Buyer Power and Pass-through of Tariff Cuts

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Abstract

I demonstrate empirically that the presence of retailers can reduce gains from trade under certain market structures. Theory suggests that retailers buyer power (monopsony power), via negotiating with foreign suppliers, reduces gains from trade liberalization. Buyer power allows retailers to absorb the decline in trade costs in the form of a higher markup, rather than passing it on to consumers. I find that a 10% reduction in tariff rates causes US domestic retail prices to decline by 4.3% on average for goods that are subject to buyer power among retailers, versus 7.2% for goods not subject to buyer power. Furthermore, I show that for products that are subject to buyer power, the trade cost reduction can be completely absorbed by retailers' markup adjustment when the concentration in the retail sector exceeds a certain threshold. For products that are not subject to buyer power, conversely, lower tariff rates lead to lower consumer prices at any level of concentration in the retail sector.

Keywords: international trade, import price, monopsony, concentration

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1. Introduction

Traditional international trade theory implies that price levels within a country will decline as it opens up to trade, but the traditional model does not account for international trade intermediaries such as retailers, assuming that manufacturers sell their

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goods directly to final consumers. In the real world, it is rare that manufacturers in one country directly sell their goods to final consumers in another. In spite of the importance of retailers in trade, only recently has increasing attention been given to retailers in the international trade literature. (e.g., Head et al. (2010), Feenstra and Hanson (2004), Akerman (2010), Ahn et al. (2011), Blum et al. (2010), Felbermayr and Jung (2011), Dasgupta and Mondria (2010))

The purpose of this paper is to test the effect of retailers' buyer power over manufacturers on prices when trade cost falls. This hypothesis is implied by Raff and Schmitt (2009) and Francois et al. (2008). The mechanism proposed by Raff and Schmitt (2009) is that due to intense price competition induced by trade liberalization, retailers with buyer power offer exclusive contracts to manufacturers to foreclose their rival retailers. Higher retail market concentration and increased price levels are followed by retailers' switch from non-exclusive contracts to exclusive contracts to manufacturers. Although Raff and Schmitt derive novel results from their model, they do not present any empirical evidence. A similar theoretical result is implied by Francois et al. (2008)'s model, but their empirical results do not decompose retailers' market power against manufacturers and final consumers. By using inverse export supply elasticity estimates, I isolate the effect of retailers' buyer power from retailers' market power against consumers.

To assess the effect of retailers' buyer power on prices as a country lowers its trade barriers, I use US trade data gathered over the period of 1994 to 2003. During this period, the US experienced a phased reduction in tariffs for imports as the General Agreement on Tariffs and Trade (GATT) transformed to the World Trade Organization (WTO) in 1995. Additionally, the retail sector was dominated by a small number of large retailers; the 2002 US Census reports that the largest four firms' market share (CR4) for warehouse clubs and supercenters (NAICS 452910) was 92.1 percent and the CR4 for discount department stores (NAICS 452112) was 95.0 percent.[1]

To evaluate the impact of retailers' buyer power on import prices, I use two measures of retailer's buyer power over manufacturers. Clarke (2002) notes that retailers' ability to have a significant effect on prices is related to both the relative size and strength of retailers and the scope of exercising that strength. Given a few large retailers dominating

[1] Wal-Mart and Target fall into this category.

the US retail sector, I focus on the extent of retailer's buyer power for the main analysis. The extent of retailer's buyer power is measured by elasticity of supply. Based on the estimates of elasticity of supply provided by Broda et al. (2008), I classify goods into two groups. High-buyer-power goods are goods that large retailers are more likely to exert buyer power due to low export supply elasticity, whereas low-buyer-power goods are goods with high export supply elasticity for which retailers have less bargaining power. I estimate the average difference of tariff rate pass-through of high- and low-buyer-power goods. I further use the four firm retail concentration ratios to examine the effect of the relative size and strength of the retailers on tariff rate pass-through.

Because the relevant literature notes the informational advantages retailers have, I test whether there is a systematic difference of tariff rate pass-through to prices between differentiated goods and homogeneous goods. Because differentiated goods have higher search barriers and because retailers resolve informational problems in exchange, retailers charge higher markups on differentiated products than on homogeneous goods.[2]

To examine the effect of retail concentration on tariff rate pass-through, I use the four-firm concentration ratios (CR4) for the retail sector reported by the US Census every five years. The retail sector is classified by 6-digit NAICS (North American Industry Classification System). Examples of retail sectors with high concentration in years 1997 and 2002 are shown in Table 1. Because most of the imports flow into multiple retail sectors, I use the sector weights provided by Basker and Van (2010), which are the sales of a product type that flows into a particular retail sector divided by total sales of that product type going to all retail sectors. I thereby calculate the weighted average of the CR4 for each product type of imports. I further compare the CR4 effect on tariff pass-through between two subsamples, a sample that consists of only high-buyer-power goods and a sample with low-buyer-power goods.[3] I thereby calculate the weighted average of the CR4 for each product type of imports. I further compare the CR4 effect on tariff pass-through between two subsamples, a sample that consists of only high-buyer-power goods and a sample with low-buyer-power goods.

[2]Rauch (1999) shows that the search barriers between international buyers and sellers in trade are higher for differentiated products than for homogeneous goods.

[3]Basker and Van (2010) classifies the HS10 retail goods into 38 product types.

Lastly, I show that retailer's buyer power based on export supply elasticity is able to capitalize on changes in tariff rates but not on changes in exchange rates, which is possible because the changes in tariff rates are almost permanent, whereas changes in exchange rates are not. A perpetual tariff cut leads to an increase in the foreign manufacturer's expected future gain from exporting, which will induce more foreign manufacturers to begin exporting, thus increasing the bargaining power of the retailers; on the other hand, exchange rate changes do not induce a change in the extensive margin.[4]

To preview the results, following a 10 percent reduction in tariff rates, domestic retail price declined only 4.3 percent on average for high-buyer-power goods, whereas domestic retail price decreased by 7.2 percent for low-buyer-power goods. These results indicate that for high-buyer-power goods, retailers increase their markup on goods as trade costs fall. By comparison, in the control sample consisting of intermediate goods, the buyer power effect is less significant than that for retail goods, suggesting that the presence of retailers blunts the effect of trade liberalization. Furthermore, the buyer power effect is more pronounced when retailers play an important role in matching; within the retail goods sample, retailers increase their markup on differentiated products rather than on homogeneous goods as trade costs fall.

