ASEAN+1 RTAs (AANZFTA, ACFTA, AJCEP, and AKFTA).[7] Table 2 shows the distribution of RoOs for these ASEAN+1 RTAs.[8] AANZFTA has many selective types, firms to choose between two types, such as CC or VA. Indeed, 84% of RoOs are these selective types, facilitating the use of AANZFTA. AKFTA has a similar pattern of RoOs with a large share of selective types. For both AANZFTA and AKFTA, CH/VA registers the largest share, approximately 47% and 79% in the total number of products, respectively. CH/VA also has the largest share in AJCEP, amounting to 59% of the total. In the case of AJCEP, CC has the second-largest share after CH/VA. The pattern of RoOs is totally different in the case of ACFTA, as 97% of them

[6] http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=37

[7] The Appendix discusses the economic characteristics of the member countries (such as RCA, NEXR, and MFN tariff rates).

[8] In AFTA, all products are subject to VA. Thus, RoOs in AFTA would not become a template for RoOs in ASEAN+1 RTAs.

are VA. If one classifies CC/VA and CH/VA as VA type, then virtually all RoOs for ACFTA are of VA type.

===== Table 2 =====

We examine the restrictiveness of RoOs for the four ASEAN+1 RTAs. Based on our scoring rule, we evaluate the restrictiveness of RoOs for the products at an HS six-digit level. Table 3 shows the scores at three different aggregation levels, i.e., industry, intermediate-final products, and overall. The score is constructed so that the higher the score, the more restrictive RoO is. Industries are identified at a tariff section level of the HS classification. Final products include 112, 122, 41, 51, 52, 61, 62, or 63 based on the Broad Economic Categories classification, and the remainder are classified as intermediate products. Average total product scores show that AANZFTA and AKFTA have less restrictive RoOs than ACFTA and AJCEP. ACFTA has more stringent rules of origin than AJCEP.

===== Table 3 =====

When comparing RoOs for intermediate and final products, RoOs for final products are more restrictive for all ASEAN+1 RTAs except ACFTA, which has very similar restrictiveness for these two types of products. RoOs that are more restrictive for final products than intermediate products appear to reflect government policy, similar to tariff escalation. It could also indicate the government's desire to be a part of global value chains or supply chains where intermediate products are actively traded. The more restrictive RoOs for final products are also found in NAFTA (Cadot et al., 2006). Except for ACFTA, where there is a very small variation in the scores among different industries, an examination of the restrictiveness of RoOs at an industry level reveals the government's protection policy. Live animals and vegetable products have high scores for AANZFTA, AJCEP, and AKFTA, indicating a high level of restrictiveness. The textiles industry has a high score for AANZFTA and AJCEP. For AJCEP, in addition to these products, animal/vegetable fats and oils, food products, leather products, wood products, and footwear have high scores.

5. Empirical Results

This section summarizes our estimation results. The baseline results of estimating equation (7) using the ordered logit model are reported in column (I) of Table 4. It shows that the coefficient for plus-one's RCA is significantly negative, indicating that less (more) restrictive RoOs are set in products with higher (lower) export competitiveness for plus-one countries. Plus-one's preference based on its global competitiveness is reflected in

determining the stringency of RoOs. Another significant coefficient is found in the minimum value of RCA indices among ASEAN countries. It is significantly negative, indicating that more stringent RoOs are set in products where the least competitive ASEAN country has the lowest RCA. The median and maximum values of the RCA indices, on the other hand, have insignificant coefficients.

===== Table 4 =====

As discussed in Section 2.2, the results on ASEAN's RCA variables show that ASEAN's joint preference reflects the preference of the least competitive ASEAN country more strongly than the preference of the most competitive ASEAN country or a majority of ASEAN countries. It may suggest, as implied by Proposition 1, that their weights on exporter profits relative to domestic producer profits are small in their joint preference. These results may imply that ASEAN as a whole is more concerned with import protection than with expanding exports. The insignificant results of the median and maximum values, on the other hand, imply a balance of bargaining power between plus-one countries and ASEAN countries. Alternatively, it may be simply because these elements do not play a significant role in determining ASEAN's joint preference on RoOs.

