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Tariff Pass-through in Wholesaling: Evidence from Firm-level Data in Japan

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Abstract

Tariff pass-through is a vital issue for considering who and to what extent the trade liberalization benefits. This paper empirically examines the tariff pass-through in wholesaling by employing the wholesale firm-level data in Japan. We found that importing wholesalers significantly raised their margin ratio (i.e., (sales – procurements) / sales) against tariff reduction. On average, a 1% reduction of tariffs raised the margin ratio by around 0.25 percentage point. This rise is equivalent to the rise of sales prices to procurement prices by around 0.34%. For comparison purposes, we also analyzed tariff pass-through for the import and consumer prices and found that a 1% reduction of tariffs raised import prices (export prices for exporters) by 0.49% and decreased consumer prices by 0.08%. In sum, wholesalers in importing country enjoy the smaller part of tariff rent than producers in exporting country but the larger part than consumers in importing country.

Keywords: Tariff pass-through; Wholesaling, Japan
JEL classification: F15; F53

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1. Introduction

The impact of a tariff reduction or elimination on prices, or "tariff pass-through," has long been studied in the international economics literature. A tariff pass-through is a vital issue when considering who and to what extent trade liberalization benefits. In general, goods go from a producer in a foreign country (i.e., an exporter) to a household in a home country through wholesalers, retailers, and other local players (e.g., distribution services providers). In this flow of goods, for example, if a foreign producer captures all the rent from tariff reduction by raising its producer price by the same amount as the tariff reduction (i.e., the tariff reduction is perfectly passed through to the producer price), consumers cannot enjoy any benefits from tariff reduction. Thus, to evaluate the benefits from trade liberalization, it is crucial to know how the rent from tariff reduction is distributed among players in the flow, that is, foreign producers, wholesalers, retailers, consumers, and other local players.[1] To this end, the tariff pass-through rate, which indicates how prices are set by each player in response to a 1% change in tariffs, is a useful measure.

The academic literature has quantified the tariff pass-through for trade prices and consumer prices. An early empirical work on import prices is Feenstra (1989), which investigated the tariff pass-through for US imports from Japan by using product-level import data. Similar analyses were conducted by Rezitis and Brown (1999), Chang and Winters (2002), and Mallick and Marques (2008). Further, by employing firm-level export data, Ludema and Yu (2016) and Görg et al. (2017) investigated the tariff pass-through in cases of US and Hungarian exports, respectively. Several studies have examined the effects of tariff reduction through preferential, or regional trade agreements (RTAs) (Cadot et al., 2005; Olarreaga and Ozden, 2005; Ozden and Sharma, 2006; Cirera, 2014). The studies noted above have found an incomplete tariff pass-through, that is, that a part of tariff reduction is passed onto trade prices, that is, to foreign producers. On the other hand, Porto (2006), Nicita (2009), Han et al. (2016), and Ural Marchand (2012) investigated the pass-through in consumer prices by employing household survey data. These studies found a decrease in consumer prices through tariff reductions. To summarize, the literature has shown that both producers and consumers enjoy the benefits of a tariff reduction.

This study empirically examines the tariff pass-through in the case of Japanese wholesalers. As mentioned above, several studies have investigated the tariff pass-through from the perspective of producers and that of consumers. However, no studies have ever empirically explored this from the perspective of wholesalers despite the fact that they are one of the key players in the flow of goods. We fill this gap by employing firm-level data on Japanese wholesalers. Indeed, the wholesale sector has accounted for a non-negligible share of national GDP. In 2015, for example, it was 8% in

[1] The relationship among various prices is provided in Appendix A.

Japan (Cabinet Office) and 6% in the United States (Bureau of Economic Analysis). These shares are larger than or as large as those in the retail sector (6% in both Japan and the United States). Specifically, we investigate the effects of tariffs on wholesalers' margin ratios. Margin ratio is defined at the firm-level as "sales minus procurements" over sales.[2] We examine how much importing wholesalers raise their margin ratio against a tariff reduction.

It is noteworthy that the pass-through in wholesalers is qualitatively different from that in home-country consumers and foreign producers (i.e., exporters). In the flow of transactions, producers and consumers are the first and last players, respectively. Therefore, the changes in producer prices and consumer prices directly indicate producers and consumers' benefits from shocks such as tariff changes. On the other hand, since wholesalers lie in the middle of the flow, the shocks affect both their procurement and sales prices. Thus, in the analysis of tariff pass-through in wholesalers, we need to investigate the change in sales prices *relative to* procurement prices. In this study, as mentioned above, we investigate the effects of tariffs on margin ratios because these ratios are one of the typical indicators of wholesalers' performance used in the field of marketing research. Further, some recent studies in economics have investigated margin ratios (e.g., Anderson et al., 2018). We can show the effects on sales prices relative to those on procurement prices by examining the effects on margin ratios because the margin ratio is one minus the procurement price relative to the sales price. Then, to investigate the tariff pass-through for wholesaling, we focus on the aforementioned effects for importing wholesalers.

Our findings are summarized as follows: We start with the investigation of tariff pass-through in import and consumer prices because, to the best of our knowledge, there has been no evidence of these pass-throughs for Japan. We found that a 1% reduction in tariffs raises (tariff-exclusive) import prices (i.e., the export prices for foreign producers) by 0.49% and decreases consumer prices by 0.08%. Our investigation on wholesalers indicates that importing wholesalers significantly raise their margin ratio and, thus, their sales prices relative to procurement prices against the tariff reduction. On average, a 1% reduction in tariffs raises the margin ratio by approximately 0.25 percentage points. This magnitude is equivalent to the rise of relative sales prices by approximately 0.34%. Although one should be cautious when comparing the aforementioned magnitude across players, at the very least, our results may suggest that the wholesalers in the importing country enjoy a smaller portion of the tariff rent than the producers in the exporting country but a larger portion than the consumers in the importing country. In other words, since the pass-through rates are related to the price elasticity of demand of each player, consumers may have a relatively inelastic demand with respect to prices.

In addition to the above-mentioned literature on tariff pass-throughs, this study is related to at least three strands of literature. The first includes the theoretical, rather than

[2] Measuring the markup may be more popular in economics, but the two measures are similar.

empirical, studies on tariff pass-throughs in retail (e.g., Richardson, 2004; Raff and Schmitt, 2009; 2012; 2016; Francois and Wooton, 2010; Cole and Eckel, 2018). In particular, Raff and Schmitt (2012) developed a model of international trade with heterogeneous retailers based on Melitz and Ottaviano (2008) and explored the effects of trade liberalization on the retail market structure. In their model, trade liberalization induces lower consumer prices, not only through the standard pass-through effects but also by making the competition tougher through the selection mechanism. As a result, it reduces the markups of retailers who source goods domestically but raises the markups of retailers who engage in direct imports. To the best of our knowledge, there are no theoretical studies that shed light on a tariff pass-through in wholesaling. However, these mechanisms, although they refer to retailing, may be useful when we consider the tariff pass-through in wholesaling.

The second strand is the literature on the exchange-rate pass-through for wholesalers or retailers. Examples of relevant studies include Hellerstein (2008), Nakamura and Zerom (2010), Antoniades and Zaniboni (2016), and Berner, Birg, and Boddin (2016). The results of these studies are mixed. Hellerstein (2008) showed that foreign producers (i.e., exporters) obtain a larger rent from the change of exchange rates than retailers and consumers. On the other hand, Nakamura and Zerom (2010) found that the pass-through occurs almost entirely at the wholesale level. To summarize, the distribution of the rent stemming from exchange rate changes among the recipients differs across studies (e.g., for different countries and products). Against this backdrop, we provide the first evidence for the existence of a tariff pass-through, which is known to be similar to an exchange rate pass-through, as shown in Feenstra (1989). As mentioned above, we found evidence of a significant tariff pass-through in Japanese wholesaling.

The third strand is the literature that examines the firm-level performance of wholesalers and/or retailers in the context of international trade (e.g., Bernard et al., 2010; Meinen and Raff, 2018). For example, to examine how increased consumer goods imports affect retail market performance and structure, Meinen and Raff (2018) investigated the performance of retailers in Denmark for the period from 1999 to 2008. They found that retailers that start to import have 8% more sales, 6% higher profits, and 2% greater markups in the year they initiate importing compared to non-importing retailers. In our study, we discover some new evidence on wholesalers' margin ratio. For example, we found that a tariff reduction lowers (raises) the margin ratio of wholesalers who procure their products from domestic (foreign) producers.[3]

The rest of this paper is organized as follows: The next section investigates the tariff pass-through in import and consumer prices. After presenting our empirical framework for examining the tariff pass-through in wholesaling in Section 3, we report

[3] Other types of empirical studies on wholesalers include Basker and Van (2010) and Atkin et al. (2018).

our estimation results in Section 4. Finally, Section 5 concludes the study.

2. Tariff Pass-through in Import and Consumer Prices

Before examining the tariff pass-through in wholesaling, this section investigates the tariff pass-through in import prices and consumer prices because there has been no evidence of these pass-throughs in Japan. By simply ignoring international transportation costs, we take the pass-through in import prices to be indicative of the exporting countries' gain. However, let us note that, more accurately, the pass-through in import prices shows the sum of gains for the exporting countries and for the international transportation sectors. These pass-throughs in import prices and consumer prices are later compared to those in wholesalers.

To analyze import prices, we focus on Japanese imports from 175 countries during the period from 1988 to 2014. Following the existing studies on tariff pass-through in import prices, we estimate the equation below.

$$\ln P_{cit}^{Import} = \alpha \ln(1 + Tariff_{cit}^{Applied}) + \mathbf{FE} + \epsilon_{cit}. \quad (1)$$

P_{cit}^{Import} is the (tariff-exclusive) unit import price (i.e., import value divided by import quantity) of product i from country c in year t. Product is defined at the harmonized system (HS) six-digit level[4]. Data on import values and quantities are obtained from UN Comtrade. $Tariff_{cit}^{Applied}$ is the tariff rate applied by Japan to product i imported from country c in year t. In this empirical model, the meaning of the coefficient for tariffs depends on the underlying theoretical settings, a typical element of which is the price elasticity of demand for buyers such as wholesalers. Tariffs data are drawn from World Integrated Trade Solution (WITS). In this analysis, since we have information on import source countries or exporting countries, we take into account not only most favored nation (MFN) tariff rates but also preferential tariff rates, including those for RTAs and the generalized system of preferences (GSP). **FE** represents various fixed effects, which are explained later.

The trend of the simple average of Japanese tariff rates on imports from 175 countries is shown in Figure 1. Notice that we should be cautious about how we interpret the level because it heavily depends on the number of non-preference partners (i.e., countries that applied relatively high rates) included in the computation of the simple average. We should pay attention to the trend in this figure. The figure also shows the trend according to the average levels applied in 1988: positive, higher than 10%, and higher than 20%. Naturally, the more drastic change can be observed for products with a higher average level in 1988. Overall, Japanese tariffs gradually declined. The reduction in the 1990s was mainly driven by the reduction of MFN rates, following

[4] Aggregation at an HS six-digit level means that we use the common HS version (HS1988) during our sample period.

the agreement made in the Uruguay Round negotiations. For Japan, MFN tariffs had been already eliminated for 42% of the total tariff lines by the latter half of the 2000s, and have remained unchanged since then. The slight decrease in the average since the latter half of the 2000s is due to the proliferation of RTAs. The sharp decrease in 2007 is because Japan eliminated GSP tariff rates on almost all products from the least developed countries, following the Hong Kong Ministerial Declaration in December 2005 (Ito and Aoyagi, 2019).

=== Figure 1 ===

The baseline estimation result is reported in column (I) in Table 1. In this specification, we include exporting country-product and exporting country-year fixed effects. The former type of fixed effects controls for the time-invariant parameters in the sector-specific productivity distribution in exporting countries whereas the latter controls for factor prices such as wages in exporting countries and the total income in Japan. The coefficient for tariffs is estimated to be significantly negative, which is consistent with our expectations. If its magnitude takes the value -1, the change in tariffs is perfectly passed through to import prices, that is, we have a 100% tariff pass-through to import prices. On the other hand, an insignificant coefficient for tariffs (i.e., a coefficient equal to 0) means that tariffs do not change import prices at all, that is, we have a 0% tariff pass-through. Our result that the magnitude lies in the middle suggests an imperfect tariff pass-through. In column (II), we add product-year fixed effects, which control for not only the product-level demand size but also the variation or change in Japanese MFN tariff rates. Specifically, the coefficient for tariffs captures the effect of tariff changes which results from the application of the preferential tariff rates. The results again show a significantly negative coefficient.

=== Table 1 ===

We further conduct additional estimation: in column (III), we restrict sample products to those used for the analysis of the tariff pass-through in wholesaling in a later section, to obtain results comparable to those of the tariff pass-through across the different players.[5] The coefficient for tariffs is again estimated to be significantly negative. A 1% decrease in (one-plus) tariffs raises import prices by 0.49%. In columns (IV)-(VI), we use non-logged tariff rates as our main independent variable rather than logged tariff rates. When tariff rates are small, the log of a one-plus tariff is almost equivalent to the actual tariff rate, that is, $\ln(1 + Tariff_{cit}^{Applied}) \approx Tariff_{cit}^{Applied}$.[6]

[5] The product list used in the analysis for wholesaling is available in Appendix B.

