Micro, Macro, and Strategic Forces in International Trade Invoicing

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Abstract

Existing studies of which currencies are used in the invoicing of international trade have identified a range of determinants, both macroeconomic (such as exchange rate volatility) and microeconomic (such as the degree of competition). We show that in addition to these determinants transaction-level characteristics matter, and offer an interpretation in terms of strategic bargaining between importers and exporters. Using a new highly disaggregated dataset of Canadian import transactions, we confirm the role of macro and microeconomic considerations, and find important roles for exchange rate regimes and the characteristics of individual import transactions. In particular, larger transactions are associated with more use of the Canadian dollar, and heterogeneity in importer size matter for invoicing outcomes.

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1. Introduction

The currency in which exporters set the price of their goods – the so-called "invoicing" currency – is a central feature of international economics. It determines who among the exporter or the customer bears exchange rate risk, and the extent to which movements in exchange rates affect the relative prices of internationally traded goods, and hence balance of payments adjustment.[2] The choice of the invoicing currency when the price is fixed in that currency is thus related to the choice of the degree of pass-through when the price can be adjusted ex-post in response to shocks, as discussed in Engel (2006) and Goldberg and Tille (2008). Gopinath, Itskhoki and Rigobon (2010) document this correspondence between invoicing and pass-through for U.S. imports. In a model of infrequent price adjustment, they show that the firms which only partially adjust their prices when they get an opportunity to do so are also the ones which set prices in US dollars between adjustments.

An extensive literature has identified two broad categories of drivers of invoicing currency choice. The first reflects microeconomic and structural industry features, such as the price-sensitivity of demand and exporters' market shares. The second reflects macroeconomic considerations, such as the need of producers to hedge against unforeseen movements in marginal costs, for instance due to exchange rate volatility or the presence of imported inputs priced in foreign currencies.[3] In addition to the choice between the exporter's currency and the customer's the literature also considers so-called third "vehicle" currencies. A limitation of the literature is the focus on macro and micro considerations. While these are clearly relevant, recent works stress the role of characteristics of individual exporters and importers. This role is present in Goldberg and Tille (2013) who consider that invoicing is determined through a bargaining between the parties, in line with the evidence of Friberg and Wilander (2008) and Ito et al. (2010), and show that so-called "strategic" considerations reflecting the bargaining position of the parties matter for the invoicing choice for individual transactions, as well as in aggregate terms.

In this paper we assess the roles of these micro, macro and strategic considerations. While the first two considerations are explored in the aggregate and sectoral datasets used in the existing literature, the third strategic aspect requires using disaggregated data to capture

[2] Examples include Obstsfeld and Rogoff (1995), where producer currencies are assumed to be used, Betts and Devereux (2000) and Devereux and Engel (2003) where local currency pricing is assumed, and Corsetti and Pesenti (2004) where intermediate rates of exchange rate pass though into traded goods prices are permitted. Goldberg and Tille (2006) discuss the consequences of asymmetric practices across countries for trade balance adjustment.

[3] A non-exhaustive list of recent contributions includes Bacchetta and van Wincoop (2005), Devereux, Engel, and Storgaard (2004), Friberg (1998), Novy (2006), Goldberg and Tille (2008). Goldberg and Tille (2008) describe these main determinants as reflecting hedging or coalescing motives by exporters.

transaction level characteristics. We use a new and highly disaggregated dataset of all Canadian import transactions between February 2002 and February 2009 (44.5 million observations) that includes information on the industry, the invoicing currency, the transaction size, and the country of origin. An unfortunate limitation of the database is the absence of individual identifiers of exporters and importers. Nonetheless, our inclusion of available transaction-level considerations and importer characteristics (at an industry level) allows us to go beyond the usual reliance on aggregate and industry-level data. A related paper is Gopinath, Itskhoki and Rigobon (2010) who use BLS data to provide insights into the frequency of price adjustment in U.S. imports and the relationship to invoicing currency.[4]

In terms of the broad patterns of invoicing currency use, the U.S. dollar is used in the bulk of Canadian imports from the United States, which account for a little more than half of total Canadian imports. Imports from other countries however make more substantial use of other currencies, with a mix of producer currencies, vehicle currencies, and local currency (the Canadian dollar). We identify a novel feature in the form of a link between transaction size and invoicing, with the local currency being used more extensively on larger shipments than on smaller ones. This size pattern is robust and observed across all industries, and in imports from the United States as well as from other countries. We also document novel roles for the structures of importers across Canadian industries, potentially suggesting strategic interactions with exporters, and for the importance of exchange rate regimes.

We set the stage for our econometric analysis by presenting a simple model that summarizes the drivers of invoicing choice, drawing on the works of Atkeson and Burstein (2008) and Goldberg and Tille (2008). Goldberg and Tille (2008) show the impact of aggregate and industry-level characteristics, such as the co-movements between exchange rate and costs and the degree of competitiveness in the industry. Atkeson and Burstein (2008) move towards a more micro-level analysis and show that heterogeneity among exporters in their market shares leads to a heterogeneous transmission of cost to prices, as firms' market shares affect the price elasticity of the demand they face. A related point is made by Berman, Martin and Mayer (2012) who focus on heterogeneous productivity, and find that the firms' specific productivity levels affect their market share and elasticity of demand, hence the transmission of cost shocks to prices. While these recent contributions stress the heterogeneous nature of firms' choices, they still consider a "unilateral" decision where prices are set solely by exporters, with no influence of

[4] Donnenfeld and Haug (2003) provide an early look at a subsample of Canadian data for an earlier period. Goldberg and Tille (2008) survey other prior research. Another important study that utilizes highly disaggregated data is Berman, Martin, and Mayer (2012), who explore heterogeneity in pass through across French exporters.

the characteristics of importers beyond the shape of industry demand. This standard assumption is at odds with the evidence of decisions through negotiations presented by Friberg and Wilander (2008). We thus extend the theoretical literature with a simple variant of the model by Goldberg and Tille (2013) where prices and invoicing currencies are set through a bargaining between individual exporters and importers. The sizes of the parties and market structure then matter: being large confers a higher effective bargaining weight when counterparts are risk averse, which in turn affects the currency of invoicing and the price level.

The roles of macro, micro and strategic considerations identified in the theory section are then assessed through a formal econometric analysis using multinominal logit (MNL) specifications. Our analysis generates three broad sets of results. First, we confirm the roles of microeconomic and macroeconomic determinants emphasized in prior studies. Exporters in industries where demand is more price-sensitive tend to coalesce more on particular currencies, and this coalescing occurs over both the U.S. dollar and the Canadian dollar. Exporters from countries with relatively volatile exchange rates use their own currency to a lesser degree in international trade transactions. Exporters tilt invoice-currency selection toward currencies that offer a better hedge against movements in their production costs. Exporters in industries with heavier reliance on commodities and energy as production inputs are more likely to invoice in U.S. dollars, as these inputs are predominantly invoiced in dollars. Transactions from a country with a higher share of the total exports in a particular industry have invoicing choice tilted more toward use of their own currency.

Second, the invoicing choice by non-U.S. exporters is heavily influenced by macroeconomic considerations, both at the country level and over time. A novel aspect is the role of exchange rate regimes. Exports from countries with currency pegs to the US dollar are more likely to be invoiced in US dollars, while producer currency pricing is stronger among Eurozone exporters. Exporters also tilt away from use of the Canadian dollar when they are from a country with a large market share in the industry. The weight of specific regions also matters, as all exporters tilt invoicing toward producer currency pricing in industries with a larger presence of Eurozone exporters, and toward vehicle currency pricing when Chinese exporters have a large presence.

Third, we document a substantial role for strategic considerations. The relative size of individual transactions in an industry matters, with larger transactions being far more likely to be invoiced in the local currency. Importer concentration also matters, with local currency pricing more prevalent in industries where the import side is dominated by a few firms. In addition to its direct impact on invoicing, size matters in magnifying the effects of other strategic variables with

the marginal effects of importer concentration are considerably more pronounced for the largest transactions. For exporters from countries other than the United States, the exchange rate regime in place interacts with the empirical importance of the strategic variables in invoicing decisions. By contrast, strategic variables play a dominant role in explaining the use of local currency by some US exports.

The paper is structured as follows. Section 2 presents our new invoicing data set and documents the key facts of invoicing choices. Section 3 presents our simple model illustrating the theoretical determinants of invoicing. The section first presents the standard unilateral decision model drawing on Atkeson and Burstein (2008), and then derives a model with bargaining decisions drawing on Goldberg and Tille (2013). Section 4 provides a multinomial logit analysis of the invoicing data, validating previous hypotheses of determinants and showing the role of the more novel drivers. We also present extensive robustness checks. Section 5 concludes with lessons from the analysis and open questions on currency invoicing choice and exchange-rate pass through.

2. The invoicing of Canadian imports

Our analysis uses a novel database of Canadian imports based on the records of individual transactions collected by the Canada Border Services Agency (CBSA). Each transaction is recorded in a customs invoice containing information on the country of origin, currency of settlement, industry code (up to HS10), quantity, and value of transaction.[5] The dataset contains the full roster of all 44.5 million transactions from February 2002 through February 2009. We apply filters to the database,[6] bringing the sample to 41.8 million observations. For tractability, we focus on Canadian imports from 45 countries of origin that account for over 99 percent of imports by both transaction count and transaction value. While the information in our dataset is rich, it is important to recognize that it is not exhaustive. First the data do not include identifiers for specific exporter and importer counterparties. We can thus not assess the size of any specific exporter and importer (in terms of the values of all transactions that she is involved in), nor can we get a sense of whether a particular exporter-importer pair engages in repeated transactions over time. We also do not observe the level of the price, and thus cannot assess whether the patterns we observe for invoicing choice are associated with any pattern in terms of price, with

[5] The Customs Coding form is referenced at http://www.cbsa-asfc.gc.ca/publications/forms-formulaires/b3-3.pdf

[6] Transactions are dropped if there is missing information for invoicing currency, industry code, country of origin, or value. We drop the months of February and March 2002 because of incomplete sampling. We also drop Canadian imports that record Canada as the country of origin, since these imports are most likely prior Canadian exports being returned to producers, or are goods re-imported for the purpose of repairs.

for instance a party taking more exchange rate exposure but obtaining a better price. The data also do not indicate whether an import transaction is arms-length or between related parties, nor the mode of transportation (road, air, sea).

We document the general patterns of the data, by sorting transactions into sixteen product categories and six regions of origin to describe the broad sectoral and geographic characteristics and the patterns of invoicing. Table 1 shows geographical and sectoral patterns in terms of *counts* of transactions (counting each transaction as one observation). While the United States is the main country of origin, there also is a sizable role of other countries. The next-largest regions of origin after the United States are Asia (including East and South East Asia and China) and the Eurozone. The next-to-last column of Table 1 shows that while some industries account for large shares of overall imports (machinery and equipment, metals, and transportation), the sectoral concentration of imports is lower than the geographical concentration (next-to-last row). Assessing the patterns in terms of *value* of transactions (weighting transaction by their value in Canadian dollars) leads to similar results, as can be seen from the last row and last column of Table 1 which show the geographical and sectoral composition, respectively, of imports by value.

The patterns of invoicing are presented in Figure 1, with the shares of the U.S. dollar (USD), Canadian dollar (CAD), euro (EUR), and other currencies in the invoicing of Canadian imports, both by transaction count (left panel) and transaction value (right panel). The USD has a dominant role, being used in over 86 percent of Canadian imports by count (75 percent by value). Other currencies play little role by count, with the CAD and EUR used in only 3.7 and 6.0 percent of transactions. The pattern is different by value where the CAD share is higher at 21.0 percent, indicating a use of the CAD concentrated in large value transactions.

The currency invoicing patterns can also be shown from the vantage point of exporters, distinguishing whether the invoicing currency is the currency of the exporter ("producer currency pricing", PCP), the currency of the importer ("local currency pricing", LCP), or a third currency ("vehicle currency pricing", VCP). Figure 2 shows the use of PCP by counts (left panel) and value (right panel). United States' exporters stand out with a dominant use of the PCP option. The use of PCP is also substantial, albeit to a lower extent, among exporters in the Eurozone, the United Kingdom, and Japan. Finally, PCP use is lower by value than by count, showing that this option is used more in transactions of relatively low values.

Our data thus indicate a novel aspect in the form of the role of relative transaction size in an industry, with higher use of LCP (i.e. the Canadian dollar) in large value transactions. This feature is robust across and within industries, as shown in Table 2 which presents the use of the

LCP option across industries both for imports from non-US countries (left panel) and from the United States (right panel). In each panel, we first document the heterogeneity of transaction size. The median transaction value (first column, in thousands of Canadian dollar) by industry shows the heterogeneity of transaction size across industries. The second column shows the heterogeneity within industries. We do so by computing the mean value for transactions in the top 5^{th} percentile (by value for the industry in question) as well for transactions in the lower 95^{th} percentile, and taking the ratio between these two mean values. The ratio is reported in the second column of Table 2 which shows that the heterogeneity within industries is clearly substantial. The last two columns of each panel consider the use of LCP. The heterogeneity across industries is shown through the average LCP share. The heterogeneity within industries is again illustrating by taking the ratio between the average LCP share in the top 5^{th} percentile of transactions and the LCP share in the bottom 95^{th} percentile. This ratio is well above 1 which shows a more intensive use of the Canadian dollar for larger transactions than smaller ones in all industries and for both US and non-US exports to Canada.

The invoicing choice also displays considerable heterogeneity across countries of origin. Focusing on non-US exporters, Table 3 shows the use of PCP, LCP, and VCP (further split between euros, U.S. dollars, and other currencies) for different regions of origin by transaction count (left panel) and by value (right panel). LCP is the least prevalent pricing practice by count, but accounts for a larger share by value, showing a concentration of this option in large value transaction. VCP is the dominant option for export transactions (by count), with the USD being the dominant vehicle currency. The use of the USD is particularly pronounced for imports from emerging market countries. Euro use as a vehicle currency is limited, except for countries in the geographic proximity of the Eurozone.

3. The determinants of invoicing

In this section we review the theoretical determinants of invoicing with the aim of setting up testable hypotheses for macro, micro and strategic determinants. We begin with the models of unilateral optimization where exporters choose their invoicing and pricing in the presence of shocks. Our setup is based on Goldberg and Tille (2008) and Atkeson and Burstein (2008). We illustrate the "coalescing" and "hedging" motives found in Goldberg and Tille (2008) and Bacchetta and van Wincoop (2005) and discuss the role of transaction costs in currency markets. We also show the impact of firms' market shares in the presence of heterogeneous elasticities of substitution across and within industries. While this can lead to different invoicing outcomes

depending on the relative market shares of firms, the invoicing decision is still the sole purview of the exporter.

In a second step we develop a simple model where the invoicing and pricing are not unilaterally set by exporters and instead reflect the outcome of bargaining between importers and exporters. This simpler variant of the model by Goldberg and Tille (2013) illustrates how pricing and invoicing are affected by sensitivity to risk and the sizes of the buyers and sellers. We keep our exposition in the text brief and focused on the main empirical implications, with a more detailed exposition in the appendix.[7]

3.1 Unilateral optimization

Consider the standard setting where an exporting firm *k* in sector *j* which sets its price and invoicing while taking account of the impact on demand. The demand reflects the firm's price relative to other firms in the sector, as well as the price index of sector *j* relative to other sectors:

$$Q_{jk} = \left[P_{jk}^B\right]^{-\lambda}\left[P_j^B\right]^{\lambda-\eta}\left[P^B\right]^{\eta}Q$$

where *Q* is aggregate demand, P_{jk}^B is the price set by the firm, P_j^B is the price index of goods of sector *j*, and P^B is the aggregate price index (all expressed in the currency of the buyer). λ and η are the elasticities of substitution within and across sectors, respectively, with $\lambda \geq \eta > 1$. The sectoral price index is given by $P_j^B = \left[\sum_{h=1}^{K}\left[P_{jh}^B\right]^{1-\lambda}\right]^{1/(1-\lambda)}$ where *K* is the number of firms in the sector. Following Atkeson and Burstein (2008) the firm takes account of its impact on P_j^B but treats P^B as exogenous. The elasticity of demand it faces is then a weighted average of the intra- and inter-sectoral elasticities of substitution, with the weight reflecting the firm's market share s_{jk}, as long as η differs from λ:[8]

$$\epsilon_{jk} = \lambda + (\eta - \lambda)s_{jk} \qquad (1)$$

The firm faces a total cost $C_{jk}(\alpha Q_{jk})^{1/\alpha}$ where α captures the degree of returns to scale in production (the case of constant returns to scale is $\alpha = 1$). The firm has to set its price in advance and chooses both the currency basket in which the price is set (the invoicing decision) and the preset level of the price in that basket (the pricing decision). The invoicing basket consists of the buyer's currency, with a share β_{jk}^b, a vehicle currency with a share β_{jk}^v, and the seller's currency for the remaining share. We denote the preset price level by P_{jk}^{fix}. The exchange rate between the

[7] A technical appendix available on request provides the complete steps followed in the theoretical analysis.

[8] $s_{jk} = P_{jk}^B Q_{jk}/\left[\sum_{h=1}^{K} P_{jh}^B Q_{jh}\right] = \left[P_{jk}^B\right]^{1-\lambda}/\sum_{h=1}^{K}\left[P_{jh}^B\right]^{1-\lambda}$

seller's currency and the buyer's currency is given by $exp[\varepsilon_S]$ where ε_S is a shock of mean zero and variance σ_S^2 with a positive shock denoting a depreciation of the seller's currency. Similarly, the exchange rate between the seller's currency and the vehicle currency is given by $exp[\varepsilon_V]$ where ε_V is a shock of mean zero and variance σ_V^2. The correlation between the two exchange rate shocks is ρ_{SV}. The ex-post price paid by the buyer is then written as:

$$P_{jk}^B = P_{jk}^{fix} exp\left[-\left(1-\beta_{jk}^b\right)\varepsilon_S + \beta_{jk}^v \varepsilon_V\right]$$

The price received by the seller is equal to P_{jk}^B adjusted for the exchange rate and costs of transacting in the various currencies. Specifically, invoicing in currency *i* entails an iceberg cost τ^i,[9] so the price received by the firm ex-post is:

$$P_{jk}^S = P_{jk}^{fix} exp\left[\beta_{jk}^b \varepsilon_S + \beta_{jk}^v \varepsilon_V - (1-\beta_{jk}^b - \beta_{jk}^v)\tau^s - \beta_{jk}^b \tau^b - \beta_{jk}^v \tau^v\right]$$

The cost of production also contains a stochastic component, with $C_{jk} = \bar{C}_{jk} exp\left[\varepsilon_{Cjk}\right]$ where ε_{Cjk} is a shock of mean zero and variance σ_C^2. The correlations between the cost shock and the two exchange rate shocks are ρ_{SC} and ρ_{VC} respectively. We assume that the overall price index P^B in the destination country is also affected by exchange rate movements and write $P^B = P^B exp\left[-\left(1-\xi_{jk}^b\right)\varepsilon_S + \xi_{jk}^v \varepsilon_V\right]$.

The firm chooses its invoicing and pricing to maximize the expected value of its profits, leading to three first-order conditions with respect to P_{jk}^{fix}, β_{jk}^b and β_{jk}^v. As these are complex expressions, we proceed in two steps. First, we consider the zero-order component[10] of the optimality condition with respect to P_{jk}^{fix} to write:

$$\bar{P}_{jk}^B = (\bar{\epsilon}_{jk} - 1)^{-1} \bar{\epsilon}_{jk} \bar{C}_{jk} (\alpha \bar{Q}_{jk})^{(1-\alpha)/\alpha} \qquad (2)$$

where upper bars denote the zero-order component of variables. (2) shows the standard result that the price is a markup over marginal cost, with the markup depending on the firm's market share through the elasticity $\bar{\epsilon}_{jk}$.

The invoicing shares determine the exposure of prices, quantities and profits to the various shocks, and are conceptually similar to the shares of various risky assets in a portfolio. We thus follow the standard approach in the literature on endogenous portfolio choice and take quadratic approximations of the first-order condition with respect to β_{jk}^b and β_{jk}^v. This allows us to capture

[9] Introduced to ensure a well-defined solution, these costs are second-order, i.e. linearly proportional to the variance of shocks.