The results using the concentration ratios as a measure of buyer power imply that when the largest four retailers' market share is 95 percent, consumer prices will not decline at all even if trade costs fall, and prices may go up as trade liberalizes when the concentration ratio is greater than 95 percent. Interestingly, I find that the threshold CR4 that leads to higher price levels is very low when I restrict the sample to only high-buyer-power goods. The threshold CR4 is 22 percent for high-buyer-power goods, whereas prices always fall for low-buyer-power goods. Even if the largest four retailers completely dominate the market, a 10 percent reduction in tariff rates leads to a 2.2 percent decline in consumer prices for goods with elastic export supply. This result is

[4] Ruhl (2008) explains the large discrepancy between the Armington elasticity in international real business cycle models and static applied general equilibrium models with the change of the extensive margin. The elasticity is smaller in business cycle models since productivity shocks are temporary while the shocks in static general equilibrium models are permanent; permanent change like tariff reduction induces a status change in non-exporters to export while potential exporters do not change their status based on temporary business cycle shocks.

consistent with theory in that if supply is perfectly elastic, even a monopsony cannot exert buyer power over manufacturers.

This paper is related to the literature regarding pass-through and market structure. Auer and Schoenle (2012) show that the exchange rate pass-through varies by trade-partner specific import share, and Berman et al. (2012) examine the differential exchange rate pass-through depending on firm's productivity; de Blas and Russ (2010) explains the incomplete exchange rate pass-through with firm's endogenous markup and market structure. These studies, however, do not consider the role of retailers in trade. Goldberg and Campa (2010) focus on distribution costs and distribution margins to explain the incomplete transmission of exchange rate changes to the CPI. At a disaggregated level, Hellerstein (2008) examines the exchange rate pass through, building a model that includes both retailers and wholesalers, but the empirical result is restricted to the beer industry.

In Section 2, I illustrate a simple model that motivates my empirical analysis. In Section 3, I describe the data I use, and Section 4 provides the specifications that are used to test my hypothesis. Section 5 shows and discusses the econometric results. Robustness checks are presented in Section 6, and I provide concluding remarks in Section 7.

2. Theory

In this section, I introduce a simple model which exhibits the double-marginalization mechanism proposed by Francois and Wooton (2010). In this model, there are n identical retailers with monopoly power in the downstream market and monopsony power in the upstream market. In addition, for analytic simplification, I assume that there are no competing domestic firms. Although this setting is extreme and unrealistic, it illustrates how the pro-competitive effect of trade liberalization can be limited when the retailer has buyer power over foreign manufacturers.

I further assume a downward sloping linear import demand function and an upward sloping linear export supply function as follows:

$$P = a - bQ$$

$$w = c + dQ$$

where P is the retail price, Q is the total quantity bought from foreign manufacturers and sold to domestic consumers by n retailers and w is the wholesale price paid to the foreign manufacturers by the retailers. a, b, c and d are parameters that depend on consumer preference, the exporting firm's technology for a specific product and other market environment factors. The export supply schedule implies that whenever $d > 0$, the retailer can exert buyer power over the foreign manufacturer by controlling the wholesale price. It can be easily shown that the marginal cost curve is above the export supply schedule with a steeper slope. However, if $d = 0$, then the retailer is a wholesale price taker, and even a monopsony cannot exert buyer power. If the retailer is imposed with a specific tariff T for each unit of import, the profit π_i for retailer i is

$$\pi_i = (a - bQ_{-i} - bq_i)q_i - (c + dQ_{-i} + dq_i + T)q_i$$

where Q_{-i} is the sum of quantity of goods purchased and sold by all retailers but i. The optimal quantity and price solved for the profit maximization problem is thus

$$q_i = \frac{a-c-T}{(n+1)(b+d)},\ Q = (\frac{n}{n+1})(\frac{a-c-T}{b+d}),\ P = a - (\frac{n}{n+1})\frac{(a-c-T)b}{(b+d)}$$

Tariff pass-through is defined as the domestic price response to tariff rate changes as follows.

$$TRPT = \frac{\partial P}{\partial T} = (\frac{n}{n+1})\frac{b}{(b+d)} \tag{1}$$

(1) tells us that for a given number of retailers n, no retailers can exert buyer power if the export supply is perfectly elastic ($d = 0$). The tariff pass-through is $\frac{n}{n+1}$ in this case. As d becomes larger (as the export supply becomes inelastic), the pass-through becomes smaller and approaches 0. Thus, consumer prices fall as tariff rates fall when the export supply is elastic. However, prices do not fall as much as tariff cuts with finite number of retailers. In fact, prices do not fall at all when the export supply is perfectly inelastic. Additionally, for a given d, the tariff rate pass-through is $\frac{1}{2}\frac{b}{(b+d)}$ when there is a single retailer, whereas as the retail market becomes more competitive with more retailers, the pass-through approaches $\frac{b}{b+d}$. In sum, (1) implies the following:

- As the elasticity of supply becomes greater, the tariff rate pass-through becomes greater. (i.e., $\frac{\partial TRPT}{\partial b} = (\frac{n}{n+1})(\frac{d}{(b+d)^2}) > 0$)

- As the number of retailers becomes larger, the tariff rate pass-through becomes greater. (i.e., $\frac{\partial TRPT}{\partial n} = \frac{1}{(n+1)^2}\frac{b}{(b+d)^2} > 0$)
- For more elastically supplied goods, the effect of competition in the retail sector on tariff rate pass-through becomes smaller. (i.e., $\frac{\partial(\partial TRPT/\partial n)}{\partial b} = -\frac{1}{(n+1)^2}\frac{d}{(b+d)^2} < 0$)

I am interested in how the retailers adjust the net-of-tariff prices when they have market power. Thus, I examine the net-of-tariff price pass-through and denote the net-of-tariff price as $P^*(= P - T)$. It is evident that the following holds:

$$\frac{\partial P^*}{\partial T} = \frac{\partial P}{\partial T} - 1 \tag{2}$$

This relationship implies that when the export supply is perfectly inelastic, $\frac{\partial P^*}{\partial T}$ is -1 (or $\frac{\partial P}{\partial T} = 0$), which means that as tariff rates fall, the net-of-tariff price goes up by the same amount, completely canceling out the trade cost reduction effect. In this case, buyer power allows retailers in highly concentrated sectors to totally absorb the decline in trade costs in the form of a higher markup, rather than passing it on to consumers. Hereafter, "tariff absorption" refers to the change in the net-of-tariff prices as tariff rates change.

3. Data

Clarke (2002) discuss three families of buyer power measure: buyer concentration, elasticity of supply and performance measures. Buyer concentration refers to the relative size and strength of buyers, and elasticity of supply refers to the scope of exercising that strength. Performance measures focus on outcomes rather than potential. Throughout this paper, I mainly focus on using elasticity of supply given the high concentration in the retail sector. However, in a later analysis, I also add buyer concentration to control for the relative size of retailers in disaggregated retail sectors. I use the US inverse export supply elasticity obtained from Broda et al. (2008) (hereafter, BLW). BLW provide 1,055 export supply elasticity at the 4-digit HS (Harmonized System Codes) level estimated from US trade data spanning from 1994 to 2003. The more inelastic the manufacturers' supply is (the greater the inverse export supply elasticity is), the more retailers can exert

buyer power over manufacturers, and vice versa.[5]

Inverse export supply elasticity is interesting because it looks at the source of buyer power. Although it would be ideal to use the inverse export supply elasticity estimates for each source country, it is not available except for a limited set of 15 countries. Fortunately, BLW show that the inverse export supply elasticity does not vary much across countries for a specific good. This finding implies that importers (retailers) systematically have more market power for some types of goods, which can be a justification for using the US export supply elasticity uniformly for all source countries.