[6] Therefore, we may interpret the result in column (III) as indicating that a 1-*percentage point* decrease in tariffs raises import prices by 0.49%. However, for accuracy, we use percentages in the

Nevertheless, since some products have high tariffs, we also try the non-logged version. The sign and statistical significance of the coefficients do not change compared to the results with the logged version. These results are a bit different from those obtained in previous studies. Rezitis and Brown (1999) found a positive, rather than negative, coefficient in an analysis of tobacco exports from Greece to the United States whereas Mallick and Marques (2008) found that, on average, for India's imports, all the tariff rent goes to the exporting countries. To summarize, the case of Japan shows that not only exporting but also importing countries enjoy some portion of the rent.

Next, we investigate the tariff pass-through in consumer prices. For this analysis, we examine the unit consumer prices of 127 commodities in Japan from 1996 to 2006. Similarly to the case of import prices, our estimation equation is

$$\ln P_{it}^{Consumer} = \beta \ln(1 + Tariff_{it}^{MFN}) + \mathrm{FE}_i + \mathrm{FE}_t + \epsilon_{it}. \quad (2)$$

$P_{it}^{Consumer}$ is the unit consumer price of product i in year t. $Tariff_{it}^{MFN}$ is Japan's MFN tariff rates for product i in year t. In this specification, we do not have an export countries dimension because our data do not report prices by import sources. Thus, we examine the effect of MFN tariff rates, rather than that of applied rates, by focusing on the years before Japan's active inclusion in RTAs. By matching the HS codes with the commodity classification in the survey on consumer prices[7], we take a weighted average of MFN tariff rates by using import values at the 1995 tariff line-level (i.e., the pre-sample year) as a weight.[8] Naturally, the coefficient for tariffs is related to the price elasticity of demand in consumers. We control for product and year fixed effects. For example, the product and year fixed effects will control for the difference in the unit of measurement of the prices across products and the total income in Japan, respectively.

Our main data source for the aforementioned unit price is Japan's Family Income and Expenditure Survey, compiled by the Ministry of Internal Affairs and Communications. The data include the yearly amount of expenditures and quantities per household. The unit price is computed by dividing the total expenditure by the total quantity. Specifically, our measure of the consumer price is the price actually paid by households. The sample households are restricted to those with two or more persons. One important point is that the consumer price here mixes the prices of foreign goods and domestic goods. It is expected that a tariff reduction decreases the price of foreign goods more than that of domestic goods. This is because the former price decreases directly by the tariff reduction whereas the rate of decrease of the latter price depends on the level of competition induced by the tariff reduction in the market and the cross-elasticity of demand between foreign and domestic goods. Due to these reasons, the magnitude of the effect of tariffs becomes smaller in our analysis compared to the

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interpretation of the logged version.

[7] The explanation on this matching is available in Appendix C.

[8] In this computation, we employed the converter of HS codes across time developed by Ito and Aoyagi (2019).

case where the focus is only on the price of foreign goods. Since we are interested in the tariff pass-through rate in foreign goods, the coefficient for tariffs in the model above will be smaller than its true level for foreign goods. The data on import values at the 1995 tariff-line level are obtained from the Japanese Customs.

The baseline estimation result is shown in column (I) in Table 2. The coefficient is positive and significant, indicating that a 1% decrease in (one-plus) MFN rates reduces consumer prices by 0.1%. This magnitude is slightly smaller than that obtained in previous studies, which was approximately 0.3% in Mexico (Nicita, 2009) and China (Han et al., 2016). In column (II), following the aforementioned literature on tariff pass-through in consumer prices, we introduce one additional variable, the log of Japan's unit import price of a product from the rest of the world, to control for its international price. The coefficient for this additional variable is significantly positive, indicating that the rise of international prices raises consumer prices as well. Further, the estimated coefficient for tariffs is again significantly positive. As in the analysis for import prices, in column (III), we restrict the sample products only to those examined for wholesaling. The coefficient for tariffs slightly decreases but is still significantly positive. A 1% reduction in tariffs lowers consumer prices by 0.08%. In columns (IV)-(VI), we use non-logged tariffs, whose coefficients are also significantly positive.

=== Table 2 ===

3. Empirical Framework

This section presents our empirical framework for investigating a tariff pass-through in wholesaling. As in the analyses conducted in the previous section, we are interested in the tariff pass-through of imported products in wholesaling. We first theoretically discuss the relationship of tariffs with the margin ratio, which is defined below. After specifying our estimation equation, we discuss some empirical issues. Finally, we briefly review discussions and studies on the Japanese distribution system.

3.1. Theoretical Considerations

To investigate the tariff pass-through in wholesaling, we examine the effect of tariffs on the margin ratio, the ratio of sales minus procurements to sales. If the sales and procurements quantities are the same, the margin ratio indicates a ratio of the sales price and the procurement price. Thus, the relation of the margin ratio with tariffs indicates how much the change in tariffs is transferred to the sales price relative to the procurement price.

In particular, by focusing on the wholesalers who procure goods from foreign

countries, we take this relation as a proxy for the tariff pass-through of imported goods in wholesaling. Let X be the ratio of the sales price to the procurement price. The margin ratio is equal to 1-1/X, and the derivative of the log of X with respect to the margin ratio is X. Thus, a one percentage-point increase in the margin ratio is equivalent to an X% increase in the sales price relative to the procurement price. Since we are interested in the effect of tariffs on importing wholesalers' relative sales prices, we subsequently use this magnitude relation to convert the effect on margin ratios into that on the relative sales prices.

Before explaining the estimation process, we first discuss the effects on the margin ratio by using a theoretical model based on Raff and Schmitt (2012). They extended the results of Melitz and Ottaviano (2008) to explore the effects of trade liberalization on the retailing sector. In the model, heterogeneous retailers source their goods from domestic or foreign producers, whose prices are denoted by w and t, respectively. The procurement price of foreign goods includes trade costs or tariffs. Since importing from a foreign producer involves fixed costs, only retailers with a unit labor requirement (c) less than a cut-off value choose importing. In addition, since retailers face a linear consumer demand function, consumer demand becomes zero if the consumer prices are too high. Given that retailers with a high unit labor requirement impose high prices, only retailers with a unit labor requirement less than another cut-off value (c_D) will remain active. Since wage is normalized to 1, retailers' marginal cost is defined as $c + w$ for domestic retailers and $c + t$ for importers.

We apply this model of retailing to wholesaling. For this application, the consumers' utility function in Raff and Schmitt (2012) should be interpreted as the retailers' production function.[9] We also need to assume that retailers cannot undertake direct importing and must procure their goods from wholesalers. Then, we can derive the margin ratio for domestic wholesalers (i.e., non-importing wholesalers) and importing wholesalers as follows:[10]

$$Margin = \begin{cases} 1 - \dfrac{2w}{c_D + 2w + c}, & \text{for Domestic Wholesalers} \\ 1 - \dfrac{2t}{c_D + w + c + t}, & \text{for Importing Wholesalers} \end{cases}.$$

The margin ratio is a combination of a sales price and a procurement price. The procurement prices (w and t) have not only a direct but also an indirect influence on the margin ratio, by changing the marginal cost and, thus, the wholesaling sales price. Naturally, the wholesaler's unit labor requirement (c) affects the marginal cost and the sales price. The same is true for the cut-off value for unit labor requirement (c_D) because a lower cut-off value reduces the sales price through the decline in wholesaler

[9] Peng, Thisse, and Wang (2006) also assumed a quasi-linear production function for final goods.

[10] See Appendix D for the derivations.

markups.[11] Since the cut-off value is a function of the average sales price across wholesalers and the mass of active wholesalers, it may indicate the degree of competition between wholesalers.

Total differentiation of the margin ratio gives[12]

$$dMargin = \begin{cases} \dfrac{2w}{(c_D + 2w + c)^2}\left[dc + \dfrac{dc_D}{dt}dt\right], & \text{for Domestic Wholesalers} \\ \dfrac{2}{(c_D + w + c + t)^2}\left[tdc - \left(c_D + w + c - t\dfrac{dc_D}{dt}\right)dt\right], & \text{for Importing Wholesalers.} \end{cases}$$

Notice that $1 > dc_D/dt > 0$, suggesting that the reduction in trade costs induces a lower cut-off value for the unit labor requirement, although the change in the cut-off value for the unit labor requirement is smaller than the change in trade costs.[13] The equation shows that the higher unit labor requirement for wholesalers is related to the larger margin ratio for both domestic wholesalers and importers.[14]

On the other hand, the effects of tariffs on margin ratios are qualitatively different for domestic wholesalers and importers. A lower tariff rate induces a smaller margin ratio for domestic wholesalers through the following mechanism: The reduction in tariff rates decreases the average prices through three channels: the standard pass-through, the exit of the domestic wholesalers with the relatively high unit labor requirement, and the increase in the proportion of importers.[15] Such a reduction in the average price decreases retailers' demand for each wholesaler and, thus, the cut-off value for unit labor requirement. As explained above, a lower cut-off value means smaller markups for wholesalers, resulting in a smaller margin ratio by decreasing the sales price. Intuitively,

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[11] Appendix D provides the expression for wholesalers' markups.

[12] Here, we treat the price of domestic goods (w) as constant and the cut-off value for unit labor requirement (c_D) as an endogenous variable. Nevertheless, a tariff reduction may force domestic producers to decrease their sales prices (w) due to the tougher competition with imported products. Our discussion does not change if this effect is not relevant in terms of magnitude.

[13] See Appendix in Raff and Schmitt (2012) for the proofs and the analytical expression of dc_D/dt.

[14] Although we assume a specific duty in this theoretical discussion, ad valorem tariff rates are used in our empirical analysis. Nevertheless, the discussion in the main text is valid because, qualitatively, ad valorem rates have the same effects on the margin ratio as the specific duty. The derivative with respect to the ad valorem rate is equal to tariff-exclusive import price multiplied by the derivative with respect to the specific duty. As the tariff-exclusive import prices are positive, the sign of the derivative with respect to the ad valorem rates is the same as that of derivative with respect to the specific duty.

[15] The first channel, the standard pass-through, works on the average price via a decline in the marginal costs and thus that in the sales prices of importing wholesalers in response to the tariff reduction. Second, since the wholesalers with a higher unit labor requirement set higher sales prices, the exit of the domestic wholesalers with a higher unit labor requirement reduces the average price of the surviving wholesalers. The aforementioned exit of wholesalers also induces a lower average price through the decline in markups. Finally, the average price is lower when the proportion of importing wholesalers is higher because the marginal costs and sales prices of importing wholesalers are lower than those of domestic wholesalers. Therefore, these three channels all lead to lower average prices.

the tougher competition induced by a tariff reduction decreases markups, sales prices, and margin ratios. On the other hand, although the same mechanism operates on the importers, the net effect of a tariff reduction on the margin ratio becomes negative because the procurement price of foreign goods decreases. In Appendix D, it is shown that the effect of reduction in the procurement price always dominates the effects of the tougher competition.

3.2. Empirical Specification

In our empirical analysis, there are three types of wholesalers in terms of procurement sources. The first type of wholesalers, called importers, procure their products from foreign countries. As demonstrated above, the tariff reduction will raise importers' margin ratios. On the other hand, the second and third types are non-importing wholesalers. The third type corresponds to the domestic wholesalers in the discussion above and includes the wholesalers who procure their products from domestic producers. Thus, as demonstrated above, the tariff reduction will lower the margin ratio of this type of wholesalers. The second type may be taken as a hybrid between the first and third types. It includes the wholesalers who procure their products from other domestic wholesalers. If those domestic wholesalers are importers, this type of wholesalers will enjoy an effect similar effect to the first type does. On the other hand, if their procurement is from non-importing domestic wholesalers, the effect will be similar to that experienced by the third type of wholesaler.

To differentiate between the effects of a tariff reduction across these three types of wholesalers, we specify our baseline equation for wholesale firm *f* in wholesale sector *i* in prefecture *r* at year *t* as follows:

$$\begin{aligned} Margin_{ft} &= \gamma_1 Tariff_{it}^{MFN} + \gamma_2 Tariff_{it}^{MFN} \times Secondtier_{ft} + \gamma_3 Tariff_{it}^{MFN} \times Importer_{ft} + \mathbf{X}_{ft}\boldsymbol{\delta} + \mathbf{Z}_{it}\boldsymbol{\varphi} \\ &+ \mathrm{FE}_f + \mathrm{FE}_{rt} \\ &+ \epsilon_{ft}. \end{aligned} \tag{3}$$

Our data, which are explained later, enable us to identify whether the procurement source is domestic or foreign countries but not a specific country in the case of foreign countries. Therefore, as in the analysis for consumer prices, we examine the effect of Japanese MFN tariff rates ($Tariff_{it}^{MFN}$). Product *i* is identified based on firms' major product in terms of sales.[16] We introduce the interaction terms of tariffs with two dummy variables. $Secondtier_{ft}$ takes the value 1 if the main procurement source for wholesaler *f* is domestic wholesalers at year *t*, and the value 0 otherwise, whereas $Importer_{ft}$ takes the value 1 if the main procurement source for wholesaler *f* is foreign countries at year *t*, and the value 0 otherwise. We call wholesalers with $Secondtier$ equal to 1 "second-tier wholesalers."