[10] This is the component that is independent from the shocks and the iceberg costs. See Tille and vanWincoop (2014) for a discussion of orders.

the second-order components of the model and to solve for the optimal shares.[11] This leads to the following equation for the invoicing share in the buyer's currency:

$$\beta_{jk}^{b} = \rho\left(\varepsilon_{Cjk}, \varepsilon_{S}\right) + \frac{T^{b}}{\bar{\epsilon}_{jk}-1} - \frac{(\lambda-1)(\lambda-\eta)\bar{s}_{jk}}{\bar{\epsilon}_{jk}\left(\bar{\epsilon}_{jk}-1\right)}\left[\beta_{jk}^{b} - \sum_{h=1}^{H}\bar{s}_{jh}\beta_{jh}^{b}\right]$$
$$-\frac{1-\alpha}{\alpha}\left\{\lambda\left(\beta_{jk}^{b} - \sum_{h=1}^{H}\bar{s}_{jh}\beta_{jh}^{b}\right) - \eta\left(\sum_{h=1}^{H}\bar{s}_{jh}\beta_{jh}^{b} - \xi_{jk}^{b}\right)\right\} \quad (3)$$

and the share in the vehicle currency:

$$\beta_{jk}^{v} = \rho\left(\varepsilon_{Cjk}, \varepsilon_{V}\right) + \frac{T^{v}}{\bar{\epsilon}_{jk}-1} - \frac{(\lambda-1)(\lambda-\eta)\bar{s}_{jk}}{\bar{\epsilon}_{jk}\left(\bar{\epsilon}_{jk}-1\right)}\left[\beta_{jk}^{v} - \sum_{h=1}^{H}\bar{s}_{jh}\beta_{jh}^{v}\right]$$
$$-\frac{1-\alpha}{\alpha}\left\{\lambda\left(\beta_{jk}^{v} - \sum_{h=1}^{H}\bar{s}_{jh}\beta_{jh}^{v}\right) - \eta\left(\sum_{h=1}^{H}\bar{s}_{jh}\beta_{jh}^{v} - \xi_{jk}^{v}\right)\right\} \quad (4)$$

The first terms on the right-hand sides of (3)-(4), $\rho\left(\varepsilon_{Cjk}, \varepsilon_{S}\right)$ and $\rho\left(\varepsilon_{Cjk}, \varepsilon_{V}\right)$, are the coefficients of regressing the cost movements ε_{Cjk} on the exchange rates ε_{S} and ε_{V}:

$$\rho\left(\varepsilon_{Cjk}, \varepsilon_{S}\right) = \frac{\rho_{SC}-\rho_{SV}\rho_{VC}}{\sigma_{S}(1-\rho_{VS}^{2})}\sigma_{C} \quad , \quad \rho\left(\varepsilon_{Cjk}, \varepsilon_{V}\right) = \frac{\rho_{VC}-\rho_{SV}\rho_{SC}}{\sigma_{V}(1-\rho_{VS}^{2})}\sigma_{C} \quad (5)$$

The second terms in (3)-(4), T^{b} and T^{v}, reflect the iceberg costs of transacting in the various currencies:

$$T^{b} = \frac{(\tau^{s}-\tau^{b})\sigma_{V}^{2}-(\tau^{s}-\tau^{v})\rho_{SV}\sigma_{S}\sigma_{V}}{\sigma_{S}^{2}\sigma_{V}^{2}(1-\rho_{SV}^{2})} \quad , \quad T^{v} = \frac{(\tau^{s}-\tau^{v})\sigma_{S}^{2}-(\tau^{s}-\tau^{b})\rho_{SV}\sigma_{S}\sigma_{V}}{\sigma_{S}^{2}\sigma_{V}^{2}(1-\rho_{SV}^{2})} \quad (6)$$

The third terms in (3)-(4) capture the movements in the relative price of firm *j* vis-à-vis the other firms in the sector that occur when the invoicing of firm *j*, β_{jk}^{b} in (3), differs from the average invoicing of firms in the sector, $\sum_{h=1}^{H}\bar{s}_{jh}\beta_{jh}^{b}$ in (3) which affects P_{j}^{B}. The final terms in (3)-(4) capture the impact of relative prices on marginal costs. This only occurs under constant returns to scale (α < 1) and reflects both the relative price of firm *j* vis-à-vis other firms in the sector, $\beta_{jk}^{b} - \sum_{h=1}^{H}\bar{s}_{jh}\beta_{jh}^{b}$ in (3), and the relative price of the sector vis-à-vis the overall price index, $\sum_{h=1}^{H}\bar{s}_{jh}\beta_{jh}^{b} - \xi_{jk}^{b}$ in (3).

Several testable implications emerge from these expressions, many being already identified in the literature. First, consider the case of $\eta = \lambda$ as in Goldberg and Tille (2008). (3)-(4) then simplify to:

$$\beta_{jk}^{b} = \Omega\xi_{jk}^{b} + (1-\Omega)\left[\rho\left(\varepsilon_{Cjk}, \varepsilon_{S}\right) + T^{b}/(\bar{\epsilon}_{jk}-1)\right] \quad (7)$$

$$\beta_{jk}^{v} = \Omega\xi_{jk}^{v} + (1-\Omega)\left[\rho\left(\varepsilon_{Cjk}, \varepsilon_{V}\right) + T^{v}/(\bar{\epsilon}_{jk}-1)\right] \quad (8)$$

where $\Omega = \lambda(1-\alpha)/[\alpha + \lambda(1-\alpha)]$.

The first term in (7)-(8) reflects the "coalescing" effect (Goldberg and Tille 2008). Firms in a sector where demand is sensitive to prices and with a marginal cost sensitive to relative

[11] The first- and second-order components are linearly proportional to the standard deviation and variance of shocks, respectively.

prices (λ is high and $\alpha < 1$, so that Ω is high) have an incentive to stabilize their relative price vis-à-vis their competitors and thus choose and invoicing, β_{jk}^{b}, in line with the prevailing one in their market, ξ_{jk}^{b}. This effect is most pronounced in sector where goods are more homogeneous and thus more substitutable (λ is high), presenting a first testable hypothesis:

Hypothesis 1*: Industries with homogenous goods are more prone to coalescing around a single currency in their invoicing of international trade.*

A related feature is that when firms have some preference for invoicing in their own currency, the average invoicing is tilted towards the currency of the country with a dominant share of the market (Bacchetta and van Wincoop 2005). Consider for example that exporters compete with many domestic firms which invoice in their own currency. ξ_{jk}^{b} is then high, which pushes β_{jk}^{b} upwards.

Hypothesis 2: *The currency of a country with a dominant market share in an industry is more likely to emerge as the dominant currency for its international trade invoicing.*

The second term in (7)-(8) captures the "hedging" motive. Invoicing in the buyer's currency is appealing when that currency tends to appreciate vis-à-vis the seller's currency at times when the seller's costs are high, that is $\rho\left(\varepsilon_{Cjk}, \varepsilon_{S}\right)$ is large. A particular case is the presence of imported inputs (Novy 2006). If these inputs are predominantly invoiced in a specific currency, the seller has an incentive to rely more on that currency to hedge his costs. Commodity inputs are of particular interest as they tend to be invoiced in US dollar, and thus should tilt the invoicing of commodity intensive industries towards the US dollar. This leads us to the following testable hypothesis:

Hypothesis 3*: Invoicing tilts towards currencies that provide a profit hedge by appreciating against the exporter currency when the exporter's costs are high.*

The final terms in (7)-(8) reflect the transaction costs in currency markets, and is affected by exchange rate volatility, and have several implications. For clarity, consider that the two exchange rates are uncorrelated ($\rho_{SV} = 0$). In this case: $T^{b} = (\tau^{s} - \tau^{b})/\sigma_{S}^{2}$ and $T^{v} = (\tau^{s} - \tau^{v})/\sigma_{V}^{2}$.

The first implication is the direct impact of transaction costs. If transacting in a vehicle currency, such as the US dollar, entails smaller costs relative to other currencies (that is τ^{v} is the lowest of all costs), then invoicing is tilted towards the vehicle currency (a low value of τ^{v} raises

T^v and thus raises β_{jk}^v). This is especially the case if the exchange rate between the seller's currency and the vehicle currency does not move much (σ_V^2 is small, so T^v is more sensitive to τ^v). This point is in line with Ito et al. (2010) who show that Japanese exporters are more likely to invoice in the destination currency when the cost of hedging the yen against that currency through a forward contract is low.

Hypothesis 4*: Exporters from a country with a currency that has low transaction costs are relatively more likely to use another currency than their own in their invoicing decision.*

A second aspect stemming from T^b and T^v is that the exchange rate regime matters. Reducing the volatility of the exchange rate between the seller's currency and another currency with smaller transaction costs raises the use of that currency in invoicing. For instance, if the seller's currency is kept stable vis-à-vis the vehicle currency (i.e. σ_V^2 is small), and that currency entails low transaction costs ($\tau^s > \tau^v$), then the vehicle currency is more appealing (T^v is higher). There is also no effect on the use of the buyer's currency (T^b is not affected). An impact on the use of the buyer's currency can occur if we consider that the iceberg costs are affected by exchange rate volatility. It could be for instance that the stabilization of the seller's currency vis-à-vis the vehicle currency reduces the volume of transactions involving the seller's currency because the vehicle offers a cheaper close substitute. This can raise the cost of transacting in the seller's currency (τ^s is higher), which raises both T^b and T^v, and thus both β_{jk}^b and β_{jk}^v.

Hypothesis 5*: Exporters from countries whose currency is pegged to a major currency are more likely to use the anchor currency, and less likely to use their own.*

While our discussion above focuses on the exchange rate regime, contrasting a peg and a floating exchange rate, it also implies that the variance of the exchange rate matters. This relates to the general equilibrium model of Devereux, Engel, and Storgaard (2004) where firms in a country where the macroeconomic fundamentals are more volatile than in other countries make less use of their own currency than firms in more stable countries.

Hypothesis 6*: Exporters in a country with more volatile fundamentals, hence a more volatile exchange rate, are less likely to use their currency.*

While the points reviewed so far are well established in the cited contributions to the literature, a limitation of many papers is that they do not lead to any heterogeneity in the pricing and invoicing decisions across firms, which is at odds with our data. This shortcoming can be addressed by allowing for heterogeneous elasticities of substitution within and across sector (λ

> η), in which case the market share of the firm matters (Atkeson and Burstein 2008). For brevity, we abstract from decreasing returns to scale (α = 1), and (3) and (4) become:

$$\beta_{jk}^{b} = \left[1 + \frac{(\lambda-1)(\lambda-\eta)\bar{s}_{jk}}{\bar{\epsilon}_{jk}(\bar{\epsilon}_{jk}-1)}\right]^{-1}\left[\rho\left(\varepsilon_{Cjk}, \varepsilon_{S}\right) + \frac{T^{b}}{\bar{\epsilon}_{jk}-1} + \frac{(\lambda-1)(\lambda-\eta)\bar{s}_{jk}}{\bar{\epsilon}_{jk}(\bar{\epsilon}_{jk}-1)}\sum_{h=1}^{H}\bar{s}_{jh}\beta_{jh}^{b}\right] \quad (9)$$

$$\beta_{jk}^{v} = \left[1 + \frac{(\lambda-1)(\lambda-\eta)\bar{s}_{jk}}{\bar{\epsilon}_{jk}(\bar{\epsilon}_{jk}-1)}\right]^{-1}\left[\rho\left(\varepsilon_{Cjk}, \varepsilon_{V}\right) + \frac{T^{v}}{\bar{\epsilon}_{jk}-1} + \frac{(\lambda-1)(\lambda-\eta)\bar{s}_{jk}}{\bar{\epsilon}_{jk}(\bar{\epsilon}_{jk}-1)}\sum_{h=1}^{H}\bar{s}_{jh}\beta_{jh}^{v}\right] \quad (10)$$

When $\lambda > \eta$ equation (1) shows that a firm with a large market share $\bar{s}_{jk}$ faces a low demand elasticity $\bar{\epsilon}_{jk}$ as it essentially competes against firms in other sectors. The first bracket on the right-hand side of (9) and (10) is thus smaller for a firm with a large market share. The firm then chooses smaller invoicing shares in the buyer's and vehicle currencies β_{jk}^{b} and β_{jk}^{v}, leading to higher pass-through of exchange rate movements. This is the finding of Atkeson and Burstein (2008) that firms with large market shares face an elasticity of demand that is more sensitive to their own price, and thus limit the increase in their price following an increase in costs. In other words firms with large market shares absorb cost shocks in their markup instead of passing it to prices.

While the contribution by Atkeson and Burstein (2008) generates a link between firms' size (as proxied by market share) and invoicing, it only does so in the presence of heterogeneity between exporting firms. Specifically, if all firms have the same market share we fall back to the result in the model with homogeneous elasticities, which is that $\beta_{jk}^{b} = \beta_{jh}^{b} = \rho\left(\varepsilon_{Cjk}, \varepsilon_{S}\right) + T^{b}/(\bar{\epsilon}_{jk} - 1)$, irrespective of the market share of each firm. In addition, and most importantly, the model maintains the assumption of unilateral decisions by sellers, which is in contrast to the finding of Friberg and Wilander (2008) that invoicing is determined through an interaction between the two parties.

3.2 Optimization through bargaining

We now consider that the pricing and invoicing decisions for a shipment form a seller *S* to a buyer *B* are taken through a bargaining process involving both parties. As the bargaining setting is more technically complex, we simplify the model along other dimensions for clarity, in particular setting α = 1 and abstracting from any impact of the price on quantities.[12] We first develop the model for the case where a single unit is sent from the seller to the buyer, in order to establish the main results, and then consider bargaining on transactions of different sizes to show the link between the size of transactions and the pricing and invoicing decisions.

[12] The setting presented here is a simplified version of the model in Goldberg and Tille (2013).

3.2.1 Bargaining over individual units.

A seller *S* bargains with a buyer *B* for the price to charge on one unit of a good, indexed by *k*. The seller produces the good using a technology with constant returns to scale and marginal cost *C*, so her profit is given by $P_{S,B}^{S} - C$. We consider that the seller values its profits according to an exponential utility function:

$$\Theta_{S,B,k}^{S} = \frac{1}{\gamma_k^S}\left[1 - Eexp\left[-\gamma_k^S(P_{S,B}^{S} - C)\right]\right] \tag{11}$$

where γ_k^S is the absolute risk aversion parameter. This specification ensures that if the bargaining is not successful the seller's utility is zero. $\Theta_{S,B,k}^{S}$ can thus be understood as the surplus from reaching an agreement.

The buyer purchases the good to resell it at an exogenous price *Z*.[13] The valuation of payoffs by the buyer is:

$$\Theta_{S,B,k}^{B} = \frac{1}{\gamma_k^B}\left[1 - Eexp\left[-\gamma_k^B(Z - P_{S,B}^{B})\right]\right] \tag{12}$$

where γ_k^B is the absolute risk aversion parameter and $P_{S,B}^{B}$=$P_{S,B}^{S}/S$. Pricing and invoicing are set through a Nash bargaining solution that maximizes the geometric product of the surpluses $\left(\Theta_{S,B,k}^{S}\right)^{1-\delta}\left(\Theta_{S,B,k}^{B}\right)^{\delta}$ where δ denotes the formal bargaining weight of the buyer.

As in the previous section, we consider that both the seller and the buyer face iceberg transaction costs on the price paid.[14] To solve for the allocation, we first evaluate the zero-order component of the optimality condition with respect to the preset component of the price, $P_{S,B}^{fix}$. This leads to an implicit function of $P_{S,B}^{fix}$ that has a unique solution for $P_{S,B}^{fix} \in (\bar{C}, Z)$. The price can be expressed as a weighted average of the final price and the seller's cost, with the weight being the buyer's "effective" bargaining weight denoted by $\tilde{\delta}$:

$$P_{S,B}^{fix} = \left(1 - \tilde{\delta}\right)Z + \tilde{\delta}\bar{C} \tag{13}$$

The expression for $\tilde{\delta}$ is given in the appendix. It is higher when the buyer's formal power δ is high, when the seller's valuation of payoff is more concave (γ_k^S is high) or when the buyer's valuation is less concave (γ_k^B is low).

[13] This assumption of the buyer as an intermediary simplifies the model by removing any impact of the seller-buyer price on the final quantity.

[14] The ex-post prices $P_{S,B}^{S}$, and $P_{S,B}^{B}$ are then $P_{S,B}^{S} = P_{S,B}^{fix}exp[\Xi_B]$ and $P_{S,B}^{S} = P_{S,B}^{fix}exp[\Xi_S]$
where: $\Xi_B = -(1 - \beta_{S,B}^{b})\varepsilon_S + \beta_{S,B}^{v}\varepsilon_V + \left(1 - \beta_{S,B}^{b} - \beta_{S,B}^{v}\right)\tau^s + \beta_{S,B}^{b}\tau^b + \beta_{S,B}^{v}\tau^v$ and
$\Xi_S = \beta_{S,B}^{b}\varepsilon_S + \beta_{S,B}^{v}\varepsilon_V - (1 - \beta_{S,B}^{b} - \beta_{S,B}^{v})\tau^s - \beta_{S,B}^{b}\tau^b - \beta_{S,B}^{v}\tau^v$

We then take quadratic approximations of the optimality condition with respect to $\beta_{S,B}^{b}$ and $\beta_{S,B}^{v}$ around the solution (11) in order to capture the second-order components of the model. This leads to the following expressions for the invoicing shares:

$$\beta_{S,B}^{b} = \frac{1+\gamma_k^B P_{S,B}^{fix}}{(\gamma_k^B+\gamma_k^S)P_{S,B}^{fix}} + \frac{\gamma_k^S \bar{C}}{(\gamma_k^B+\gamma_k^S)P_{S,B}^{fix}}\rho(\varepsilon_C, \varepsilon_S) + \frac{2}{(\gamma_k^B+\gamma_k^S)P_{S,B}^{fix}}T^b \quad (14)$$

$$\beta_{S,B}^{v} = \frac{\gamma_k^S \bar{C}}{(\gamma_k^B+\gamma_k^S)P_{S,B}^{fix}}\rho(\varepsilon_C, \varepsilon_V) + \frac{2}{(\gamma_k^B+\gamma_k^S)P_{S,B}^{fix}}T^v \quad (15)$$

where $\rho(\varepsilon_C, \varepsilon_S)$, $\rho(\varepsilon_C, \varepsilon_V)$, T^b and T^v are as in the previous section.[15]

The key difference between the solution under bargaining and under unilateral choice is that the pricing and invoicing are now affected by the concavity of the valuations, captured by γ_k^B and γ_k^S. This concavity is central in generating a link between transaction size and the pricing and invoicing. For brevity, we illustrate the results through a numerical illustration presented in Table 4. We set Z = 2, $\bar{C}$ = 1, and the standard deviation of the shocks to exchange rates and cost at 0.1. We consider that the two exchange rates are uncorrelated, and that each is correlated with the cost shock. Finally, we set the iceberg costs on the seller's and buyer's currency to 0.01, and the one on the vehicle currency to 0.005 to capture the idea that vehicle currencies are usually the most liquid ones. We consider three possible values for the absolute degree of risk aversion of the buyer and seller (namely 5, 10, 15). For each combination of γ_k^B and γ_k^S Table 4 shows the effective bargaining weight, the preset price, and the invoicing shares in buyer's and vehicle currencies.

When the buyer and seller share the same risk aversion (shaded cells) the effective bargaining weight corresponds to the formal one ($\tilde{\delta} = \delta$), and the preset price falls midpoint between the final price Z and the cost $\bar{C}$. When the buyer has a higher risk aversion ($\gamma_k^B > \gamma_k^S$, top-right section of the panels), her effective bargaining weight is reduced. This translates into a less favorable (higher) preset price for the buyer, which is partially offset by a lower exposure to exchange rate movements thanks to a higher invoicing share of the buyer's currency, $\beta_{S,B}^{b}$, and lower shares of the vehicle currency, $\beta_{S,B}^{v}$, and the seller's currency , $1 - \beta_{S,B}^{b} - \beta_{S,B}^{v}$.

Our bargaining model shows that the pricing and invoicing are affected by the relative characteristics of the seller and the buyer. This is the case even when all buyers are identical, and so are all sellers, as the pattern is still affected by differences between the representative buyer and the representative seller. This buyer-seller dimension of heterogeneity thus complements the intra-sellers dimension on which Atkeson and Burstein (2008) focus.

[15] As we consider that the technology has constant returns to scale, we do not have a "coalescing" effect.

3.2.2 Bargaining over several units.

We now extend the framework by considering that the seller and the buyer sets a pricing and invoicing that applies to several units instead of one. The key change relative to the previous section is that the concavity of payoffs γ_k^B (and γ_k^S) differs across units. Specifically, we assume that γ_k^B is higher for the first unit obtained by the buyer, and then decreases with each successive unit. As a result, a buyer is in a stronger position ceteris paribus when bargaining over the terms of purchase of say her 9th and 10th units bought than when bargaining over the terms for the purchase of the 4th and 5th units, as the lower concavity of her valuation for the 9th and 10th units gives her a higher bargaining weight.

This assumption of decreasing concavity of payoffs is motivated by the more general model of Goldberg and Tille (2013). In that paper the buyer applies a constant relative risk aversion valuation on her payoff from all the purchases she makes from various sellers.[16] This implies that the coefficient of absolute risk aversion decreases with the payoff.[17] The absolute risk aversion over a specific transaction is thus determined endogenously, with a buyer having a high absolute risk aversion and a low effective bargaining weight when she only represents a small fraction of the seller's overall sales (or the seller represents a large fraction of the buyer's purchases). The solution of the model is however quite complex, as the bargaining outcomes across all buyer-seller pairs are jointly determined.

The surpluses of the buyer and the seller (11)-(12) are now written as follows (*K* is the number of units that are bargained over):

$$\Theta_{S,B}^S = \sum_{k=1}^{K} \frac{1}{\gamma_k^S}\left[1 - Eexp\left[-\gamma_k^S(P_{S,B}^S - C)\right]\right] \quad , \quad \Theta_{S,B}^B = \sum_{k=1}^{K} \frac{1}{\gamma_k^B}\left[1 - Eexp\left[-\gamma_k^B(Z - P_{S,B}^B)\right]\right]$$

The determination of the preset price and invoicing shares follows the same steps as before. The zero-order component of the preset price can still be written as (13), with the forms of $\tilde{\delta}$ now being slightly more complex than in the previous section. The optimization with respect to the invoicing shares $\beta_{S,B}^b$ and $\beta_{S,B}^v$ leads to expressions identical to (14) and (15), except that the risk aversion coefficients are now weighted averages of the coefficients γ_k^B and γ_k^S across the various units being bargained over.[18].

[16] The CRRA specification is the standard one in macroeconomic models.

[17] As the relative risk aversion $-U''(x)x/U'(x)$ is constant, the absolute risk aversion $-U''(x)/U'(x)$ decreases as *x* increases.

[18] Specifically, γ_k^B and γ_k^S are replaced by $\sum_{k=1}^K S_k^B \gamma_k^B$ and $\sum_{k=1}^K S_k^S \gamma_k^S$ respectively, where S_k^B and S_k^S reflect the preset component of the price relative to the cost and final price, with the exact expressions given in the appendix.

We illustrate our results through a numerical example, taking the same parameters as before. There are two sellers *S1* and *S2* and two buyers *B1* and *B2* with 12 units exchanged in total. When bargaining, the seller and buyer considers that their transactions with the other seller and buyer will take place, and thus their payoffs are for the last units. The coefficients of risk aversion for the buyer and the seller are set to 12 for the first unit ($\gamma_1^S = \gamma_1^B = 12$) and then decrease by 1 for each additional unit. We consider three cases. In the "symmetry" case each seller sells 3 units to each buyer. In the "heterogeneous buyers" case there is a large buyer (*B1*) and a small buyer. In the third "heterogeneous sellers" case there is a large seller (*S1*) and a small seller. The specific values for the coefficients γ^B and γ^S are discussed in the appendix.