To address measurement errors of the estimates, BLW use categorical variables for the bottom 33rd percentile and 66th percentile indicating each low- and medium-market-power goods, respectively. The rest of the goods are classified as high-market-power goods. I use the same categorical variables that BLW use and define high-buyer-power goods as goods in the top 33rd percentile and define other goods as low-buyer-power goods.

To examine the relationship between inverse export supply elasticity estimates and the role of retailers, I show that high-buyer-power goods are typically those that are more likely to rely on retailers to be sold to final consumers. Table 2 from Feenstra and Hanson (2004) presents the proportion of Chinese direct exports and re-exports of Chinese goods through Hong Kong by sector. Indirect export through Hong Kong is more prevalent than direct export for industries that deal with toys and games, televisions and radios, footwear, electrical machinery, luggage and office machines. These products coincide with those that are classified as high-buyer-power goods presented in Table 3. On the other hand, fuel oils, vegetables and fruit, fish and inorganic chemicals are products to which direct export is important but re-export is not. These are goods that are classified as low-buyer-power goods, as shown in Table 4.

Feenstra and Hanson (2004) show that intermediaries such as retailers are important because they alleviate the matching problem between manufacturers and final consumers. Hong Kong intermediaries charge higher markups on differentiated products

[5] BLW used these estimates to measure the importer's market power to set tariff rates. They show that importer's market power has critical influence on tariff rates; for lower inverse export supply elasticity products countries set a higher tariff rate.

because search barriers for differentiated goods are higher than those for homogeneous goods. They define differentiated goods by using Rauch (1999) classification. Rauch classifies goods into three types: homogeneous goods, reference priced goods and differentiated products. Homogeneous goods are goods that are sold in organized exchanges. Reference-priced goods do not have organized exchanges, but the price is listed in trade publications and the information about the price itself is sufficiently useful for industry actors. Differentiated goods are all other goods for which 'brands' are important; price alone is not sufficient, and the price must be adjusted for differences in multidimensional characteristics, such as other varieties of the product that are supplied in the location and consumer preferences. In addition, noting that BLW show that the average inverse export supply elasticity is the highest for differentiated goods, intermediate for reference-priced goods and lowest for homogeneous goods, export supply elasticity appears to be based on from special product characteristics, such as differentiation.

For this empirical analysis, I split the sample into two subsamples: a sample that consists of only retail goods and a control sample. The 4-digit HS level indicator is from Head et al. (2010). By splitting the sample, I am able to determine whether the presence of retailers makes a difference in the change of prices as tariff rates fall. The retail sample includes only goods that could be found in large retailers' shelves. These are goods that Gereffi (1994) considers to play an important role for large retailers, brand-named merchandise and trading companies by setting up decentralized production networks in foreign countries. Gereffi refers to this phenomenon as "buyer-driven commodity chains". These are industries that typically deal with consumer-goods such as apparel, footwear and consumer electronics. The control sample is composed of intermediate goods such as ores, iron and chemicals.

Table 5 shows that the retail sample is mostly composed of differentiated goods, whereas 77 percent of the intermediate goods sample is reference-priced goods and 21 percent is differentiated products. Table 6 shows the summary statistics of the inverse export supply elasticity for each sample. The retail sample's mean inverse export elasticity is greater than that of the intermediate goods sample. This result is observed because the retail goods sample includes more differentiated goods than the intermediate goods sample.

The second buyer power measure is buyer concentration. The four-firm concentration ratio for the retail sector for years 1997 and 2002 in 6-digit NAICS are obtained from the US Census. Because there is no readily available measure of imports by retail sector, I use the mapping between imports to retail sector from Basker and Van (2010). Basker and Van first aggregate the imports that are classified at the 10-digit HS level to 38 broad product categories. Each of the products in the broad categories is sold to many different retail sectors. The authors calculate the sector weight for each product category, where sector weight is the proportion of sales that goes to a particular retail sector divided by the total sales of the product category for each year. With this sector weight, I am able to calculate the weighted average of the CR4 for each product category. If a good in a particular product category tends to be sold in more concentrated retail sectors, this product category will face a relatively higher concentration ratio than goods in other categories that mostly sell their products to retail sectors that are not concentrated. I project this back to the 10-digit HS import data such that every import that falls into the same product category faces the same weighted average CR4. Summary statistics for the concentration ratios are shown in Table 7.

To measure prices, I use the unit value of FOB (free-on-board) imports, which is the net-of-tariff import price. This measure, which is conventionally used in the pass-through literature, is constructed by dividing import value by quantities. Although it is standard to use unit price as a proxy for retail prices, there is evidence that doing so may cause measurement problems. Blonigen and Soderbery (2010) find that compared to automobile market data, some products are misclassified in import data. Although misclassification may lead to misleading price changes, the data I use consist of retail products for which these issues are less common.[6] Moreover, the benefit of using trade prices is that it is able to capture the universe of imports rather than a small subset of products. The import data are obtained from the Center for International Data at UC Davis, which is documented at the 10-digit HS level. For the main analysis, I aggregate these data to the 8-digit HS level. The decline in trade cost is captured by the variation in tariff rates, which are obtained by dividing duty by dutiable value.

[6] Blonigen and Soderbery (2010) point out that HS codes do not map very well to market-based classification. Furthermore, domestic products offshored to foreign countries are counted as new varieties.

4. Empirical Strategy

4.1. Using Inverse Export Elasticity Estimates as a Buyer Power Measure

Using data on US imports by product in HS8 code i, source country c, and year t the baseline model I estimate is: [7]

$$\begin{aligned}\ln P^*_{i,c,t} &= \beta_0 + \beta_1 \ln(1+\tau_{i,c,t}) + \beta_2 HBP_i * \ln(1+\tau_{i,c,t}) \\ &+ \beta_3 \ln IMV_{i,c,t} + \upsilon_c + \varphi_t + \phi_i + \epsilon_{i,c,t} \end{aligned} \tag{3}$$

where $P^*_{i,c,t}$ is the FOB unit value (import price net of tariff) of US imports from country c in HS8 code i and in year t, $\tau_{i,c,t}$ is the HS8 level ad valorem tariff rate, HBP_i is a dummy variable equal to 1 if i is classified as a high-buyer-power good (products in the top 33rd percentile of the inverse export elasticity measure) and 0 otherwise and $IMV_{i,c,t}$ is the import value.