[16] Approximately 75% of our sample firms do not change their major products over time.

In this specification, the coefficients γ_1, $\gamma_1+\gamma_2$, and $\gamma_1+\gamma_3$ correspond to the effects of tariffs on the margin ratio of the third, second, and first types of wholesalers, respectively. As discussed above, the effect of a tariff reduction will be negative in the first type (i.e., importers) and positive in the third type (i.e., wholesalers procuring their products from domestic producers). Therefore, γ_1 and γ_3 are expected to be positive and negative, respectively. Furthermore, $\gamma_1+\gamma_3$, which is our main interest, should be negative. On the other hand, as discussed above for the second-tier wholesalers, the sign of $\gamma_1+\gamma_2$ is an empirical question since our data cannot differentiate between non-importers who procure their products from importing wholesalers and those who procure their products from non-importing wholesalers. The sum of γ_1 and γ_2 includes the effect of tariffs on these types of non-importers. As a result, its magnitude is expected to lie between γ_1 and $\gamma_1+\gamma_3$. Since we expect γ_1 to be positive, γ_2 should be estimated to be at least negative. To summarize, the expected signs are as follows:

$$\gamma_3 < \gamma_2 < 0 < \gamma_1, \qquad \gamma_1+\gamma_3 < 0. \tag{4}$$

We further introduce some control variables. We control for non-interacting versions of the two dummy variables above (i.e., $Secondtier_{ft}$ and $Importer_{ft}$). Further, we introduce some other time-variant wholesale-firm characteristics ($\mathbf{X}_{ft}$), which include the log of the number of employees (*Employee*) and the dummy on payment method (*Cash/card dummy*), and a log of the number of establishments in firm *f* (ln *# of Units*). If the larger-sized wholesalers—in terms of the numbers of employees and establishments—have a stronger negotiation power, they may have the higher margin ratio. The dummy, *Cash/card dummy*, takes the value 1 if a wholesaler's main payment method is cash or credit cards and the value 0 if it is charge sales. Since the method of cash or credit card tends to be used for a small transaction amount, this variable is related to the transaction size.

The other control variables are as follows: As a time-variant sector characteristic ($\mathbf{Z}_{it}$), we introduce the Herfindahl index for wholesalers (*HHI*). If the competition of the wholesale market is tougher (i.e., *HHI* is smaller), the margin ratio will be lower. Finally, we control for firm and prefecture-year fixed effects. The firm fixed effect includes wholesale firms' inherent characteristics, which may be related to the choice of their main procurement source. The inclusion of the prefecture-year fixed effect is also important because the sales price must include not only the procurement price but also factor prices (e.g., wages) and transport costs. These elements are likely to depend on the location of wholesalers. Further, the size of the demand obviously differs by region (prefecture). The prefecture-year fixed effect will control for these differences across regions.

3.3. Empirical Issues

Our main dataset is the Census of Commerce (the Census, hereafter), conducted on all firms engaged in wholesale and retail trade. The Census has been conducted every five years since 1997. To focus on the effect of MFN rates, we use the data collected in 1997, 2002, and 2007.[17] The wholesale sectors are defined by a five-digit code. For example, "textiles" at the four-digit level has five sectors, including raw silk and cocoons, chemical fiber materials, other fiber materials, yarn, and textiles. To avoid matching tariffs in one sector with wholesalers dealing in many different products (e.g., general trading companies), we exclude those dealing in products with more than two three-digit codes. Such firms account for approximately 10% in terms of the total sales in wholesaling. The data source for tariffs is the same as that in Section 2. We match the five-digit code in the Census with the tariff line-level code of the Japanese HS.[18] There are cases where multiple nine-digit HS codes are matched to one five-digit code in the Census. We take a weighted average in this aggregation by using 1995 import values (i.e., a pre-sample year), obtained from Japanese Customs. Since the figures in the Census are those for 1996, 2001, and 2006, we match sectors with tariffs in these years. The Herfindahl index is computed by using the firm-level sales of all wholesalers (including general trading companies) obtained from the Census.

There are four empirical and data issues. First, we conduct a firm-level analysis, rather than a firm-product-level analysis, because the Census reports the data on procurements only at the firm level. Second, we focus on the wholesalers whose main sales destination is the domestic market, not the foreign market. In addition, we exclude wholesalers mainly engaged in intra-firm transactions. As a result, the wholesalers included in the estimation sell mainly to either domestic wholesalers or to retailers. Further, the sample wholesalers are restricted only to those whose main procurement source is foreign countries, domestic producers, or domestic wholesalers. Identifying each wholesaler's main sales partner and procurement source is possible because the Census reports the share of each partner and source in terms of transaction values. Third, margin ratios are computed by using the annual sales and purchases. It is natural that not all procurements in a year are necessarily sold within that year. However, since our dataset does not include figures on inventory, we do not adjust procurements in response to this issue.

Finally, our tariff variables may suffer from a measurement error problem because multiple nine-digit HS codes are matched to each five-digit code in the Census. As a

[17] Although the Census includes information on retailers in addition to that on wholesalers, we focus on wholesalers in this study. The main reason for not analyzing retailers is because consumers tend to purchase everyday products in supermarkets or department stores rather than in sector-specific retail shops. Furthermore, since we cannot compute the margin ratio at a firm-product-level, it is almost impossible to map tariff rates to supermarkets and department stores. As a result, the analysis on sector-specific retail shops will not show the whole picture on the allocation of tariff rent between retailers and consumers.

[18] The explanation on this matching is available in Appendix C.

result, ordinary least square (OLS) estimates are subject to attenuation bias toward zero. To address this measurement error, we perform an instrumental variable (IV) estimation. As an instrument, we use Japan's revealed comparative advantage (RCA) index defined at a five-digit sector code for wholesaling. RCA will be highly correlated with tariff rates because it is generally higher for competitive products, and the tariff rate is lower for those products (see, e.g., Rodrik, 1995). Furthermore, there are no reasons to think that RCA is correlated with the measurement errors for tariff variables or with the error term in equation (3). In short, RCA will play a valid role as an instrument. The data on import values for computing the RCA index are obtained from UN Comtrade.

3.4. Background and Data Overview

In this section, to provide an overview, we briefly review the discussion and studies on the Japanese distribution system and a comparison with the US distribution system. Then, we discuss the variation of margin ratio for Japanese wholesalers based on our data.

From the late 1980s to the mid-1990s, triggered by the Japan-US trade negotiation called the Structural Impediments Initiative, the inefficiency of the Japanese distribution system was widely discussed. At that time, the retail prices of many products in Japan were found to be significantly higher compared to those of their counterparts in the United States. It was indicated that such a difference may be attributed to fact that the Japanese distribution system is characterized by many small retailers, multiple layers of wholesalers, exclusive (keiretsu) trading practices, a sole representative importer, long-term contracts, and other factors. There were two conflicting views concerning the Japanese distribution system. One view claims that the aforementioned characteristics are sources of inefficiency (Kuribayashi, 1991), whereas the other view argues that the Japanese distribution system evolved as the result of rational adaptions and, thus, it is efficient (Ito and Maruyama, 1991; Porter and Sakakibara, 2004). Regardless of the validity of either view, many of these characteristics were considered to work as a barrier for new firms, particularly foreign firms trying to enter the Japanese consumer markets (Batzer and Laumer, 1990). After approximately two decades of stagnation in the Japanese economy, Bebenroth (2011) and Bebenroth et al. (2014) indicated that the Japanese distribution system had become more efficient and open, and that foreign firms in Japan also enjoyed successful entries.

There are several quantitative studies on the differences between the Japanese and the US distribution system. By employing the margin ratio of wholesalers and retailers from 1979 to 1985, Ito and Maruyama (1991) found that this ratio is similar for Japan, the United States, and other OECD countries. They concluded that "although the Japanese distribution system appears to be very different from its US counterpart, its performance, measured by value added, gross margin, operating expenses, and labor costs is quite

comparable with US performance." However, extending the data coverage from 1965 to 1985 for Japan and using comparable figures for the United States, Nishimura (1993) confirmed that the margin ratio, both at aggregate and product-group levels, is lower in Japan. He also found that, although the margin ratio was increasing with time, its rise could be mostly explained by the increase in the share of wage payment in sales, meaning that the real wage increase dominates the productivity growth.

In a recent study, by using more up-to-date data for Japan and the United States, Nomura and Miyagawa (2017) estimated margin ratios in the retail and wholesale sectors. They found that, in 2006, the margin ratio of Japanese wholesalers was 3.5 percentage points lower than that of US wholesalers, whereas the margin ratio of retailers was 2.3 percentage points higher in Japan. Furthermore, a comparison between 1996 and 2001 showed that, in Japan, the margin ratios decreased for wholesalers who directly purchased from domestic manufacturers but increased for importing wholesalers. For Japanese retailers, on the other hand, the margin ratio increased from 1996 to 2001 but then decreased until 2012. As regards the interaction between wholesalers and retailers in Japan, there is a trend showing the shift of margins from wholesalers to retailers, suggested by a decrease in the margin ratio of the wholesalers and an increase in that of the retailers from 1996 to 2012.

The core variable of our interest is the margin ratio of wholesalers. Figure 2 depicts the distribution of margin ratios for our sample wholesalers in 2006. Our original data include observations with zero- or one-valued margin ratios.[19] The case of a value of 1 arises when the procurements are recorded as zero. We exclude this case from the estimation because this type of transaction does not seem to be a normal one. On the other hand, the margin ratio becomes zero when the same non-zero value is recorded for sales and procurements. Although we keep this case in the estimation sample, we later drop this for a robustness check.[20] Figure 2 reaches a peak at approximately 0.2, meaning that the sales price is approximately 25% (=100/(1−0.2) − 1) higher than the procurement price. As seen in Table 3, which reports the basic statistics of our sample, the mean of the margin ratio is 0.267, meaning that the mean of sales prices relative to procurement prices is 1.364. This value will be used when converting the effect on margin ratios into that on the relative sales prices vis-à-vis the procurement prices.

=== Figure 2 & Table 3 ===

[19] There are few observations with a negative value, accounting for less than 1% of all observations.

[20] Although one may suggest using the Tobit model, there are two reasons why we use OLS (and IV) estimation. First, it is easier to interpret the marginal effects of variables in the linear estimation provided by OLS, compared to the non-linear estimation of the Tobit model (Ai and Norton, 2003). Second, as a robustness check, we drop observations with zero-valued margin ratios. In this case, the Tobit model and OLS produce the same results.

4. Empirical Results

This section reports our estimation results. Since our main variable, tariffs, changes in a sector-year dimension, we cluster the standard errors by wholesale sectors (Bertrand et al., 2004). We first report the OLS estimation results and then those obtained by IV. Finally, we estimate some additional models.

4.1. OLS Results

We start with the OLS estimation. The baseline result is shown in column (I) in Table 4. All tariff-related variables, including the tariff variable and its interaction terms with the importer dummy and the second-tier dummy, have insignificant coefficients. As is consistent with the expectation specified in (4), the coefficient for tariffs is positive whereas that for the interaction with the importer dummy is negative. The sum of these two coefficients is also negative. However, these coefficients are insignificant. In the case of the interaction term with the second-tier dummy, the opposite sign is obtained. Although the second-tier dummy also has an insignificant coefficient, the coefficient for the importer dummy variable is significantly positive. This finding indicates that importing wholesalers have margin ratios 1 percentage-point higher than those of non-importing wholesalers. The higher margin ratio of importing wholesalers is consistent with the result by Meinen and Raff (2018), that importing wholesalers have 2% greater markups, as mentioned in Section 1.

=== Table 4 ===

The results for other variables are as follows: Although the number of employees has an insignificant coefficient, the estimated coefficient for the number of establishments is significantly positive. Thus, larger-sized wholesalers, in terms of the number of establishments, have a significantly higher margin ratio. The insignificant number of employees might be an interesting result because, in manufacturing, a larger number of employees is associated with a higher performance based on most indicators (e.g., Van Ark and Monnikhof, 1996). The coefficient for Cash/card dummy is significantly negative, indicating economies of scale in the margin ratio. The Herfindahl index has an insignificant coefficient with a sign opposite to what was expected. This result implies that if the competition in the wholesale market is tougher (i.e., *HHI* is smaller), the margin ratio is higher.

We check the robustness of the OLS results above. Specifically, we estimate our model for four specific samples. First, in column (II) in Table 4, as mentioned in Section 3.4, we exclude observations with a zero-valued margin ratio because such cases may occur in practice but must be special cases. Second, in column (III), we exclude the

products for which MFN tariff rates are zero because a further tariff reduction is impossible for these products. Third, in column (IV), we restrict sample wholesalers only to those for whom the five-digit sector code with the largest sales accounts for more than 50% of the total sales. This restriction is to improve the correspondence of the five-digit code between the margin ratio and the tariffs. Fourth, in column (V), we restrict only to wholesalers with only a single establishment, to more precisely control for the fixed effect of location. In this estimation, the variable of the logged number of establishments is naturally dropped.