Table 5 shows the average value across transactions of the effective bargaining weight, the preset price, and the invoicing shares. In the symmetric case all transactions are identical. The effective and formal bargaining weights coincide and the price falls midpoint between the final price Z and the cost $\bar{C}$. The invoicing is predominantly in the buyer's currency, with some use of the vehicle currency. In the heterogeneous buyers' case, the average effective bargaining weight again coincides with the formal one. This however hides a heterogeneous situation as the large buyer gets a higher effective bargaining weight than the small buyer. This results in a lower preset price for sales to the large buyer, which dominates the average. This is partially offsets by higher exchange rate exposure as the invoicing moves away from the buyer's currency towards the seller's and vehicle currency. The heterogeneous sellers' case is symmetric. While the average effective bargaining weight again coincides with the formal one, it is larger for the large seller than for the small one. This results in a higher preset price as the cost of additional exposure of the sellers to the exchange rate.

Our model therefore implies that size matters. Specifically, parties that account for a larger share of the market get a higher effective bargaining power. This tilts the preset price in their favor, an advantage partially offsets by higher exposure to exchange rate movements. As our modelization applies in similar ways to buyers and sellers, we can consider two forms of heterogeneity in size. The "fragmentation" of one side of the market (exporters or importers) reflects whether that side consists of a limited number of large agents or a large number of small ones (with all agents being identical). The "heterogeneity" of one side of the market by contrast reflects whether agents on a given side of the market are similar or whether there are large ones and small ones. The work by Atkeson and Burstein (2008) considers the second aspect but only among exporters, and abstracts from the first one.

Hypothesis 7*: Strategic considerations between exporters and importers matter. When bargaining takes place over the pricing and invoicing decisions, characteristics that raise the effective bargaining power of importers (such as higher exporter fragmentation, or dominant position of some importers) reduce the average price paid by importers and shift the exchange rate risk towards the importers through lower use of the importer's currency in invoicing.*

Overall, these hypotheses developed in this section provide a range of microeconomic, macroeconomic, and strategic determinants of currency choice for invoicing international trade transactions.[19] While separating these across the three buckets is not precise, we broadly regroup hypotheses 1 (coalescing) and 2 (exporting country market share) as representing microeconomic considerations. Hypotheses 3 (hedging properties), 4 (transaction costs), 5 (exchange rate regime) and 6 (volatility of fundamentals) reflect macroeconomic considerations. Hypothesis 7 (size of parties) is treated as the strategic determinant of invoice currency selection.

4. Econometric Analysis

We formally assess the theoretical hypotheses by constructing variables to proxy the microeconomic, macroeconomic, and strategic determinant of invoicing currency choice. We denote the industry (at the HS4 level) by superscript *i*, the exporting country by superscript *e*, time by subscript *t*, and the specific transaction by superscript *j*.

4.1 Approach

Given the particular invoicing patterns of imports from the United States, we split the full (cleaned) sample between import from the United States (24.6 million observations) and imports from other countries (17.2 million observations). Each transaction is assigned indicator variables specifying whether that transaction is invoiced using the producer's currency (PCP=1, LCP=VCP=0), the destination currency (LCP=1, PCP=VCP=0), or a vehicle currency (VCP=1, PCP=LCP=0). We perform multinomial logit (MNL) regression specifications (MNL) for each of the two subsamples. As the three invoicing alternatives are mutually exclusive and exhaustive, our analysis is interpreted in terms of the probability of choosing an invoicing option (LCP or VCP) relative to a baseline option which we take to be the PCP.

[19] The literature also points to additional considerations. Transactions between independent entities are characterized by different transmission of costs to prices than transaction between affiliated firms, the later accounting for a large fraction of international trade (Daly, Hellerstein and Marsh 2006). Hellerstein and Villas-Boas (2010) find that imports prices are much more sensitive to exchange rate movements for imports transaction involving affiliated firms. Ito et al. (2010) show that Japanese exporters adopt an invoicing strategy that shifts the exchange rate exposure towards the parent company through invoicing in the currency of the countries where affiliates are located. This leads to a more centralized management of profit exposures of the different affiliates.

The baseline specification models the likelihood of an exporter from country *e* in industry *i* at time *t*, with transaction characteristic *j*, choosing a specific invoice currency as:

$$\Pi_t^{i,e,j}(LCP, VCP) = MNL(X_t^e, X_t^{i,e}, X^i, X_t^i, X_t^{i,j}) \quad (16)$$

Regression residuals are clustered by HS4 industry to absorb unexplained correlations among industry residuals, or clustered both by HS4 industry and by exporting country. The respective micro, macro and strategic drivers of invoicing that we introduce vary along a number of dimensions: by exporting country and time (X_t^e); by exporting country, industry and time ($X_t^{i,e}$); by industry (X^i); by industry and time ($X_t{}^i$); or by transaction, industry, and time ($X_t^{i,j}$). Our specification takes a partial equilibrium perspective, treating aggregate and industry characteristics as given.

The variables and their specific definitions are described in Table 6. They include the variables capturing microeconomic and macroeconomic considerations that are standard in the literature,[20] as well as variables that are novel, namely transaction size and variables constructed to capture importer market structure at the industry level. Two size variables directly enter the specifications (16). The first is the Absolute Transaction Size, which is the CAD value of the transaction. Absolute transaction size could matter for foreign currency hedging considerations as larger transactions may generate lower marginal hedging costs, for instance if hedging contains a sizable fixed cost component.

The second size variable is the Relative Transaction Size within an industry, which is a dummy variable equal to one if the transaction is among the top 5 percent of transactions by value in the industry at time *t*. This variable ties to strategic interactions. As discussed in Hypothesis 7, the invoicing pattern is expected to differ between larger and smaller transactions in any industry, reflecting the fragmentation of both exporters and importers. At the same time, if the importer (exporter) is big and can hedge, he will care less about obtaining (granting) LCP. We also consider different relative size cut-offs in the robustness section.

Two other novel variables relate to the structure of the import side of the market in each industry. Our theoretical analysis points to the relevance of the fragmentation on each side of the markets, i.e. whether they consist of a few large agents or many small ones. As we do not have identifiers on specific exporters or importers, and we already account for exporter market share by industry and export location among the microeconomic variables, we first construct an industry

[20] We construct variables to capture whether any particular currency provides a good hedge again movements in exporters' cost (i.e. whether it appreciates when costs increase). The construction of this variables follow Goldberg and Tille (2008), and it is important to recognize that it involves more assumptions than the construction of other variables and thus the related inferences are to be taken with some care.

level measure of *importer concentration* (the inverse of fragmentation) using data on the importers' structures in specific industries. Specifically, data from Statistics Canada provide us with the shares of the top 5, 10, and 20 importers in each HS4 industry in 2009. For our baseline specifications, we use the share of the top 10 importers as a proxy for importer concentration, with a high value indicating that the import side of the market consists of a limited number of large importers. The data also allow us to construct a measure of *importer heterogeneity*, which reflects the relative size of different importers. For our baseline specification, we compute by industry the ratio between the share of imports going to the top 10 largest importers and the share of imports going to the next top 10 importers. A value of one indicates that the top 10 and the next 10 importers are homogeneous. The larger the ratio (above 1), the more diverse is the structure of importers. Both measures are later subjected to extensive robustness checks.

Our estimates of the MNL specification (16) explain the LCP or VCP choice relative to the PCP baseline, and thus the estimated coefficients represent the effects of the explanatory variables on the probability of choosing the LCP or VCP alternative over the PCP alternative. We present the results in three steps. We first present the maximum likelihood estimates of the coefficients. These however do not indicate marginal effects of variables. The marginal effects instead have to be constructed conditional on levels of each of the respective variables included in (16).[21] Second, we compute the marginal effects focusing on the novel aspects of our analysis, namely the role of exchange rate regimes and the strategic variables. Finally, we provide Akaike Information Criteria (AIC) statistics for each specification in order to rank the contribution of the micro, macro, and strategic variables in explaining invoicing outcomes.[22]

Our baseline results are followed by various robustness checks tests, considering in particular whether estimates changes between the first and second half of the sample and whether the changing market shares in specific industries of countries such as China and the Eurozone matter. The bulk of our analysis in section 4.2 focuses on imports from countries other than the United States as they contain the most variation in invoicing choice. The results for imports from the United States are presented in section 4.3.

4.2 Invoicing of imports from countries other than the United States

[21] Thus, the statistical significance and signs of coefficient estimates reported in the tables are meaningful, but they should not be read as elasticities of the invoicing share with respect to the variable in question, as the impact is contingent on the value of the other explanatory variables.

[22] This statistic equals -2ln (L)+2k where k is the number of parameters being estimated and L is the log likelihood. Smaller values indicate that a model explains the data better (less information is lost in fitting the model to the data) than larger values. Separate specifications represented by the columns of the table are used to introduce sets of explanatory variables sequentially.

4.2.1 Baseline estimates

The MNL results for the invoicing of transactions from countries other than the United States are presented in Table 7. For each variable the Table shows the maximum likelihood estimates of the coefficient along with the standard error. For each of the seven specifications the Table presents two sets of estimates. The first "LCP" column shows whether the variables tilt the invoicing to or away from LCP relative to the baseline PCP option, and the second "VCP" column shows whether the invoicing is tilted to or from VCP relative to PCP, with VCP consisting predominantly of US dollar use. The seven specifications include differing groupings of variables: specifications 1 to 3 separately introduce microeconomic (specification 1), macroeconomic (specification 2) and strategic (specification 3) determinants. Specifications 4 to 6 include two out of the three groups of determinants, and specification 7 includes all three. The bottom row of the table reports AIC statistics, with lower scores indicating better explanatory power of the variables included. All of the results have residuals clustered by country of exporter and by HS4 industry.[23]

The microeconomic drivers of invoice currency choice generate results consistent with the predictions of Hypotheses 1 and 2. Across specifications 1, 4, 5, and 7, more homogeneous goods are more likely to be invoicing in the local or vehicle currencies (LCP and VCP) instead of the exporters' currencies. Imports from a country that has a larger market share in an industry show lower prevalence of LCP, with more mixed effects on VCP prevalence. As the US is the largest exporter to Canada in many industries, the coalescing effect from microeconomic determinants may tilt the invoicing primarily towards the US dollar. Commodity input intensity raises the likelihood of VCP use with no effect on LCP use, consistent with hedging considerations as commodities tend to be invoiced in US dollars. The invoicing of imports in industries with a higher US ownership share is tilted towards VCP, with no consistent impact on LCP. Transactions in industries with higher ownership shares by European Union countries are less likely to use LCP or VCP.

The results for the macroeconomic determinants, provided across specifications 2, 4, 6, and 7, present are in line with Hypotheses 3 to 6. Imports from countries with exchange rates that are more volatile vis-à-vis the Canadian dollar show more use of LCP and VCP as exporters substitute away from their own currencies. Imports from countries where the exchange rate is more volatile vis-à-vis the US dollar show more use of LCP and less use of VCP. In addition to exchange rate volatility, exchange rate regimes matter. Import from countries that have dollar

[23] Comparable tables, available by request, use alternative clustering strategies of residuals without generating qualitative differences in results.

pegs are more likely to be invoiced in LCP or VCP (typically the US dollar). Imports from countries that use the euro are more likely to make use of PCP at the expense of the other two alternatives.

We next turn to consideration of which currencies provide natural hedges for production costs and of the drivers of costs of transacting. Imports from countries for which the Canadian dollar provides a good hedge, appreciating when costs are high, are more likely to be invoiced in LCP than in VCP. Imports from countries where he US dollar provides a good hedge rely more on LCP and VCP. Transactions that are large in absolute terms, and thus may entail lower hedging costs, are significantly more likely to be invoiced in LCP or VCP. Comparing specifications 2 and 7, we observe that this effect is largely unchanged even when we also control for the relative size of transaction within each industry. We finally consider the turnover of various currencies in foreign exchange markets, which is an inverse proxy for transaction costs. Imports from countries that have a relatively high volume of foreign exchange transaction between their currency and the Canadian dollar show lower reliance on LCP and VCP. Even though the quantitative importance of this result is low, it is nonetheless contrary to our hypotheses and remains even when other controls are in the regressions. By contrast the results are more in line with our hypotheses for imports from countries that have a relatively high volume of foreign exchange transaction between their currency and the US dollar, as these show more use of LCP and VCP.

The strategic variables are introduced in Specifications 3, 5, 6, and 7. Three key results emerge pertaining to Hypothesis 7. First, higher importer concentration in an industry raises the use of both LCP and VCP at the expense of PCP. A higher concentration indicates that importers have a relatively high bargaining power, and tilt the invoicing towards the Canadian or US dollar. As the US dollar is the primary vehicle currency, its higher use possibly reflects the fact that it is viewed as a closer substitute to the Canadian dollar than other foreign currencies are, so a move of invoicing away from foreign currency raises not only the share of the Canadian dollar, but also the US dollar. Second, importer heterogeneity shifts invoicing towards the PCP at the expense of both LCP and VCP. This is consistent with Hypothesis 7 and the numerical illustration of the model in Table 5 where invoicing shifts from LCP to PCP when importers are heterogeneous,. Finally, transactions that are relatively large compared to others in the industry are associated with less use of the PCP option and more use of the LCP and VCP options. The model of Goldberg and Tille (2013) shows that the relationship between invoicing and relative transaction size depends on the markets structure: it is negative when importers are heterogeneous and positive when exporters are heterogeneous.

The AIC model fit statistics show that the most important determinants of invoice currency choice among imports from countries other than the United State are the macroeconomic drivers. In particular, exchange rate volatility and regimes explain the largest amount of cross-sectional and intertemporal variation in invoice currency choice. The next group of drivers captures the traditional microeconomic determinants, closely followed by the group of variables proxying for the strategic determinants.

4.2.2 Quantitative effects of exchange rate regimes and strategic forces

The coefficients reported in Table 7 cannot be interpreted as the marginal impact of the corresponding variables, as in the MNL specifications these marginal effects are conditional on the values of the other explanatory variables. In this section we explore the quantitative importance of selected drivers, focusing on the aspects that are novel to our paper. Specifically, these are the exchange rate regime, the market share of the exporting country in the HS4 industry, importer concentration, importer fragmentation and relative transaction size at the in HS4 industry level. As the marginal effects depend on the values of the other variables, we consider that the situation for differentiated goods and set the value of the other explanatory variables in specification 7 from Table 7 at their median.

The results are presented in Figure 3 which consists of three panels. In each panel we illustrate the role of the relative transaction size by separately presenting results for transactions in the top 5^{th} percentile in the industry (left figures) and for the remaining transactions (95^{th} percentile and below, right figures). In each panel, the top charts show the impact on LCP use, the middle charts on VCP use, and the bottom charts display PCP use. Within each chart we separately show the values for different exchange rate regimes, namely for imports from countries with a peg to the US dollar (dashed-dotted line), countries using the euro (solid line), and other countries (dashed line). The three panels differ by the market structure measure used in the horizontal axis.

The role of the market share of the country of origin in the HS4 industry is shown in panel A. Five main points emerge. First, the exchange rate regime has a sizable impact primarily on VCP and PCP use. Specifically, transactions from countries with a US dollar peg make the most use of that currency by opting for the VCP option, which reflects the fact that the US dollar offers smaller transaction costs than the exporters' currency for similar exchange rate characteristics. Transactions from countries using the euro by contrast make substantially less use of the VCP option and more use of the PCP, i.e. the euro. Transactions from countries with other exchange rate regimes fall between these two polar cases. The second point is that large

transactions (in the top 5th percentile) show more use of LCP, primarily at the expense of PCP as the use of VCP is similar between the left and right charts. Third, the exporting country's market share matters very little among transactions in the lowest 95th percentile, except for a reduction in the LCP use when the market share increases from low value (the absolute value of the LCP use remains small however). Fourth, the market share of exporting countries matters more among transactions in the top 5th percentile of size. Increasing the market share from low values lowers the use of LCP, and raises that of VCP and PCP. This suggests that large transactions may be associated with large importers whose bargaining power is highest against exporters from countries with small market share. The importers' bargaining power is reduced when the market share of the exporters' countries increases. The effect only occurs for relatively low values of the market share, presumably as exporters anyway have a substantial bargaining power when the market share exceeds 20 percent. Finally, the sensitivity of the invoicing of large transaction to the exporting country's market share is more pronounced for transaction from countries with a US dollar peg.

Panel B is organized similarly to panel A and focuses on the role of importer concentration, namely the share of industry imports accounted for by the top 10 percent of importers. We observe that the exchange regime primarily affects the use of VCP and PCP, and that LCP is more used in relatively large transactions, similarly to the patterns in Panel A. Two additional results emerge. First, all transactions exhibit increased use of LCP when importer concentration rises, the quantitative importance of this effect being much more pronounced among transactions in the top 5th percentile of size. This pattern indicates that importers with a dominant position can secure a smaller exposure to exchange rate movements. Second the impact of concentration on VCP use is contrasted depending on the exchange rate regime and transaction size. Among smaller transactions, a higher importer concentration raises the reliance on VCP, especially among euro users. By contrast a higher concentration reduces the use of VCP among large transaction, the effect being most pronounced for imports from countries with a peg to the US dollar.

The impact of importer heterogeneity – the ratio between the value of transactions accounted for by the top 10 importers and that of transactions accounted for by the next 10 importers – is illustrated in Panel C. As in Panels A and B we observe that LCP use is higher among larger transactions. In contrast to the first two panels, we see that the exchange rate regime matters not only for VCP use, but also for LCP and PCP use. Two points can be observed from the charts. First, higher heterogeneity reduces the use of VCP both for large and small transactions. A similar reduction is also observed in the use of LCP, except for imports from

countries with a peg to the dollar where LCP use actually moderately increases. Overall, we thus observe that higher heterogeneity shifts the invoicing towards PCP. This is consistent with the pattern emerging from the numerical illustration of Table 5, as the aggregate pattern is dominated by the large importers who accept more exchange rate exposure in return for a lower price. Second, the impact of heterogeneity, in the form of more PCP use when heterogeneity is higher, is more pronounced for imports from countries using the euro than for imports from countries with a dollar peg. This can reflect the fact that the exchange rate between the Canadian dollar and the US dollar is less volatile than the one between the Canadian dollar and the euro. Exporters in countries using the euro may then ask for a larger reduction in their exchange rate exposure as an offset to granting lower prices to large importers than exporters in countries with a peg to the US dollar.

4.2.3 Robustness of invoicing determinants over time, and across industries.

Given the novel role for strategic considerations developed in the paper, we undertake a broad range of checks to determine the robustness of the results. For brevity, our discussion focuses on the main findings.[24] We start by considering whether the relationships between variables changed through time by splitting the sample in August 2005. We then assess the impact at the industry level of changing market shares of some countries, namely China and the Eurozone. Next, we examine the robustness of the results to excluding all Walrasian goods. Finally, we explore a range of alternative constructions of the variables capturing strategic interactions (transaction size, importer concentration, and importer heterogeneity).

To assess whether the results are sensitive to the years considered, we compare the results based on the early part of the sample (from 2002 through the second quarter of 2005) with the ones based on the latter part (from the third quarter of 2005 through 2009). The results are broadly steady across periods,[25] with the main changes being some shift from PCP to VCP in the latter period, with reduced relevance or sign shifts on some variables related to exchange rate variability and currency hedge roles. The patterns of effects through strategic determinants of invoicing are unchanged. The AIC criteria indicate that macroeconomic variables as a group are the strongest driver of invoice currency selection throughout, and strategic variables overtake the micro-economic determinants in the second half of the sample period.

While the overall invoicing patterns remained stable through time, as shown by Figures 1 and 2, the situation could be contrasted across industries. In particular, the weight of China in

[24] Detailed results are available in appendix tables.
[25] The results are given in appendix table 8, left panel.

international trade rose throughout our sample, although with considerable industry variation, while the market shares of Eurozone countries also evolved. We thus explore whether changing trade shares of China and the Eurozone countries at the HS4 industry level impacted the patterns of invoicing. We compute the exporting country market shares in the two halves of the sample, and regress the changes in the (log) invoicing shares between the two periods on the change in the (log) market share of China or the Eurozone, relying on transactions by count.

Table 8 presents the results for the impact of the market shares of China (top panel) and the Eurozone (bottom panel). In each case, we run the regression using all observations from countries other than the United States (left panels), as well as observations also excluding imports from China or the Eurozone, respectively (right panels), to assess the impact on invoicing patterns of exporters from the rest of the world. The industries which saw larger increases in China's market share also had significant increases in VCP, presumably reflecting a larger use of US dollars. This is not solely driven by VCP use by Chinese exporters but is also observed among other exporters, a pattern consistent with a coalescing motive where these exporters increase their use of the VCP to limit the discrepancy between their invoicing and that of their Chinese competitors. We also observe a positive relationship between China's market share and the use of LCP, but this result is not robust.[26] A very different profile emerges for the market share of Eurozone exporters. Specifically, a higher market share of the Eurozone is associated with a clearly larger use of PCP, as well as LCP, and a decline in VCP. These results are observed both for Eurozone exporters and for exporters from other countries, a pattern consistent with the coalescing motive.

Our next robustness checks assess the sensitivity of the results to the specific samples along two lines. We first estimate the MNL specifications dividing the sample at the broad industry level instead of the transaction level data, and we confirm the statistical and economical relevance of the various invoicing drivers across respective industry groupings. Second, we exclude the Walrasian goods from the sample, as one could be concerned that they have distinct pricing features. The results remain similar to the baseline ones, the main differences being a reduced role of foreign ownership and of absolute transaction size in some specifications.

Our final and most extensive set of robustness checks pertain to the specific construction of the strategic variables, i.e. relative transaction size, importer concentration, and importer heterogeneity.[27] In our baseline specification, the cutoff for relative transaction size is the top 5th

[26] Specifically, that coefficient is not significant when weighting observations by transaction values (not reported).
[27] The results are shown in appendix tables 2, 3 and 4, focusing on the coefficients of the strategic variables for brevity.

percentile by size in an HS4 industry. We consider alternative cutoffs at the top 1st, 10th, and 20th percentiles. We also consider an alternative with the continuous transaction size measure defined over percentiles. The main impact of the alternative cutoffs is the expected rescaling of the size of the coefficient on the relative transaction size, with the magnitude being stronger for higher cutoffs. The impact on LCP use is robust to the alternative definitions. In terms of VCP use, size plays little role for the largest transactions, as the coefficient is only significant for the top 20th cutoff and continuous size measure, with larger transactions making moderately less use of VCP.