I compare the adjustment of the net-of-tariff prices for the two groups of goods, high-buyer-power goods and low-buyer-power goods. The value of β_1 indicates how net-of-tariff prices adjust as tariff rates drop for low-buyer-power goods, whereas $\beta_1 + \beta_2$ indicates the adjustment for high-buyer-power goods. Although retailers do not have much buyer power for low-buyer-power goods, β_1 will still be negative because the US is a large country. β_2 will be negative if buyer power enables retailers to absorb more of the decline in trade costs in the form of a higher markup.

If transaction costs of buying from foreign countries are high, purchasing on a greater scale can disperse this transaction cost. β_3 captures this effect. Scale economies of import is also discussed in Basker and Van (2008). A scale economy in import implies a negative sign for β_3. This controls for the endogeneity that retailers with high buyer power purchase on larger scales and thus have volume discounts that also consequently increase retailers' buyer power negotiating with manufacturers for lower prices. Country fixed effects and year fixed effects are included to capture demand shifters, and product fixed effects are included to control for all product characteristics that affect price. $\epsilon_{i,c,t}$ is an error term assumed to be independently and identically distributed.

[7] I do not include the buyer power dummy variable itself since I include HS8 level product fixed effects. The HS8 fixed effects absorb all time-invariant product characteristics.

I also run the basic model for different types of goods based on Rauch (1999)'s classification within the retail sample. If retailers are able to exert buyer power because they have a comparative advantage with respect to information, then the β_2 coefficient is expected to be most statistically and economically significant for differentiated goods and the least significant for homogeneous goods; consumers' preferences will vary more for differentiated goods by country, and thus, the role of intermediaries will become more critical for differentiated goods. Due to the complication of re-classifying the high-buyer-power goods, I use continuous inverse export elasticity. Country fixed effects and year fixed effects are included to capture demand shifters and product fixed effects are included to control for all product characteristics that affect price. $\epsilon_{i,c,t}$ is an error term assumed to be independently and identically distributed.

4.2. Using the Four Firm Concentration Ratio as a Measure of Buyer Power

In this section, I discuss the effect of retailers' size and strength on prices by specifying an empirical model using the four-firm concentration ratio (CR4). The CR4 data are collected for only five years; therefore, I restrict the sample to years 1997 and 2002. Because Basker and Van (2010) groups 10-digit HS imports into broader groups, I use the trade data at the HS10 level. Thus, net-of-tariff unit price P^*, import value $IMV_{i,c,t}$ and ad valorem tariff rate $\tau_{i,c,t}$ vary by 10-digit HS code i, source country c and year t. $CR4_{i,t}$ varies by year t, and 38 product categories for each i are included therein. Using these data and controlling for country, year and HS10 fixed effects, I specify the following model.

$$\begin{aligned} \ln P^*_{i,c,t} = \beta_0 + \beta_1 CR4_{i,t} + \beta_2 CR4_{i,t} * \ln(1+\tau_{i,c,t}) \\ + \beta_3 \ln IMV_{i,c,t} + \upsilon_c + \varphi_t + \phi_i + \epsilon_{i,c,t} \end{aligned} \tag{4}$$

I do not include $\ln(1+\tau_{i,c,t})$ in the specification due to The high correlation between $CR4_{i,t} * \ln(1+\tau_{i,c,t})$, which occurs because each category is identically applied to many different tariff rates that vary by HS10 and country. [8]

[8] The correlation is 0.7 and due to multicollinearity issues, estimates become very sensitive by functional specification and fixed effects once I include $\ln(1+\tau_{i,c,t})$.

As the retail sector becomes more concentrated, prices must go up, and thus, I expect a positive sign on β_1. The decline in tariffs will be absorbed more in the form of higher markup of retailers in highly concentrated retail sectors because these retailers have more bargaining power over foreign manufacturers. A negative sign of β_2 is thus expected as the possible range of $CR4$ is between 0 and 1. I can further infer the threshold CR4 that completely cancels out the tariff reduction effect on prices. The threshold CR4 can be calculated by setting $\beta_2 CR4$ equal to -1 given the estimate of β_2, which further implies that to ensure some consumer gains through trade liberalization, the concentration ratio must be lower than $-\frac{1}{\beta_2}$. Otherwise, lower trade barriers may lead to higher prices, in fact hurting consumers from trade liberalization. The implication of β_3 is the same as that indicated the previous analysis; a negative sign indicates that there are volume discounts of trade.[9] The implication of β_3 is the same as that indicated in the previous analysis; a negative sign indicates that there are volume discounts of trade.

To compare the effect of $CR4$ on tariff rate pass-through of high-buyer-power goods and low-buyer-power goods, I estimate (4) by each type of products. A greater $CR4$ effect on tariff rate pass-through is implied by a greater magnitude of β_2; a greater β_2 then imply a lower threshold $CR4$. In other words, the pro-competitive effect of trade is limited even if the retail sector is not concentrated due to retailers' bargaining power attributed to informational advantages. On the other hand, low-buyer-power goods retail prices fall due to tariff cuts even if the retail sector is concentrated.

5. Results

5.1. The Baseline Model

Table 8 presents the regression estimates of the baseline model for two samples: a sample that consists of only retail goods and the control sample including only intermediate goods. For each samples, I run the baseline regression with and without the log of

[9] Higher price levels during the period of trade liberalization has been reported in Korea. The price of imported retail Chilean wine did not drop at all and in some cases even increased despite the elimination of the 15% tariff rates after Korea joined a Free Trade Agreement with Chile. Importers, wholesalers and retailers each charging high markup has been blamed to exploit the benefit of free trade leaving no improvement in consumer welfare.

distance between two countries in trade. The variable distance is included to control for quality effects on import prices following Hong (2006), where HongâĂŹs idea is based on the Washington Apples effect suggested by Alchian and Allen (1977); imports that travel a longer distance are goods with higher quality than imports from geographically close source countries. The distance data are obtained from Centre d'Etudes Prospectives et d'Informations Internationales (CEPII). [10]

The first coefficient is the tariff pass-through of low-buyer-power goods. The results of the retail sample show a negative sign on the first coefficient estimate, suggesting that there are some increases in the low-buyer-power goods' net-of-tariff prices in response to lower tariffs. When there is a 10% reduction in tariff rates, the net-of-tariff prices go up by 2.8%, and thus, consumers face a 7.2% price reduction on average for low-buyer-power goods. The negative sign on the second estimate implies that industries producing high-buyer-power goods increase the net-of-tariff prices for lower tariffs to a greater extent than they do for low-buyer-power goods. Thus, the sum of the first two coefficients is the pass-through of high-buyer-power goods. For the same reduction in tariff rates, the net of tariff prices go up by 5.7%, and consumer faces only a 4.3% price decline on average for high-buyer-power goods. These estimates are significant at the 0.01 level, showing a very strong effect. This finding is consistent with theory, indicating that when the monopsony is able to exert buyer power over manufacturers, the reduction in trade costs tend to result in a smaller decrease in consumer prices because retailers increase their net-of-tariff-prices.