Column (II) in "Ordered logit" reports the estimation results of equation (8). On NEXR, all three variables have significantly negative coefficients. These results imply that more stringent RoOs are implemented in products where plus-one countries are less competitive against the majority of ASEAN countries, the most competitive ASEAN country, or the least competitive ASEAN country. In other words, plus-one countries benefit from RoOs. These NEXR results do not change in the estimation of equation (9), the result of which is shown in column (III) of "Ordered logit." On the other hand, all variables on RCA indices turn out to be insignificant. This disparity may indicate that, rather than relative competitiveness against the rest of the world, relative competitiveness among member countries may be more important in the RoO negotiation, with the plus-one country wielding more bargaining power.

Next, we conduct five kinds of robustness checks. To begin, we estimate our models using the ordinary least squares (OLS) method. The main disadvantage of using the OLS method to estimate our model is that it is sensitive to the absolute value of the dependent variable. One advantage is that we can control for HS six-digit fixed effects. The results are reported in column "OLS" in Table 7. When compared to the ordered logit model, the results do not differ much. Since we introduce HS six-digit level-fixed effects, the empirical identification of ASEAN's RCA variables (i.e., the median, minimum, and maximum values of RCA indices among ASEAN countries) relies only on their over-time changes (i.e., their changes from 2003 to 2005). Thus, the fixed effects in the OLS estimation absorb the majority of variations in these variables. Nonetheless, even after controlling for NEXR variables, i.e., column (VI), we can see a significantly negative coefficient for the minimum value of

ASEAN's RCA.

Second, we exclude products for which at least one RTA country is not required to commit to any tariff reduction. For each country, we identify the products for which preferential tariffs under an RTA are not available in 2019 as "excluded products" under that RTA. Then, in each RTA, we drop products identified as excluded in at least one country in that RTA. The estimation results by the ordered logit model are shown in column "Exclusion" in Table 5. The total number of observations decreases slightly. The results are similar to those shown in Table 4. Plus-one's RCA and the minimum value of RCA among ASEAN countries have significantly negative coefficients when we do not control for countries' NEXR, though their coefficients become insignificant when we do. All NEXR variables have significantly negative coefficients, indicating that the preference for plus-one countries prevails.

===== Table 5 =====

Third, we exclude AJCEP from our study RTAs in order to minimize the role of existing RTAs, particularly bilateral RTAs. Indeed, Brunei, Indonesia, Malaysia, the Philippines, Singapore, and Thailand all signed bilateral RTAs with Japan before the AJCEP. The RoOs in these bilateral RTAs may have an impact on the RoOs in AJCEP. To reduce the impact of this effect, we simply exclude AJCEP from our observations.[9] Table 6 shows the results in the "Excluding Japan" column. There are two notable differences from the previous estimation results. First, the coefficient for the NEXR's minimum value is found to be insignificant. This result may indicate that Japan strongly preferred the more restrictive RoOs when the most competitive ASEAN country is highly competitive against Japan. Second, even after controlling for the NEXR variables, the minimum value of RCA indices among ASEAN countries has a significantly negative coefficient. This result may suggest that Japan was opposed to imposing more stringent RoOs in products where the least competitive ASEAN country has the lower export competitiveness relative to the rest of the world.

Fourth, the decision-making in ASEAN may be different between when the export competitiveness does and does not differ much across ASEAN countries. We compute the standard deviation (S.D.) of RCA indices in 2005 among ASEAN countries for each product to see this. Then we divide the study products into two groups based on whether the S.D. is greater than or less than the median value. The differences in export competitiveness across

[9] This estimation also serves to minimize the role of multinational enterprises (MNEs) in ASEAN. Out of our study plus-one countries, only Japan invested heavily in ASEAN during our study period. According to the ASEAN Investment Report 2007, Japan was the top investor to ASEAN, accounting for 18% of total inward foreign direct investment (FDI) in ASEAN in 2005. Each of the other plus-one countries contributed less than 2% of total FDI. As a result of Japan's exclusion, we are able to minimize the role of MNEs in ASEAN negotiations.

ASEAN countries are greater in products with higher S.D. Table 6 displays the results of the ordered logit model. In low S.D. products, the results in RCA indices are insignificant, and in high S.D. products, they are similar to the baseline results (i.e., "Ordered logit" in Table 4). This difference may indicate that ASEAN countries tend to accept plus-one countries' preference and to prioritize a least competitive ASEAN country's preference when their export competitiveness differs much one another. The results in the NEXR indices do not change much between high and low S.D.