Turning to importer concentration, our baseline measure considers the share of industry imports accounted for by the top 10 exporters. We alternatively consider the share of imports accounted for by the top 5, and top 20 importers. The sign and significance patterns on the various coefficients under these alternative specifications are consistent with the baseline results.

We finally consider alternative measures of importer heterogeneity. Our baseline specification utilizes the ratio between the share of imports accounted for by the top 10 importers and the share accounted for by the next 10 importers. We alternatively consider the ration between the top 5 importers with the next 5 importers (top5-next5), and with the average of the next 15 importers. These alternative measures do not alter the sign and significance of the coefficients and further demonstrate robustness.

4.3 Invoicing of United States Exports to Canada

4.3.1 Baseline estimates

Our results thus far have focused on import transaction from countries other than the United States, as these show more variation in the invoicing choice. We now undertake a similar exercise for transactions coming from the United States. As we only consider one origin country, we of course cannot exploit any cross-country dimension such as exchange rate regimes. Our estimates for the various coefficients are presented in Table 9, which is built along similar lines than Table 7, again considering PCP as the default option. Residuals are clustered only by industry. Given the limited use of VCP in Canadian imports from the United States (less than 1 percent of transactions), we focus our discussion on the drivers of LCP use relative to PCP.

LCP is used to a higher degree on reference-priced goods, but less so when the US exporters have a large market share in the industry and when industries are more commodity intensive. The higher use of US dollar invoicing in industries with a large market share of US exporters supports Hypothesis 2, while the impact of commodity use is consistent with Hypothesis 3. Strategic variables have significant impacts, but the significance of some differ

from the ones presented in Table 7 for imports from non-US countries. Relative transaction size still strongly matters, as larger transactions are associated with more use of LCP. Higher importer concentration raises the use of the LCP option. The coefficients are, however, not as strongly significant as in Table 7. The role of importer heterogeneity is more limited, with only a marginal significance for VCP use.

In terms of explanatory power, the strategic variables dominate, followed by the microeconomic variables and the macroeconomic variables. The role of strategic variables is consistent with Hypothesis 7, and interestingly shows that while the US dollar plays a dominant role on imports coming from the United States, this role is not exclusive. Deviations from PCP primarily reflect the strategic considerations that so far have not been addressed in the literature. As the significance of some strategic variables is limited, relative to non-US transactions, a more detailed understanding of strategic considerations for US exports is an interesting avenue for future work.

4.3.2 Quantitative effects of exchange rate regimes and strategic forces

Paralleling the type of quantitative exercise done for transactions from non-US countries, we based on U.S. specifications we assess the magnitude of the roles of U.S. market share in the industry, relative transaction size, importer concentration, and importer heterogeneity. The results are shown in Figure 4. In each of the two panels, we present the use of LCP (left chart) and PCP (right chart), each chart showing the consequences for transactions in the top 5^{th} percentile of size for the industry (dashed line) and the bottom 95^{th} percentile (solid line). In the first panel, the invoicing currency use is shown as a function of the market share of the United States in the industry. Two points emerge from the figure. First, the use of LCP is concentrated in the larger transactions (but not exclusive to them). Second, invoicing shifts from LCP to PCP when the market share of U.S. exporters increases, a pattern consistent with the coalescing motive.

The bottom panel of Figure 4 shows the impact of importer concentration, defined as the share of industry imports accounted for by the largest 10 importers. LCP use is again concentrated among the larger transactions. A higher concentration of importers does not affect the invoicing of the smaller transactions but raises the use of LCP among the larger transactions. This pattern presumably reflects large importers interacting with large exporters.[28]

[28] As the impact of importer heterogeneity is not precisely estimated among imports from the United States, we do not present the computations of its magnitude for brevity.

4.3.3 Robustness of invoicing determinants over time, and across industries.

We undertake several robustness checks which are similar to the ones presented for imports from non-US countries. The drivers of invoicing are again stable across the earlier and later subsamples of data, the only changes being a limited robustness of exchange-rate related variables.[29] Interestingly, the relative overall importance of the microeconomic and strategic variables switches over time with strategic variables becoming more important in the second part of the sample.

Excluding Walrasian goods leads to small differences. Specifically, importer concentration and exchange rate volatility vis-à-vis the Canadian dollar become stronger determinants of LCP while the impact of foreign ownership is reduced. This latter result may be attributable to a high degree of aggregation in the raw data available on foreign ownership of manufacturing industries.

As the strategic considerations are a novel component of the paper, we undertake substantial robustness checks to alternative assumptions in the construction of our measures of transaction size, importer concentration, and importer heterogeneity.[30] The results are robust to the alternative cutoffs for transaction size. The impact of importer concentration is robust, and larger when considering the share of imports attributed to the top 20 importers instead of the top 10 ones. Finally, alternative definitions of importer heterogeneity lower its impact on VCP and LCP, which is not surprising given the marginal significance of heterogeneity in the baseline specification.

5. Concluding Remarks

This paper uses a rich new transaction-level database to explore the drivers of international trade invoicing. The drivers encompass macro, micro and strategic considerations, and we establish the relevance of transaction-level considerations. In addition to showing the relevance of factors previously identified as important for invoicing outcomes, including exporting country market share, commodity intensity of production, and hedging considerations, our analysis has highlighted the importance of exchange rate regimes and strategic interactions among exporters and importers. We document an interesting and the novel connection between transaction size and invoicing, showing that larger transactions are more likely to invoice in local currency pricing than would otherwise be the case. The empirical results are consistent with a simple

[29] The results are given in appendix table 8, right panel.
[30] The results are in appendix tables 5, 6 and 7.

model of bargaining interplay between customers and exporters in the selection of invoicing currencies.

As currency use in invoicing and exchange rate pass through are features of trade that feature prominently in international macroeconomic considerations, our work sheds light on observed rates of exchange rate pass through and on which types of forces might lead to changes in the status quo of currency usage in invoicing international trade. For instance, a shift from a large number of relatively small importers to a handful of larger ones, such as large retail chains, could boost the use of the importers' currency, leading to more pricing in local currency terms and even more limited exchange rate pass-through into import prices. A shift away from dollar pegs towards floating exchange rates or the euro could lower the use of the dollar as an invoicing currency, as could reduce dollar use as the reference currency on commodities and raw materials in global markets. A reduced in the global role of the dollar could have implications for the international transmission of economic fluctuations and policy effectiveness, all important themes in the global economy. Alternative scenarios for invoicing, already linked theoretically and empirically to differences in exchange rate pass through on international trade, have potential to explain patterns of adjustment of export and import quantities to exchange rates. These are topics that are worthy of extensive further research.

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Figure 1: Currency Use in Trade Invoicing

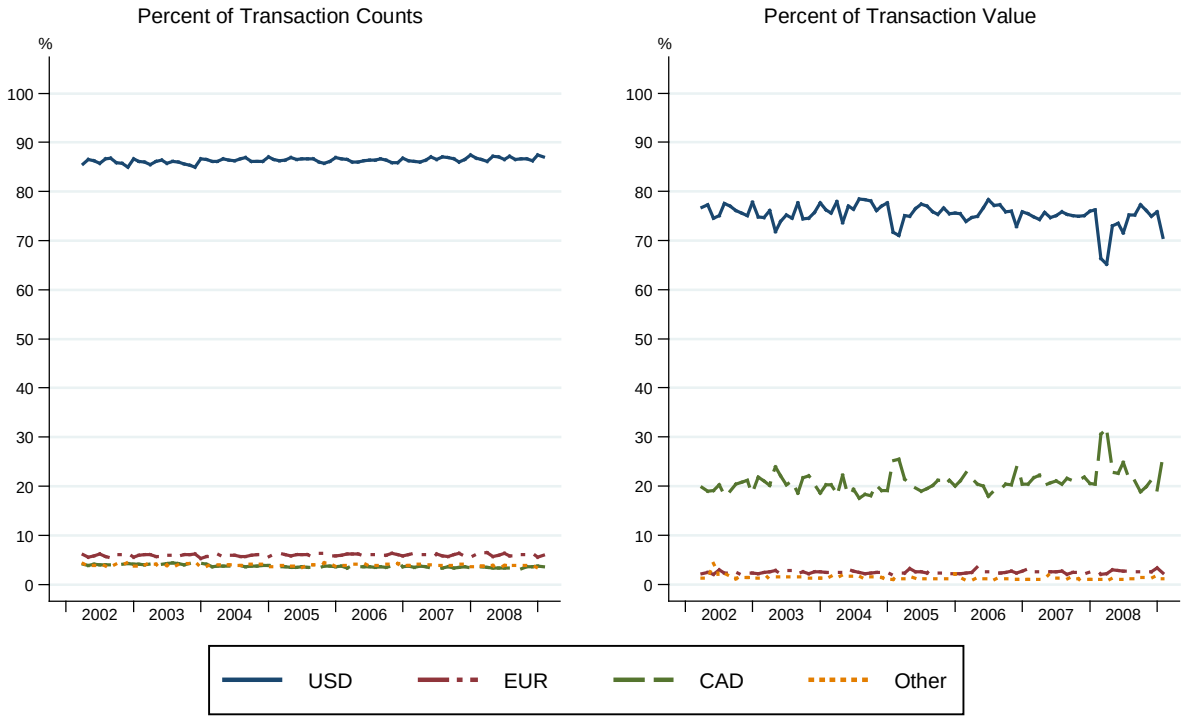


Figure 2: PCP Prevalence in Trade Invoicing, by Exporting Country

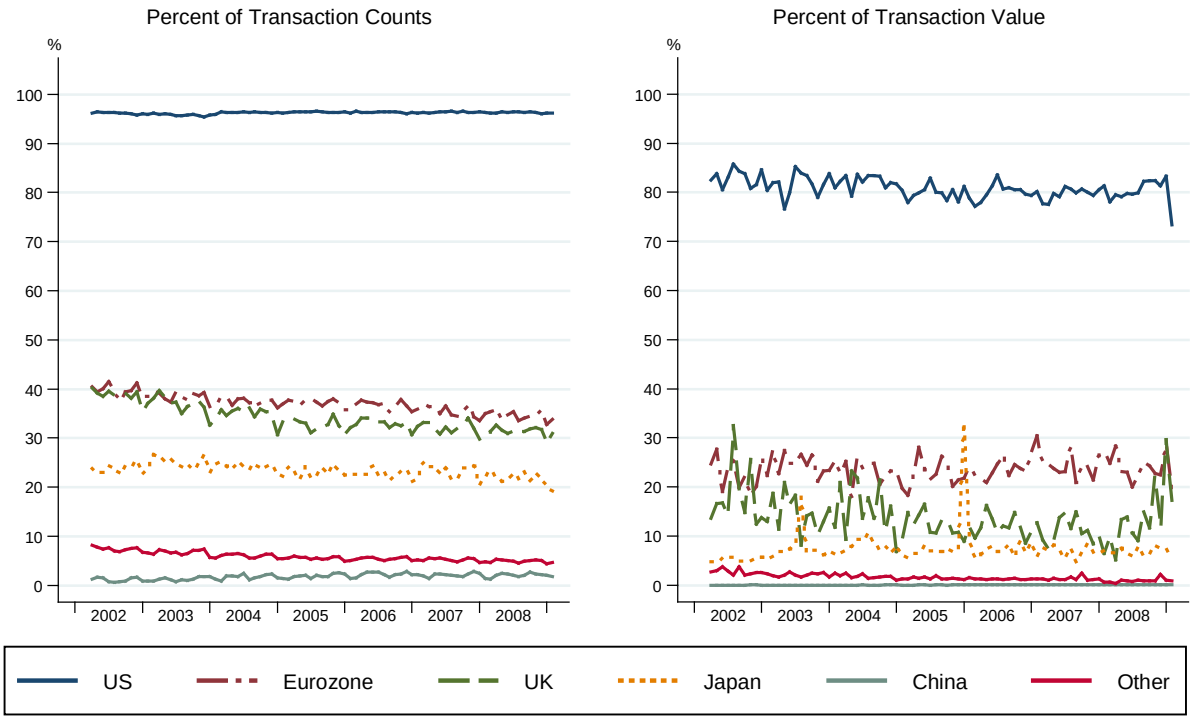
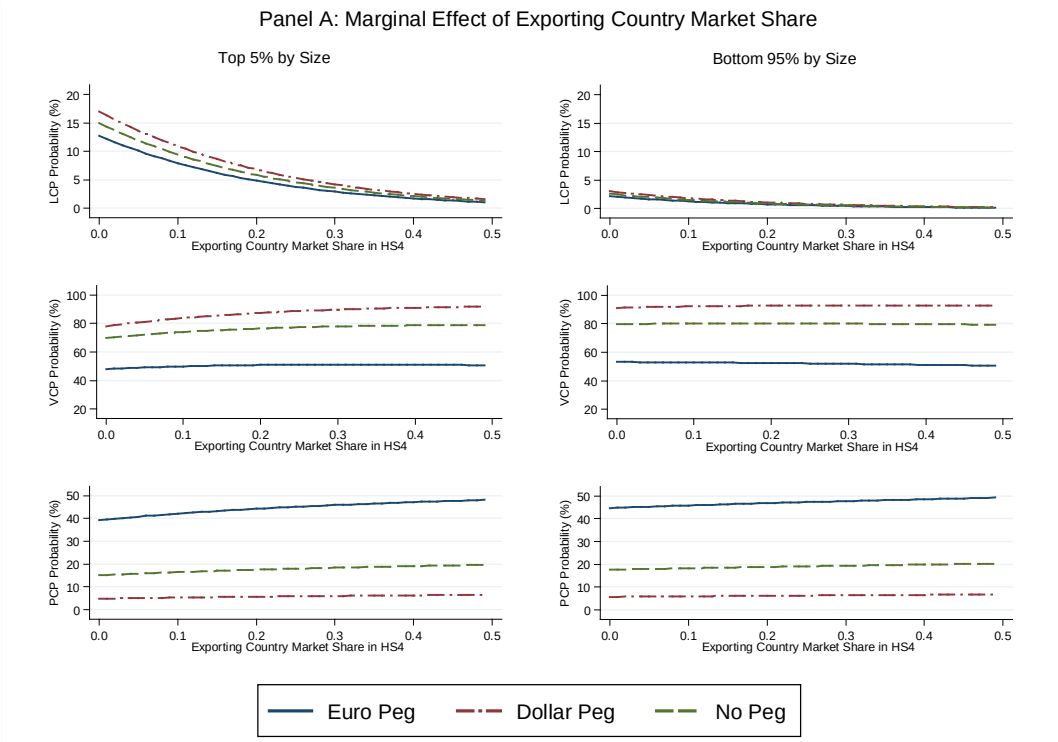


Figure 3: Quantitative Importance of Drivers, Non-US Exporters



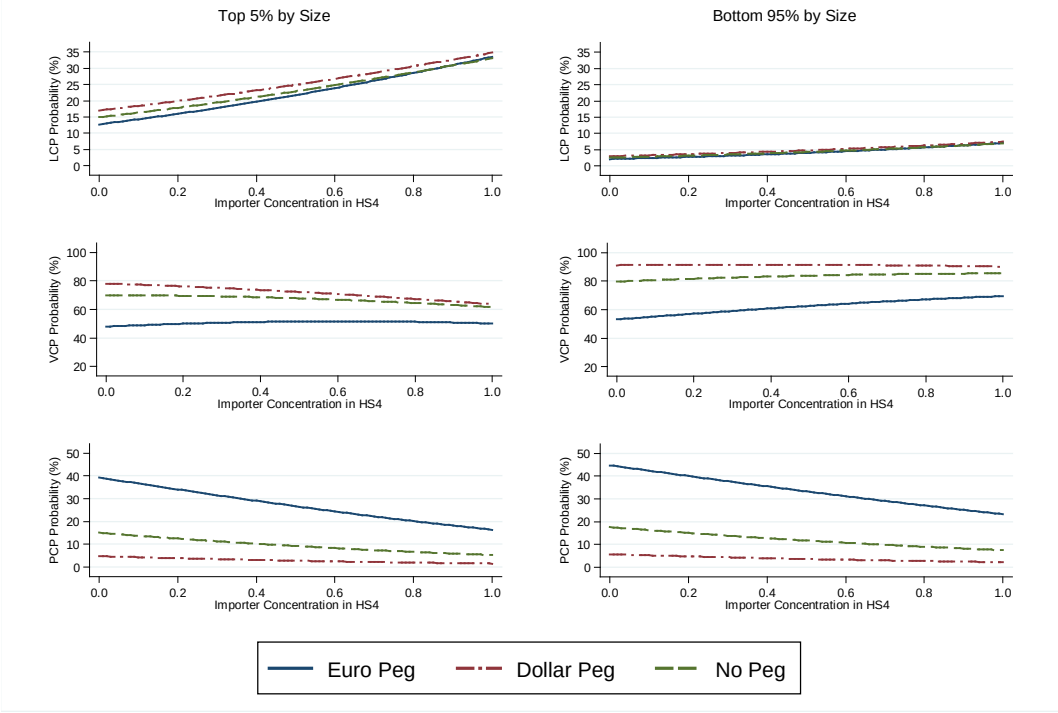


Figure 3 (Cont'd)

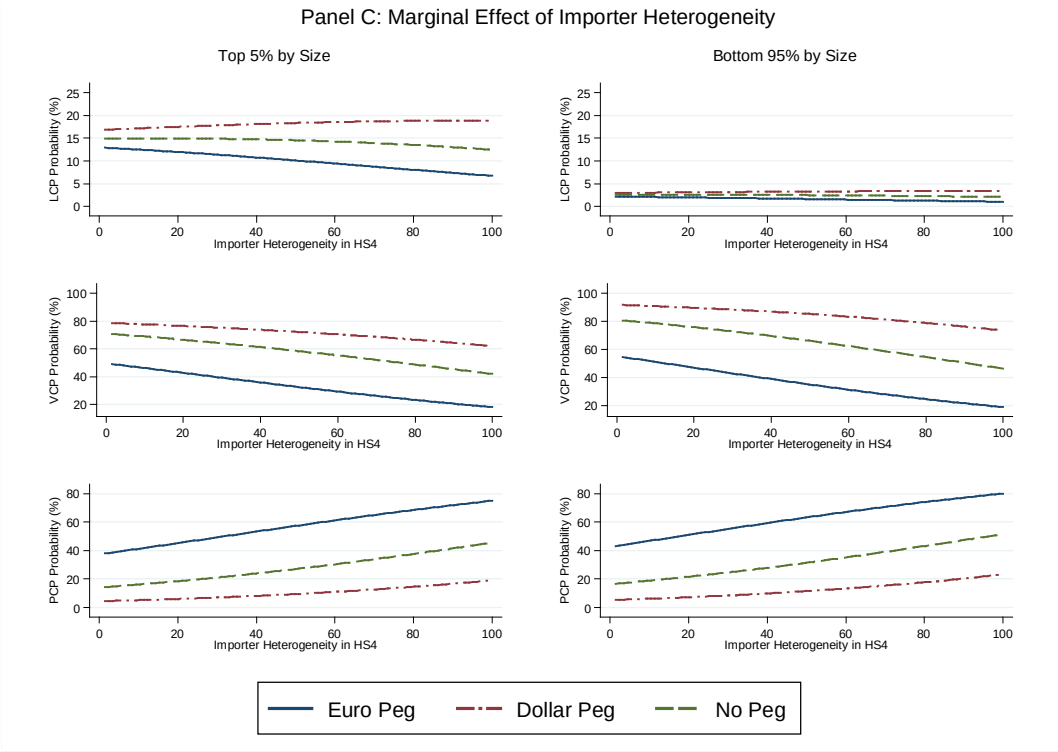


Figure 4: Quantitative Importance of Drivers, US Exporters

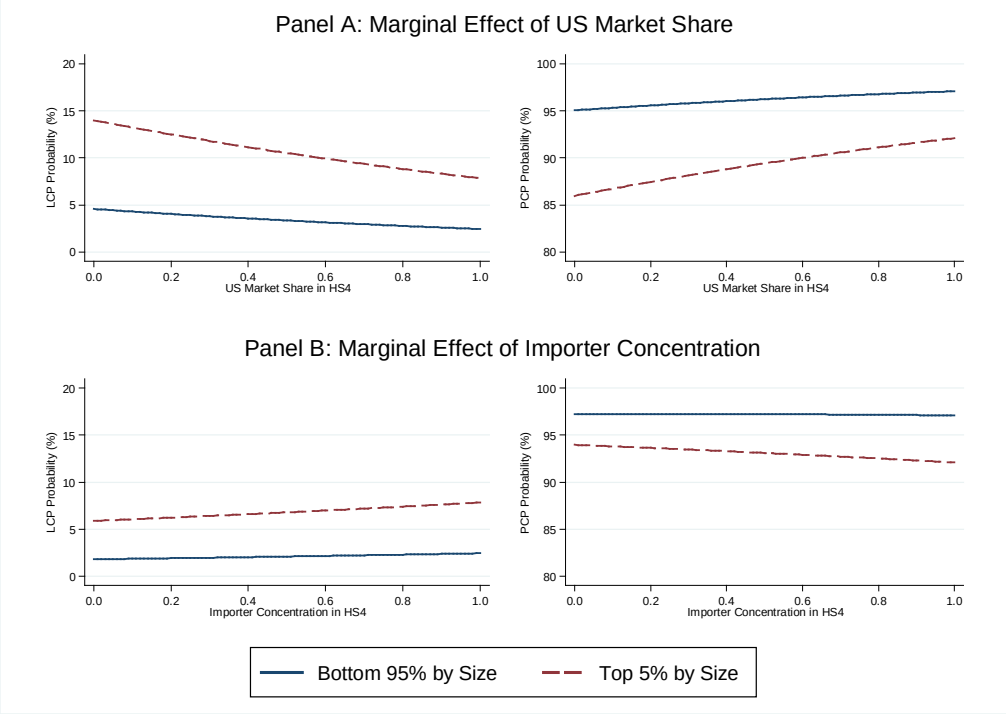


Table 1: Regional Exporter Presence in Canadian Imports by Broad Industry Group, by Count								
	Percent Share by Import Transaction Count							
Industry Category	United States	Eurozone	East and SE Asia	China	Other Americas	All Other Countries	Percent of Total	Percent of Value
Animal Products	68.2	5.0	11.2	4.6	3.0	8.1	1.0	0.8
Vegetable Products	60.6	7.9	10.4	5.9	3.8	11.5	3.1	1.9
Foodstuffs	61.7	11.8	9.0	3.5	1.6	12.3	3.2	3.0
Mineral Products	84.0	4.6	2.1	3.2	0.7	5.4	1.5	10.9
Chemicals	70.3	11.5	3.8	3.3	0.4	10.6	9.8	7.8
Plastics/Rubbers	63.7	11.2	8.6	3.3	0.9	12.4	7.0	4.7
Leathers/Furs/Hides	44.2	14.3	17.4	9.3	1.9	12.9	1.0	0.4
Wood Products	66.3	9.8	9.3	4.7	1.0	8.9	7.2	3.4
Textiles	42.8	13.6	18.9	9.2	1.4	14.2	9.3	2.7
Footwear/Headgear	39.7	12.9	20.4	15.1	1.9	10.0	1.2	0.5
Stone/Glass	52.9	13.3	12.0	6.8	1.7	13.5	4.6	2.2
Metals	61.7	11.4	8.9	4.6	0.8	12.5	13.2	6.8
Machinery/Electrical	56.3	13.4	9.6	3.5	0.9	16.2	23.2	25.7
Transportation	65.4	10.3	6.7	3.2	0.8	13.6	2.8	21.0
Miscellaneous	54.5	11.6	11.9	6.5	0.5	15.0	10.9	6.2
Service	67.2	9.0	8.2	2.9	0.7	12.0	0.8	2.0
Total	58.9	11.8	10.1	5.0	1.0	13.2	100.0	100.0
Percent of Value	56.6	9.2	5.5	7.5	1.5	19.8	100.0	

Note: This table provides the shares of respective countries or regions, and the shares of respective industries, in the counts of import transactions of Canada. Imports are divided into 16 broad industry groups based on HS4 identifiers. Information also is provided on the contribution of the countries or regions, and the broad industry groups, to the total value of Canadian imports. Eurozone countries include: Austria, Belgium, Finland, France, Germany, Italy, Netherlands, Portugal, Spain, and Ireland; East and SE Asia countries include: Hong Kong, Korea, Indonesia, India, Malaysia, Philippines, Singapore, Thailand, Vietnam, and Taiwan; Other Americas countries include: Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Nicaragua, Panama, Paraguya, Peru, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, Greenland, Guadeloupe, French Guiana, Martinique, Saint Pierre and Miquelon, Anguilla, Bermuda, Virgin Islands, Cayman Islands, Falkland Islands, Montserrat, Turks and Caicos Islands, Aruba, Netherlands Antilles, and South Sudan.

