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# THE MYTH OF U.S. DOLLAR DOMINANCE IN JAPANESE EXPORTS: NEW EVIDENCE FROM JAPANESE CUSTOMS LEVEL DATA

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# ABSTRACT

While Japanese exports are generally considered invoiced mainly in U.S. dollars (USD), this study presents contrary evidence that most Japanese firms choose yen-invoiced exports. Surprisingly, only the top one percent of firms in size tend to choose USD-invoiced exports, based on the Japan Customs export declaration data that was newly made available to researchers. By conducting fixed-effect panel estimation using the granular Japan Customs transaction data, combined with the most comprehensive firm-level data compiled by the Ministry of Economy, Trade and Industry (METI), we demonstrate that the firm size and the intra-firm export share significantly reduce yen-invoiced exports. Smaller firms with few overseas subsidiaries tend to choose yen-invoiced exports to avoid foreign exchange risk. In contrast, larger firms efficiently manage foreign exchange risk arising from USD-invoiced exports, since they tend to export to overseas subsidiaries and benefit from operational hedging that offsets USD-denominated import payments with export revenues within group companies. Smaller firms would continue to choose yen-invoice exports unless they can benefit from operational hedging.

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# 1. Introduction

Export firms strategically select invoice currency and price and quantity-setting in their exports to maximize expected profits and manage foreign exchange risk. The choice of invoice currency is widely analyzed in the exchange rate pass-through (ERPT) literature since the former significantly affects the latter, at least in the short run (Gopinath et al., 2010). The invoice currency choice is also studied in the literature on international macroeconomics, especially when considering the effect of exchange rate changes on international trade and the impact of the international transmission mechanism of macroeconomic policy (Obstfeld and Rogoff, 2000; Devereux and Engel, 2003).

Recent empirical studies, such as Boz et al. (2022), demonstrated that exporters were more likely to choose a vehicle currency for export invoicing (i.e., vehicle currency pricing: VCP) than their own currencies (i.e., producer's currency pricing: PCP). The U.S. dollar (USD) tends to play a vehicle role in global trade, which is called the "dominant currency paradigm" (Gopinath et al., 2020).

Japan is a well-known example of USD dominance for trade invoicing since the share of its own currency (yen) invoicing for exports is much smaller than that of other advanced countries (Ito and Kawai, 2016; Ito et al., 2018). As shown in Figure 1, around 50 percent or more of Japanese exports are invoiced in USD, while yen-invoiced exports account for 34–37 percent from 2014 to 2023.<sup>1</sup> In the 1980s and 1990s, the Japanese government initiated numerous policies to promote the "internationalization of the yen" for trade invoicing (Fukuda and Ji, 1994; Kawai, 1996; Sato, 1999). However, Japan's yen invoicing (PCP) share has long been smaller than the corresponding share of USD invoicing (Figure 1). Thus, the aggregated data of invoice currency choice in Japanese exports indicates that even though the government made efforts to liberalize financial transactions for further use of the yen, Japanese export firms have rationally chosen not the yen but the USD for their trade invoicing (Ito et al. 2018).

#### [Figure 1 around here]

In marked contrast to the existing studies, this paper presents contrary evidence of the USD dominance in Japanese exports, making three novel contributions. First, we present new and striking evidence that most Japanese export firms choose yen-invoiced exports. Accessing the granular export and import declaration data compiled by Japan Customs that have recently been made available to researchers, we reveal that most Japanese export firms choose not the USD but the yen for their export invoicing. Such invoicing choice is more evidently observed for smaller-size firms.<sup>2</sup> Specifically, as

<sup>&</sup>lt;sup>1</sup> Figure 1 has often been presented in many previous studies to show the progress of Japan's yen-invoiced exports. See, for instance, Ito and Kawai (2016) and Ito et al. (2018).

 $<sup>^2</sup>$  Ito et al. (2013, 2018) found this evidence for Japanese listed firms and associated it with intra-firm trade for their empirical analysis. Goto et al. (2021) examined invoice currency choice in exports of Japanese small- and medium-sized firms. These studies argued that smaller firms tend to invoice their exports in the yen. However, they collected information on the invoice currency choice through the questionnaire survey, and the number of sample firms is at

shown in Section 2, we measure the firm size in the percentile rank of firms' export amounts. If Japanese export firms fall into the lowest quartile, the average yen-invoiced export share is 74.7 percent, and the average USD-invoiced share is just 20.6 percent, much smaller than what Figure 1 suggests. Even when sample firms fall into the highest quartile, the average yen-invoiced export share is 52.3 percent, still larger than the average USD-invoiced share (39.3 percent). More intriguingly, only the top one percent of Japanese export firms tend to choose more USD-invoiced exports (55.8 percent) than yen-invoiced exports (29.6 percent), which conforms to the aggregated share of invoice currency choice in Figure 1.