Overall, the results in these four columns are similar to those in column (I). A noteworthy difference lies in column (IV), where the coefficient for the interaction term of tariffs with the importer dummy is significantly negative, as is consistent with our expectations. Further, its absolute magnitude is larger than that of the tariff coefficients. Thus, a reduction in tariffs raises importing wholesalers' margin ratios. Another difference is that the coefficient for the importer dummy becomes insignificant in columns (III) and (V). The cash/card dummy and the number of establishments have significant coefficients in all cases. In addition, even when focusing on single-establishment wholesalers, we still have an insignificant coefficient for the number of employees.

4.2. IV Results

Next, we estimate the same model as above by the IV method. Table 5 reports the estimation results.[21] The test statistics for under-identification and weak identification show reasonably high values. The results for the explanatory variables are drastically different. In particular, the estimated coefficients for the tariff variable and its interaction term with the importer dummy are significant. Compared to the OLS results, the absolute magnitude of these coefficients rises as the attenuation bias due to the measurement error problem in our tariff variable is addressed. Their signs are consistent with our expectations specified in (4). While the estimated tariffs coefficient is positive, the interaction term with the importer dummy has a negative coefficient. Furthermore, the sum of these two coefficients becomes negative. These results imply that a tariff reduction decreases (increases) the margin ratio for wholesalers who procure their products from domestic producers (from foreign countries). The coefficient for the interaction term with the second-tier wholesaler dummy is insignificant with a sign opposite to what was expected.

=== Table 5 ===

[21] As is consistent with our expectations, in the first stage estimation, the estimated coefficient for the RCA index is significantly negative. Its value and standard error are −0.065 and 0.0001, respectively.

Overall, this table shows that, a 1% decrease in tariffs raises the margin ratio of importing wholesalers by approximately 0.25 percentage points. As mentioned in Section 3.1, an increase in a margin ratio by 1 percentage point is equivalent to an X% increase in the sales price relative to the procurement price (X). Therefore, evaluating X at the average among importing wholesalers (i.e., 1.364), we can state that a 1% decrease in tariffs raises the relative sales prices by approximately 0.34%. In Section 2, we found, for the common set of products, that a 1% reduction in tariffs raises import prices by 0.49% and lowers consumer prices by 0.08%. Although we should be cautious with the comparison of the magnitude across players, at the very least, our results may suggest that wholesalers in the importing country enjoy a smaller portion of tariff rent compared to producers in the exporting country but a larger portion than consumers in the importing country.

The IV results on the other variables are as follows: In all columns, although the estimated coefficients for the importer dummy are significantly positive, those of the second-tier dummy are insignificant. Thus, on average, the highest margin ratio is found in importing wholesalers. On the other hand, the estimated coefficients for the number of employees are again insignificant. These results may indicate that, unlike in the case of manufacturing, the number of employees is not necessarily associated with the performance of wholesale firms. The estimated coefficients for the number of establishments are significantly positive, indicating that larger-sized wholesalers in terms of the number of establishments have a significantly higher margin ratio. The coefficients for the cash/card dummy are again significantly negative whereas those for HHI are insignificant.

4.3. Further Robustness Checks

We further conduct three kinds of robustness checks on our tariff variable. First, we conduct two kinds of robustness checks on tariffs. One is using the non-logged version of tariff variable as in the analyses in Section 2. The results by the IV method are reported in Table 6 and are similar to those in Table 5. For example, column (I) shows that, for the importing wholesalers, a 1-percentage-point rise in tariffs decreases the margin ratio by 0.26 percentage points. The other check is as follows: when we compute the weighted average of tariff rates, we exclude tariff line-level products with tariffs over 100%. Such products with extremely high tariff rates have non-ad-valorem types of tariffs. Specifically, those high rates are based on the transformation of non-ad-valorem tariffs into ad-valorem equivalent rates. Since such rates are known to be unstable, we exclude products with high tariff rates (i.e., 100%) in the computation of the weighted average. The results are shown in Table 7 and are similar to those in Table 5.[22]

[22] Using this tariff variable, we also estimate the models analogous to those in Tables 4, 6, 8, and 9. The results are available in Tables B2-5 in Appendix B. In addition, another robustness check on tariff

=== Tables 6 & 7 ===

Second, we introduce the exchange rates. As discussed in Section 1, there are some empirical studies on the exchange rate-pass through for wholesalers. To evaluate the effects of tariffs relative to those of the exchange rates, we introduce exchange rates and their interaction terms with the importer and second-tier dummy variables. Specifically, we use the real effective exchange rate at each five-digit wholesale sector level. Following Dai et al. (2019), its log version is given by

$$\ln Exchange_{it} = \sum_k \left\{ \left(\frac{Imports_{ki1995}}{\sum_l Imports_{li1995}} \right) \left(\frac{EXC_{kt}}{EXC_{k1995}} \times \frac{P_{JPNt}}{P_{kt}} \right) \right\}.$$

$Imports_{ki1995}$ is 1995 Japanese import values for sector i from country k. EXC_{kt} is the bilateral exchange rate of country k's currency against the Japanese yen in year t. P_{JPNt} and P_{kt} are household prices in Japan and country k, respectively, in year t. A higher value of this exchange rate index means an appreciation of the Japanese yen. While the data on import values are drawn from Japanese Customs, we obtain the data on exchange rates and household prices from Penn World Table version 9.1.

=== Table 8 ===

The estimation results for only the tariff- and exchange rate-related variables are shown in Table 8.[23] While the results for the tariff-related variables are unchanged, the estimated coefficients for all exchange rate-related variables are insignificant. Specifically, we did not find a significant exchange rate-pass through for Japanese wholesalers.[24] One reason for this insignificant result might be the fact that most of Japanese imports are invoiced in US dollars (USD). According to the website of Japanese Customs, the share of USD-invoiced imports has been approximately 70% since 2000.[25] Therefore, for Japanese imports from each country, it is the exchange rates with USD that may matter, rather than those with each country's currency. In our empirical framework, the effects of the exchange rates with USD are controlled for by the (prefecture-) year fixed effects.

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variables is to restrict the sample products only to those that had 1996 MFN rates higher than their median. Namely, we focus on the pass-through in products with a more drastic reduction in MFN rates. The results are qualitatively unchanged and are available in Table B6 in Appendix B.

[23] The results for the other variables are available in Table B7 in Appendix B. Also, as another control variable, we introduce import penetration ratios from China, which are constructed by employing the Census of Manufacture and trade statistics in Japan. The results are reported in Table B8 and show the similar results. The coefficients for the import penetration ratios are estimated to be significantly positive, indicating that the margin ratio is higher in the sectors with the larger imports from China. This result seems to reflect an increase in cheap procurements from China.

[24] This result does not change even when excluding all tariff-related variables. The results are shown in Table B9 in Appendix B.

[25] http://www.customs.go.jp/toukei/shinbun/trade-st/tuuka.htm

Finally, we further control for tariffs' heterogeneous effects on the margin ratio from various dimensions. First, to investigate if the magnitude of the tariff pass-through differs by the size of wholesalers, we introduce the interaction term of tariffs with the log of the number of employees. For example, the larger-sized wholesalers may enjoy the larger portion of the tariff rent because of their stronger bargaining power in the negotiation. Second, to investigate if the extent of competition in the wholesale market affects the magnitude of tariff pass-through, we introduce the interaction term of tariffs with the Herfindahl index. For example, when tariffs decrease, wholesalers may not be able to raise their margin ratio if the competition in the market is tough. The results for only tariff-related variables are shown in Table 9.[26] Among the previous tariff-related variables, only the estimated coefficients for the interaction term with the importer dummy are significant and have the expected sign. The new interaction terms mostly have insignificant coefficients. The significant coefficient for the interaction term with the number of employees can be found in columns (II) and (V) but has a sign opposite to our expectations.

=== Table 9 ===

5. Concluding Remarks

This study empirically examined a tariff pass-through in wholesaling by employing Japanese wholesale firm-level data. We found that importing wholesalers significantly raise their margin ratio against a tariff reduction. On average, a 1% reduction in tariffs raises the margin ratio by approximately 0.25 percentage points. This magnitude is equivalent to a rise in sales prices relative to procurement prices by approximately 0.34%. In addition, for comparison purposes, we investigated a tariff pass-through for import and consumer prices and found that a 1% reduction in tariffs raises import prices by 0.49% and decreases consumer prices by 0.08%. Although we should be cautious about the comparison of the magnitude across players, at the very least, our results may suggest that wholesalers in the importing country enjoy a smaller portion of tariff rent than producers in the exporting country but a larger portion than consumers in the importing country. However, it should be noted that our result for consumer prices includes the effects on domestic product prices. Therefore, the tariff pass-through in the consumer prices of imported products may be higher than our estimate.

We found that a tariff reduction presents relatively small benefits to the consumers, while relatively large benefits go to foreign producers and domestic wholesalers. Such relatively small benefits may indicate that consumers have a relatively inelastic demand

[26] The results for the other variables are available in Table B10 in Appendix B.

with respect to prices compared to producers and wholesalers. Furthermore, the smaller benefits are consistent with the public view in Japan that consumers recognize few benefits generated by RTAs. Nevertheless, this result does not necessarily mean that the welfare gain from a tariff reduction is small at a national level because of the large gain for other players, especially wholesalers. Furthermore, the recent increase of business-to-consumer cross-border e-commerce may decrease the role of wholesalers and retailers and enable consumers to obtain a larger portion of tariff rent.

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Table 1. Tariff Pass-through in Import Prices

	(I)	(II)	(III)	(IV)	(V)	(VI)
ln (1 + Tariff)	-0.2416***	-0.4554***	-0.4925***			
	[0.0789]	[0.1126]	[0.1225]			
Tariff				-0.2115***	-0.4059***	-0.4380***
				[0.0679]	[0.1018]	[0.1111]
Exporter-HS6 FE	X	X	X	X	X	X
Exporter-Year FE	X	X	X	X	X	X
HS6-Year FE		X	X		X	X
Sample	All	All	Common	All	All	Common
R-squared	0.8454	0.8516	0.8588	0.8454	0.8516	0.8588
Number of obs	1,523,325	1,517,612	1,077,420	1,523,325	1,517,612	1,077,420

Notes: The dependent variable is a log of import prices. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. In the parenthesis is the standard error clustered by exporting country-HS six-digit code. In column "Common," we restrict sample products only to those covered in our analysis for wholesaling.

Table 2. Tariff Pass-through in Consumer Prices

	(I)	(II)	(III)	(IV)	(V)	(VI)
ln (1 + Tariff)	0.1036*	0.1085*	0.0796*			
	[0.0606]	[0.0614]	[0.0436]			
Tariff * 100				0.0385**	0.0403***	0.0331***
				[0.0156]	[0.0155]	[0.0117]
ln Import price		0.0442	0.0517*		0.0439	0.0515*
		[0.0318]	[0.0309]		[0.0318]	[0.0308]
Sample	All	All	Common	All	All	Common
Number of obs.	1,484	1,484	1,405	1,484	1,484	1,405
Adj R-squared	0.9928	0.9928	0.9955	0.9928	0.9928	0.9955

Notes: The dependent variable is a log of consumer prices. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. In the parenthesis is the standard error clustered by products. In all specifications, we control for product and year fixed effects. In column "Common," we restrict sample products only to those covered in our analysis for wholesaling.

Table 3. Baseline Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Margin	164,256	0.267	0.169	0	1.000
ln (1 + Tariff)	164,256	0.067	0.099	0	1.774
ln (1 + Tariff) * Importer	164,256	0.002	0.016	0	1.774
ln (1 + Tariff) * Second-tier	164,256	0.044	0.090	0	1.774
Importer dummy	164,256	0.036	0.186	0	1
Second-tier	164,256	0.654	0.476	0	1
ln Employee	164,256	2.046	1.019	0	8.923
Cash/card dummy	164,256	0.866	0.340	0	1
HHI	164,256	0.023	0.049	0.001	0.901
ln # of Units	164,256	0.201	0.527	0	7.601
RCA	164,256	-1.616	1.750	-6.353	2.032
ln Exchange	164,256	-0.006	0.231	-0.663	0.846
ln Exchange * Importer	164,256	-0.001	0.047	-0.663	0.846
ln Exchange * Second-tier	164,256	-0.005	0.190	-0.663	0.846

Source: Authors' computation.