Table 2: Percent LCP Share and Import Transaction Size								
	Non-US Countries				United States			
	Size, CAD in thousands		LCP Share by Count		Size, CAD in thousands		LCP Share by Count	
Industry Category	Mean	Ratio of Upper 5% to Bottom 95%, by Size	Mean	Ratio of Upper 5% to Bottom 95%, by Size	Mean	Ratio of Upper 5% to Bottom 95%, by Size	Mean	Ratio of Upper 5% to Bottom 95%, by Size
Animal Products	64	18.8	6.3	4.2	49	16.1	2.2	5.6
Vegetable Products	31	22.8	5.9	3.3	46	16.7	2.4	2.6
Foodstuffs	66	45.3	6.9	5.9	58	16.0	4.0	5.6
Mineral Products	2,205	621.7	5.3	2.6	154	40.7	2.7	3.2
Chemicals	73	54.9	7.2	5.9	44	34.8	3.9	4.3
Plastics/Rubbers	28	37.8	3.9	7.8	53	15.4	2.9	3.4
Leathers/Furs/Hides	36	63.4	3.8	3.6	8	70.7	3.4	8.0
Wood Products	19	43.6	4.6	5.2	37	26.7	3.2	6.4
Textiles	23	33.3	4.3	3.3	15	33.6	3.4	3.5
Footwear/Headgear	45	35.5	4.8	1.9	4	69.3	4.5	8.9
Stone/Glass	31	28.4	4.2	3.3	34	34.1	3.2	3.7
Metals	32	36.0	4.2	4.1	36	21.4	3.0	3.2
Machinery/Electrical	77	35.9	3.7	5.5	71	24.8	2.9	3.1
Transportation	445	97.5	3.3	6.4	522	35.8	2.6	4.8
Miscellaneous	44	49.4	4.3	4.5	33	27.4	3.4	4.6
Service	199	141.4	7.1	7.7	143	79.0	5.1	5.1

Note: This table provides information on the mean size of transactions in specific industry categories, the difference in size between the 5th percentile of transactions and the 95th percentile of transactions by HS4 industry, and the LCP shares across those same groupings. The table provides information on the size and invoicing by industry for the panel of transactions that excludes United States exporters, and separately for US export transactions. Results are shown for imports divided into 16 broad industry groups based on HS4 identifiers. Top 5% distinction is made at the HS4/Year level. Means of LCP and Size over broad industry categories are calculated by a weighted average of averages within these HS4/Year groups (identical to an average across broad industry category). Ratios are also calculated within HS4/Year and averaged up to the broad industry level through weighted averages (different from ratios calculated after aggregating to the broad industry level).

Table 3: PCP, LCP, and VCP Shares in Canadian Imports, by Exporting Region										
	Percent of Transactions, by Count					Percent of Transactions, by Value				
	PCP	LCP	VCP			PCP	LCP	VCP		
			Euros	Dollars	Other			Euros	Dollars	Other
United Kingdom	34.1	4.2	5.5	55.4	0.7	13.5	21.1	1.2	64.2	0.1
Switzerland	23.3	5.4	13.5	57.3	0.6	21.1	39.6	2.8	36.4	0.1
Euro Area	37.0	4.8	---	55.8	2.5	23.6	31.4	---	44.1	0.9
Emerging Europe	1.0	8.8	23.3	64.0	2.9	0.4	28.0	10.2	60.6	0.8
Scandinavia	16.3	7.2	10.7	64.8	1.0	3.5	22.7	3.2	70.2	0.4
Japan	23.4	3.2	3.0	69.0	1.4	7.3	42.4	0.2	50.0	0.1
Korea	0.5	4.8	1.2	91.6	1.9	0.1	39.5	0.1	60.2	0.2
China	1.9	2.5	4.5	81.4	9.8	0.1	12.5	0.2	86.5	0.7
India	2.6	5.0	4.5	85.6	2.3	0.1	16.2	0.8	82.5	0.4
Mexico	1.8	3.2	1.3	93.5	0.3	0.3	21.6	0.0	77.9	0.1
Russia	0.2	7.5	3.3	88.6	0.4	0.0	21.8	0.2	78.0	0.0
United States	96.3	3.2	0.3	---	0.2	80.9	18.8	0.1	---	0.1

Note: This table provides the distribution of invoicing currency type for each exporting country or regions in their exports to Canada. The types are producer currency pricing (PCP), local currency pricing (LCP), or vehicle currency pricing (VCP). Vehicle currencies are further divided into euros, dollars, or some other currency. Percentages are computed by counts and by value. Euro area countries include: Austria, Belgium, Finland, France, Germany Ireland, Italy, Netherlands, Portugal, and Spain; Emerging Europe includes: Czech Republic, Hungary, and Poland; Scandinavia includes: Denmark, Norway, and Sweden.

Table 4: Pricing and invoicing under bargaining					
			Buyer's risk aversion γ_k^B		
			5	10	15
Seller's risk aversion γ_k^S	5	buyer's effective bargaining weight, $\tilde{\delta}$	0.5	0.4	0.3
		preset price, $P_{S,B}^{fix}$	1.5	1.6	1.7
		invoicing share of buyer's currency, $\beta_{S,B}^b$	0.7	0.8	0.8
		invoicing share of vehicle currency, $\beta_{S,B}^v$	0.2	0.1	0.1
	10	buyer's effective bargaining weight, $\tilde{\delta}$	0.6	0.5	0.3
		preset price, $P_{S,B}^{fix}$	1.4	1.5	1.6
		invoicing share of buyer's currency, $\beta_{S,B}^b$	0.5	0.6	0.7
		invoicing share of vehicle currency, $\beta_{S,B}^v$	0.2	0.1	0.1
	15	buyer's effective bargaining weight, $\tilde{\delta}$	0.7	0.6	0.5
		preset price, $P_{S,B}^{fix}$	1.3	1.4	1.5
		invoicing share of buyer's currency, $\beta_{S,B}^b$	0.4	0.5	0.6
		invoicing share of vehicle currency, $\beta_{S,B}^v$	0.2	0.1	0.1

The table shows the outcome of the bargaining over a single unit, depending on the absolute risk aversion parameters of the buyer and the seller. Parameters: $Z = 2$, $\bar{C} = 1$, $\delta = 0.5$, $\sigma_S = \sigma_V = \sigma_C = 0.1$, $\tau^s = \tau^b = 0.01$, $\tau^v = 0.005$, $correl(\varepsilon_S, \varepsilon_V) = 0$, $correl(\varepsilon_C, \varepsilon_S) = correl(\varepsilon_C, \varepsilon_V) = 0.25$. $\gamma_1^S = \gamma_1^B = 12$ and $\gamma_k^S = \gamma_k^B = 12 - k$ for k =1,2,3…

Table 5: Pricing and invoicing under bargaining Average values across all transactions, 2x2 case			
	Symmetric case	Heterogeneous buyers	Heterogeneous sellers
buyer's effective bargaining weight, $\tilde{\delta}$	0.5	0.5	0.5
preset price, $P_{S,B}^{fix}$	1.5	1.48	1.52
invoicing share of buyer's currency, $\beta_{S,B}^{b}$	0.63	0.61	0.65
invoicing share of vehicle currency, $\beta_{S,B}^{v}$	0.13	0.14	0.12

The table shows the average outcome of the bargaining across all 12 transactions between 2 buyers and 2 sellers. In the symmetric case each seller sells 3 units to each buyer. In the heterogeneous buyers case each seller sells 4 units to the large buyer B1 and 2 to the small buyer B2. In the heterogeneous sellers case each buyer buys 4 units from the large seller S1 and 2 from the small seller S2. Parameters: $Z = 2,\ \bar{C} = 1,\ \delta = 0.5,\ \sigma_S = \sigma_V = \sigma_C = 0.1,\ \tau^s = \tau^b = 0.01,\ \tau^v = 0.005,\ correl(\varepsilon_S, \varepsilon_V) = 0,\ correl(\varepsilon_C, \varepsilon_S) = correl(\varepsilon_C, \varepsilon_V) = 0.25.$ $\gamma_1^S = \gamma_1^B = 12$ and $\gamma_k^S = \gamma_k^B = 12 - k$ for *k* =1,2,3…

Table 6: Regression variable definition and construction	
Microeconomic	
High Homogeneity Goods *Intermediate Homogeneity Goods*	Two dummy variables constructed at the HS4 industry level *i* to allow division of goods into three categories from the Rauch index: Walrasian (high homogeneity), reference-priced (intermediate homogeneity), and differentiated.
Exporting country market share	Share of exporters from country *e* in all imports of HS4 industry *i* in quarter *t*.
Commodity input intensity	Share of commodities inputs in total industry costs from the Standard Use Table of the United States 2002 Benchmark Input-Output tables at the HS4 level (***1***).
Foreign ownership share	Extent of foreign ownership by Canadian industry (21 NAICs categories) (***2***). Annual data (2002-2007) from Statistics Canada. Includes a separate breakdown of all foreign owners, U.S., and euro area owners for some industries.
Macroeconomic	
Exchange rate volatility	Coefficients of variation of the exchange rate between exporter's currency and the Canadian dollar (*Relative Exchange Rate Volatility of* LCP_t^e) or the vehicle currency (*Relative Exchange Rate Volatility of* VCP_t^e, the vehicle currency is the euro for U.S. exporters or the dollar for non-U.S. exporters). Computed over a rolling lagged five-year window of monthly exchange rates.
Dollar peg or Euro area/peg	Dummy variables *Dollar Peg Country*$_t^e$ and *Euro Peg Country*$_t^e$ for country *e* and *quarter t* from Ilzetski, Reinhart and Rogoff (2009).
Better natural hedge currency	Zero-one indicators by *e* and *t* of whether LCP or PCP, or VCP or PCP, have higher covariance with producer costs, based on a rolling quarterly sample of Canadian consumption and exporter production costs (***3***).
Absolute transaction size	Canadian dollar value of transaction.
Foreign exchange volume ratio	Shares in daily global foreign exchange market turnover in 2001, 2004, 2007 and 2010 (BIS Triennial Central Bank Survey of Foreign Exchange and Derivatives, Annex Table 3), with interpolation to create continuous market share variables. Currencies not included are given 0 shares. Computed ratios of volumes of the exporter currency *e* relative to the LCP and VCP alternatives (the VCP option is the euro for U.S. or the dollar for non-U.S. exporters).
Strategic	
Importer concentration	Shares of the top 5, 10 (baseline), and 20 importers in HS4 industry *i* in 2009.
Importer heterogeneity	Ratio between the value imports going to the top 10 largest importers in HS4 industry and the value of imports going to the next top 10 importers.
Relative Transaction size	Dummy variable equal to one if the transaction falls in the top 5^{th} percentile of transactions (by value) in HS4 industry *i* during year *t* .

1. The specific commodity categories are: oil and gas extraction, coal mining, metal ores mining, non-metallic mineral mining and quarrying, petroleum and coal products, plastic and rubber products, nonmetallic mineral products, primary ferrous metal products, primary nonferrous metal products, and foundry products. Since the detailed I-O codes are aggregates of NAICS codes, the intensity measure is a simple weighted average over the categories.
2. Table 179-0004 Corporations Returns Act (CRA), major financial variables. A shortcoming is that this series contains only a single aggregate for all of manufacturing. Since we are missing data for 2008 and 2009, we assume that these observations are identical to the 2007 shares. All of the HS codes basically fall into just a few categories: agriculture/forestry/fishing/hunting, oil and gas extraction and support activities, mining and quarrying, and manufacturing. There is time variation in the foreign ownership to exploit, but no government ownership data for agriculture and manufacturing, and only one observation (of 0% ownership) for oil/gas and mining government ownership.
3. This computation uses the technique of Goldberg and Tille (2008) to determine which currency (the USD, CAD, or EUR) significantly outperforms by hedging the volatility of the exporter's costs and demand uncertainty. For this computation, discussed in the Appendix, we use CanSim Table 380-0002, Personal expenditure on consumer goods and services. Production costs are proxied by respective PPI series from IFS.

Table 7: Determinants of Invoicing Currency Choice - Non-US Exports to Canada

		1		2		3		4		5		6		7	
		LCP	VCP	LCP	VCP	LCP	VCP	LCP	VCP	LCP	VCP	LCP	VCP	LCP	VCP
Micro	Highly Homogenous Goods (Walrasian)	0.47***	0.20*					0.48***	0.18**	0.17	0.12			0.19**	0.09
		0.10	0.11					0.08	0.08	0.10	0.12			0.09	0.09
	Intermediate Homogeneity Goods (Reference Priced)	0.63***	0.14***					0.68***	0.21***	0.48***	0.09*			0.53***	0.16***
		0.05	0.05					0.05	0.04	0.05	0.05			0.04	0.04
	Exporting Country Market Share in Industry	-0.92***	1.89***					-2.85***	-0.17	-3.84***	1.71***			-5.41***	-0.30**
		0.19	0.19					0.20	0.14	0.25	0.19			0.24	0.14
	Commodity Input Intensity of Industry	-0.07	0.74***					0.14	1.16***	-0.24	0.76***			0.07	1.20***
		0.19	0.19					0.19	0.17	0.20	0.20			0.19	0.18
	Foreign Ownership Share by Industry - US	0.30	1.89***					0.94***	2.22***	-0.02	1.93***			0.68**	2.29***
		0.26	0.31					0.29	0.29	0.28	0.31			0.30	0.29
	Foreign Ownership Share by Industry - EU	-1.02*	-2.89***					-3.43***	-2.45***	-1.40**	-2.85***			-3.80***	-2.46***
		0.61	0.68					0.69	0.68	0.63	0.68			0.72	0.69
	Foreign Ownership Share by Industry - non US, ROW	2.13**	0.41					10.48***	3.58***	3.39***	0.23			11.53***	3.48***
		1.08	1.20					1.20	1.20	1.09	1.21			1.21	1.21
Macro	Relative Exchange Rate Volatility of LCP			4.25***	5.19***			4.16***	5.34***			3.98***	5.13***	3.99***	5.36***
				0.24	0.24			0.25	0.25			0.25	0.25	0.26	0.25
	Relative Exchange Rate Volatility of VCP			1.58***	-0.83***			1.63***	-0.61***			1.94***	-0.77***	1.89***	-0.57***
				0.17	0.19			0.19	0.21			0.18	0.19	0.19	0.21
	Dollar Peg Country			0.92***	1.16***			1.25***	1.24***			0.75***	1.16***	1.28***	1.26***
				0.07	0.06			0.08	0.07			0.07	0.06	0.08	0.07
	Euro Area or Euro Peg Country			-1.07***	-1.29***			-1.10***	-1.33***			-1.10***	-1.31***	-1.11***	-1.33***
				0.04	0.04			0.04	0.04			0.04	0.04	0.04	0.04
	Better Natural Hedge Currency - LCP			0.03***	-0.03***			0.02**	-0.03***			0.03**	-0.03***	0.02	-0.03***
				0.01	0.01			0.01	0.01			0.01	0.01	0.01	0.01
	Better Natural Hedge Currency - VCP			0.17***	0.21***			0.21***	0.23***			0.15***	0.21***	0.19***	0.24***
				0.02	0.02			0.02	0.02			0.02	0.02	0.02	0.02
	Absolute Transaction Size (Lower Hedging Cost)			0.27***	0.22***			0.53***	0.30***			0.22**	0.20**	0.27***	0.19**
				0.08	0.08			0.13	0.10			0.09	0.09	0.10	0.09
	Foreign Exchange Volume Ratio (Lower Transaction Cost) - LCP			-0.20***	-0.33***			-0.10***	-0.22***			-0.22***	-0.33***	-0.13***	-0.22***
				0.01	0.01			0.02	0.02			0.02	0.01	0.02	0.02
	Foreign Exchange Volume Ratio (Lower Transaction Cost) - VCP			3.56***	5.47***			1.68***	3.42***			3.98***	5.58***	2.20***	3.43***
				0.29	0.29			0.34	0.34			0.30	0.29	0.35	0.35
Strategic	Importer Concentration (1)					1.87***	0.92***			1.79***	0.84***	1.83***	0.88***	1.84***	0.92***
						0.11	0.11			0.11	0.11	0.10	0.09	0.10	0.09
	Importer Heterogeneity (2)					-0.01***	-0.02***			-0.01***	-0.02***	-0.01***	-0.01***	-0.01***	-0.02***
						0.00	0.00			0.00	0.00	0.00	0.00	0.00	0.00
	Relative Transaction Size in Industry (Top 5th Percentile by Size)					1.74***	0.48***			2.12***	0.22***	1.44***	0.00	1.91***	0.03
						0.04	0.05			0.04	0.04	0.05	0.05	0.05	0.05
	Model Fit Statistic - (AIC)	20,989,046		19,466,249		20,996,679		18,850,952		20,570,501		18,812,796		18,475,516	

Note: This table provides the results of MNL specifications describing which variables influence the likelihood of local currency pricing (LCP) relative to producer currency pricing (PCP), or vehicle currency pricing (VCP) relative to PCP. The MNL specification sample consists of all Canadian import transactions from all countries with the exception of the United States. Residuals are clustered by HS4 industry and by exporting country. Constants (not shown) are included in all specifications. (1) Baseline results use importer concentration, defined as the share accounted for by the top 10 Canadian importers by HS4 industry, and 2) Importer heterogeneity is constructed as the ratio of imports going to the top 10 Canadian importers to the imports going to the next 10 Canadian importers.

Table 8: Changes in Trade Shares and Invoicing Outcomes: China and the Eurozone

	Panel A: Log Change in China Trade Share v. Invoicing outcomes, Ex-US sample, by Counts					
	All Import Transactions			All Import Transactions Excluding China		
	Δ in Log LCP Share	Δ in Log PCP Share	Δ in Log VCP Share	Δ in Log LCP Share	Δ in Log PCP Share	Δ in Log VCP Share
Δ in Log China Share	0.05**	-0.02	0.03***	0.07***	0.10***	-0.01
	(0.03)	(0.02)	(0.01)	(0.03)	(0.02)	(0.01)
Constant	-0.20***	-0.15***	0.04***	-0.19***	-0.15***	0.05***
	(0.02)	(0.02)	(0.00)	(0.02)	(0.01)	(0.01)
Observations	1,159	1,170	1,191	1,153	1,169	1,188
Adj R^2	0.00	0.00	0.02	0.01	0.02	0.00

Standard errors in parentheses

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

	Panel B: Log Change in Eurozone Trade Share v. Invoicing outcomes, Ex-US sample, by Counts					
	All Import Transactions			All Import Transactions Excluding Eurozone		
	Δ in Log LCP Share	Δ in Log PCP Share	Δ in Log VCP Share	Δ in Log LCP Share	Δ in Log PCP Share	Δ in Log VCP Share
Δ in Log Euro Share	0.18***	0.53***	-0.09***	0.31***	0.53***	-0.05***
	(0.04)	(0.03)	(0.01)	(0.04)	(0.05)	(0.01)
Constant	-0.16***	-0.10***	0.04***	-0.16***	-0.25***	0.05***
	(0.02)	(0.01)	(0.00)	(0.02)	(0.02)	(0.00)
Observations	1,189	1,209	1,227	1,165	1,152	1,222
Adj R^2	0.01	0.17	0.06	0.04	0.08	0.02

Standard errors in parentheses

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

Note: This table provides the results of bivariate OLS regressions of the change in China or Eurozone shares over time and by HS4 industry, against the change over the same time frame and by industry in the overall prevalence local currency pricing (LCP), producer currency pricing (PCP), or vehicle currency pricing (VCP). All variables are introduced as changes in logs. The changes are computed as the difference between variable levels over the June 2005 (exclusive) through 2009 period versus the 2002 through June 2005 (inclusive) period.