The third row suggests that there is a significant effect on transaction costs in international trade. Estimation results of both (1) and (2) suggests that retailers are able to disperse the fixed cost of trade with greater volumes of imports. However, the coefficient estimate for distance in (2) is positive, but insignificant; distance does not appear to

[10] Hong (2006) adds the distance variable when examining the tariff rate pass-through. She finds that the unit value of imports is positively associated with the distance between two trade partners. Consider there are two substitutes with different types: high quality and low quality. If the transport cost is imposed as specific taxes, then the relative price of high quality goods would be lower for any markets which are far apart from the origin. Thus, goods that travel a long distance are likely to be goods with high quality.

function as a good proxy for the quality of US retail imports.[11]

The last two columns of Table 8 represent the estimates for the intermediate goods sample. The sign on the tariff pass-through estimate for low-buyer-power goods is negative, but the magnitude is smaller than that of the estimate for the retail sample. Furthermore, it is statistically insignificant. The estimate measuring additional tariff absorption of the net-of-tariff prices for high-buyer-power goods is significant at the 0.1 level, but the effect is economically less significant than that of the retail sample. This result suggests that with the presence of strong retailers, consumers do not fully benefit from lower prices by trade liberalization. Discounts for large volumes of sales appear to be greater for intermediate goods than for retail goods, which may indicate that the one-time transaction volume is higher in trade for intermediate goods than for retail goods. Note that the distance measure for quality functions very well for the manufacturing goods sample. After controlling for quality, the buyer power effect on tariff absorption becomes larger, but it is still smaller than that for the retail sample. The result is consistent with the literature. Berman et al. (2012) find lower exchange rate pass-through for consumer goods than for intermediate goods. [12]

5.1.1. The Role of Matching of Retailers and the Buyer Power Effect

Table 9 shows the regression results by degree of differentiation using Rauch classification within the retail sample. With retailers' informational advantages regarding the quality of foreign manufacturers and information of the US market, these retailers are able to match international sellers and buyers and thus earn informational rents. (Feenstra and Hanson (2004)) The only sample showing a significantly negative sign on the interaction term of buyer power and tariffs is the differentiated goods sample, which implies that retailers are able to charge higher markups on differentiated goods rather than on homogeneous goods.

[11] Bernard et al. (2010) note that US retailers and mixed wholesaler-retailers' trade is relatively insensitive to distance, which is likely due to their concentration in consumer goods such as clothing and footwear that are sourced disproportionately from far-away China. Likewise, the insignificant estimate may be due to the large imports from China with a comparative advantage in providing low-cost goods.

[12] Specifically, examining French firm-level data, they find that for a 10% depreciation of exporter's currency, exporter's increase the FOB price by 2% while for intermediate goods the exporter increase the price only by 0.7%.

5.2. Using Concentration Ratios to Measure Buyer Power

In this section, I show how concentration in the retail sector affects retailers' ability to absorb the reduction in trade costs in the form of higher markups. Table 10 shows that the concentration ratio itself increases the consumer price level. Under a free-trade regime with 0 tariff rates, a 10%p increase in $CR4$ results in a 6.69% increase in consumer prices.[13] The estimate for the variable of interest $CR4 * \ln(1+\tau)$ has a negative sign, meaning that for imports that flow into a highly concentrated retail sector, the net-of-tariff price increases as tariff rates fall. The threshold $CR4$ ratio $-\frac{1}{\hat{\beta}_2}$ implies that as the four-firm concentration ratio of the retail sector exceeds 95%, even if tariff rate falls, consumers do not benefit from the reduction in trade costs and could become worse off with higher tariff-inclusive-prices.

Table 11 shows the regression results for each high-buyer-power good sample and low-buyer-power good sample.[14] The magnitude of the estimates for $CR4 * \ln(1+\tau)$ is clearly smaller for low-buyer-power goods than that for high-buyer-power goods. Surprisingly, the threshold $CR4$ ratio is as low as 22% for high-buyer-power good; retailers are able to absorb all reduction in trade costs in the form of higher markups, and tariff-inclusive-price may even go up when $CR4$ exceeds 22%.

On the other hand, it is shown that at any level of concentration ratio in the retail sector, retailers can never absorb all of the reduction in trade costs. In other words, even if the largest four retail firm dominate the entire market (CR4=1), for a 10% reduction in tariff rates, the retailers increase the net-of-tariff price P^* by 7.8%, leaving room for the consumers to benefit from a reduction of 2.2% in consumer prices. This result is consistent with theory indicating that if manufacturers' supply is elastic, retailers are not able to exert buyer power and net-of-tariff prices increase to a lower extent.

[13] A 1%p increase in the retail sector $CR4$ on $\ln P^*$ is $\hat{\beta}_1 + \hat{\beta}_2 * \ln(1+\tau)$, where $\hat{\beta}_1$ is the estimate for $CR4$ and $\hat{\beta}_2$ is the estimate for $CR4 * \ln(1+\tau)$. Because β_2 is less than 0, the $CR4$ effect on prices is weaker for higher tariff rates. This result can be interpreted as follows. When trade is not allowed, retailers are limited to procuring goods from domestic manufacturers. However, as trade is liberalized, retailers are able to procure goods from not only domestic manufacturers but also from foreign manufacturers as well, making the retailers' bargaining power stronger over manufacturers under the free-trade regime.

[14] Recall that high buyer power and low buyer power is defined as the top 1/3rd of inverse export elasticity and the bottom 2/3rd of inverse export elasticity.

The increase in (tariff-inclusive) price levels as a form of trade liberalization contradicts the implications of traditional trade models, but this can be explained by Raff and Schmitt (2009). Raff and Schmitt suggest the possibility that price levels can actually increase because the contractual arrangement between the retailer and manufacturer can change as the trade regime moves from autarky to free trade. In their model, the retailer can offer two types of contracts, exclusive and non-exclusive, where exclusive contracts require the manufacturer to supply goods to only one retailer exclusively and non-exclusive contracts do not have such requirements. When the retailers have bargaining power over manufacturers to offer vertical contracts to manufacturers, the intense price competition among retailers induced by free trade creates an incentive to retailers to offer an exclusive contract to manufacturers over a non-exclusive contract. When the retailer can foreclose his rival by offering an exclusive contract to the manufacture, then the retail price actually increases as the retail sector becomes more concentrated.