Table 4. Baseline Results by OLS

	(I)	(II)	(III)	(IV)	(V)
ln (1 + Tariff)	0.0046	0.0061	0.0068	0.0014	-0.007
	[0.0104]	[0.0104]	[0.0106]	[0.0117]	[0.0111]
ln (1 + Tariff) * Importer	-0.0474	-0.0681	-0.0358	-0.1138*	-0.0123
	[0.0502]	[0.0530]	[0.0496]	[0.0662]	[0.0500]
ln (1 + Tariff) * Second-tier	0.0022	0.0022	-0.0003	0.0034	0.0065
	[0.0110]	[0.0110]	[0.0113]	[0.0125]	[0.0120]
Importer dummy	0.0090*	0.0108**	0.006	0.0123**	0.004
	[0.0049]	[0.0049]	[0.0051]	[0.0055]	[0.0053]
Second-tier	0.0008	0.001	0.001	0.0004	0.001
	[0.0014]	[0.0014]	[0.0016]	[0.0016]	[0.0016]
ln Employee	0.0016	0.001	0.0024	0.0012	0.0006
	[0.0014]	[0.0014]	[0.0015]	[0.0015]	[0.0015]
Cash/card dummy	-0.0079***	-0.0086***	-0.0067***	-0.0078***	-0.0081***
	[0.0018]	[0.0018]	[0.0019]	[0.0019]	[0.0019]
HHI	-0.0099	-0.0087	-0.0029	-0.0133	-0.0014
	[0.0111]	[0.0110]	[0.0124]	[0.0118]	[0.0125]
ln # of Units	0.0146***	0.0142***	0.0144***	0.0145***	
	[0.0017]	[0.0017]	[0.0018]	[0.0018]	
Margin = 0	Incl.	Excl.	Incl.	Incl.	Incl.
Tariff = 0	Incl.	Incl.	Excl.	Incl.	Incl.
Top share > 50%				X	
Single establishment					X
R-squared	0.6925	0.7007	0.688	0.6967	0.6938
Number of obs	164,256	161,984	139,987	146,020	136,608

Notes: The dependent variable is a margin ratio. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. In the parenthesis is the standard error clustered by wholesale sectors. In all specifications, we control for firm and prefecture-year fixed effects. In "Top share > 50%," we restrict sample wholesalers only to those in which the five-digit sector code with the largest sales accounts for more than 50% in terms of sales. In "Single establishment," we restrict only to those with the only single establishment.

Table 5. IV Results

	(I)	(II)	(III)	(IV)	(V)
ln (1 + Tariff)	0.1275***	0.1120***	0.0473	0.1642***	0.1375***
	[0.0433]	[0.0428]	[0.0414]	[0.0592]	[0.0490]
ln (1 + Tariff) * Importer	-0.3797***	-0.4247***	-0.3424***	-0.4237***	-0.3010**
	[0.1020]	[0.1016]	[0.1071]	[0.1180]	[0.1202]
ln (1 + Tariff) * Second-tier	0.0122	0.0074	0.0081	0.011	0.0086
	[0.0246]	[0.0243]	[0.0263]	[0.0270]	[0.0279]
Importer dummy	0.0289***	0.0323***	0.0265***	0.0305***	0.0220***
	[0.0074]	[0.0073]	[0.0082]	[0.0082]	[0.0085]
Second-tier	0.0002	0.001	0.0004	0.0001	0.001
	[0.0020]	[0.0020]	[0.0024]	[0.0022]	[0.0023]
ln Employee	0.0013	0.001	0.002	0.0009	0.0003
	[0.0014]	[0.0014]	[0.0015]	[0.0015]	[0.0016]
Cash/card dummy	-0.0080***	-0.0087***	-0.0067***	-0.0079***	-0.0081***
	[0.0018]	[0.0018]	[0.0019]	[0.0019]	[0.0019]
HHI	-0.0144	-0.0126	-0.005	-0.016	-0.0055
	[0.0112]	[0.0112]	[0.0126]	[0.0119]	[0.0127]
ln # of Units	0.0145***	0.0141***	0.0143***	0.0144***	
	[0.0017]	[0.0017]	[0.0018]	[0.0018]	
Margin = 0	Incl.	Excl.	Incl.	Incl.	Incl.
Tariff = 0	Incl.	Incl.	Excl.	Incl.	Incl.
Top share > 50%				X	
Single establishment					X
Underidentification test	785.8	771.5	720.6	529.3	665.8
Weak identification test	304.2	298.5	290.6	198.1	257.3
Centered R-squared	0.6915	0.6999	0.6877	0.6955	0.6926
Number of obs	164,256	161,984	139,987	146,020	136,608

Notes: The dependent variable is a margin ratio. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. In the parenthesis is the standard error clustered by wholesale sectors. In all specifications, we control for firm and prefecture-year fixed effects. In "Top share > 50%," we restrict sample wholesalers only to those in which the five-digit sector code with the largest sales accounts for more than 50% in terms of sales. In "Single establishment," we restrict only to those with the only single establishment. In underidentification and weak identification tests, we report Kleibergen-Paap rk LM statistic and Kleibergen-Paap rk Wald F statistic, respectively.

Table 6. IV Results: Non-logged Tariffs

	(I)	(II)	(II)	(III)	(IV)
Tariff	0.1599***	0.1405***	0.0605	0.2016***	0.1712***
	[0.0534]	[0.0529]	[0.0515]	[0.0721]	[0.0602]
Tariff * Importer	-0.4241***	-0.4731***	-0.3823***	-0.4643***	-0.3403**
	[0.1120]	[0.1115]	[0.1184]	[0.1276]	[0.1330]
Tariff * Second-tier	0.0139	0.0082	0.0093	0.0123	0.0096
	[0.0286]	[0.0283]	[0.0311]	[0.0312]	[0.0324]
Importer dummy	0.0301***	0.0335***	0.0276***	0.0315***	0.0231***
	[0.0076]	[0.0075]	[0.0085]	[0.0083]	[0.0087]
Second-tier	0.0002	0.001	0.0004	0.0001	0.001
	[0.0021]	[0.0021]	[0.0025]	[0.0023]	[0.0024]
ln Employee	0.0014	0.001	0.002	0.0009	0.0003
	[0.0014]	[0.0014]	[0.0015]	[0.0015]	[0.0016]
Cash/card dummy	-0.0079***	-0.0087***	-0.0067***	-0.0079***	-0.0081***
	[0.0018]	[0.0018]	[0.0019]	[0.0019]	[0.0019]
HHI	-0.0142	-0.0125	-0.0051	-0.016	-0.0055
	[0.0112]	[0.0111]	[0.0126]	[0.0119]	[0.0127]
ln # of Units	0.0145***	0.0141***	0.0143***	0.0144***	
	[0.0017]	[0.0017]	[0.0018]	[0.0018]	
Margin = 0	Incl.	Excl.	Incl.	Incl.	Incl.
Tariff = 0	Incl.	Incl.	Excl.	Incl.	Incl.
Top share > 50%				X	
Single establishment					X
Underidentification test	1015.3	997.8	928.7	698.0	860.5
Weak identification test	408.8	401.7	396.1	269.2	345.7
Centered R-squared	0.6918	0.7001	0.6878	0.6958	0.693
Number of obs	164,256	161,984	139,987	146,020	136,608

Notes: The dependent variable is a margin ratio. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. In the parenthesis is the standard error clustered by wholesale sectors. In all specifications, we control for firm and prefecture-year fixed effects. In "Top share > 50%," we restrict sample wholesalers only to those in which the five-digit sector code with the largest sales accounts for more than 50% in terms of sales. In "Single establishment," we restrict only to those with the only single establishment. In underidentification and weak identification tests, we report Kleibergen-Paap rk LM statistic and Kleibergen-Paap rk Wald F statistic, respectively.

Table 7. IV Results: Alternative Tariffs

	(I)	(II)	(III)	(IV)	(V)
ln (1 + Tariff)	0.2865***	0.2514***	0.1149	0.3194***	0.3042***
	[0.0917]	[0.0910]	[0.0919]	[0.1134]	[0.1029]
ln (1 + Tariff) * Importer	-0.4555***	-0.4994***	-0.3950***	-0.4721***	-0.3847***
	[0.1124]	[0.1118]	[0.1192]	[0.1238]	[0.1361]
ln (1 + Tariff) * Second-tier	0.023	0.0149	0.0157	0.0202	0.0171
	[0.0374]	[0.0371]	[0.0430]	[0.0401]	[0.0427]
Importer dummy	0.0319***	0.0351***	0.0286***	0.0323***	0.0255***
	[0.0076]	[0.0075]	[0.0086]	[0.0082]	[0.0089]
Second-tier	-0.0003	0.001	0.0000	-0.0004	0.0002
	[0.0024]	[0.0024]	[0.0031]	[0.0026]	[0.0028]
ln Employee	0.0013	0.001	0.0022	0.0009	0.0003
	[0.0014]	[0.0014]	[0.0015]	[0.0015]	[0.0016]
Cash/card dummy	-0.0078***	-0.0086***	-0.0067***	-0.0078***	-0.0080***
	[0.0018]	[0.0018]	[0.0019]	[0.0019]	[0.0019]
HHI	-0.0106	-0.0094	-0.0036	-0.0124	-0.0018
	[0.0111]	[0.0111]	[0.0125]	[0.0118]	[0.0126]
ln # of Units	0.0146***	0.0142***	0.0144***	0.0145***	
	[0.0017]	[0.0017]	[0.0018]	[0.0018]	
Margin = 0	Incl.	Excl.	Incl.	Incl.	Incl.
Tariff = 0	Incl.	Incl.	Excl.	Incl.	Incl.
Top share > 50%				X	
Single establishment					X
Underidentification test	763.9	752.2	656.4	543.6	635.3
Weak identification test	287.2	282.8	257.2	200.7	237.7
Centered R-squared	0.6878	0.6878	0.6878	0.6878	0.6928
Number of obs	164,256	161,984	139,987	146,020	136,608

Notes: The dependent variable is a margin ratio. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. In the parenthesis is the standard error clustered by wholesale sectors. In all specifications, we control for firm and prefecture-year fixed effects. In this table, we use the tariff variable that is constructed by excluding products with tariffs over 100%. In "Top share > 50%," we restrict sample wholesalers only to those in which the five-digit sector code with the largest sales accounts for more than 50% in terms of sales. In "Single establishment," we restrict only to those with the only single establishment. In underidentification and weak identification tests, we report Kleibergen-Paap rk LM statistic and Kleibergen-Paap rk Wald F statistic, respectively.

Table 8. IV Results: Exchange Rates

	(I)	(II)	(III)	(IV)	(V)
ln (1 + Tariff)	0.1249***	0.1091**	0.0475	0.1622***	0.1372***
	[0.0434]	[0.0429]	[0.0414]	[0.0594]	[0.0491]
ln (1 + Tariff) * Importer	-0.3840***	-0.4244***	-0.3429***	-0.4314***	-0.3015**
	[0.1034]	[0.1031]	[0.1081]	[0.1203]	[0.1215]
ln (1 + Tariff) * Second-tier	0.0114	0.0068	0.0083	0.0097	0.0079
	[0.0246]	[0.0244]	[0.0264]	[0.0271]	[0.0280]
ln Exchange	-0.004	-0.0049	0.0003	-0.0015	-0.0001
	[0.0041]	[0.0041]	[0.0042]	[0.0044]	[0.0046]
ln Exchange * Importer	-0.0018	0.0029	-0.0007	-0.0059	-0.0004
	[0.0097]	[0.0096]	[0.0098]	[0.0102]	[0.0110]
ln Exchange * Second-tier	-0.0003	0.0003	0.0003	-0.002	-0.0016
	[0.0037]	[0.0037]	[0.0039]	[0.0040]	[0.0042]
Margin = 0	Incl.	Excl.	Incl.	Incl.	Incl.
Tariff = 0	Incl.	Incl.	Excl.	Incl.	Incl.
Top share > 50%				X	
Single establishment					X
Underidentification test	754.6	740.5	693.6	510.1	641.2
Weak identification test	289.4	283.8	276.7	189.5	245.5
Centered R-squared	0.6915	0.6999	0.6877	0.6955	0.6926
Number of obs	164,256	161,984	139,987	146,020	136,608