Table 9: Determinants of Invoicing Currency Choice - US Exports to Canada

		1		2		3		4		5		6		7	
		LCP	VCP	LCP	VCP	LCP	VCP	LCP	VCP	LCP	VCP	LCP	VCP	LCP	VCP
Micro	Highly Homogenous Goods (Walrasian)	-0.07	-1.97***					-0.01	-1.98***	-0.15***	-1.87***			-0.09	-1.88***
		0.05	0.41					0.06	0.41	0.06	0.45			0.06	0.45
	Intermediate Homogeneity Goods (Reference Priced)	0.11***	-1.10***					0.15***	-1.11***	0.08**	-1.04***			0.12***	-1.04***
		0.03	0.22					0.04	0.22	0.03	0.23			0.03	0.23
	Exporting Country Market Share in Industry	-0.44***	0.13					-0.49***	0.17	-0.61***	0.20			-0.65***	0.22
		0.05	0.29					0.05	0.30	0.05	0.29			0.05	0.29
	Commodity Input Intensity of Industry	-0.36***	0.85					-0.42***	0.87	-0.45***	0.82			-0.49***	0.82
		0.10	0.61					0.11	0.62	0.09	0.63			0.10	0.63
	Foreign Ownership Share by Industry - US	-1.24***	7.09***					-0.73	3.14**	-1.35***	7.16***			-0.90*	3.16***
		0.33	1.08					0.45	1.25	0.35	1.06			0.48	1.21
	Foreign Ownership Share by Industry - EU	3.52***	11.91***					5.08***	14.22***	3.64***	11.68***			5.51***	13.69***
		0.79	2.83					1.10	2.70	0.89	2.87			1.25	2.73
	Foreign Ownership Share by Industry - non US, ROW	1.49	-27.22***					1.20	-10.54**	1.55	-27.07***			1.02	-9.85**
		1.08	3.84					1.23	4.46	1.08	3.84			1.32	4.53
Macro	Relative Exchange Rate Volatility of LCP			-0.58***	0.75			0.25	1.61			-0.49***	0.27	0.31	1.62
				0.11	1.07			0.20	0.99			0.11	1.01	0.21	1.00
	Relative Exchange Rate Volatility of VCP			-0.40***	-0.46			-0.25	0.90			-0.40***	-0.70*	-0.34	0.93
				0.08	0.46			0.20	0.58			0.08	0.41	0.23	0.58
	Better Natural Hedge Currency - LCP			0.00	0.02			-0.03***	-0.10***			0.00	0.01	-0.03***	-0.10***
				0.00	0.02			0.01	0.03			0.00	0.02	0.01	0.02
	Better Natural Hedge Currency - VCP			0.08***	0.02			0.08***	0.04**			0.09***	0.02	0.08***	0.03**
				0.00	0.02			0.00	0.02			0.00	0.02	0.01	0.02
	Absolute Transaction Size - Millions (Lower Hedging Cost)			0.15**	-0.48			0.16**	-0.47			0.08**	0.05	0.08**	0.04
				0.06	0.82			0.07	0.84			0.03	0.07	0.03	0.09
	Foreign Exchange Volume Ratio (Lower Transaction Cost) - LCP			-0.05***	0.32***			-0.09***	0.09			-0.04***	0.37***	-0.09***	0.10
				0.01	0.07			0.02	0.07			0.01	0.06	0.02	0.07
	Foreign Exchange Volume Ratio (Lower Transaction Cost) - VCP			3.02***	-12.00***			5.46***	-2.41			2.88***	-13.45***	5.42***	-2.57
				0.24	2.08			0.55	2.13			0.25	1.69	0.57	2.10
Strategic	Importer Concentration (1)					0.21**	-1.37**			0.34***	-0.76	0.18*	-1.37**	0.31***	-0.76
						0.10	0.57			0.10	0.59	0.10	0.57	0.10	0.59
	Importer Heterogeneity (2)					0.00	0.02***			0.01*	0.02*	0.00	0.02***	0.01	0.01*
						0.00	0.01			0.00	0.01	0.00	0.01	0.00	0.01
	Relative Transaction Size in Industry (Top 5th Percentile by Size)					1.21***	-1.84***			1.28***	-1.85***	1.15***	-1.86***	1.22***	-1.88***
						0.05	0.20			0.05	0.21	0.04	0.19	0.04	0.20
	Model Fit Statistic - (AIC)	8,164,766		8,527,523		8,156,172		8,129,256		7,966,382		8,136,987		7,948,392	

Note: This table provides the results of MNL specifications describing which variables influence the likelihood of local currency pricing (LCP) relative to producer currency pricing (PCP), or vehicle currency pricing (VCP) relative to PCP. The MNL specification sample consists of all Canadian import transactions from the United States. Residuals are clustered by HS4 industry. Constants (not shown) are included in all specifications. (1) Baseline results use importer concentration, defined as the share accounted for by the top 10 Canadian importers by HS4 industry, and 2) Importer heterogeneity is constructed as the ratio of imports going to the top 10 Canadian importers to the imports going to the next 10 Canadian importers.

Appendix 1: Models of invoicing

A.1.1 Unilateral optimization

The model is based on Atkeson and Burstein (2008) and Goldberg and Tille (2008). The demand faced by firm *k* in sector *j* reflects its price relative to other firms in the sector, as well as the price index of sector *j* relative to other sectors:

$$Q_{jk} = \left[P_{jk}^B\right]^{-\lambda}\left[P_j^B\right]^{\lambda-\eta}[P^B]^{\eta}Q$$

where Q is aggregate demand P_{jk}^B is the price set by the firm, P_j^B is the price index of goods of sector j, P^B is the aggregate price index. All prices are expressed in the currency of the buyer. λ and η are the elasticities of substation within and across sectors, respectively, with $\lambda \geq \eta > 1$. The sectoral price index is given by: $P_j^B = \left[\sum_{h=1}^{K}\left[P_{jh}^B\right]^{1-\lambda}\right]^{1/(1-\lambda)}$. In setting its price, firm *k* takes account of its impact on the sectoral price level. The elasticity of demand it faces is then a weighted average between the intra- and intersectoral elasticities of substitution, with the weight reflecting the firm's market share s_{jk}:

$$\epsilon_{jk} = \lambda + (\eta - \lambda)s_{jk} \quad , \quad s_{jk} = \frac{P_{jk}^B Q_{jk}}{\sum_{h=1}^{K} P_{jh}^B Q_{jh}} = \frac{\left[P_{jk}^B\right]^{1-\lambda}}{\sum_{h=1}^{K}\left[P_{jh}^B\right]^{1-\lambda}}$$

Firm *k* faces a total cost $C_{jk}(\alpha Q_{jk})^{1/\alpha}$ expressed in seller's currency, where α captures the degree of returns to scale in production (the case of constant returns to scale is $\alpha = 1$). If it can freely adjust its price, it sets it as a markup over cost, with the markup reflecting the elasticity of demand:

$$SP_{jk}^B = \frac{\epsilon_{jk}}{\epsilon_{jk}-1} C_{jk}(\alpha Q_{jk})^{(1-\alpha)/\alpha} \tag{A1}$$

where *S* is the exchange rate with an increase denoting a depreciation of the exporter's currency.

When the firm needs to set the price in advance, its optimization entails an invoicing decision on the currency basket to use, and a pricing decision on the price level to set in that basket. The invoicing shares in buyer's and vehicle currency are denoted by β_{jk}^b and β_{jk}^v respectively, and the preset price level by P_{jk}^{fix}. The exchange rate between the seller's currency and the buyer's currency is given by $exp[\varepsilon_S]$ where ε_S is a shock of mean zero and variance σ_S^2. Similarly, the exchange rate between the seller's currency and the vehicle currency is given by $exp[\varepsilon_V]$ where ε_V is a shock of mean zero and variance σ_V^2. The correlation between the two exchange rate shocks is ρ_{SV}. The ex-post price paid by the buyer is then:

$$P_{jk}^B = P_{jk}^{fix} exp\left[-\left(1-\beta_{jk}^b\right)\varepsilon_S + \beta_{jk}^v \varepsilon_V\right]$$

The price received by the seller is equal to P_{jk}^B adjusted for the exchange rate and iceberg costs of transacting in the various currencies. Specifically, invoicing in currency *i* entails an iceberg cost τ^i. These costs are second-order, i.e linearly proportional to the variance of shocks. The price received by the firm ex-post is then:

$$P_{jk}^S = P_{jk}^{fix} exp\left[\beta_{jk}^b \varepsilon_S + \beta_{jk}^v \varepsilon_V - (1 - \beta_{jk}^b - \beta_{jk}^v)\tau^s - \beta_{jk}^b \tau^b - \beta_{jk}^v \tau^v\right]$$

The cost of production also entails a stochastic component and is written as $C_{jk} = \bar{C}_{jk} exp\left[\varepsilon_{Cjk}\right]$ where ε_{Cjk} is a shock of mean zero and variance σ_C^2. The correlations between the cost shock and the two exchange rate shocks are ρ_{SC} and ρ_{VC} respectively. We assume that the overall price index P^B in the destination country is also affected by exchange rate movements: $P^B = P^B exp\left[-\left(1 - \xi_{jk}^b\right)\varepsilon_S + \xi_{jk}^v \varepsilon_V\right]$.

Firm *k* chooses P_{jk}^{fix}, β_{jk}^b and β_{jk}^v to maximize the expected discounted value of profits:

$$E\left\{D_{jk} P_{jk}^S \left[P_{jk}^B\right]^{-\lambda}\left[P_j^B\right]^{\lambda-\eta}[P^B]^\eta Q - D_{jk} C_{jk}\left(\alpha\left[P_{jk}^B\right]^{-\lambda}\left[P_j^B\right]^{\lambda-\eta}[P^B]^\eta Q\right)^{\frac{1}{\alpha}}\right\}$$

where D_{jk} is a stochastic discount factor that is exogenous to the firm. The zero-order component of the optimality condition (A1) with respect to the preset price is: $\bar{P}_{jk}^B = \bar{\epsilon}_{jk}(\bar{\epsilon}_{jk} - 1)^{-1}\bar{C}_{jk}(\alpha \bar{Q}_{jk})^{(1-\alpha)/\alpha}$, where $\bar{\epsilon}_{jk}$ is the elasticity of demand in the absence of shocks and iceberg costs and $\bar{S} = 1$. The optimality conditions with respect to β_{jk}^b is given by:

$$E\left\{D_{jk} P_{jk}^S \left[P_{jk}^B\right]^{-\lambda}\left[P_j^B\right]^{\lambda-\eta}[P^B]^\eta Q(\varepsilon_S + \tau^s - \tau^b)\right\}$$

$$= -E\left\{\bar{C}_{jk}(\alpha \bar{Q}_{jk})^{(1-\alpha)/\alpha}\epsilon_{jk}\varepsilon_S\right\} + E\left\{D_{jk} P_{jk}^S \left[P_{jk}^B\right]^{-\lambda}\left[P_j^B\right]^{\lambda-\eta}[P^B]^\eta Q \epsilon_{jk}\varepsilon_S\right\}$$

We express this condition as a quadratic approximation around the zero-order solution:

$$\beta_{jk}^b + \beta_{jk}^v \frac{E\varepsilon_S\varepsilon_V}{E(\varepsilon_S)^2} = \frac{E\varepsilon_S\varepsilon_{Cjk}}{E(\varepsilon_S)^2} + \frac{1}{\bar{\epsilon}_{jk} - 1}\frac{\tau^s - \tau^b}{E(\varepsilon_S)^2}$$

$$+ \frac{(\lambda - 1)(\eta - \lambda)\bar{s}_{jk}}{\bar{\epsilon}_{jk}\left(\bar{\epsilon}_{jk} - 1\right)}\left[\beta_{jk}^b + \beta_{jk}^v \frac{E\varepsilon_S\varepsilon_V}{E(\varepsilon_S)^2} - \sum_{h=1}^{H} \bar{s}_{jh}\left(\beta_{jh}^b + \beta_{jh}^v \frac{E\varepsilon_S\varepsilon_V}{E(\varepsilon_S)^2}\right)\right]$$

$$- \frac{1 - \alpha}{\alpha}\left\{\begin{array}{l} \lambda\left[\beta_{jk}^b + \beta_{jk}^v \frac{E\varepsilon_S\varepsilon_V}{E(\varepsilon_S)^2} - \sum_{h=1}^{H} \bar{s}_{jh}\left(\beta_{jh}^b + \beta_{jh}^v \frac{E\varepsilon_S\varepsilon_V}{E(\varepsilon_S)^2}\right)\right] \\ +\eta\left[\sum_{h=1}^{H} \bar{s}_{jh}\left(\beta_{jh}^b + \beta_{jh}^v \frac{E\varepsilon_S\varepsilon_V}{E(\varepsilon_S)^2}\right) - \left(\xi_{jk}^b + \xi_{jk}^v \frac{E\varepsilon_S\varepsilon_V}{E(\varepsilon_S)^2}\right)\right] \end{array}\right\}$$

We proceed similarly for the optimality conditions with respect to β_{jk}^v. Combining the resulting relations, we obtain equations (3)-(4) in the text:

$$\beta_{jk}^{b} = \rho\left(\varepsilon_{Cjk}, \varepsilon_{S}\right) + \frac{T^{b}}{\bar{\epsilon}_{jk} - 1} + \frac{(\lambda - 1)(\eta - \lambda)\bar{s}_{jk}}{\bar{\epsilon}_{jk}\left(\bar{\epsilon}_{jk} - 1\right)}\left[\beta_{jk}^{b} - \sum_{h=1}^{H} \bar{s}_{jh}\beta_{jh}^{b}\right]$$
$$- \frac{1 - \alpha}{\alpha}\left\{\lambda\left(\beta_{jk}^{b} - \sum_{h=1}^{H} \bar{s}_{jh}\beta_{jh}^{b}\right) - \eta\left(\sum_{h=1}^{H} \bar{s}_{jh}\beta_{jh}^{b} - \xi_{jk}^{b}\right)\right\}$$

$$\beta_{jk}^{v} = \rho\left(\varepsilon_{Cjk}, \varepsilon_{V}\right) + \frac{T^{v}}{\bar{\epsilon}_{jk} - 1} + \frac{(\lambda - 1)(\eta - \lambda)\bar{s}_{jk}}{\bar{\epsilon}_{jk}\left(\bar{\epsilon}_{jk} - 1\right)}\left[\beta_{jk}^{v} - \sum_{h=1}^{H} \bar{s}_{jh}\beta_{jh}^{v}\right]$$
$$- \frac{1 - \alpha}{\alpha}\left\{\lambda\left(\beta_{jk}^{v} - \sum_{h=1}^{H} \bar{s}_{jh}\beta_{jh}^{v}\right) - \eta\left(\sum_{h=1}^{H} \bar{s}_{jh}\beta_{jh}^{v} - \xi_{jk}^{v}\right)\right\}$$

where $\rho\left(\varepsilon_{Cjk}, \varepsilon_{S}\right)$ and $\rho\left(\varepsilon_{Cjk}, \varepsilon_{V}\right)$ are the coefficients of regressing ε_{Cjk} on ε_{S} and ε_{V}:

$$\rho\left(\varepsilon_{Cjk}, \varepsilon_{S}\right) = \frac{\rho_{SC} - \rho_{SV}\rho_{VC}}{\sigma_{S}(1 - \rho_{VS}^{2})}\sigma_{C} \quad , \quad \rho\left(\varepsilon_{Cjk}, \varepsilon_{V}\right) = \frac{\rho_{VC} - \rho_{SV}\rho_{SC}}{\sigma_{V}(1 - \rho_{VS}^{2})}\sigma_{C}$$

and the terms T^{b} and T^{v} reflect the iceberg cost of transacting in the various currencies:

$$T^{b} = \frac{(\tau^{s} - \tau^{b})\sigma_{V}^{2} - (\tau^{s} - \tau^{v})\rho_{SV}\sigma_{S}\sigma_{V}}{\sigma_{S}^{2}\sigma_{V}^{2}(1 - \rho_{VS}^{2})} \quad , \quad T^{v} = \frac{(\tau^{s} - \tau^{v})\sigma_{S}^{2} - (\tau^{s} - \tau^{b})\rho_{SV}\sigma_{S}\sigma_{V}}{\sigma_{S}^{2}\sigma_{V}^{2}(1 - \rho_{VS}^{2})}$$

A.1.2 Optimization through bargaining

Bargaining over individual units

We consider the bargaining between a buyer *B* and a seller *S* on the pricing and invoicing one unit of good indexed by *k*. The surplus from a successful bargain for the seller is (equation (11) in the text):

$$\Theta_{S,B,k}^{S} = \frac{1}{\gamma_{k}^{S}}\left[1 - Eexp\left[-\gamma_{k}^{S}(P_{S,B}^{S} - C)\right]\right]$$

where $P_{S,B}^{S}$ is the price expressed in the seller's currency, *E* the expectation operator, *C* is the cost of producing the unit, and γ_{k}^{S} is the absolute risk aversion parameter of the seller. The buyer purchases the unit to resell it at an exogenous price *Z*. Her surplus is (equation (12) in the text):

$$\Theta_{S,B,k}^{B} = \frac{1}{\gamma_{k}^{B}}\left[1 - Eexp\left[-\gamma_{k}^{B}(Z - P_{S,B}^{B})\right]\right]$$

where $P_{S,B}^{B}$=$P_{S,B}^{S}/S$ is the price expressed in the buyer's currency, and γ_{k}^{B} is the absolute risk aversion parameter of the buyer. The bargaining process maximizes the geometric product of the surpluses $\left(\Theta_{S,B,k}^{S}\right)^{1-\delta}\left(\Theta_{S,B,k}^{B}\right)^{\delta}$ where δ denotes the formal bargaining weight of the buyer.

The bargaining covers the invoicing decision, setting the share of invoicing in the buyer's currency and vehicle currency $\beta_{S,B}^{b}$ and $\beta_{S,B}^{v}$, and the pricing decision, setting the preset price level in the chosen basket

currency, $P_{S,B}^{fix}$. As in the unilateral pricing model, we consider that the seller and the buyer face iceberg costs.[31]

The ex-post prices $P_{S,B}^{B}$, and $P_{S,B}^{B}$ are then $P_{S,B}^{S} = P_{S,B}^{fix} exp[\Xi_B]$ and $P_{S,B}^{S} = P_{S,B}^{fix} exp[\Xi_S]$ where:

$$\Xi_B = -(1-\beta_{S,B}^{b})\varepsilon_S + \beta_{S,B}^{v}\varepsilon_V + \left(1-\beta_{S,B}^{b}-\beta_{S,B}^{v}\right)\tau^s + \beta_{S,B}^{b}\tau^b + \beta_{S,B}^{v}\tau^v$$

$$\Xi_S = \beta_{S,B}^{b}\varepsilon_S + \beta_{S,B}^{v}\varepsilon_V - (1-\beta_{S,B}^{b}-\beta_{S,B}^{v})\tau^s - \beta_{S,B}^{b}\tau^b - \beta_{S,B}^{v}\tau^v$$

The derivatives of the buyer's and seller's surpluses with respect to the preset price and the invoicing shares are:

$$\frac{\partial \Theta_{S,B,k}^{S}}{\partial P_{S,B}^{fix}} = E\{A_S\} \quad , \quad \frac{\partial \Theta_{S,B,k}^{B}}{\partial P_{S,B}^{fix}} = -E\{A_B\}$$

$$\frac{\partial \Theta_{S,B,k}^{S}}{\partial \beta_{S,B}^{b}} = P_{S,B}^{fix} E\{A_S(\varepsilon_S + \tau^s - \tau^b)\} \quad , \quad \frac{\partial \Theta_{S,B,k}^{B}}{\partial \beta_{S,B}^{b}} = P_{S,B}^{fix} E\{A_B(-\varepsilon_S + \tau^s - \tau^b)\}$$

$$\frac{\partial \Theta_{S,B,k}^{S}}{\partial \beta_{S,B}^{v}} = P_{S,B}^{fix} E\{A_S(\varepsilon_V + \tau^s - \tau^v)\} \quad , \quad \frac{\partial \Theta_{S,B,k}^{B}}{\partial \beta_{S,B}^{v}} = P_{S,B}^{fix} E\{A_B(-\varepsilon_V + \tau^s - \tau^v)\}$$

Where $A_S = exp[\Xi_S] exp\left[-\gamma_k^S (P_{S,B}^{fix} exp[\Xi_S] - \bar{C} exp[\varepsilon_C])\right]$ and $A_B = exp[\Xi_B] exp\left[-\gamma_k^B (Z - P_{S,B}^{fix} exp[\Xi_B])\right]$.