5.3. Exchange Rate and Cost Pass-through

In this section, I turn my attention to retailers' response to changes in exchange rate and source countries' production costs. Recent studies have noted the heterogeneous reaction of exporters to exchange rate and production cost changes. With firm-level data, Berman et al. (2012), show that firms with higher performance react more to depreciation by charging higher markup than low-performance firms do. Hellerstein (2008) also explains the incomplete exchange rate pass-through by considering markup adjustment by manufacturers and retailers. Hellerstein shows that markup adjustment by retailers and wholesalers accounts for roughly half of incomplete transmission and local-cost component account for the other half.

Here, I compare the buyer power effect on tariff rate pass-through with the exchange rate and cost pass-through. Specifically, I examine whether there are systematic differences between high-buyer-power goods and low-buyer-power goods for each pass-through elasticity estimate. Ruhl (2008) notes that the Armington elasticity—the elasticity of substitution between goods from different countries— appears to be smaller in international real business cycle literature than the elasticity used in international trade models; the international real business cycle models' Armington elasticity is generated from productivity shocks, which are considered temporary, whereas for international trade models,

the elasticity is larger because it considers permanent changes in tariff rates. The persistence of shocks affect the choice to export; non-exporters may start to export once trade barriers become permanently lower and promise higher profits for all future periods, whereas firms do not change their exporting status based on transitory shocks.

The impact on prices should also differ by the persistence of shocks based on Ruhl (2008)'s study. More non-exporters start to enter the international market as tariff rates fall permanently, which subsequently gives more bargaining power to US retailers over foreign manufacturers exporting to the US market. On the other hand, the improved profitability due to exchange rate changes is viewed as transitory, and the extensive margin should not change significantly. Because there are few changes in the extensive margin, retailers' buyer power over manufacturers is constant. Therefore, buyer power will have little effect on exchange rates or production costs pass-through.

The exchange rate is defined as the source country's currency per US dollar and is obtained from the Penn World Table. Production cost is measured using the source country's wage for every year. Wages are obtained from Occupational Wages around the World (OWW) data provided by Freeman and Oostendorp. I use the hourly wage in US dollars, which was obtained by country-specific calibration with imputation because it provides the largest number of data. I take the average of sectoral wages for each of the 171 countries.

The results shown in Table 12 imply that unlike buyer power effects on tariff pass-through, the buyer power effects on exchange rate or cost pass-through are not significant for both retail goods and manufacture samples. Thus, in contrast to tariff pass-through, the exchange rate and cost pass-through do not differ between high-buyer-power goods and low-buyer-power goods. This result confirms my conjecture that there is more markup adjustment due to trade liberalization than when exchange rates or production cost changes.

6. Robustness Check

In the main analysis, the single dummy variable used to measure buyer power is coarse. Thus, to check that the results are robust, I implement a new division of the goods, low-buyer-power goods LBP, medium-buyer-power goods MBP and high-buyer-

power goods HBP, which indicate the top 1/3rd and 2/3rd and the bottom 1/3rd of the inverse export elasticity measure, respectively. Each of the categorical variables is equal to 1 as the goods fall into the appropriate groups. I also use the continuous measure of buyer power rather than categorical variables. Lastly, to address the concern that buyer (monopsony) power may be correlated to seller (monopoly) power and thus the estimation result may suffer from endogeneity problems, I add the inverse demand elasticity as a measure of monopoly power. I use the 10-digit HS level Broda and Weinstein (2006)'s US import demand elasticity estimated for years the 1990-2001. The results are shown in Table 13.

The first coefficients for (1) and (5) show the tariff pass-through of the base category, low-buyer-power goods; the second and third coefficients measure the additional markup adjustment for medium-buyer-power goods and high-buyer-power goods. The retail sample estimate of the first row of column (1) shows that tariff-inclusive retail prices of low-buyer-power goods drops by 7.73% for a 10% tariff cut. Although the result suggests that there is no additional tariff absorption to medium-buyer-power goods' net-of-tariff prices compared to prices of low-buyer-power goods, net-of-tariff prices of high-buyer-power goods increase by an additional 3.34% than that for low-buyer-power goods. The estimates from the intermediate goods sample suggest that there is no significant markup adjustment to tariff cuts for low-buyer-power goods, but net-of-tariff prices increase to 1.44% on average for medium-buyer-power goods and 3.24% for high-buyer-power goods for a 10% cut in tariff rates.

Other specifications use a continuous measure of buyer power: the log of inverse export supply elasticity. BLW acknowledges measurement errors for the estimated inverse export supply elasticity. Because the measurement error is severe in the highest level of estimates, I trim off the top decile to avoid the measurement problem. For (2) and (6), I include both the inverse export supply elasticity and the inverse export supply elasticity interacted with the tariff rate. To include the inverse export supply elasticity, I drop the HS8 fixed effects because the HS8 fixed effects soak up all the time-invariant, source-country-invariant product characteristics including the inverse export supply elasticity. However, when I do not include the HS8 fixed effects, the sign of the tariff pass-through is reversed for both of the samples. The reversed sign implies that there exists product

characteristics correlated with unit price omitted in the specification. Although this specification suffers from endogeneity problems, the coefficient for the interaction term of buyer power measure and tariff rates still remains significantly negative. The results of (3) and (7) agree well with the baseline model using dummy variables as a buyer power measure.

(4) and (8) show the estimation results obtained when I add the inverse demand elasticity to the estimation. The inverse demand elasticity, $1/\eta^d$, is the measurement of the extent of retailer's market power over final consumers. Although statistically insignificant, the sign is negative in (4). The negative sign indicates that when retailers are able to exert market power over final consumers, they absorb the reduction in tariff rates by increasing net-of-tariff prices, as they do when they can exert buyer power over manufacturers. However, when comparing the magnitude and the statistical significance of the markup adjustment based on buyer power and market power, retailers' buyer power appears to be more important than retailers' market power over final consumers in increasing their markup as trade costs fall. For the intermediate goods sample, the results reported in (8) show that the interaction term of buyer power and tariff rate is statistically less significant, but the magnitude remains similar when compared with the results in reported (7). In contrast to the retail sample, the coefficient for the market power over consumers and tariff rate interaction term is strongly significant in the manufacture sample. Although the estimate is smaller than the interaction of manufacturers' buyer power and tariff rates, it is greater than the corresponding estimate for the retail sample.

7. Conclusion

My goal in this paper is to empirically study the effect of retailers' bargaining power over manufacturers on tariff rate pass-through. I find that domestic prices do not fall as much as the reduction of tariff rates and the decline in prices are smaller for products over which retailers are more able to exert buyer power. I further show that the reduction in tariff rates is completely absorbed by higher net-of-tariff prices when the market share of the largest four retailers is 95 percent. This threshold is much lower when considering only high-buyer-power goods, further implying that trade liberalization may in fact increase prices when retailers have market power over manufacturers as Raff and Schmitt (2009)'s

theory suggests. For low-buyer-power goods, it is shown that even when the largest four retailers entirely dominate the retail sector, the net-of-tariff prices cannot increase to the extent that it completely cancels out the tariff cuts. For this type of product, consumers can enjoy lower prices from free trade. Even for low-buyer-power goods, however, prices do not fall as much as the decline in trade costs when retail concentration is high. This result implies not only that the relative size and strength of the retailers matters but also that the scope for exercising this strength is important.