=== Table 6 ===

Fifth, we observed a small variation in RoOs in ACFTA in Table 2. As a result, RoOs in ACFTA may not be determined systematically based on country or product characteristics. Column "Excluding China" in Table 7 excludes ACFTA from our study RTAs. There are few significant coefficients when compared to the previous tables' results. Only the coefficient for the median value of plus-one's NEXR is significantly estimated in column (III). As a result, we can assert that plus-one countries strongly prefer to set less restrictive RoOs in products where they are more competitive than the majority of ASEAN countries. Other elements include balancing bargaining power between the plus-one country and the most and least competitive ASEAN countries.

=== Table 7 ===

In sum, the result in the median value of plus-one's NEXR is the most robust and significant one in that all estimations produce significant results. Namely, plus-one countries' claim is stronger when they have higher competitiveness against most ASEAN countries than against a specific country. This behavior seems reasonable because plus-one countries can export to a larger number of countries with preferential tariffs, increasing their benefits from realizing lax RoO. When the majority of ASEAN countries have lower competitiveness against the plus-one country, the interests of ASEAN countries are less likely to clash, increasing the overall benefits of implementing stringent RoOs and making ASEAN countries more eager to fight against the plus-one country. The estimation results may indicate that the former effect on the side of the plus-one country outweighs the latter effect on the side of ASEAN. As discussed in Section 2, there may be some possible reasons why the preference of plus-one countries is more realized. For example, even if many ASEAN members share the same preference, the joint-negotiation paradox may weaken ASEAN's negotiating power. Also, each member may be less eager to express its preference in favor of the joint preference, resulting in a "free-rider problem" in RoO negotiation.[10]

Next, we also add three variables on MFN tariffs, i.e., $MFN_{pt}^{Plus-one\,i}$, MFN_{pt}^{Median}, and

[10] For instance, Panagariya and Findley (1996) argue that common external tariffs of a customs union can be lower than those of a free trade agreement due to reduced influence in lobbying activities.

MFN_{pt}^{Max}. The estimation results are shown in column "MFN" in Table 7. The previous variables (RCA-related variables and NEXR-related variables) have similar results to those in Table 4. Among the MFN variables, only plus-one's MFN rates have significant coefficients, which have a positive sign. This suggests that the more restrictive RoOs are likely to be imposed on the products that plus-one countries protect with higher MFN tariffs. Namely, plus-one's preference is realized here. The coefficients for the median and maximum rates of MFN tariffs among ASEAN countries are insignificant. Nevertheless, it is also important to note that the less restrictive RoOs are not set in the products where most ASEAN countries or the most protecting ASEAN country have higher MFN tariffs. Thus, the negotiation powers may be balanced between ASEAN and plus-one countries in those products.

Finally, we estimate our model for intermediate products and final products separately. The estimation results are shown in Table 8. There are two notable differences between intermediate and final products. One can be found in the RCA of the plus-one. When plus-one countries have high export competitiveness in comparison to the rest of the world, RoOs are more likely to be less restrictive in intermediate products and more restrictive in final products, though the latter result is insignificant in column (IV). The other contrast is found in the median of MFN rates in ASEAN countries, which shows a similar contrast to the case of plus-one's RCA. These results suggest that ASEAN has greater bargaining power and imposes more stringent RoOs on finished goods than on intermediate goods. As with tariff escalation, ASEAN countries may have strong intentions to seek escalation of RoO restrictiveness along production processes, whereas plus-one countries place a greater emphasis on low RoO restrictiveness to facilitate the trade of intermediate products and the development of global value chains.

===== Table 8 =====

6. Concluding Remarks

Domestic political economy has a strong influence on trade policy, reflecting the interests of domestic producers rather than domestic consumers. Such a tendency is evident in RTA negotiations, where product-by-product protection levels can be determined in a highly flexible manner through tariff reduction schedules and RoOs. In the literature of analyzing RTAs, however, RoOs have attracted much less attention than tariffs. Unlike tariff reduction schedules, which can differ between member countries, RoOs in RTAs are set to be common to all RTA members. Therefore, RoOs are especially important when analyzing the nature of trade negotiations among member countries.

This study examined the factors that influence RoOs in four ASEAN-plus-one RTAs. One distinctive feature of our study RTAs is that ASEAN as a whole negotiates with a plus-

one country. Overall, we found that the preference of plus-one countries is more realized in RoOs than the preference of ASEAN countries. Plus-one countries' claims are found to be stronger when they have higher competitiveness against the majority of ASEAN countries rather than against a specific ASEAN country, possibly because plus-one countries have the opportunity to export to a larger number of countries with preferential tariffs. It could also be because ASEAN's group negotiations cause the interests of ASEAN countries to clash while limiting their individual opportunities to negotiate.