Second, in addition to the firm size, we demonstrate that intra-firm exports significantly decrease the share of yen-invoiced exports. Previous studies, such as Chung (2016) and Amiti et al. (2022), examined the exporters' invoice currency choice when they imported intermediate inputs from abroad. However, these studies did not directly investigate how intra-firm trade affected the choice of invoice currency.<sup>3</sup> Ito et al. (2012, 2013, 2018) collected firm-level information on invoice currency choice in intra-firm trade and revealed that intra-firm exports significantly reduced (raised) yen-invoiced (USD-invoiced) transactions. Although pioneering works, these studies used a limited number of observations obtained through interviews and questionnaire surveys of Japanese firms. Yoshimi et al. (2024) used the transaction-level data obtained from the Japan Customs export and import declaration data and distinguished intra-firm from arm's-length Japanese automobile exports to France. While Yoshimi et al. (2024) presented interesting findings that intra-firm exports significantly reduced yen-invoiced exports to France, their conclusions are limited to one industry's exports to just one destination country, with only 17 Japanese export firms.

In contrast to these studies, we used the most comprehensive survey data of Japanese firms, the "Basic Survey of Japanese Business Structure and Activities" (BSJBSA) compiled by the Ministry of Economy, Trade and Industry (METI), Japan, to obtain the information on Japanese firm's intra-firm export share. The BSJBSA is an annual survey of all firms with establishments in the mining, industrial, commercial, and other service industries with at least 50 employees and capital or investments of at least 30 million Japanese yen. In the 2020 survey, 36,294 firms were surveyed, with a response rate of 81.5%. We collected information on 8,644 firms from the BSJBSA that exported goods to foreign countries during the sample period from 2014 to 2019.<sup>4</sup> Using the Japan Customs export and import declaration data, we calculate the share of invoice currency for exports of 8,644 firms by product and destination. We then conduct panel estimation to examine whether the intra-firm export share affects

most 227 for Ito et al. (2018) and 300 for Goto et al. (2021), which is far smaller than our study.

<sup>&</sup>lt;sup>3</sup> Ylonen and Teivainen (2018) argued that firms' pricing behavior depends on whether their trade is intra-firm or arm's-length one. Kato (2019) empirically examined the effect of exchange rate changes on intra-firm trade and arm's-length trade.

<sup>&</sup>lt;sup>4</sup> We follow Matsuura et al. (2023) to calculate the intra-firm export share of sample firms using the Basic Survey of Japanese Business Structure and Activities (BSJBSA) compiled by the Ministry of Economy, Trade and Industry (METI).

the share of yen-invoiced exports. Our panel estimation demonstrates that the larger the intra-firm export share, the smaller the Japanese firms' yen-invoiced exports are. Our conclusion is robust even when we control for various fixed effects and the firm size variables.

Third, the effect of operational hedging on invoice currency choice is considered for a panel estimation. Operational hedging is a measure to offset import payments by export revenues, through which foreign exchange risk can be reduced.<sup>5</sup> To evaluate the operational hedging effect, we calculate the extent of trade balance/imbalance for each export firm from the Japan Customs export and import declaration data and investigate how the firm's trade balance or imbalance (surplus or deficit) affects the choice of invoice currency. The larger its trade imbalances, the more exposed an export firm is to foreign exchange risks. The influences of trade imbalances may be more severe for small-size firms since they have disadvantages in foreign exchange hedging compared to large-size firms.<sup>6</sup> We also analyze whether the effect of a trade surplus differs from that of trade deficits for Japanese export firms.

Thus, our empirical analysis reveals that the intra-firm export share significantly reduces yeninvoiced exports. Since larger-size firms tend to export their products to their overseas subsidiaries along their global production/sales network, they have less incentive to pass on the exchange rate risk to their subsidiaries. Operational hedging significantly works for larger-size firms by offsetting all export revenues and import payments within their global production/sales network, where the USD tends to be chosen for trade invoicing. Given that large Japanese firms take advantage of operational hedging—offsetting exports in US dollars with imports in US dollars—such dependence on USD would not be changed. In contrast, smaller firms with fewer overseas subsidiaries have strong incentives to avoid exchange rate risk by choosing yen-invoiced exports since most of their counterparts are foreign firms with no capital ties. Smaller firms must avoid exchange rate risk in their exports, given the disadvantage of their financial hedging. Smaller firms would continue to rely on yen-invoiced exports unless they can utilize operational hedging.