Although the results consistently show a significant effect of buyer power on tariff rate pass-through, buyer power does not appear to have a significant effect on exchange rate and cost pass-through. This finding may be observed because tariff reductions are perceived as permanent and firms expect a substantial increase in profits leading to more exporters, which imparts more bargaining power to retailers. On the other hand, exchange rates and costs are more volatile, and firms tend to respond less because they consider the changes as temporary. It is further shown that pass-through is affected more by retailers' buyer power over foreign manufacturers than their market power on final consumers.

The implications of the present paper call for a nexus between trade and competition policy. When retailers have market power, the gains from trade are unlikely to be maximized because retailers absorb the reduction in trade costs in the form of a higher markup, and consumers do not benefit from lower price levels, as traditional trade theory implies.

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Table 1: Highly Concentrated Retail Sectors

NAICS	description	1997 CR4	2002 CR4	ΔCR4
452910	Warehouse clubs and supercenters	0.90	0.92	0.03
444110	Home centers	0.75	0.91	0.16
453210	Office supplies and stationery stores	0.76	0.78	0.03
451120	Hobby, toy, and game stores	0.70	0.72	0.01
443112	Radio, television, and other electronics stores	0.62	0.69	0.07
452110	Department stores	0.62	0.66	0.04
451211	Books stores	0.54	0.66	0.12
451130	Sewing, needlework, and piece goods stores	0.54	0.59	0.05
448130	Children's and infants' clothing stores	0.61	0.58	-0.02
451220	Prerecorded tape, compact disc, and record stores	0.47	0.58	0.11
446120	Cosmetics, beauty supplies, and perfume stores 49.3	0.49	0.57	0.08

Table 2: Direct Exports and Re-Exports of Chinese Goods for Selected Two-Digit Industries

SITC	Industry	Industry Share of Direct Exports	Industry Share of Re-Exports	Re-Export Share of Total Exports
03	Fish	2.9	0.6	16.9
05	Vegetables, Fruit	3.6	0.9	19.6
33	Fuel Oils	8.2	0.1	0.8
52	Inorganic Chemicals	2.1	0.3	12.2
65	Textiles Yarn Fabrics	10.2	8.7	48.6
66	Nonmetal. Minerals	2.2	1.1	37.5
67	Iron, Steel	2.7	0.2	8.6
69	Metal Products	3.7	2.3	41.0
75	Office Machines	0.6	3.4	88.1
76	TVs, Radios	1.5	9.3	86.2
77	Elec. Machinery	2.5	7.1	78.1
83	Luggage	0.8	5.5	88.5
84	Apparel	17.2	17.4	53.5
85	Footwear	2.7	7.8	76.7
88	Cameras, Watches	0.4	3.2	89.9
89	Toys, Games	4.9	21.0	82.9

source: Hanson and Feenstra [2004] Table III

Table 3: High Buyer Power Goods

HS code	Description	Inverse Export Elasticity
6210	Garments, made up of fabrics of heading No. 56.02, 56.03, 59.03, 59.06 or 59.07	1254.49
8419	Nonelectric instantaneous/storage water heaters; machinery, plant or laboratory equipment for treatment of material by temperature change i.e heating, distilling, sterilizing, condensing, cooling (not domestic) microwave ovens	1254.49
9612	Typewriter or similar ribbons, inked or otherwise prepared for giving impressions; ink-pads	1238.81
8423	Weighing machinery (excl. balances of a sensitivity$\leq$50mg); weighing machine weights of all kinds	752.46
8523	Prepared unrecorded media (no film) for sound etc.	96.60
8452	Sewing machines, other than book-sewing machines of heading No.84.40; furniture, bases and covers specially designed for sewing machines; sewing machine needles	90.87
8526	Radar apparatus, radio navigational aid & remote control apparatus	80.53
9609	Pencils, crayons, pencil leads, pastels, drawing charcoals, writing or drawing chalks & tailors' chalks	75.12
8451	Machinery (not 8450) for washing, wringing, drying, ironing, pressing, dyeing, dressing, finishing, coating/impregnating yarns/fabrics	53.80
9614	Smoking pipes (incl. pipe bowls) & cigar or cigarette holders, and parts thereof	49.25
8424	Mechanical appliances for projecting/dispersing/spraying liquids/powders fire extinguishers, spray guns, steam or sand blasting machines	44.07

Table 4: Low buyer power goods

HS code	Description	Inverse Export Elasticity
6103	Men's or boys' suits, ensembles, jackets, blazers, trousers, bib and brace overalls, breeches & shorts, knitted or crocheted	0.28
2006	Vegetables, fruit, nuts, fruit-peel and other parts of plants, preserved by sugar(drained, glace or crystallised).	0.27
1105	Flour, meal, powder, flakes, granules and pellets of potatoes	0.27
1005	Maize (Corn)	0.25
1008	Buckwheat, millet and canary seed;other cereals.	0.23
7317	Nails, tacks, drawing pins, corrugated nails, staples (not 8305) and similar of iron or steel (not heads of copper).	0.23
6402	Other footwear with outer soles and uppers of rubber or plastics	0.20
1602	Other prepared or preserved meat, meat offal or blood.	0.20
1003	Barley	0.19
1004	Oats	0.19
1001	Wheat and meslin	0.17
1101	Wheat or meslin flour	0.13
0903	Mate	0.11
1102	Cereal flours other than of wheat or meslin	0.10
1601	Sausages and similar products, of meat, meat offal or blood; food preparations based on these products	0.09
1107	Malt, whether or not roasted	0.09

Table 5: Sample Composition by Rauch Classification

	homogeneous	reference priced	differentiated	total
Retail Goods Sample	4,035	4,622	176,921	185,578
	(2.17%)	(2.49%)	(95.34%)	(100%)
Intermediate Goods Sample	981	41,834	11,230	54,045
	(1.82%)	(77.41%)	(20.78%)	(100%)

Table 6: Inverse Export Elasticity Summary Statistics

	Retail goods		Intermediate goods	
mean $(1/\eta^s)$	36.08		25.47	
s.d $(1/\eta^s)$	194.76		140.95	
	N	Percent	N	Percent
High Buyer Power	141,707	75.39	39,248	69.88
Low Buyer Power	46,255	24.61	16,916	30.12
Total	187, 962	100.0	56,164	100.0

Table 7: Summary Statistics of the Concentration Ratios

	year	mean	std. dev.	min	max	N
NAICS	1997	0.254	0.207	0.015	0.896	72
	2002	0.299	0.232	0.017	0.921	72
Product Category	1997	0.336	0.151	0.018	0.606	38
	2002	0.413	0.165	0.057	0.650	38

Note: The first two row reports the summary statistics of the raw CR4 for each retail sectors reported by the US Census.The last two rows are the weighted CR4 by using sector weights.