The weak negotiating power on the ASEAN side may be interpreted as inability of negotiators, but it may also demonstrate the preferability of plurilateral negotiations over bilateral ones in terms of social welfare: Because plurilateral negotiations balance out the different interests of member countries, the protectionist interest of a member country is reflected less to the negotiation outcomes than bilateral negotiations. Namely, a group negotiation may help to soften the political and economic stance and achieve a trade-friendly agreement. This indicates that the formations and expansions of plurilateral RTAs covering many countries with different characteristics, such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership, the Transatlantic Trade and Investment Partnership, or the Regional Comprehensive Economic Partnership, are more likely to be stepping stones to realize free trade with a less harmful RoO than piling up bilateral RTAs. Nevertheless, to prove these arguments more accurately, we need to investigate the differences in RoOs between plurilateral and bilateral RTAs rather than those across plurilateral RTAs in our future study.

We also found that bargaining powers are likely to be balanced between the plus-one country and the most or least competitive ASEAN country. In this case, the relative competitiveness of the two countries has no significant relationship with the restrictiveness of RoOs. The distinction between intermediate and final goods may be consistent with the tariff escalation structure. In the case of ASEAN, the presence of multinational enterprises, particularly Japanese multinationals, was already significant in major manufacturing subsectors in the early 2000s, and thus ASEAN countries may not have had a strong incentive to oppose trade-friendly RoOs in intermediate goods. Indeed, vertical trade, i.e., production process-wise division of labor, prevailed in Asia, while European countries got engaged in intermediate goods trade based on horizontal differentiation (Kimura et al., 2007). Therefore, it will be interesting to examine and compare with the case of RoOs in the RTAs by the European Union or among developed countries.

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Table 1. Bargaining Powers and the Stringency of RoOs When Interests are Different

	$\frac{\partial RoO^*(k)}{\partial t_G^{MFN}(k)}$	$\frac{\partial RoO^*(k)}{\partial t_j^{MFN}(k)}$	$\frac{\partial RoO^*(k)}{\partial \alpha_G(k)}$	$\frac{\partial RoO^*(k)}{\partial \alpha_j(k)}$
$\theta_G > \theta_j$	$+$	$-$	$-$	$+$
$\theta_G < \theta_j$	$-$	$+$	$+$	$-$

Table 2. The Scores and Distributions of RoOs

	Score	AANZ	AC	AJ	AK
CC	7	290	1	1,237	5
CC&VA	10				2
CC/VA	3	798	7	118	504
CH	6	185		410	11
CH&VA	9				5
CH/VA	2	2,301	113	2,905	3,826
CS	4			7	
CS&VA	8	3			
CS/VA	1	1,016		35	73
VA	5	67	4,815	221	70
WO	11	223	7	3	376

Source: Authors' compilation using the legal text of ASEAN+1 RTAs.

Table 3. Average Scores of RoOs by Industry

	AANZ	AC	AJ	AK
Live animals	7.7	5.0	7.0	10.6
Vegetable products	6.2	5.0	6.9	10.1
Animal/vegetable fats and oils	3.0	5.1	6.6	2.5
Food products	2.5	4.9	6.6	2.7
Mineral products	2.0	5.0	2.0	2.0
Chemical products	1.2	5.0	2.1	2.0
Plastics and rubber	2.2	4.3	2.0	2.1
Leather products	2.1	3.5	7.0	2.1
Wood products	2.0	5.0	5.5	2.0
Paper products	2.0	5.0	2.0	2.0
Textiles	4.7	5.0	6.7	2.6
Footwear	2.3	3.4	5.4	2.0
Plastic or glass products	2.0	5.0	2.1	2.0
Precision metals	2.7	5.1	3.6	2.1
Base Metal	2.4	5.0	3.1	2.1
Machinery	1.7	5.0	2.0	2.0
Transport equipment	3.3	5.0	3.1	2.6
Precision machinery	1.8	5.0	2.0	2.0
Miscellaneous	2.0	5.0	1.9	2.1
Intermediate goods	2.7	5.0	3.5	2.4
Final goods	3.1	4.9	4.2	3.6
Total	2.9	4.9	3.7	2.9

Source: Authors' compilation using the legal text of ASEAN+1 RTAs.