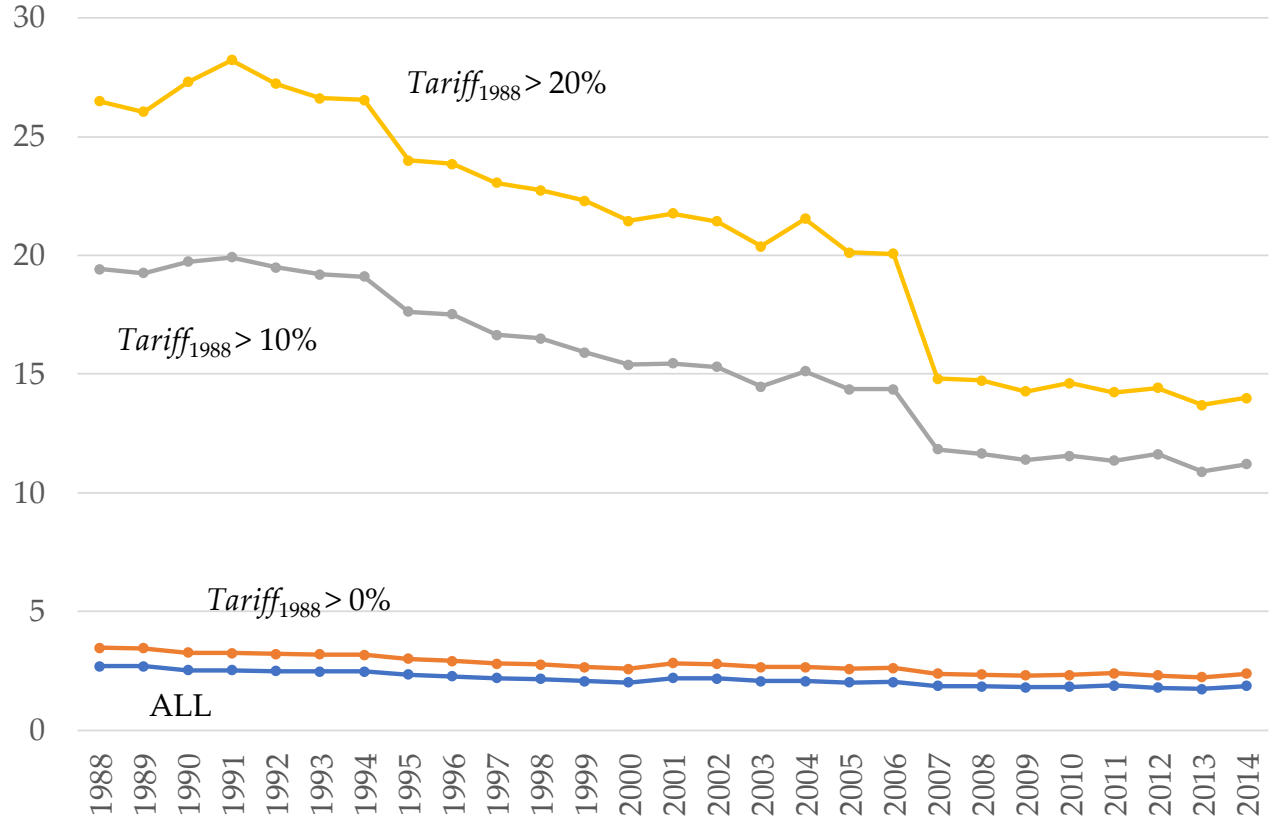
Notes: The dependent variable is a margin ratio. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. In the parenthesis is the standard error clustered by wholesale sectors. In all specifications, we control for firm and prefecture-year fixed effects. In "Top share > 50%," we restrict sample wholesalers only to those in which the five-digit sector code with the largest sales accounts for more than 50% in terms of sales. In "Single establishment," we restrict only to those with the only single establishment. In underidentification and weak identification tests, we report Kleibergen-Paap rk LM statistic and Kleibergen-Paap rk Wald F statistic, respectively. The results in the remaining variables are available in Table B6 in Appendix B.

Table 9. IV Results: Heterogenous Pass-through

	(I)	(II)	(III)	(IV)	(V)
ln (1 + Tariff)	0.0425	-0.001	-0.0265	0.0925	0.019
	[0.0697]	[0.0684]	[0.0693]	[0.0840]	[0.0788]
ln (1 + Tariff) * Importer	-0.3786***	-0.4234***	-0.3430***	-0.4230***	-0.3025**
	[0.1020]	[0.1017]	[0.1072]	[0.1180]	[0.1201]
ln (1 + Tariff) * Second-tier	0.0126	0.0078	0.0087	0.0116	0.0093
	[0.0247]	[0.0244]	[0.0264]	[0.0270]	[0.0280]
ln (1 + Tariff) * ln Employee	0.034	0.0451**	0.032	0.030	0.0593**
	[0.0225]	[0.0222]	[0.0231]	[0.0259]	[0.0278]
ln (1 + Tariff) * HHI	0.3892	0.525	0.1578	0.3516	0.292
	[0.7448]	[0.7313]	[0.5082]	[1.1266]	[0.9706]
Margin = 0	Incl.	Excl.	Incl.	Incl.	Incl.
Tariff = 0	Incl.	Incl.	Excl.	Incl.	Incl.
Top share > 50%				X	
Single establishment					X
Underidentification test	344.5	351.0	707.7	137.2	179.1
Weak identification test	63.8	65.6	171.9	23.4	30.3
Centered R-squared	0.6915	0.6998	0.6877	0.6955	0.6925
Number of obs	164,256	161,984	139,987	146,020	136,608

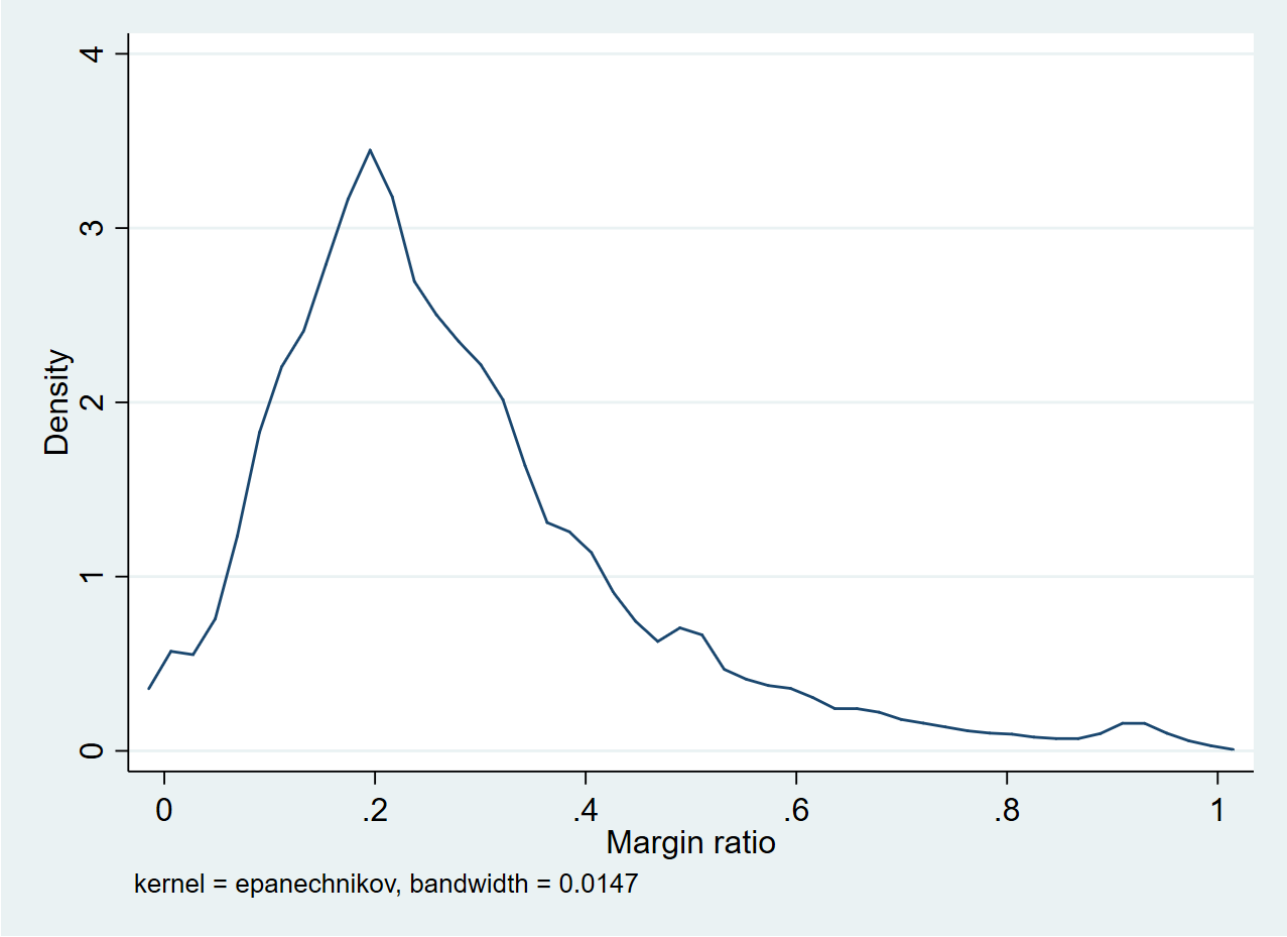
Notes: The dependent variable is a margin ratio. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. In the parenthesis is the standard error clustered by wholesale sectors. In all specifications, we control for firm and prefecture-year fixed effects. In this table, we report the results in only tariff-related variables. In "Top share > 50%," we restrict sample wholesalers only to those in which the five-digit sector code with the largest sales accounts for more than 50% in terms of sales. In "Single establishment," we restrict only to those with the only single establishment. In underidentification and weak identification tests, we report Kleibergen-Paap rk LM statistic and Kleibergen-Paap rk Wald F statistic, respectively. The results in the remaining variables are available in Table B7 in Appendix B.

Figure 1. Trend of Simple Average of Applied Tariff Rates in Japan (%)



Source: Authors' compilation using WITS.

Figure 2. Distribution of Margin Ratios in 2006



Source: Authors' compilation.

Online Appendix for "Tariff Pass-through in Wholesaling: Evidence from Firm-level Data in Japan"

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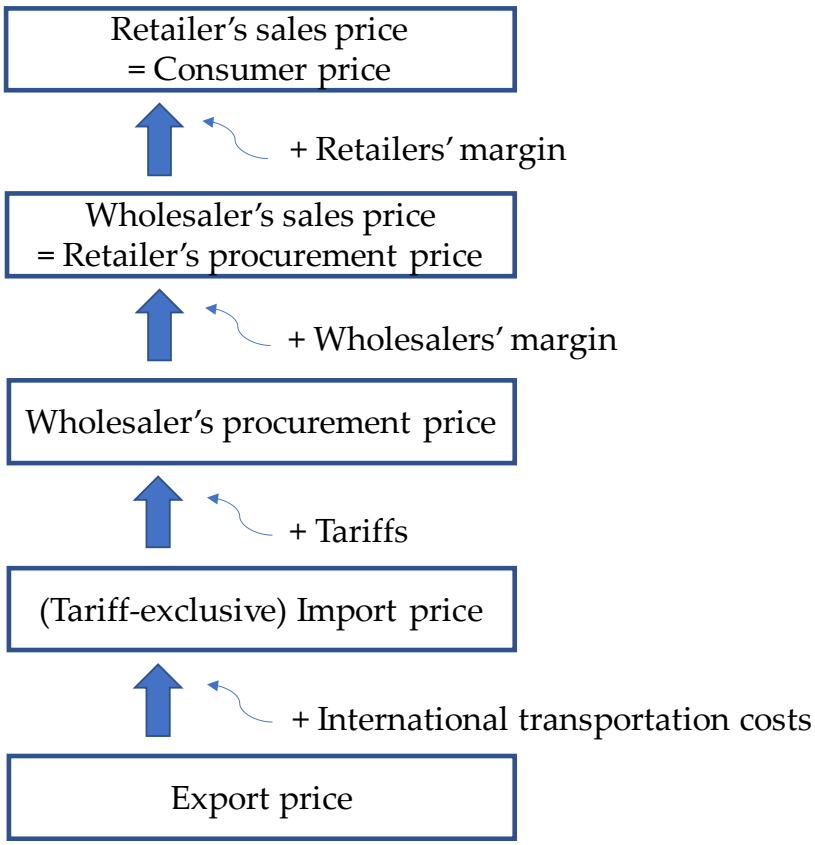
Appendix A. Prices



Source: Authors' compilation.

Note. In this figure, we neglect other local players such as distribution services providers or domestic transportation sectors.

Appendix B. Tables

Table B1. Description of Wholesale Sectors: Two- and Three-digit Levels

2-digit	3-digit	Description
50		Textile and apparel
	501	Textile products (except apparel, apparel accessories and notions)
	502	Apparel, apparel accessories and notions
51		Food and beverages
	511	Agricultural, animal and poultry farm and aquatic products
	512	Food and beverages
52		Building materials, minerals and metals, etc.
	521	Building materials
	522	Chemicals and related products
	523	Minerals and metals
	524	Recovered material
53		Machinery and equipment
	531	General machinery and equipment
	532	Motor vehicles
	533	Electrical machinery, equipment and supllies
	539	Miscellaneous machinery and equipment
54		Miscellaneous wholesale trade
	541	Furniture, fixtures and house furnishings
	542	Drugs and toiletries
	549	Other products, n.e.c

Source: Census of Commerce

Table B2. Baseline Results by OLS (Alternative Tariffs)

	(I)	(II)	(III)	(IV)	(V)
ln (1 + Tariff)	0.0408**	0.0483**	0.0485**	0.0282	0.028
	[0.0199]	[0.0197]	[0.0205]	[0.0220]	[0.0227]
ln (1 + Tariff) * Importer	-0.1164*	-0.1504**	-0.1073	-0.1321*	-0.0656
	[0.0666]	[0.0664]	[0.0691]	[0.0719]	[0.0772]
ln (1 + Tariff) * Second-tier	-0.0156	-0.0182	-0.0245	-0.0164	-0.01
	[0.0188]	[0.0187]	[0.0199]	[0.0204]	[0.0214]
Importer dummy	0.0128**	0.0153***	0.0107*	0.0132**	0.007
	[0.0053]	[0.0052]	[0.0057]	[0.0056]	[0.0060]
Second-tier	0.0018	0.003	0.0026	0.0016	0.002
	[0.0016]	[0.0016]	[0.0018]	[0.0018]	[0.0018]
ln Employee	0.0016	0.0009	0.0023	0.0012	0.0006
	[0.0014]	[0.0014]	[0.0015]	[0.0015]	[0.0015]
Cash/card dummy	-0.0079***	-0.0086***	-0.0067***	-0.0078***	-0.0081***
	[0.0018]	[0.0018]	[0.0019]	[0.0019]	[0.0019]
HHI	-0.0098	-0.0086	-0.0028	-0.0132	-0.0015
	[0.0111]	[0.0110]	[0.0124]	[0.0118]	[0.0125]
ln # of Units	0.0146***	0.0142***	0.0144***	0.0145***	
	[0.0017]	[0.0017]	[0.0018]	[0.0018]	
Margin = 0	Incl.	Excl.	Incl.	Incl.	Incl.
Tariff = 0	Incl.	Incl.	Excl.	Incl.	Incl.
Top share > 50%				X	
Single establishment					X
R-squared	0.6925	0.7007	0.688	0.6967	0.6938
Number of obs	164,256	161,984	139,987	146,020	136,608

Notes: The dependent variable is a margin ratio. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. In the parenthesis is the standard error clustered by wholesale sectors. In all specifications, we control for firm and prefecture-year fixed effects. In this table, we use the tariff variable that is constructed by excluding products with tariffs over 100%. In "Top share > 50%," we restrict sample wholesalers only to those in which the five-digit sector code with the largest sales accounts for more than 50% in terms of sales. In "Single establishment," we restrict only to those with the only single establishment.