The first order condition with respect to the preset price $P_{S,B}^{fix}$ is:

$$0 = (1-\delta)\Theta_{S,B,k}^{B} \frac{\partial \Theta_{S,B,k}^{S}}{\partial P_{S,B}^{fix}} + \delta \Theta_{S,B,k}^{S} \frac{\partial \Theta_{S,B,k}^{B}}{\partial P_{S,B}^{fix}}$$

The zero-order component of this condition is:

$$\frac{1-\delta}{\gamma_k^B}\left[1 - exp\left[-\gamma_k^B\left(Z - P_{S,B}^{fix}\right)\right]\right] exp\left[-\gamma_k^S\left(P_{S,B}^{fix} - \bar{C}\right)\right]$$

$$= \frac{\delta}{\gamma_k^S}\left[1 - exp\left[-\gamma_k^S\left(P_{S,B}^{fix} - \bar{C}\right)\right]\right] exp\left[-\gamma_k^B\left(Z - P_{S,B}^{fix}\right)\right]$$

This relation has a unique solution for $P_{S,B}^{fix} \in (\bar{C}, Z)$. It can be re-arranged to express the price as a function of the buyer's effective bargaining weight $\tilde{\delta}$ (equation (13) in the text):

$$P_{S,B}^{fix} = \left(1-\tilde{\delta}\right)Z + \tilde{\delta}\bar{C}$$

The effective bargaining weight reflects the concavity of both parties' payoffs:

$$\tilde{\delta} = \delta + \delta(1-\delta)\frac{H\left(\gamma_k^S, \left(P_{S,B}^{fix} - \bar{C}\right)\right) - H\left(\gamma_k^B\left(Z - P_{S,B}^{fix}\right)\right)}{(1-\delta)H\left(\gamma_k^B\left(Z - P_{S,B}^{fix}\right)\right) + \delta H\left(\gamma_k^S, \left(P_{S,B}^{fix} - \bar{C}\right)\right)}$$

where the function $H(\gamma, X)$ is increasing in both arguments and converges to one when *X* goes to zero:

$$H(\gamma, X) = \frac{1}{\gamma}\frac{1 - exp[-\gamma X]}{X exp[-\gamma X]}$$

[31] Our results only reflect the average iceberg cost and not its allocation across the parties.

This implies that $\tilde{\delta}$ is increasing in δ, increasing in γ_k^S, and decreasing in γ_k^B, holding $P_{S,B}^{fix} - \bar{C}$ and $Z - P_{S,B}^{fix}$ constant. Of course $\tilde{\delta}$ in turn affects $P_{S,B}^{fix}$ but this does not overturn the direct impact of δ, γ_k^S, γ_k^B on the effective bargaining weight.

The first order condition with respect to the invoicing share $\beta_{S,B}^b$ is:

$$0 = (1-\delta)\Theta_{S,B,k}^B \frac{\partial \Theta_{S,B,k}^S}{\partial \beta_{S,B}^b} + \delta \Theta_{S,B,k}^S \frac{\partial \Theta_{S,B,k}^B}{\partial \beta_{S,B}^b}$$

which we write as:

$$\frac{1-\delta}{\gamma_k^B}\left[1 - E exp\left[-\gamma_k^B\left(Z - P_{S,B}^{fix} exp[\Xi_B]\right)\right]\right] \times E\left\{exp\left[-\gamma_k^S \begin{pmatrix} P_{S,B}^{fix} exp[\Xi_S] \\ -\bar{C} exp[\varepsilon_C] \end{pmatrix}\right] exp[\Xi_S](\varepsilon_S + \tau^s - \tau^b)\right\}$$

$$= \frac{\delta}{\gamma_k^S}\left[1 - exp\left[-\gamma_k^S \begin{pmatrix} P_{S,B}^{fix} exp[\Xi_S] \\ -\bar{C} exp[\varepsilon_C] \end{pmatrix}\right]\right] \times E\left\{exp\left[-\gamma_k^B\left(Z - P_{S,B}^{fix} exp[\Xi_B]\right)\right] exp[\Xi_B](\varepsilon_S - \tau^s + \tau^b)\right\}$$

We express this condition as a quadratic approximation around the zero-order solution:

$$\beta_{S,B}^b + \beta_{S,B}^v \frac{E\varepsilon_S\varepsilon_V}{E(\varepsilon_S)^2} = \frac{1 + \gamma_k^B P_{S,B}^{fix}}{(\gamma_k^B + \gamma_k^S)P_{S,B}^{fix}} + \frac{\gamma_k^S \bar{C}}{(\gamma_k^B + \gamma_k^S)P_{S,B}^{fix}} \frac{E\varepsilon_S\varepsilon_C}{E(\varepsilon_S)^2} + \frac{2}{(\gamma_k^B + \gamma_k^S)P_{S,B}^{fix}} \frac{\tau^s - \tau^b}{E(\varepsilon_S)^2}$$

We proceed similarly for the optimality conditions with respect to $\beta_{S,B}^v$. Combining the resulting relations, we obtain equations (14)-(15) in the text:

$$\beta_{S,B}^b = \frac{1 + \gamma_k^B P_{S,B}^{fix}}{(\gamma_k^B + \gamma_k^S)P_{S,B}^{fix}} + \frac{\gamma_k^S \bar{C}}{(\gamma_k^B + \gamma_k^S)P_{S,B}^{fix}} \rho(\varepsilon_C, \varepsilon_S) + \frac{2}{(\gamma_k^B + \gamma_k^S)P_{S,B}^{fix}} T^b$$

$$\beta_{S,B}^v = \frac{\gamma_k^S \bar{C}}{(\gamma_k^B + \gamma_k^S)P_{S,B}^{fix}} \rho(\varepsilon_C, \varepsilon_V) + \frac{2}{(\gamma_k^B + \gamma_k^S)P_{S,B}^{fix}} T^v$$

where $\rho(\varepsilon_C, \varepsilon_S)$ and$\rho(\varepsilon_C, \varepsilon_V)$ are the coefficients of regressing ε_C on ε_S and ε_V and the terms T^b and T^v are as in the model of unilateral optimization.

Bargaining over several units

We now consider that the buyer *B* and the seller *S* bargain over a price to apply to *K* units of the good, each unit associated with a different coefficient of risk aversion. The surpluses are:

$$\Theta_{S,B}^S = \sum_{k=1}^K \frac{1}{\gamma_k^S}\left[1 - E exp\left[-\gamma_k^S (P_{S,B}^S - C)\right]\right] = \sum_{k=1}^K \frac{1}{\gamma_k^S}\left[1 - E exp\begin{bmatrix} -\gamma_k^S (P_{S,B}^{fix} exp[\Xi_S] \\ -\bar{C} exp[\varepsilon_C]) \end{bmatrix}\right]$$

$$\Theta_{S,B}^B = \sum_{k=1}^K \frac{1}{\gamma_k^B}\left[1 - E exp\left[-\gamma_k^B (Z - P_{S,B}^B)\right]\right] = \sum_{k=1}^K \frac{1}{\gamma_k^B}\left[1 - E exp\left[-\gamma_k^B (Z - P_{S,B}^{fix} exp[\Xi_B])\right]\right]$$

The derivatives of the surpluses with respect to the price and the invoicing shares are:

$$\frac{\partial \Theta_{S,B}^{S}}{\partial P_{S,B}^{fix}} = \sum_{k=1}^{K} E\{A_{S.k}\} \quad , \quad \frac{\partial \Theta_{S,B}^{B}}{\partial P_{S,B}^{fix}} = -\sum_{k=1}^{K} E\{A_{B,k}\}$$

$$\frac{\partial \Theta_{S,B}^{S}}{\partial \beta_{S,B}^{b}} = P_{S,B}^{fix} \sum_{k=1}^{K} E\{A_{S.k}(\varepsilon_S + \tau^s - \tau^b)\} \quad , \quad \frac{\partial \Theta_{S,B}^{B}}{\partial \beta_{S,B}^{b}} = P_{S,B}^{fix} \sum_{k=1}^{K} E\{A_{B,k}(-\varepsilon_S + \tau^s - \tau^b)\}$$

$$\frac{\partial \Theta_{S,B}^{S}}{\partial \beta_{S,B}^{v}} = P_{S,B}^{fix} \sum_{k=1}^{K} E\{A_{S.k}(\varepsilon_V + \tau^s - \tau^v)\} \quad , \quad \frac{\partial \Theta_{S,B}^{B}}{\partial \beta_{S,B}^{v}} = P_{S,B}^{fix} \sum_{k=1}^{K} E\{A_{B,k}(-\varepsilon_V + \tau^s - \tau^v)\}$$

where:

$$A_{S.k} = exp[\Xi_S] exp\left[-\gamma_k^S (P_{S,B}^{fix} exp[\Xi_S] - \bar{C} exp[\varepsilon_C])\right]$$

$$A_{B,k} = exp[\Xi_B] exp\left[-\gamma_k^B (Z - P_{S,B}^{fix} exp[\Xi_B])\right]$$

The zero-order component of the optimality condition with respect to the preset price is:

$$(1-\delta)\left\{\sum_{k=1}^{K} \frac{1}{\gamma_k^B}\left[1 - exp\left[-\gamma_k^B (Z - P_{S,B}^{fix})\right]\right]\right\}\left\{\sum_{k=1}^{K} exp\left[-\gamma_k^S (P_{S,B}^{fix} - \bar{C})\right]\right\}$$

$$= \delta\left\{\sum_{k=1}^{K} \frac{1}{\gamma_k^S}\left[1 - exp\left[-\gamma_k^S (P_{S,B}^{fix} - \bar{C})\right]\right]\right\}\left\{\sum_{k=1}^{K} exp\left[-\gamma_k^B (Z - P_{S,B}^{fix})\right]\right\}$$

This can again be written as a function of the buyer's effective bargaining weight $P_{S,B}^{fix} = (1-\tilde{\delta})Z + \tilde{\delta}\bar{C}$. The functions in $\tilde{\delta}$ are now:

$$H\left(\gamma_k^S, (P_{S,B}^{fix} - \bar{C})\right) = \frac{\left\{\sum_{k=1}^{K} \frac{1}{\gamma_k^S}\left[1 - exp\left[-\gamma_k^S (P_{S,B}^{fix} - \bar{C})\right]\right]\right\}}{(P_{S,B}^{fix} - \bar{C})\{\sum_{k=1}^{K} exp\left[-\gamma_k^S (P_{S,B}^{fix} - \bar{C})\right]\}}$$

$$H\left(\gamma_k^B, (Z - P_{S,B}^{fix})\right) = \frac{\left\{\sum_{k=1}^{K} \frac{1}{\gamma_k^B}\left[1 - exp\left[-\gamma_k^B (Z - P_{S,B}^{fix})\right]\right]\right\}}{(Z - P_{S,B}^{fix})\{\sum_{k=1}^{K} exp\left[-\gamma_k^B (Z - P_{S,B}^{fix})\right]\}}$$

Turning to the optimality conditions with respect to the invoicing shares, we again express them as quadratic approximations around the zero-order solution. The condition with respect to $\beta_{S,B}^{b}$ is written as:

$$\beta_{S,B}^{b} + \beta_{S,B}^{v} \frac{E\varepsilon_S \varepsilon_V}{E(\varepsilon_S)^2}$$

$$= \frac{1 + P_{S,B}^{fix} \sum_{k=1}^{K} S_k^B \gamma_k^B}{P_{S,B}^{fix} \sum_{k=1}^{K} (S_k^B \gamma_k^B + S_k^S \gamma_k^S)} + \frac{\bar{C} \sum_{k=1}^{K} S_k^S \gamma_k^S}{P_{S,B}^{fix} \sum_{k=1}^{K} (S_k^B \gamma_k^B + S_k^S \gamma_k^S)} \frac{E\varepsilon_S \varepsilon_C}{E(\varepsilon_S)^2}$$

$$+ \frac{2}{P_{S,B}^{fix} \sum_{k=1}^{K} (S_k^B \gamma_k^B + S_k^S \gamma_k^S)} \frac{\tau^s - \tau^b}{E(\varepsilon_S)^2}$$

where:

$$S_k^S = \frac{exp\left[-\gamma_k^S\left(P_{S,B}^{fix} - \bar{C}\right)\right]}{\sum_{k=1}^{K} exp\left[-\gamma_k^S\left(P_{S,B}^{fix} - \bar{C}\right)\right]} \quad , \quad S_k^B = \frac{exp\left[-\gamma_k^B\left(Z - P_{S,B}^{fix}\right)\right]}{\sum_{k=1}^{K} exp\left[-\gamma_k^B\left(Z - P_{S,B}^{fix}\right)\right]}$$

We proceed similarly for the optimality conditions with respect to $\beta_{S,B}^{v}$. Combining the resulting relations, we write:

$$\beta_{S,B}^{b} = \frac{1 + P_{S,B}^{fix}\sum_{k=1}^{K} S_k^B\gamma_k^B}{P_{S,B}^{fix}\sum_{k=1}^{K}(S_k^B\gamma_k^B + S_k^S\gamma_k^S)} + \frac{\bar{C}\sum_{k=1}^{K} S_k^S\gamma_k^S}{P_{S,B}^{fix}\sum_{k=1}^{K}(S_k^B\gamma_k^B + S_k^S\gamma_k^S)}\rho(\varepsilon_C, \varepsilon_S) + \frac{2}{P_{S,B}^{fix}\sum_{k=1}^{K}(S_k^B\gamma_k^B + S_k^S\gamma_k^S)}T^b$$

$$\beta_{S,B}^{v} = \frac{\bar{C}\sum_{k=1}^{K} S_k^S\gamma_k^S}{P_{S,B}^{fix}\sum_{k=1}^{K}(S_k^B\gamma_k^B + S_k^S\gamma_k^S)}\rho(\varepsilon_C, \varepsilon_V) + \frac{2}{P_{S,B}^{fix}\sum_{k=1}^{K}(S_k^B\gamma_k^B + S_k^S\gamma_k^S)}T^v$$

Appendix Table 1: Descriptive Statistics for Explanatory Variables									
Variable	Dimensionality	United States				Non-US Countries			
		Min	Max	Mean	Std Dev	Min	Max	Mean	Std Dev
Highly Homogenous Goods (Walrasian)	HS4	0.00	1.00	0.03	0.17	0.00	1.00	0.02	0.14
Intermediate Homogeneity Goods (Reference Priced)	HS4	0.00	1.00	0.20	0.40	0.00	1.00	0.11	0.32
Exporting Country Market Share in Industry	HS4, Country, Quarter	0.00	1.00	0.62	0.25	0.00	1.00	0.06	0.13
Commodity Input Intensity of Industry	HS4	0.00	0.78	0.11	0.10	0.00	0.78	0.10	0.09
Foreign Ownership Share by Industry - US	HS4, Year	0.00	0.39	0.29	0.06	0.00	0.39	0.29	0.05
Foreign Ownership Share by Industry - EU	HS4, Year	0.00	0.15	0.13	0.02	0.00	0.15	0.13	0.02
Foreign Ownership Share by Industry - non US, ROW	HS4, Year	0.00	0.05	0.04	0.01	0.00	0.05	0.04	0.01
Relative Exchange Rate Volatility of LCP	Country, Quarter	0.02	0.07	0.05	0.02	0.01	0.42	0.05	0.02
Relative Exchange Rate Volatility of VCP	Country, Quarter	0.08	0.18	0.13	0.03	0.00	0.37	0.09	0.06
Dollar Peg Country	Country, Quarter	---	---	---	---	0.00	1.00	0.17	0.38
Euro Area or Euro Peg Country	Country, Quarter	---	---	---	---	0.00	1.00	0.30	0.46
Better Natural Hedge Currency - LCP	Country, Quarter	0.00	1.00	0.36	0.48	0.00	1.00	0.33	0.47
Better Natural Hedge Currency - VCP	Country, Quarter	0.00	1.00	0.38	0.49	0.00	1.00	0.26	0.44
Absolute Transaction Size (Lower Hedging Cost)	Transaction	0.00	1647.81	0.06	1.22	0.00	4941.76	0.07	2.21
Foreign Exchange Volume Ratio (Lower Transaction Cost) - LCP	Country, Year	17.20	20.96	20.09	0.89	0.00	8.91	2.00	3.16
Foreign Exchange Volume Ratio (Lower Transaction Cost) - VCP	Country, Year	2.22	2.36	2.33	0.04	0.00	0.45	0.10	0.16
Importer Concentration (1)	HS4	0.00	1.00	0.52	0.20	0.00	1.00	0.48	0.18
Importer Heterogeneity (2)	HS4	1.56	100.00	5.67	6.60	1.56	100.00	5.00	5.73
Relative Transaction Size in Industry (Top 5th Percentile by Size)	HS4, Year	0.00	1.00	0.05	0.22	0.00	1.00	0.05	0.22

(1) Top 10 Importer Share by Industry

(2) Top 10 Amount/(Top 20 Amount - Top 10 Amount), winsorised at 100

	Appendix Table 2: Robustness to Alternative Cutoffs for Large Transaction Size, Non-US Exporters to Canada								
		Contains Strategic Variables		*Contains Micro & Strategic Variables*		*Contains Macro & Strategic Variables*		*Contains Micro, Macro, & Strategic Variables*	
		Specification 3		Specification 5		Specification 6		Specification 7	
		LCP	VCP	LCP	VCP	LCP	VCP	LCP	VCP
Baseline	Importer Concentration (1)	1.87***	0.92***	1.79***	0.84***	1.83***	0.88***	1.84***	0.92***
		0.11	0.11	0.11	0.11	0.10	0.09	0.10	0.09
	Importer Heterogeneity (2)	-0.01***	-0.02***	-0.01***	-0.02***	-0.01***	-0.01***	-0.01***	-0.02***
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Relative Transaction Size in Industry (Top 5th Percentile by Size)	1.74***	0.48***	2.12***	0.22***	1.44***	0.00	1.91***	0.03
		0.04	0.05	0.04	0.04	0.05	0.05	0.05	0.05
	Clustering	hs4, country		hs4, country		hs4, country		hs4, country	
	Model Fit Statistic - (AIC)	20,996,679		20,570,501		18,812,796		18,475,516	
Top 1st Percentile	Importer Concentration (1)	1.89***	0.93***	1.79***	0.84***	1.86***	0.88***	1.84***	0.92***
		0.11	0.11	0.11	0.11	0.10	0.09	0.10	0.09
	Importer Heterogeneity (2)	-0.01***	-0.02***	-0.01***	-0.02***	-0.01***	-0.01***	-0.01***	-0.02***
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Relative Transaction Size in Industry (Top 1st Percentile by Size)	2.47***	0.56***	2.92***	0.19***	1.98***	-0.07	2.53***	-0.09
		0.06	0.07	0.07	0.06	0.09	0.09	0.10	0.09
	Clustering	hs4, country		hs4, country		hs4, country		hs4, country	
	Model Fit Statistic - (AIC)	21,034,093		20,627,504		18,844,647		18,532,448	
Top 10th Percentile	Importer Concentration (1)	1.86***	0.92***	1.80***	0.84***	1.82***	0.88***	1.84***	0.92***
		0.11	0.11	0.11	0.11	0.10	0.09	0.10	0.09
	Importer Heterogeneity (2)	-0.01***	-0.02***	-0.01***	-0.02***	-0.01***	-0.01***	-0.01***	-0.02***
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Relative Transaction Size in Industry (Top 10th Percentile by Size)	1.39***	0.35***	1.68***	0.15***	1.15***	-0.04	1.51***	-0.01
		0.03	0.04	0.03	0.03	0.04	0.04	0.04	0.04
	Clustering	hs4, country		hs4, country		hs4, country		hs4, country	
	Model Fit Statistic - (AIC)	20,995,362		20,570,763		18,810,239		18,470,944	
Top 20th Percentile	Importer Concentration (1)	1.86***	0.92***	1.79***	0.84***	1.82***	0.88***	1.83***	0.92***
		0.11	0.11	0.11	0.11	0.10	0.09	0.10	0.09
	Importer Heterogeneity (2)	-0.01***	-0.02***	-0.01***	-0.02***	-0.01***	-0.01***	-0.01***	-0.02***
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Relative Transaction Size in Industry (Top 20th Percentile by Size)	1.02***	0.19***	1.22***	0.05*	0.85***	-0.10***	1.10***	-0.08***
		0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
	Clustering	hs4, country		hs4, country		hs4, country		hs4, country	
	Model Fit Statistic - (AIC)	21,017,517		20,600,413		18,820,873		18,489,791	
Continuous Measure	Importer Concentration (1)	1.86***	0.93***	1.78***	0.84***	1.82***	0.89***	1.82***	0.92***
		0.11	0.11	0.11	0.11	0.10	0.09	0.10	0.09
	Importer Heterogeneity (2)	-0.01***	-0.02***	-0.01***	-0.02***	-0.01***	-0.02***	-0.01***	-0.02***
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Relative Transaction Size in Industry (Continuous Percentile)	0.01***	0.00***	0.02***	0.00***	0.01***	0.00***	0.02***	0.00***
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Clustering	hs4, country		hs4, country		hs4, country		hs4, country	
	Model Fit Statistic - (AIC)	21,013,364		20,565,299		18,774,909		18,443,181	

(1) Top 10 Importer Share by Industry

(2) Top 10 Amount / (Top 20 Amount - Top 10 Amount), winsorised at 100

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

Note: Coefficient estimates represent a subset of the full spectrum of variables included in the respective specification in *Table 7: Determinants of Invoicing Currency Choice - Non-US Exports to Canada*

Note: Regression statistics are based on the entire respective specification found in *Table 7: Determinants of Invoicing Currency Choice - Non-US Exports to Canada*

	Appendix Table 3: Robustness to Alternative Construction of Importer Concentration, Non-US Exporters to Canada								
		Contains Strategic Variables		*Contains Micro & Strategic Variables*		*Contains Macro & Strategic Variables*		*Contains Micro, Macro, & Strategic Variables*	
		Specification 3		Specification 5		Specification 6		Specification 7	
		LCP	VCP	LCP	VCP	LCP	VCP	LCP	VCP
Baseline	**Importer Concentration (Top 10 Importer Share by Industry)**	1.87***	0.92***	1.79***	0.84***	1.83***	0.88***	1.84***	0.92***
		0.11	0.11	0.11	0.11	0.10	0.09	0.10	0.09
	Importer Heterogeneity (1)	-0.01***	-0.02***	-0.01***	-0.02***	-0.01***	-0.01***	-0.01***	-0.02***
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Relative Transaction Size in Industry (Top 5th Percentile by Size)	1.74***	0.48***	2.12***	0.22***	1.44***	0.00	1.91***	0.03
		0.04	0.05	0.04	0.04	0.05	0.05	0.05	0.05
	Clustering	hs4, country		hs4, country		hs4, country		hs4, country	
	Model Fit Statistic - (AIC)	20,996,679		20,570,501		18,812,796		18,475,516	
Top 5 Importer Share	**Importer Concentration (Top 5 Importer Share by Industry)**	1.93***	0.96***	1.81***	0.88***	1.91***	0.94***	1.87***	0.95***
		0.12	0.12	0.12	0.12	0.11	0.10	0.11	0.10
	Importer Heterogeneity (1)	-0.01***	-0.02***	-0.01***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Relative Transaction Size in Industry (Top 5th Percentile by Size)	1.75***	0.48***	2.12***	0.22***	1.44***	0.00	1.90***	0.02
		0.04	0.05	0.04	0.04	0.05	0.05	0.05	0.05
	Clustering	hs4, country		hs4, country		hs4, country		hs4, country	
	Model Fit Statistic - (AIC)	21,005,141		20,578,106		18,818,586		18,483,382	
Top 20 Importer Share	**Importer Concentration (Top 20 Importer Share by Industry)**	1.93***	0.94***	1.89***	0.86***	1.87***	0.87***	1.93***	0.94***
		0.10	0.10	0.11	0.10	0.09	0.08	0.09	0.09
	Importer Heterogeneity (1)	-0.01***	-0.01***	-0.01***	-0.02***	-0.01***	-0.01***	-0.01***	-0.01***
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Relative Transaction Size in Industry (Top 5th Percentile by Size)	1.74***	0.47***	2.13***	0.22***	1.43***	0.00	1.91***	0.03
		0.04	0.05	0.04	0.04	0.05	0.05	0.05	0.05
	Clustering	hs4, country		hs4, country		hs4, country		hs4, country	
	Model Fit Statistic - (AIC)	20,987,521		20,562,278		18,807,202		18,467,373	