Table 4. Baseline Results

	Ordered logit			OLS		
	(I)	(II)	(III)	(IV)	(V)	(VI)
Plus-one's RCA	-0.025**		-0.006	-0.022***		-0.009
	[0.012]		[0.008]	[0.006]		[0.007]
Median of ASEAN's RCA	0.009		-0.073	0.011		0.04
	[0.049]		[0.049]	[0.199]		[0.195]
Max of ASEAN's RCA	0.000		0.000	0.001		0.000
	[0.000]		[0.000]	[0.001]		[0.001]
Min of ASEAN's RCA	-0.882**		-0.558	-2.640***		-1.984**
	[0.446]		[0.401]	[0.941]		[0.896]
Median of Plus-one's NEXR		-0.393***	-0.395***		-0.265***	-0.257***
		[0.034]	[0.034]		[0.030]	[0.030]
Min of Plus-one's NEXR		-0.047**	-0.045*		-0.073***	-0.066***
		[0.023]	[0.024]		[0.021]	[0.021]
Max of Plus-one's NEXR		-0.112**	-0.108**		-0.186***	-0.184***
		[0.044]	[0.044]		[0.042]	[0.042]
Number of observations	20,012	19,184	19,184	19,999	19,115	19,115
Pseudo/adjusted R-squared	0.284	0.293	0.293	0.469	0.486	0.486

Source: Authors' estimation.

Notes: Estimation results were obtained using the ordered logit or OLS method. ***, **, and * denote statistical significance at 1%, 5%, and 10% levels, respectively. Robust standard errors are shown in brackets. In all specifications, we control for plus-one country fixed effects and product fixed effects. The product-fixed effects are defined at an HS six-digit level in the case of OLS and an HS three-digit level in the case of the ordered logit model.

Table 5. Robustness Checks: Ordered Logit Estimation

	Exclusion			Excluding Japan		
	(I)	(II)	(III)	(IV)	(V)	(VI)
Plus-one's RCA	-0.025**		-0.007	-0.005		0.004
	[0.011]		[0.008]	[0.005]		[0.004]
Median of ASEAN's RCA	-0.008		-0.088	0.061		0.013
	[0.060]		[0.061]	[0.049]		[0.050]
Max of ASEAN's RCA	0.000		0.000	0.000		0.000
	[0.000]		[0.000]	[0.000]		[0.000]
Min of ASEAN's RCA	-1.004*		-0.64	-0.839***		-0.627**
	[0.542]		[0.497]	[0.314]		[0.290]
Median of Plus-one's NEXR		-0.365***	-0.366***		-0.302***	-0.304***
		[0.035]	[0.035]		[0.037]	[0.037]
Min of Plus-one's NEXR		-0.047**	-0.045*		-0.011	-0.014
		[0.024]	[0.024]		[0.026]	[0.025]
Max of Plus-one's NEXR		-0.167***	-0.162***		-0.155***	-0.155***
		[0.048]	[0.048]		[0.048]	[0.048]
Number of observations	19,226	18,430	18,430	14,987	14,293	14,293
Pseudo R-squared	0.286	0.296	0.296	0.326	0.339	0.339

Source: Authors' estimation.

Notes: Estimation results were obtained using the ordered logit method. ***, **, and * denote statistical significance at 1%, 5%, and 10% levels, respectively. Robust standard errors are shown in brackets. In all specifications, we control for plus-one country fixed effects and product fixed effects defined at an HS three-digit level. In column "Exclusion," we exclude products that at least one country in a concerned RTA does not need to commit to any tariff reduction. In column "Excluding Japan," we exclude AJCEP from our study RTAs.