Table B3. IV Results: Non-logged Tariffs (Alternative Tariffs)

	(I)	(II)	(II)	(III)	(IV)
Tariff	0.3169***	0.2781***	0.1284	0.3531***	0.3361***
	[0.1012]	[0.1005]	[0.1024]	[0.1251]	[0.1136]
Tariff * Importer	-0.4944***	-0.5417***	-0.4304***	-0.5118***	-0.4181***
	[0.1215]	[0.1209]	[0.1297]	[0.1335]	[0.1472]
Tariff * Second-tier	0.0247	0.016	0.0172	0.0213	0.0184
	[0.0410]	[0.0406]	[0.0476]	[0.0440]	[0.0468]
Importer dummy	0.0328***	0.0360***	0.0295***	0.0331***	0.0263***
	[0.0078]	[0.0077]	[0.0088]	[0.0084]	[0.0091]
Second-tier	-0.0003	0.001	0.0000	-0.0004	0.0002
	[0.0025]	[0.0025]	[0.0032]	[0.0027]	[0.0028]
ln Employee	0.0013	0.001	0.002	0.0009	0.0003
	[0.0014]	[0.0014]	[0.0015]	[0.0015]	[0.0016]
Cash/card dummy	-0.0078***	-0.0086***	-0.0067***	-0.0078***	-0.0080***
	[0.0018]	[0.0018]	[0.0019]	[0.0019]	[0.0019]
HHI	-0.0103	-0.0091	-0.0036	-0.0121	-0.0015
	[0.0111]	[0.0111]	[0.0125]	[0.0119]	[0.0126]
ln # of Units	0.0146***	0.0142***	0.0144***	0.0145***	
	[0.0017]	[0.0017]	[0.0018]	[0.0018]	
Margin = 0	Incl.	Excl.	Incl.	Incl.	Incl.
Tariff = 0	Incl.	Incl.	Excl.	Incl.	Incl.
Top share > 50%				X	
Single establishment					X
Underidentification test	778.2	766.1	664.7	555.4	646.5
Weak identification test	291.0	286.4	259.1	204.0	240.5
Centered R-squared	0.6928	0.6927	0.692	0.6956	0.6956
Number of obs	139,987	139,987	139,987	146,020	146,020

Notes: The dependent variable is a margin ratio. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. In the parenthesis is the standard error clustered by wholesale sectors. In all specifications, we control for firm and prefecture-year fixed effects. In this table, we use the tariff variable that is constructed by excluding products with tariffs over 100%. In "Top share > 50%," we restrict sample wholesalers only to those in which the five-digit sector code with the largest sales accounts for more than 50% in terms of sales. In "Single establishment," we restrict only to those with the only single establishment. In underidentification and weak identification tests, we report Kleibergen-Paap rk LM statistic and Kleibergen-Paap rk Wald F statistic, respectively.

Table B4. IV Results: Exchange Rates (Alternative Tariffs)

	(I)	(II)	(III)	(IV)	(V)
ln (1 + Tariff)	0.2856***	0.2495***	0.1175	0.3197***	0.3086***
	[0.0935]	[0.0928]	[0.0935]	[0.1156]	[0.1049]
ln (1 + Tariff) * Importer	-0.4608***	-0.5000***	-0.3973***	-0.4794***	-0.3859***
	[0.1142]	[0.1135]	[0.1206]	[0.1259]	[0.1380]
ln (1 + Tariff) * Second-tier	0.023	0.0151	0.0167	0.0196	0.0174
	[0.0377]	[0.0373]	[0.0433]	[0.0405]	[0.0430]
ln Exchange	-0.0003	-0.0016	0.0019	0.0017	0.0038
	[0.0043]	[0.0042]	[0.0044]	[0.0046]	[0.0048]
ln Exchange * Importer	-0.0044	0.0002	-0.0026	-0.0071	-0.003
	[0.0096]	[0.0095]	[0.0097]	[0.0101]	[0.0111]
ln Exchange * Second-tier	0.0003	0.0008	0.0006	-0.0015	-0.001
	[0.0037]	[0.0037]	[0.0039]	[0.0040]	[0.0042]
Importer dummy	0.0319***	0.0351***	0.0285***	0.0322***	0.0255***
	[0.0076]	[0.0075]	[0.0086]	[0.0082]	[0.0089]
Second-tier	-0.0003	0.001	0.0000	-0.0003	0.0002
	[0.0025]	[0.0024]	[0.0031]	[0.0026]	[0.0028]
ln Employee	0.0013	0.001	0.002	0.0008	0.0002
	[0.0014]	[0.0014]	[0.0015]	[0.0015]	[0.0016]
Cash/card dummy	-0.0078***	-0.0086***	-0.0067***	-0.0078***	-0.0080***
	[0.0018]	[0.0018]	[0.0019]	[0.0019]	[0.0019]
HHI	-0.0106	-0.0091	-0.0042	-0.0125	-0.0025
	[0.0111]	[0.0111]	[0.0125]	[0.0119]	[0.0126]
ln # of Units	0.0146***	0.0142***	0.0144***	0.0145***	
	[0.0017]	[0.0017]	[0.0018]	[0.0018]	
Margin = 0	Incl.	Excl.	Incl.	Incl.	Incl.
Tariff = 0	Incl.	Incl.	Excl.	Incl.	Incl.
Top share > 50%				X	
Single establishment					X
Underidentification test	741.3	729.3	636.3	530.9	616.6
Weak identification test	276.2	271.6	246.9	194.5	228.7
Centered R-squared	0.6956	0.6949	0.7	0.7	0.7
Number of obs	146,020	146,020	161,984	161,984	161,984

Notes: The dependent variable is a margin ratio. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. In the parenthesis is the standard error clustered by wholesale sectors. In all specifications, we control for firm and prefecture-year fixed effects. In this table, we use the tariff variable that is constructed by excluding products with tariffs over 100%. In "Top share > 50%," we restrict sample wholesalers only to those in which the five-digit sector code with the largest sales accounts for more than 50% in terms of sales. In "Single establishment," we restrict only to those with the only single establishment. In underidentification and weak identification tests, we report Kleibergen-Paap rk LM statistic and Kleibergen-Paap rk Wald F statistic, respectively.

Table B5. IV Results: Heterogenous Pass-through (Alternative Tariffs)

	(I)	(II)	(III)	(IV)	(V)
ln (1 + Tariff)	0.1192	0.0483	-0.0231	0.2152	0.060
	[0.1178]	[0.1167]	[0.1238]	[0.1427]	[0.1325]
ln (1 + Tariff) * Importer	-0.4520***	-0.4957***	-0.3926***	-0.4727***	-0.3869***
	[0.1122]	[0.1116]	[0.1191]	[0.1238]	[0.1363]
ln (1 + Tariff) * Second-tier	0.0192	0.0116	0.0149	0.0202	0.014
	[0.0377]	[0.0374]	[0.0432]	[0.0402]	[0.0432]
ln (1 + Tariff) * ln Employee	0.058	0.0744**	0.056	0.043	0.1033**
	[0.0353]	[0.0349]	[0.0383]	[0.0381]	[0.0442]
ln (1 + Tariff) * HHI	2.5647	2.643	0.7335	3.0242	3.253
	[1.7140]	[1.6837]	[0.9145]	[2.7145]	[2.7626]
Importer dummy	0.0319***	0.0351***	0.0286***	0.0324***	0.0258***
	[0.0076]	[0.0075]	[0.0086]	[0.0082]	[0.0089]
Second-tier	-0.0001	0.001	0.0001	-0.0003	0.0004
	[0.0025]	[0.0024]	[0.0031]	[0.0026]	[0.0028]
ln Employee	-0.0021	-0.004	-0.002	-0.0016	-0.0057*
	[0.0025]	[0.0025]	[0.0030]	[0.0027]	[0.0030]
Cash/card dummy	-0.0078***	-0.0085***	-0.0066***	-0.0077***	-0.0080***
	[0.0018]	[0.0018]	[0.0019]	[0.0019]	[0.0019]
HHI	-0.1057*	-0.1076*	-0.0372	-0.1255	-0.123
	[0.0636]	[0.0627]	[0.0429]	[0.1017]	[0.1021]
ln # of Units	0.0145***	0.0141***	0.0143***	0.0143***	
	[0.0017]	[0.0017]	[0.0018]	[0.0018]	
Margin = 0	Incl.	Excl.	Incl.	Incl.	Incl.
Tariff = 0	Incl.	Incl.	Excl.	Incl.	Incl.
Top share > 50%				X	
Single establishment					X
Underidentification test	116.7	119.4	666.7	43.2	42.0
Weak identification test	18.3	18.7	157.8	7.2	6.8
Centered R-squared	0.6996	0.6916	0.6916	0.6916	0.6912
Number of obs	161,984	164,256	164,256	164,256	164,256

Notes: The dependent variable is a margin ratio. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. In the parenthesis is the standard error clustered by wholesale sectors. In all specifications, we control for firm and prefecture-year fixed effects. In this table, we use the tariff variable that is constructed by excluding products with tariffs over 100%. In this table, we report the results in only tariff-related variables. In "Top share > 50%," we restrict sample wholesalers only to those in which the five-digit sector code with the largest sales accounts for more than 50% in terms of sales. In "Single establishment," we restrict only to those with the only single establishment. In underidentification and weak identification tests, we report Kleibergen-Paap rk LM statistic and Kleibergen-Paap rk Wald F statistic, respectively.

Table B6. IV Results: Only High-tariff Products

	(I)	(II)	(III)	(IV)	(V)
ln (1 + Tariff)	0.06	0.0473	0.0547	0.093	0.052
	[0.0487]	[0.0482]	[0.0489]	[0.0630]	[0.0532]
ln (1 + Tariff) * Importer	-0.4064**	-0.4409***	-0.4105**	-0.4588**	-0.3215*
	[0.1579]	[0.1579]	[0.1587]	[0.1824]	[0.1826]
ln (1 + Tariff) * Second-tier	0.0012	0.01	0.0013	-0.0179	0.0022
	[0.0325]	[0.0323]	[0.0329]	[0.0348]	[0.0364]
Importer dummy	0.0359**	0.0386**	0.0362**	0.0387**	0.024
	[0.0152]	[0.0151]	[0.0153]	[0.0169]	[0.0170]
Second-tier	0.0004	0.000	0.0003	0.0025	0.0004
	[0.0038]	[0.0037]	[0.0038]	[0.0040]	[0.0042]
ln Employee	0.0019	0.002	0.0021	0.0021	0.0011
	[0.0017]	[0.0017]	[0.0017]	[0.0018]	[0.0019]
Cash/card dummy	-0.0064***	-0.0076***	-0.0064***	-0.0061***	-0.0067***
	[0.0022]	[0.0022]	[0.0022]	[0.0023]	[0.0024]
HHI	0.0074	0.0089	0.0095	0.0102	0.0194
	[0.0174]	[0.0173]	[0.0174]	[0.0187]	[0.0192]
ln # of Units	0.0169***	0.0166***	0.0168***	0.0160***	
	[0.0021]	[0.0021]	[0.0021]	[0.0023]	
Margin = 0	Incl.	Excl.	Incl.	Incl.	Incl.
Tariff = 0	Incl.	Incl.	Excl.	Incl.	Incl.
Top share > 50%				X	
Single establishment					X
Underidentification test	451.7	446.8	447.2	269.9	389.4
Weak identification test	184.8	182.8	182.9	106.7	160.3
Centered R-squared	0.6905	0.6979	0.691	0.6957	0.691
Number of obs	136,608	136,608	136,608	136,608	139,987

Notes: The dependent variable is a margin ratio. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. In the parenthesis is the standard error clustered by wholesale sectors. In all specifications, we control for firm and prefecture-year fixed effects. We restrict sample products only to those that had MFN rates in 1996 higher than their median. In "Top share > 50%," we restrict sample wholesalers only to those in which the five-digit sector code with the largest sales accounts for more than 50% in terms of sales. In "Single establishment," we restrict only to those with the only single establishment. In underidentification and weak identification tests, we report Kleibergen-Paap rk LM statistic and Kleibergen-Paap rk Wald F statistic, respectively.