Table 8: Baseline Regression

	retail goods		intermediate goods	
	(1)	(2)	(3)	(4)
$\ln(1+\tau)$	-0.28^{***}	-0.28^{***}	-0.02	-0.03
	(0.06)	(0.06)	(0.04)	(0.05)
$BP * \ln(1+\tau)$	-0.29^{***}	-0.29^{***}	-0.09^{*}	-0.14^{*}
	(.05)	(0.05)	(0.05)	(0.08)
$\ln IMV$	-0.04^{***}	-0.04^{***}	-0.16^{***}	-0.16^{***}
	(.005)	(0.005)	(0.01)	(0.01)
$\ln(dist)$		0.012		0.24^{***}
		(0.055)		(0.05)
HS8 fixed effects	yes	yes	yes	yes
country fixed effects	yes	no	yes	no
year fixed effects	yes	yes	yes	yes
N	150,561	150,561	37,886	37,881
$adj.R^2$	0.7446	0.7449	0.7328	0.7328

Note: Robust standard errors in parentheses. All standard errors are clustered at country level. Distance between two countries is measured in kilometers for the most populated cities.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 9: Regression Results by Degree of Differentiation

	homogeneous	reference-priced	differentiated
	(1)	(2)	(3)
$\ln(1+\tau)$	-0.792***	-0.619***	-0.230***
	(0.0482)	(0.0603)	(0.0464)
$\ln(1/\eta^s) * \ln(1+\tau)$	0.0521**	0.00469	-0.0866***
	(0.0232)	(0.0305)	(0.0122)
$\ln(IMV)$	-0.0395***	-0.0323***	-0.0317***
	(0.0106)	(0.00959)	(0.00485)
N	1,742	2,302	144,514
adj. R^2	0.827	0.598	0.726

Note: Robust standard errors in parentheses. All robust standard errors clustered at country level. All specification controls for country, year and HS8 fixed effects. The sample is restricted to retail goods sample. Conservative Rauch classification is used. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 10: Using CR4 as a measure of buyer power

	(1)
$CR4$	0.669***
	(0.162)
$CR4 * \ln(1+\tau)$	-1.052***
	(0.191)
$\ln(IMV)$	-0.0710***
	(0.00206)
N	177,922
adj. R^2	0.785

Note: Robust standard errors clustered at HS10 in parentheses.

Country, year, HS10 fixed effects are controlled.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 11: CR4 effect on tariff pass-through by product types

	(1)	(2)
	HBP	LBP
$CR4$	0.599	0.605***
	(0.404)	(0.156)
$CR4 * \ln(1+\tau)$	-4.589***	-0.777***
	(0.980)	(0.178)
$\ln(IMV)$	-0.0888***	-0.0620
	(0.00559)	(0.002034)
N	39,039	132,470
adj. R^2	0.679	0.8327

Note: Robust standard errors in parentheses are clustered at HS10 level.

Country, year, HS10 fixed effects are controlled.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 12: Comparison with exchange rate and cost pass through

	retail goods			intermediate goods		
	(1)	(2)	(3)	(4)	(5)	(6)
$\ln(1+\tau)$	-0.282***	-0.246***	-0.292***	-0.0369	0.0355	-0.0466
	(0.0830)	(0.0455)	(0.0869)	(0.0492)	(0.0328)	(0.0495)
$HBP * \ln(1+\tau)$	-0.359***	-0.309***	-0.354***	-0.180*	-0.200***	-0.176*
	(0.0584)	(0.0497)	(0.0594)	(0.0916)	(0.0700)	(0.0905)
$\ln(IMV)$	-0.0628***	-0.0777***	-0.0611***	-0.186***	-0.165***	-0.186***
	(0.00970)	(0.00951)	(0.00914)	(0.0151)	(0.0163)	(0.0149)
$\ln(wage)$	0.318***		0.298***	0.181***		0.167***
	(0.0325)		(0.0314)	(0.0337)		(0.0348)
$HBP * \ln(wage)$	0.0221		0.00496	-0.0152		-0.0240
	(0.0551)		(0.0637)	(0.0218)		(0.0239)
$\ln(e)$		-0.0841***	-0.0342*		-0.0489*	-0.0264
		(0.0187)	(0.0194)		(0.0263)	(0.0242)
$HBP * \ln(e)$		-0.0176	-0.0311*		-0.0200	-0.0108
		(0.0128)	(0.0181)		(0.0123)	(0.0142)
HS8 fixed effects	yes	yes	yes	yes	yes	yes
country fixed effects	no	no	no	no	no	no
year fixed effects	no	no	no	no	no	no
N	75,600	149,095	74,873	21,076	37,855	21,073
adj. R^2	0.740	0.699	0.742	0.709	0.710	0.710

Note: Robust Standard errors in parentheses. All robust standard errors are clustered at country level.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 13: Robustness Test

	retail goods				intermediate goods			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\ln(1+\tau)$	-0.227***	0.238***	-0.328***	-0.312***	0.00631	0.345***	-0.103***	-0.1198***
	(0.0562)	(0.012)	(0.0563)	(0.059)	(0.0491)	(0.0407)	(0.03597)	(0.452627)
$MBP * \ln(1+\tau)$	-0.124				-0.144***			
	(0.0970)				(0.0498)			
$HBP * \ln(1+\tau)$	-0.334***				-0.180**			
	(0.0763)				(0.0806)			
$\ln(IMV)$	-0.0352***	-0.0202**	-0.0351***	-0.0381***	-0.156***	-0.206***	-0.1565***	-0.161**
	(0.00458)	(0.009)	(0.00455)	(0.0048)	(0.0131)	(0.0198)	(0.01313)	(0.0137)
$\ln(1/\eta^s)$		-0.186***				0.4009***		
		(0.0331)				(0.0382)		
$\ln(1/\eta^s) * \ln(1+\tau)$		-0.128***	-0.064***	-0.0723***		-0.0144	-0.0479***	-0.0407*
		(0.00923)	(0.0118)	(0.0123)		(0.0111)	(0.01591)	(0.0237)
$\ln(1/\eta^d) * \ln(1+\tau)$				-0.0017				-0.0114***
				(0.002)				(0.0137)
HS8 fixed effects	yes	no	yes	yes	yes	no	yes	yes
country fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
year fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
N	150,561	150,561	150,561	136,343	37,886	36,111	37,886	30,063
Adjusted R^2	0.746	0.1004	0.7462	0.7386	0.733	0.286	0.7329	0.7394

Note: Robust standard errors in parentheses are clustered at country level.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$