Table 6. Standard Deviations of RCA Indices across ASEAN Countries: Ordered Logit Estimation

	Low S.D.			High S.D.		
	(I)	(II)	(III)	(IV)	(V)	(VI)
Plus-one's RCA	-0.008		-0.003	-0.056*		-0.001
	[0.008]		[0.007]	[0.029]		[0.017]
Median of ASEAN's RCA	-0.139		-0.274	0.005		-0.065
	[0.451]		[0.464]	[0.047]		[0.046]
Max of ASEAN's RCA	0.019		0.011	0.000		0.000
	[0.020]		[0.020]	[0.000]		[0.000]
Min of ASEAN's RCA	20.668		22.255	-0.778**		-0.466
	[22.205]		[23.272]	[0.385]		[0.334]
Median of Plus-one's NEXR		-0.281***	-0.281***		-0.431***	-0.435***
		[0.063]	[0.063]		[0.042]	[0.043]
Min of Plus-one's NEXR		-0.059*	-0.058*		-0.082**	-0.083**
		[0.033]	[0.033]		[0.036]	[0.037]
Max of Plus-one's NEXR		0.049	0.052		-0.205***	-0.202***
		[0.089]	[0.089]		[0.049]	[0.049]
Number of observations	10,109	9,453	9,453	9,903	9,731	9,731
Pseudo R-squared	0.318	0.33	0.33	0.262	0.273	0.273

Source: Authors' estimation.

Notes: Estimation results were obtained using the ordered logit method. ***, **, and * denote statistical significance at 1%, 5%, and 10% levels, respectively. Robust standard errors are shown in brackets. In all specifications, we control for plus-one country-fixed effects and product-fixed effects defined at an HS three-digit level. We compute each product's S.D. of RCA indices in 2005 among ASEAN countries. In this table, we estimate our model for two product groups, namely whether the S.D. is greater than or less than the median value.

Table 7. Excluding ACFTA and Introducing MFN Tariff Rates: Ordered Logit Estimation

	Excluding China			MFN		
	(I)	(II)	(III)	(IV)	(V)	(VI)
Plus-one's RCA	-0.015***		-0.008	-0.023**		-0.004
	[0.006]		[0.006]	[0.012]		[0.008]
Median of ASEAN's RCA	-0.005		-0.036	-0.004		-0.088*
	[0.050]		[0.051]	[0.049]		[0.049]
Max of ASEAN's RCA	0.000		0.000	0.000		0.000
	[0.000]		[0.000]	[0.000]		[0.000]
Min of ASEAN's RCA	0.029		-0.031	-0.797*		-0.474
	[0.370]		[0.359]	[0.449]		[0.404]
Median of Plus-one's NEXR		-0.217***	-0.217***		-0.403***	-0.407***
		[0.041]	[0.041]		[0.034]	[0.034]
Min of Plus-one's NEXR		0.023	0.027		-0.049**	-0.049**
		[0.032]	[0.031]		[0.023]	[0.024]
Max of Plus-one's NEXR		-0.039	-0.035		-0.107**	-0.103**
		[0.042]	[0.043]		[0.044]	[0.044]
Plus-one's MFN rates				2.943***	3.144***	3.143***
				[0.381]	[0.419]	[0.418]
Median of ASEAN's MFN rates				0.915	0.609	0.581
				[0.631]	[0.653]	[0.654]
Max of ASEAN's MFN rates				-0.137	-0.114	-0.102
				[0.217]	[0.226]	[0.226]
Number of observations	15,011	14,289	14,289	19,926	19,101	19,101
Pseudo R-squared	0.414	0.414	0.414	0.289	0.299	0.299

Source: Authors' estimation.

Notes: Estimation results were obtained using the ordered logit method. ***, **, and * denote statistical significance at 1%, 5%, and 10% levels, respectively. Robust standard errors are shown in brackets. In all specifications, we control for plus-one country fixed effects and product fixed effects defined at an HS three-digit level. In column "Excluding China," we exclude ACFTA from our study RTAs.

Table 8. Estimation Results for Intermediate Goods and Final Goods: Ordered Logit Estimation