(1) Top 10 Amount / (Top 20 Amount - Top 10 Amount), winsorised at 100

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

Note: Coefficient estimates represent a subset of the full spectrum of variables included in the respective specification in *Table 7: Determinants of Invoicing Currency Choice - Non-US Exports to Canada*

Note: Regression statistics are based on the entire respective specification found in *Table 7: Determinants of Invoicing Currency Choice - Non-US Exports to Canada*

Appendix Table 4: Robustness to Alternative Construction of Importer Heterogeneity, Non-US Exporters to Canada									
		Contains Strategic Variables		*Contains Micro & Strategic Variables*		*Contains Macro & Strategic Variables*		*Contains Micro, Macro, & Strategic Variables*	
		Specification 3		Specification 5		Specification 6		Specification 7	
		LCP	VCP	LCP	VCP	LCP	VCP	LCP	VCP
Baseline	Importer Concentration (1)	1.87***	0.92***	1.79***	0.84***	1.83***	0.88***	1.84***	0.92***
		0.11	0.11	0.11	0.11	0.10	0.09	0.10	0.09
	Importer Heterogeneity (2a)	-0.01***	-0.02***	-0.01***	-0.02***	-0.01***	-0.01***	-0.01***	-0.02***
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Relative Transaction Size in Industry (Top 5th Percentile by Size)	1.74***	0.48***	2.12***	0.22***	1.44***	0.00	1.91***	0.03
		0.04	0.05	0.04	0.04	0.05	0.05	0.05	0.05
	Clustering	hs4, country		hs4, country		hs4, country		hs4, country	
	Model Fit Statistic - (AIC)	20,996,679		20,570,501		18,812,796		18,475,516	
Top 5 - Bottom 5 Heterogeneity in Top 10	Importer Concentration (1)	1.94***	0.92***	1.88***	0.82***	1.86***	0.87***	1.92***	0.93***
		0.12	0.11	0.12	0.12	0.11	0.09	0.11	0.10
	Importer Heterogeneity (2b)	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***	-0.04***	-0.04***
		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	Relative Transaction Size in Industry (Top 5th Percentile by Size)	1.74***	0.47***	2.12***	0.22***	1.44***	0.01	1.91***	0.03
		0.04	0.05	0.04	0.04	0.05	0.05	0.05	0.05
	Clustering	hs4, country		hs4, country		hs4, country		hs4, country	
	Model Fit Statistic - (AIC)	21,000,633		20,575,983		18,815,545		18,477,982	
Top 5 - Bottom 15 Heterogeneity in Top 20	Importer Concentration (1)	1.98***	1.03***	1.92***	0.94***	1.91***	0.96***	1.97***	1.03***
		0.12	0.12	0.12	0.12	0.11	0.09	0.11	0.10
	Importer Heterogeneity (2c)	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Relative Transaction Size in Industry (Top 5th Percentile by Size)	1.74***	0.47***	2.12***	0.22***	1.44***	0.01	1.91***	0.03
		0.04	0.05	0.04	0.04	0.05	0.05	0.05	0.05
	Clustering	hs4, country		hs4, country		hs4, country		hs4, country	
	Model Fit Statistic - (AIC)	20,993,632		20,568,743		18,811,303		18,472,764	

(1) Top 10 Importer Share by Industry

(2a) Top 10 Amount / (Top 20 Amount - Top 10 Amount), winsorised at 100

(2b) Top 5 Amount / (Top 10 Amount - Top 5 Amount), winsorized at 100

(2c) 3 * Top 5 Amount / (Top 20 Amount - Top 5 Amount), winsorized at 100

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

Note: Coefficient estimates represent a subset of the full spectrum of variables included in the respective specification in *Table 7: Determinants of Invoicing Currency Choice - Non-US Exports to Canada*
Note: Regression statistics are based on the entire respective specification found in *Table 7: Determinants of Invoicing Currency Choice - Non-US Exports to Canada*

	Appendix Table 5: Robustness to Alternative Cutoffs for Large Transaction Size, US Exporters to Canada							
		Contains Strategic Variables		*Contains Micro & Strategic Variables*		*Contains Macro & Strategic Variables*		*Contains Micro, Macro, & Strategic Variables*	
		Specification 3		Specification 5		Specification 6		Specification 7	
		LCP	VCP	LCP	VCP	LCP	VCP	LCP	VCP
Baseline	Importer Concentration (1)	0.21**	-1.37**	0.34***	-0.76	0.18*	-1.37**	0.31***	-0.76
		0.10	0.57	0.10	0.59	0.10	0.57	0.10	0.59
	Importer Heterogeneity (2)	0.00	0.02***	0.01*	0.02*	0.00	0.02***	0.01	0.01*
		0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01
	Relative Transaction Size in Industry (Top 5th Percentile by Size)	1.21***	-1.84***	1.28***	-1.85***	1.15***	-1.86***	1.22***	-1.88***
		0.05	0.20	0.05	0.21	0.04	0.19	0.04	0.20
	Clustering	hs4		hs4		hs4		hs4	
	Model Fit Statistic - (AIC)	8,156,172		7,966,382		8,136,987		7,948,392	
Top 1st Percentile	Importer Concentration (1)	0.19*	-1.36**	0.32***	-0.75	0.17*	-1.36**	0.30***	-0.74
		0.10	0.57	0.10	0.58	0.10	0.57	0.10	0.59
	Importer Heterogeneity (2)	0.01	0.02***	0.01*	0.01*	0.00	0.02***	0.01	0.02*
		0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01
	Relative Transaction Size in Industry (Top 1st Percentile by Size)	2.20***	-2.10***	2.29***	-2.14***	2.09***	-1.89***	2.19***	-1.91***
		0.07	0.20	0.07	0.21	0.07	0.52	0.07	0.49
	Clustering	hs4		hs4		hs4		hs4	
	Model Fit Statistic - (AIC)	8,147,779		7,959,790		8,132,702		7,945,921	
Top 10th Percentile	Importer Concentration (1)	0.21**	-1.38**	0.34***	-0.77	0.18*	-1.39**	0.30***	-0.78
		0.10	0.57	0.10	0.59	0.10	0.57	0.10	0.59
	Importer Heterogeneity (2)	0.00	0.02***	0.01*	0.02*	0.00	0.02***	0.01	0.01*
		0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01
	Relative Transaction Size in Industry (Top 10th Percentile by Size)	0.82***	-1.58***	0.87***	-1.60***	0.76***	-1.61***	0.82***	-1.63***
		0.04	0.19	0.04	0.20	0.04	0.18	0.04	0.19
	Clustering	hs4		hs4		hs4		hs4	
	Model Fit Statistic - (AIC)	8,181,677		7,992,254		8,158,514		7,970,272	
Top 20th Percentile	Importer Concentration (1)	0.21**	-1.40**	0.34***	-0.79	0.17*	-1.40**	0.29***	-0.79
		0.10	0.58	0.09	0.59	0.10	0.58	0.10	0.59
	Importer Heterogeneity (2)	0.01	0.02***	0.01*	0.01*	0.00	0.02***	0.01	0.01*
		0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01
	Relative Transaction Size in Industry (Top 20th Percentile by Size)	0.48***	-1.28***	0.52***	-1.29***	0.44***	-1.30***	0.48***	-1.31***
		0.03	0.21	0.03	0.22	0.03	0.21	0.03	0.21
	Clustering	hs4		hs4		hs4		hs4	
	Model Fit Statistic - (AIC)	8,207,508		8,019,589		8,179,802		7,993,089	
Continuous Measure	Importer Concentration (1)	0.20**	-1.46**	0.33***	-0.85	0.17*	-1.46**	0.29***	-0.86
		0.10	0.59	0.10	0.60	0.10	0.59	0.10	0.60
	Importer Heterogeneity (2)	0.01	0.02***	0.01*	0.02*	0.00	0.02***	0.01	0.01*
		0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01
	Relative Transaction Size in Industry (Continuous Percentile)	0.01***	-0.02***	0.01***	-0.02***	0.00***	-0.02***	0.01***	-0.02***
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Clustering	hs4		hs4		hs4		hs4	
	Model Fit Statistic - (AIC)	8,197,721		8,009,113		8,167,596		7,980,440	

(1) Top 10 Importer Share by Industry

(2) Top 10 Amount / (Top 20 Amount - Top 10 Amount), winsorised at 100

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

Note: Coefficient estimates represent a subset of the full spectrum of variables included in the respective specification in *Table 9: Determinants of Invoicing Currency Choice - US Exports to Canada*

Note: Regression statistics are based on the entire respective specification found in *Table 9: Determinants of Invoicing Currency Choice - US Exports to Canada*

	Appendix Table 6: Robustness to Alternative Construction of Importer Concentration, US Exporters to Canada								
		Contains Strategic Variables		*Contains Micro & Strategic Variables*		*Contains Macro & Strategic Variables*		*Contains Micro, Macro, & Strategic Variables*	
		Specification 3		Specification 5		Specification 6		Specification 7	
		LCP	VCP	LCP	VCP	LCP	VCP	LCP	VCP
Baseline	**Importer Concentration (Top 10 Importer Share by Industry)**	0.21**	-1.37**	0.34***	-0.76	0.18*	-1.37**	0.31***	-0.76
		0.10	0.57	0.10	0.59	0.10	0.57	0.10	0.59
	Importer Heterogeneity (1)	0.00	0.02***	0.01*	0.02*	0.00	0.02***	0.01	0.01*
		0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01
	Relative Transaction Size in Industry (Top 5th Percentile by Size)	1.21***	-1.84***	1.28***	-1.85***	1.15***	-1.86***	1.22***	-1.88***
		0.05	0.20	0.05	0.21	0.04	0.19	0.04	0.20
	Clustering	hs4		hs4		hs4		hs4	
	Model Fit Statistic - (AIC)	8,156,172		7,966,382		8,136,987		7,948,392	
Top 5 Importer Share	**Importer Concentration (Top 5 Importer Share by Industry)**	0.21*	-1.40**	0.36***	-0.79	0.19	-1.41**	0.33***	-0.80
		0.12	0.71	0.11	0.71	0.12	0.71	0.11	0.71
	Importer Heterogeneity (1)	0.00	0.02***	0.01	0.02*	0.00	0.02***	0.01	0.02*
		0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01
	Relative Transaction Size in Industry (Top 5th Percentile by Size)	1.21***	-1.84***	1.28***	-1.85***	1.15***	-1.86***	1.22***	-1.88***
		0.05	0.20	0.05	0.21	0.04	0.19	0.04	0.20
	Clustering	hs4		hs4		hs4		hs4	
	Model Fit Statistic - (AIC)	8,157,353		7,966,736		8,138,136		7,948,706	
Top 20 Importer Share	**Importer Concentration (Top 20 Importer Share by Industry)**	0.23**	-1.55***	0.35***	-0.91*	0.20**	-1.55***	0.32***	-0.91*
		0.09	0.51	0.08	0.53	0.09	0.50	0.09	0.53
	Importer Heterogeneity (1)	0.01	0.02***	0.01**	0.02**	0.00	0.02***	0.01**	0.02**
		0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01
	Relative Transaction Size in Industry (Top 5th Percentile by Size)	1.22***	-1.85***	1.28***	-1.86***	1.15***	-1.87***	1.22***	-1.89***
		0.05	0.20	0.05	0.21	0.04	0.19	0.04	0.20
	Clustering	hs4		hs4		hs4		hs4	
	Model Fit Statistic - (AIC)	8,153,453		7,965,254		8,134,288		7,947,225	

(1) Top 10 Amount / (Top 20 Amount - Top 10 Amount), winsorised at 100

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

Note: Coefficient estimates represent a subset of the full spectrum of variables included in the respective specification in *Table 9: Determinants of Invoicing Currency Choice - US Exports to Canada*
Note: Regression statistics are based on the entire respective specification found in *Table 9: Determinants of Invoicing Currency Choice - US Exports to Canada*

Appendix Table 7: Robustness to Alternative Construction of Importer Heterogeneity, US Exporters to Canada

		Contains Strategic Variables		*Contains Micro & Strategic Variables*		*Contains Macro & Strategic Variables*		*Contains Micro, Macro, & Strategic Variables*	
		Specification 3		Specification 5		Specification 6		Specification 7	
		LCP	VCP	LCP	VCP	LCP	VCP	LCP	VCP
Baseline	Importer Concentration (1)	0.21**	-1.37**	0.34***	-0.76	0.18*	-1.37**	0.31***	-0.76
		0.10	0.57	0.10	0.59	0.10	0.57	0.10	0.59
	Importer Heterogeneity (2a)	0.00	0.02***	0.01*	0.02*	0.00	0.02***	0.01	0.01*
		0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01
	Relative Transaction Size in Industry (Top 5th Percentile by Size)	1.21***	-1.84***	1.28***	-1.85***	1.15***	-1.86***	1.22***	-1.88***
		0.05	0.20	0.05	0.21	0.04	0.19	0.04	0.20
	Clustering	hs4		hs4		hs4		hs4	
	Model Fit Statistic - (AIC)	8,156,172		7,966,382		8,136,987		7,948,392	
Top 5 - Bottom 5 Heterogeneity in Top 10	Importer Concentration (1)	0.26***	-1.25**	0.40***	-0.62	0.23**	-1.25**	0.36***	-0.63
		0.09	0.54	0.09	0.57	0.09	0.54	0.09	0.57
	Importer Heterogeneity (2b)	0.01	0.03*	0.01	0.02	0.01	0.03*	0.01	0.02
		0.01	0.01	0.01	0.03	0.01	0.01	0.01	0.03
	Relative Transaction Size in Industry (Top 5th Percentile by Size)	1.21***	-1.84***	1.28***	-1.85***	1.15***	-1.87***	1.22***	-1.89***
		0.05	0.20	0.05	0.21	0.04	0.19	0.05	0.20
	Clustering	hs4		hs4		hs4		hs4	
	Model Fit Statistic - (AIC)	8,157,301		7,967,637		8,138,019		7,949,526	
Top 5 - Bottom 15 Heterogeneity in Top 20	Importer Concentration (1)	0.20*	-1.49***	0.33***	-0.81	0.16	-1.49***	0.29**	-0.81
		0.12	0.55	0.11	0.58	0.12	0.55	0.11	0.58
	Importer Heterogeneity (2c)	0.01	0.03***	0.01	0.02	0.01	0.03***	0.01	0.02
		0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01
	Relative Transaction Size in Industry (Top 5th Percentile by Size)	1.21***	-1.84***	1.28***	-1.85***	1.15***	-1.87***	1.22***	-1.89***
		0.05	0.20	0.05	0.21	0.04	0.19	0.05	0.20
	Clustering	hs4		hs4		hs4		hs4	
	Model Fit Statistic - (AIC)	8,155,735		7,966,527		8,136,483		7,948,459	

(1) Top 10 Importer Share by Industry

(2a) Top 10 Amount / (Top 20 Amount - Top 10 Amount), winsorised at 100

(2b) Top 5 Amount / (Top 10 Amount - Top 5 Amount), winsorized at 100

(2c) 3 * Top 5 Amount / (Top 20 Amount - Top 5 Amount), winsorized at 100

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

Note: Coefficient estimates represent a subset of the full spectrum of variables included in the respective specification in *Table 9: Determinants of Invoicing Currency Choice - US Exports to Canada*
Note: Regression statistics are based on the entire respective specification found in *Table 9: Determinants of Invoicing Currency Choice - US Exports to Canada*

Appendix Table 8: Split Sample MNL Results for Non-US and for US Exporter Transactions									
		Non-US Countries				United States			
		Pre June 2005		Post June 2005		Pre June 2005		Post June 2005	
		LCP	VCP	LCP	VCP	LCP	VCP	LCP	VCP
Micro	Highly Homogenous Goods (Walrasian)	0.20**	0.05	0.14	0.04	-0.10	-1.39***	-0.07	-2.43***
		0.09	0.09	0.09	0.09	0.07	0.51	0.06	0.38
	Intermediate Homogeneity Goods (Reference Priced)	0.58***	0.16***	0.48***	0.12***	0.11***	-1.45***	0.12***	-0.84***
		0.04	0.04	0.04	0.04	0.04	0.32	0.04	0.23
	Exporting Country Market Share in Industry	-5.69***	-0.16	-5.18***	-0.47***	-0.83***	0.43	-0.48***	0.10
		0.27	0.14	0.24	0.14	0.06	0.34	0.05	0.30
	Commodity Input Intensity of Industry	0.20	1.43***	0.04	1.13***	-0.62***	1.06*	-0.38***	0.70
		0.19	0.18	0.19	0.18	0.11	0.64	0.10	0.66
	Foreign Ownership Share by Industry - US	-1.95***	-1.15*	-11.74***	-9.38***	-0.45	1.12	-1.72	-12.43
		0.61	0.64	0.99	1.00	0.69	1.82	2.82	11.95
	Foreign Ownership Share by Industry - EU	8.51***	11.01***	16.55***	15.96***	5.34***	13.74**	7.39***	24.60***
		1.51	1.54	1.18	1.14	1.91	5.67	2.01	6.79
	Foreign Ownership Share by Industry - non US, ROW	-4.40***	-15.36***	32.40***	22.75***	4.64***	2.99	-1.09	80.84
		1.09	1.04	3.96	4.06	1.37	4.58	15.06	67.59
Macro	Relative Exchange Rate Volatility of LCP	11.76***	13.84***	-10.10***	-11.07***	0.89***	2.50**	-2.56***	0.43
		0.40	0.39	0.71	0.63	0.22	1.05	0.59	1.52
	Relative Exchange Rate Volatility of VCP	2.70***	0.49**	2.09***	-0.74***	-2.45***	3.69***	-0.60**	-0.13
		0.21	0.24	0.26	0.27	0.29	1.16	0.24	0.69
	Dollar Peg Country	1.60***	1.56***	0.97***	0.98***	---	---	---	---
		0.08	0.08	0.08	0.08	---	---	---	---
	Euro Area or Euro Peg Country	-1.03***	-1.28***	-1.29***	-1.48***	---	---	---	---
		0.04	0.03	0.05	0.04	---	---	---	---
	Better Natural Hedge Currency - LCP	0.11***	0.09***	-0.10***	-0.16***	0.02*	-0.05	-0.03***	-0.02
		0.01	0.01	0.01	0.01	0.01	0.04	0.01	0.03
	Better Natural Hedge Currency - VCP	0.37***	0.43***	0.03	0.04**	0.08***	-0.02	-0.28**	-1.06*
		0.02	0.02	0.02	0.02	0.01	0.02	0.14	0.63
	Absolute Transaction Size (Lower Hedging Cost)	0.33***	0.25**	0.23***	0.15*	0.06**	0.06*	0.09**	-0.29
		0.12	0.12	0.08	0.08	0.03	0.04	0.04	1.13
	Foreign Exchange Volume Ratio (Lower Transaction Cost) - LCP	-0.80***	-0.60***	-0.13***	-0.05***	0.00	0.25***	-1.45	-8.28**
		0.06	0.06	0.02	0.01	0.03	0.09	0.91	4.15
	Foreign Exchange Volume Ratio (Lower Transaction Cost) - VCP	16.29***	11.41***	2.33***	0.04	-1.36**	1.53	38.81	230.40**
		1.27	1.18	0.31	0.29	0.57	3.24	25.09	114.80
Strategic	Importer Concentration (1)	1.91***	0.87***	1.81***	0.99***	0.36***	-0.91	0.26**	-0.67
		0.10	0.09	0.10	0.09	0.10	0.60	0.10	0.60
	Importer Heterogeneity (2)	-0.01***	-0.01***	-0.02***	-0.02***	0.01*	0.02**	0.01	0.01
		0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
	Relative Transaction Size in Industry (Top 5th Percentile by Size)	1.89***	-0.01	1.92***	0.05	1.16***	-1.67***	1.26***	-1.92***
		0.06	0.05	0.05	0.05	0.05	0.32	0.05	0.31

(1) Top 10 Importer Share by Industry

(2) Top 10 Amount / (Top 20 Amount - Top 10 Amount), winsorised at 100

Note: Time Periods are split on August 1, 2005

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

Note: This table provides the results of MNL specifications describing which variables influence the likelihood of local currency pricing (LCP) relative to producer currency pricing (PCP), or vehicle currency pricing (VCP) relative to PCP. The MNL specification sample consists of all Canadian import transactions from all countries with the exception of the United States. Residuals are clustered by HS4 industry and by exporting country. Constants (not shown) are included in all specifications. (1) Baseline results use importer concentration, defined as the share accounted for by the top 10 Canadian importers by HS4 industry, and 2) Importer heterogeneity constructed as the ratio of imports going to the top 10 Canadian importers to the imports going to the next 10 Canadian importers. Respective columns of the table refer to Canadian import transactions over the period 2002 through June 2005 (inclusive) or for the period June 2005 (exclusive) through 2009.