The rest of the paper is organized as follows. Section 2 describes the two micro databases and presents new stylized facts for the invoice currency choice in Japanese exports. Section 3 elaborates on the empirical model, and Section 4 shows empirical results. Finally, Section 5 concludes this study.

#### 2. Data and New Stylized Facts

# 2.1 Micro Databases

<sup>&</sup>lt;sup>5</sup> As Lyonnet et al. (2022) discussed, the effect of exchange rate variations on a firm's import payments can be compensated by the corresponding effect on a firm's export revenues.

<sup>&</sup>lt;sup>6</sup> Lyonnet et al. (2022) showed that firm size positively affects currency hedging and negatively affects own currency invoicing (i.e., producer's currency pricing: PCP).

This paper uses two micro databases to investigate how the invoice currency choice is affected by firm size and intra-firm trade. The first database is the export and import declaration data at a transaction level compiled by Japan Customs, the Ministry of Finance. We were given academic access to the transaction-level information on export/import amounts and quantities, destination/source countries, the type of export/import goods, the export/import firm's identification code, the choice of invoice currency, etc.<sup>7</sup>

The second database is the Basic Survey of Japanese Business Structure and Activities (BSJBSA),<sup>8</sup> compiled by Japan's Ministry of Economy, Trade and Industry (METI). We can access firm-level information on intra-firm exports and other firm characteristics, such as research and development (R&D) expenditures.

Collecting and matching the data from the above two databases, this study uses 4,408,033 export transactions by 8,644 firms from 2014 to 2019,<sup>9,10</sup> and the number of export destinations is 233 countries and economies.<sup>11</sup> This transaction data is merged into the firm characteristic data obtained from the BSJBSA.<sup>12</sup>

The intra-firm trade share is obtained not from the transaction-level information but from the firmlevel information obtained from the BSJBSA.<sup>13</sup> The Japan Customs data provides us with the names of counterparts for Japanese exports and imports, but there is no information on whether each transaction is intra-firm or arm's-length trade. As for Japanese exports to Thailand, for instance, we can obtain the information on the name and address of the Thai counterpart (importer). To identify whether the Thai importer is a Japanese export firm's overseas subsidiary, we must first prepare the list of overseas subsidiaries of the Japanese export firm in question using other data sources, and then to match the importer's name and address with the list of overseas subsidiaries. Yoshimi et al. (2024) conducted this matching focusing on 17 Japanese automobile firms and their exports to a single destination country, France.<sup>14</sup> However, it is extremely difficult to conduct similar matching for 8,644

<sup>&</sup>lt;sup>7</sup> In early 2022, the Japan Customs, the Ministry of Finance (MOF) started to allow academic researchers to use the large-scale customs transaction-level data for empirical research, including detailed information on Japanese export and import transactions, on the condition of maintaining the anonymity of the firms that made customs declarations in exports and/or imports. Our research group was approved for this study and granted the use of the transaction-level data of exports and imports for the 2014–2020 period.

<sup>&</sup>lt;sup>8</sup> The BSJBSA is an annual survey of all firms with establishments in the mining, industrial, commercial, and other service industries with at least 50 employees and capital or investments of at least 30 million Japanese yen. In the 2020 survey, 36,294 companies were surveyed, with a response rate of 81.5%.

<sup>&</sup>lt;sup>9</sup> We do not use the data for 2020 since Japanese firms were seriously affected by the COVID-19 pandemic from around March 2020, which may affect our empirical results.

<sup>&</sup>lt;sup>10</sup> The BSJBSA survey reports the fiscal year data: for example, the 2014 fiscal year represents the period from April 1, 2014 to March 31, 2015.

<sup>&</sup>lt;sup>11</sup> We include Hong Kong and Taiwan in the 233 destinations.

<sup>&</sup>lt;sup>12</sup> The Japan Customs export declaration data and the BSJBSA data were merged by connecting the corporate identification numbers assigned by Japan's National Tax Agency, referring to Ito et al. (2023).

<sup>&</sup>lt;sup>13</sup> The intra-firm export share for individual sample firms is calculated by dividing its export amounts to its overseas subsidiaries by its total export amounts.