	Intermediate goods			Final goods		
	(I)	(II)	(III)	(IV)	(V)	(VI)
Plus-one's RCA	-0.057***		-0.041***	0.007		0.019***
	[0.013]		[0.011]	[0.006]		[0.006]
Median of ASEAN's RCA	0.163		0.118	-0.063		-0.129**
	[0.111]		[0.117]	[0.051]		[0.051]
Max of ASEAN's RCA	0.000		-0.001	0.000		0.000
	[0.001]		[0.001]	[0.000]		[0.000]
Min of ASEAN's RCA	-13.794		-15.8	-0.177		0.037
	[11.928]		[13.889]	[0.391]		[0.363]
Median of Plus-one's NEXR		-0.280***	-0.262***		-0.452***	-0.479***
		[0.047]	[0.047]		[0.053]	[0.053]
Min of Plus-one's NEXR		-0.052*	-0.031		-0.021	-0.041
		[0.030]	[0.030]		[0.040]	[0.040]
Max of Plus-one's NEXR		-0.073	-0.071		-0.183***	-0.175***
		[0.070]	[0.070]		[0.056]	[0.056]
Plus-one's MFN rates	2.319***	2.591***	2.530***	4.642***	4.238***	4.348***
	[0.503]	[0.562]	[0.546]	[0.740]	[0.679]	[0.693]
Median of ASEAN's MFN rates	-3.694***	-3.695***	-3.829***	3.616***	3.107***	3.139***
	[0.969]	[0.990]	[0.995]	[0.960]	[0.992]	[1.000]
Max of ASEAN's MFN rates	0.233	0.297	0.304	-0.767	-0.672	-0.7
	[0.262]	[0.270]	[0.270]	[0.473]	[0.485]	[0.488]
Number of observations	12,307	11,750	11,750	7,619	7,351	7,351
Pseudo R-squared	0.312	0.32	0.321	0.278	0.288	0.289

Source: Authors' estimation.

Notes: In this table, we estimate our model for intermediate goods and final goods separately. Estimation results were obtained using the ordered logit method. ***, **, and * denote statistical significance at 1%, 5%, and 10% levels, respectively. Robust standard errors are shown in brackets. In all specifications, we control for plus-one country fixed effects and product fixed effects defined at an HS three-digit level.

Appendix. Data Overview

Table A1 reports the average of RCA indices by industries and countries/regions. The figures for ASEAN indicate the simple averages of RCA indices among ASEAN countries and all products in each industry. Similarly, the average of RCA indices between Australia and New Zealand is reported in column "AUS/NZL." Due to the high values in labor-intensive industries such as the agricultural industry, ASEAN countries register the highest value in the total. China and Australia/New Zealand show a similar values in the total. The former has relatively high values in most industries, while agricultural and mining industries show relatively high values in the latter. Japan and Korea have the similar and relatively low values in the total. Japan has high values in machinery industries (machinery, transport equipment, and precision machinery industries) but low values in labor-intensive industries, such as agricultural industries. Korea showed moderate values in most industries.

===== Table A1 =====

Table A2 compares the NEXR of plus-one countries to that of ASEAN countries. We calculate the NEXR (net exports over the sum of exports and imports) for each ASEAN country first, and then take a simple average across ASEAN countries. As implied by the fact that both ASEAN and Australia/New Zealand have relatively high RCA values in agricultural industries, i.e., both groups have export competitiveness in similar industries, Australia/New Zealand has the lowest NEXR in the total, though its values in agricultural industries are small but positive. China has the highest NEXR in the total due to its positive values in almost all industries. Meanwhile, NEXR values in Japan and Korea are positive in many industries but negative in labor-intensive industries.

===== Table A2 =====

Table A3 depicts the pattern of import protection as measured by MFN tariff rates. The average MFN rates for total products show that Korea has the highest level of protection, followed by China and ASEAN. Australia/New Zealand and Japan registered a low level of protection. Moreover, several notable patterns exist for each country and group. For ASEAN, there are relatively small variations in MFN rates among different industries, as MFN rates for most products are between 7% and 15%. It should be noted that food products, footwear, and transport equipment have high MFN rates of over 16%. For Australia/New Zealand, MFN tariff rates are low for most products except textiles and footwear, which receive relatively high protection at 11% and 12% MFN tariff rates. In the case of China, MFN tariff

rates are high compared with other countries. The products that register very high MFN rates are food products (21%) and animal/vegetable fats and oils (20%). For Japan, high MFN tariff rates are found in several products, including food products (15%), leather products (14%), and footwear (13%). It is worth noting that MFN tariff rates for paper products, machinery, transportation equipment, and precision machinery are all less than 0.2%. At a more disaggregated product level, many products have zero MFN tariff rates. Agricultural products in Korea are subject to extremely high MFN tariff rates. The MFN tariff rate for vegetable products is as high as 96%, and the MFN tariff rates for food products and live animals are 29% and 23%, respectively. Tariff rates for manufactured products are high compared to Australia/New Zealand and Japan and are comparable to those for ASEAN. Among the manufactured products, tariff rates for textiles and footwear are relatively high at 10%.