Table B7. The Other Results in Table 8

	(I)	(II)	(III)	(IV)	(V)
Importer dummy	0.0290***	0.0324***	0.0265***	0.0305***	0.0220***
	[0.0074]	[0.0073]	[0.0082]	[0.0081]	[0.0085]
Second-tier	0.0003	0.001	0.0004	0.0001	0.001
	[0.0020]	[0.0020]	[0.0024]	[0.0022]	[0.0023]
ln Employee	0.0014	0.001	0.002	0.0009	0.0003
	[0.0014]	[0.0014]	[0.0015]	[0.0015]	[0.0016]
Cash/card dummy	-0.0079***	-0.0087***	-0.0067***	-0.0079***	-0.0081***
	[0.0018]	[0.0018]	[0.0019]	[0.0019]	[0.0019]
HHI	-0.0133	-0.0114	-0.0052	-0.0154	-0.0053
	[0.0112]	[0.0112]	[0.0126]	[0.0119]	[0.0127]
ln # of Units	0.0144***	0.0141***	0.0143***	0.0144***	
	[0.0017]	[0.0017]	[0.0018]	[0.0018]	
Margin = 0	Incl.	Excl.	Incl.	Incl.	Incl.
Tariff = 0	Incl.	Incl.	Excl.	Incl.	Incl.
Top share > 50%				X	
Single establishment					X
Underidentification test	962.9	874.2	874.2	977.2	419.3
Weak identification test	380.0	344.2	344.2	390.1	160.5
Centered R-squared	0.6978	0.706	0.706	0.7036	0.696
Number of obs	128,009	125,730	125,730	111,590	105,589

Note: This table reports the results in the other variables in Table 8.

Table B8. IV Results: Additional Control

	(I)	(II)	(III)	(IV)
ln (1 + Tariff)	0.054***	0.052***	0.046**	0.053**
	[0.019]	[0.019]	[0.022]	[0.022]
ln (1 + Tariff) * Importer	-0.300***	-0.315***	-0.307***	-0.334***
	[0.092]	[0.091]	[0.101]	[0.111]
ln (1 + Tariff) * Second-tier	-0.009	-0.012	-0.003	-0.008
	[0.022]	[0.022]	[0.025]	[0.025]
China penetration	0.035***	0.033***	0.033***	0.029***
	[0.008]	[0.008]	[0.009]	[0.009]
Importer dummy	0.029***	0.029***	0.027***	0.031***
	[0.009]	[0.009]	[0.009]	[0.010]
Second-tier	0.004*	0.005**	0.003	0.005*
	[0.002]	[0.002]	[0.002]	[0.003]
ln Employee	0.002	0.001	0.002	0.001
	[0.002]	[0.002]	[0.002]	[0.002]
Cash/card dummy	-0.011***	-0.012***	-0.010***	-0.011***
	[0.002]	[0.002]	[0.002]	[0.002]
HHI	-0.014	-0.014	-0.017	-0.009
	[0.013]	[0.013]	[0.014]	[0.015]
ln # of Units	0.015***	0.014***	0.015***	
	[0.002]	[0.002]	[0.002]	
Margin = 0	Incl.	Excl.	Incl.	Incl.
Top share > 50%			X	
Single establishment				X
Underidentification test	962.9	874.2	977.2	419.3
Weak identification test	380.0	344.2	390.1	160.5
Centered R-squared	0.6978	0.706	0.7036	0.696
Number of obs	128,009	125,730	111,590	105,589

Notes: The dependent variable is a margin ratio. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. In the parenthesis is the standard error clustered by wholesale sectors. In all specifications, we control for firm and prefecture-year fixed effects. In "Top share > 50%," we restrict sample wholesalers only to those in which the five-digit sector code with the largest sales accounts for more than 50% in terms of sales. In "Single establishment," we restrict only to those with the only single establishment. In underidentification and weak identification tests, we report Kleibergen-Paap rk LM statistic and Kleibergen-Paap rk Wald F statistic, respectively.

Table B9. IV Results for Exchange Rates

	(I)	(II)	(III)	(IV)	(V)
ln Exchange	-0.004	-0.0048	0.0006	-0.0019	-0.0002
	[0.0041]	[0.0040]	[0.0042]	[0.0044]	[0.0046]
ln Exchange * Importer	0.0018	0.0072	0.0026	-0.0005	0.0013
	[0.0094]	[0.0093]	[0.0096]	[0.0098]	[0.0108]
ln Exchange * Second-tier	-0.001	-0.0003	-0.0001	-0.0033	-0.0024
	[0.0037]	[0.0036]	[0.0039]	[0.0039]	[0.0041]
Importer dummy	0.006	0.0073*	0.004	0.006	0.004
	[0.0041]	[0.0041]	[0.0043]	[0.0043]	[0.0047]
Second-tier	0.0009	0.001	0.0010	0.0006	0.0011
	[0.0012]	[0.0012]	[0.0013]	[0.0013]	[0.0014]
ln Employee	0.0016	0.001	0.002	0.0012	0.0006
	[0.0014]	[0.0014]	[0.0015]	[0.0015]	[0.0015]
Cash/card dummy	-0.0079***	-0.0086***	-0.0067***	-0.0078***	-0.0081***
	[0.0018]	[0.0018]	[0.0019]	[0.0019]	[0.0019]
HHI	-0.0086	-0.0073	-0.0028	-0.0124	-0.0011
	[0.0111]	[0.0110]	[0.0125]	[0.0118]	[0.0125]
ln # of Units	0.0146***	0.0142***	0.0144***	0.0146***	
	[0.0017]	[0.0017]	[0.0018]	[0.0018]	
Margin = 0	Incl.	Excl.	Incl.	Incl.	Incl.
Tariff = 0	Incl.	Incl.	Excl.	Incl.	Incl.
Top share > 50%				X	
Single establishment					X
R-squared	0.6925	0.7007	0.688	0.6967	0.6938
Number of obs	164,256	161,984	139,987	146,020	136,608

Notes: The dependent variable is a margin ratio. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. In the parenthesis is the standard error clustered by wholesale sectors. In all specifications, we control for firm and prefecture-year fixed effects. In "Top share > 50%," we restrict sample wholesalers only to those in which the five-digit sector code with the largest sales accounts for more than 50% in terms of sales. In "Single establishment," we restrict only to those with the only single establishment. In underidentification and weak identification tests, we report Kleibergen-Paap rk LM statistic and Kleibergen-Paap rk Wald F statistic, respectively.

Table B10. The Other Results in Table 9

	(I)	(II)	(III)	(IV)	(V)
Importer dummy	0.0289***	0.0322***	0.0266***	0.0305***	0.0220***
	[0.0074]	[0.0073]	[0.0082]	[0.0082]	[0.0085]
Second-tier	0.0002	0.001	0.0004	0.0000	0.001
	[0.0020]	[0.0020]	[0.0024]	[0.0022]	[0.0023]
ln Employee	-0.001	-0.002	-0.0003	-0.0012	-0.004
	[0.0021]	[0.0021]	[0.0023]	[0.0023]	[0.0025]
Cash/card dummy	-0.0080***	-0.0087***	-0.0067***	-0.0079***	-0.0081***
	[0.0018]	[0.0018]	[0.0019]	[0.0019]	[0.0019]
HHI	-0.0304	-0.0342	-0.0132	-0.03	-0.0179
	[0.0314]	[0.0310]	[0.0271]	[0.0462]	[0.0404]
ln # of Units	0.0144***	0.0140***	0.0142***	0.0144***	
	[0.0017]	[0.0017]	[0.0018]	[0.0018]	
Margin = 0	Incl.	Excl.	Incl.	Incl.	Incl.
Tariff = 0	Incl.	Incl.	Excl.	Incl.	Incl.
Top share > 50%				X	
Single establishment					X
Underidentification test	962.9	874.2	874.2	977.2	419.3
Weak identification test	380.0	344.2	344.2	390.1	160.5
Centered R-squared	0.6978	0.706	0.706	0.7036	0.696
Number of obs	128,009	125,730	125,730	111,590	105,589

Note: This table reports the results in the other variables in Table 9.

Appendix C. Concordance Tables

Four concordance tables are constructed for our analysis. Product codes from different data sources are matched by referring to the names of the products for the construction of the concordance tables. For the products, which are difficult to match by the names, information on the detailed description of the products is used.

C.1. HS code and Census of Manufacture

Products with nine-digit HS codes (2011) and products with six-digit "Census of Manufacture" codes (2005) are matched by product name. For the products, which cannot be matched by product name, they are matched by referring to the description of the products provided in "Tariffs Table Explanation and Classification Example" for the Japanese HS codes and the "Commodity Classification Table" of the Japanese "Census of Manufacture" codes. 8,237 HS code products are matched with the "Census of Manufacture" codes.

C2. Family Income and Expenditure Survey and HS code

Products with three-digit "Family Income and Expenditure Survey" code are matched with products with nine-digit HS code by referring to the description of the contents of the products. For the description of the products, we use "Customs Tariff Schedules of Japan (April 2016)" for HS codes while "Income and Expenditure Classification Tables (2015)" is used for the products contained in "Family Income and Expenditure Survey." The matching range is from 102 (rice) to 926 (trunks, suitcases) of "Family Income and Expenditure Survey," where 161 products are matched with HS code products.

C3. Census of Commerce and HS code

Wholesale products with five-digit "Census of Commerce (2014)" code are matched with products with nine-digit HS code (April 2016) by referring to the description of the contents of the products. For the wholesale products, the description of the classification of "Census of Commerce" is referred. 100 products of "Census of Commerce" ranging from 51111 (cocoon) to 55999 (other wholesale products that are not classified except for tanned or crust skins) are matched with HS code products.

C4. Census of Commerce and Census of Manufacture

Wholesale products with five-digit "Census of Commerce (2005)" code are matched with products with six-digit "Census of Manufacture (2002)" code. 99 products of the wholesale sector ranging from 50111 (raw silk and cocoon) to 54999 (other products) of "Census of Commerce" are matched with the "Census of Manufacture" products.

Appendix D. Derivative of a Margin Ratio with respect to Tariffs

In this appendix, we provide the derivation and proof. The margin ratio is defined as the ratio of sales minus procurements to sales. If the quantity is the same between selling and procuring, the margin ratio indicates a ratio between a sales price and a procurement price. Following Raff and Schmitt (2012), we can derive the sales prices as

$$p = \begin{cases} w + \frac{1}{2}(c_D + c) & , \quad \text{for Domestic Wholesalers} \\ \frac{1}{2}(c_D + w + c + t), & \quad \text{for Importers} \end{cases}.$$

Markup is defined as marginal costs subtracted from sales prices of wholesalers. Combining the above expression for sale prices with marginal costs in the main text, markups are derived as $(c_D - c)/2$ and $(c_D + w - c - t)/2$ for domestic wholesalers and for importing wholesalers, respectively.

Since the procurement prices are w and t, for domestic wholesalers and importers, respectively, the margin ratio is

$$Margin = \begin{cases} 1 - \frac{2w}{c_D + 2w + c} & , \quad \text{for Domestic Wholesalers} \\ 1 - \frac{2t}{c_D + w + c + t}, & \quad \text{for Importers} \end{cases}.$$

From this equation, we calculate the derivatives of the margin ratio of domestic wholesalers as follows:

$$\frac{\partial Margin}{\partial c} = \frac{2w}{(c_D + 2w + c)^2} > 0$$
$$\frac{\partial Margin}{\partial t} = \frac{2w}{(c_D + 2w + c)^2}\frac{dc_D}{dt} > 0.$$

On the other hand, the derivatives of the margin ratio of importers with respect to a unit labor requirement, c, is

$$\frac{\partial Margin}{\partial c} = \frac{2t}{(c_D + w + c + t)^2} > 0.$$

Last, we show that $\partial Margin/\partial t < 0$. First, the derivative is derived as

$$\frac{\partial Margin}{\partial t} = -\frac{2}{(c_D + w + c + t)^2}\left[(c_D + w - c - t) + 2c + \left(1 - \frac{dc_D}{dt}\right)t\right].$$

The sign of $\partial Margin/\partial t$ is determined by the sign of $(c_D + w - c - t) + 2c + (1 - dc_D/dt)t$. As derived in Raff and Schmitt (2012), $c_D + w - c - t > 0$ since the quantity sold by an importing wholesaler is expressed as proportional to $c_D + w - c - t$ and must be positive for importers. Combined with $dc_D/dt < 1$, all terms are positive. Therefore, $(c_D + w - c - t) + 2c + (1 - dc_D/dt)t > 0$.