===== Table A3 =====

An examination of MFN tariff rates reveals some common patterns. All countries and country groups have high rates for textiles and footwear. Except for Australia/New Zealand, agricultural products are subject to high tariff rates in all countries and country groups. In the cases of ASEAN and China, transportation machinery has high tariff rates. Differences and similarities in MFN tariff rates at the industry level for different countries and country groups have important implications in the determination of RoOs in ASEAN+1 RTAs because negotiations between and among RTA members determine them.

Table A1. Average RCA Indices by Industry

	ASEAN	AUS/NZL	CHN	JPN	KOR
Live animals	1.4	10.9	0.7	0.2	0.4
Vegetable products	3.6	2.3	1.1	0.1	0.2
Animal/vegetable fats and oils	3.0	1.6	0.5	0.2	0.2
Food products	1.3	1.6	0.8	0.1	0.3
Mineral products	1.6	2.8	1.0	0.3	0.3
Chemical products	0.5	0.7	1.1	1.0	0.6
Plastics and rubber	1.1	0.3	0.7	1.2	1.1
Leather products	2.1	4.1	2.2	0.1	0.5
Wood products	5.4	2.3	1.4	0.0	0.1
Paper products	1.3	1.6	0.6	0.5	0.4
Textiles	3.3	0.9	2.5	0.4	0.9
Footwear	2.9	0.3	4.8	0.1	0.6
Plastic or glass products	0.9	0.3	1.3	1.0	0.5
Precision metals	1.5	1.5	0.7	0.9	0.4
Base Metal	0.6	0.9	1.2	1.0	0.9
Machinery	0.7	0.6	1.1	1.6	0.9
Transport equipment	0.4	0.6	0.8	1.4	0.8
Precision machinery	0.9	0.4	1.6	1.7	0.5
Miscellaneous	0.9	0.3	3.1	0.7	0.5
Total	1.5	1.4	1.4	0.8	0.7

Source: Authors' compilation using the trade data by CEPII.

Note: The ASEAN figures show the industry means of the average RCA among ASEAN countries.

Table A2. Average NEXR Indices by Industry

	AUS/NZL	CHN	JPN	KOR
Live animals	0.5	0.1	-0.1	-0.4
Vegetable products	0.4	0.6	-0.1	0.0
Animal/vegetable fats and oils	0.1	-0.1	0.2	-0.1
Food products	0.2	0.6	-0.1	0.0
Mineral products	0.3	0.4	0.4	0.2
Chemical products	0.2	0.7	0.8	0.5
Plastics and rubber	-0.1	0.4	0.5	0.5
Leather products	-0.1	0.6	-0.1	0.1
Wood products	-0.1	0.1	-0.4	-0.6
Paper products	0.0	0.5	0.6	0.4
Textiles	-0.5	0.7	0.1	0.3
Footwear	-0.5	0.8	-0.4	0.0
Plastic or glass products	-0.2	0.8	0.2	0.2
Precision metals	-0.1	0.4	0.1	0.2
Base Metal	0.2	0.7	0.7	0.7
Machinery	0.3	0.6	0.7	0.6
Transport equipment	0.1	0.7	0.7	0.6
Precision machinery	0.1	0.6	0.6	0.4
Miscellaneous	-0.3	0.8	0.1	0.2
Total	0.1	0.6	0.4	0.4

Source: Authors' compilation using the trade data by CEPII.

Table A3. Average MFN Tariff Rates by Industry (%)

	ASEAN	AUS/NZL	CHN	JPN	KOR
Live animals	11	1	16	9	23
Vegetable products	11	2	17	7	96
Animal/vegetable fats and oils	7	3	20	5	10
Food products	18	5	21	15	29
Mineral products	3	1	4	0.4	3
Chemical products	4	2	8	2	8
Plastics and rubber	9	7	11	2	7
Leather products	9	6	14	14	6
Wood products	12	5	6	4	7
Paper products	7	4	7	0	0.2
Textiles	13	11	15	7	10
Footwear	16	12	19	13	10
Plastic or glass products	10	5	15	1	8
Precision metals	8	2	11	1	5
Base Metal	7	4	8	1	5
Machinery	7	5	10	0.1	6
Transport equipment	16	7	15	0.1	6
Precision machinery	7	2	11	0.2	7
Miscellaneous	12	6	15	3	6
Total	9	5	12	4	13

Source: Authors' compilation using the tariff data by WITS.

Note: The ASEAN figures show the average MFN rates for ASEAN countries and all products in each industry.