<sup>&</sup>lt;sup>14</sup> Yoshimi et al. (2024) first conducted this matching by Python and second made a visual check of the matching results because the counterparts' names and addresses were not consistently entered in the Japan Customs export and import declaration data.

Japanese export firms and their exports to importers in 233 destination countries and economies. We finally decided to rely on the BSJBSA survey data to obtain firm-level information on the intra-firm export share. Although destination-specific intra-firm export share cannot be obtained from the BSJBSA data, our research is far more comprehensive than Yoshimi et al. (2024) and other previous studies.

# 2.2 New Stylized Facts

## 2.2.1 Firm size, intra-firm export, and invoice currency share

We first show the striking evidence of Japanese export firms' choice of invoice currency. Table 1 indicates a close relationship between firm size, intra-firm export, and invoice currency share. Specifically, the smaller the firm size measured in export amounts, the lower the intra-firm export share, leading to a larger share of yen-invoiced exports. See the upper panel of Table 1, (1) Rank in Export Amounts. For instance, in the lowest quartile (0–25) in export amounts, the intra-firm export share is just 14.6 percent, and the yen-invoiced export share is 74.7 percent. In the second highest quartile (50–75), the intra-firm export share is 29.3 percent, and the yen-invoiced export share is 52.3 percent, still higher than the USD-invoiced share (39.3 percent), while the intra-firm export share increases to 39.0 percent.

The above observations are visualized in Figure 2, showing the invoice currency share in Japanese exports to all destinations (Figure 2-A) by octiles measured by the firm size (export amounts). Only in the case of the highest octile (top 12.5 percentile) does the USD-invoiced share (56 percent) become larger than the yen-invoiced share (40 percent).<sup>15</sup> We observe a similar pattern of the invoice currency choice for Japanese exports to Asian countries (Figure 2-B).

# [Table 1 and Figure 2 around here]

Another notable finding in Table 1 is that the top one percent of firms (99–100) have far larger export amounts and number of export transactions, with a higher intra-firm export share (47.8 percent). The share of USD-invoiced exports reached 55.8 percent, much higher than the yen-invoiced export share (29.6 percent). In the lower panel of Table 1, (2) Rank in Number of Export Transactions, we present the result obtained by measuring firm size by the number of export transactions. The result is similar to what we discussed in Panel (1) of Table 1, based on the firm size measured by export amounts.

It must also be noted that the yen-invoiced (USD-invoiced) export share is always larger (smaller) in the transaction-based results presented in Panel (2) of Table 1 than in the amount-based results

<sup>&</sup>lt;sup>15</sup> See Figure II of Amiti et al. (2022), which is similar to our Figure 2. Amiti et al. (2022) pointed out that invoice currency choice is related to the firm size, although they did not delve deeper into that relationship.

presented in Panel (1) of Table 1.<sup>16</sup> This implies that the amount of individual yen-invoiced exports is smaller than that of individual USD-invoiced exports. This difference is more evident for the highest quartile (75–100) and the top 1 percentile, where the amount of each transaction is likely much larger than that for the lower quartiles.

Thus, the choice of invoice currency is closely related to the size of export firms and the intra-firm export share. This is the first study to present the "new stylized facts" for the choice of invoice currency in Japanese firm-level exports: (i) most Japanese export firms are likely to use the yen in their exports, (ii) the choice of invoice currency is likely to have a close relationship with the firm size and the intra-firm export share, (iii) only the top one percent (or possibly the top 12.5 percent) of firms invoice their exports more in USD than in the yen.

#### 2.2.2 Invoice currency share by destination and industry

Table 2 presents the intra-firm export share and the invoice currency choice by export destination (region). The intra-firm export share for each destination is obtained by a simple annual average of individual firms' intra-firm export shares for the sample period from 2014 to 2019. Table 2 reports two invoice currency shares: one based on export amounts and the other based on the number of transactions.

First, Asia and the Americas (i.e., North and South America) are the two largest export destinations. The second and third columns in Table 2, respectively, present the average export amounts and the average number of export transactions for sample firms, which clearly shows that these two regions are the most important destinations for Japanese export firms. Second, the average share of intra-firm exports is around 26–35 percent and does not differ much across destination regions. Third, USD-invoiced exports account for around 50 percent of Japanese exports to the Americas on both the amount and transaction bases. More interestingly, the share of yen-invoiced exports is the largest in the other destinations: 45–70 percent on the amount basis and 48–72 percent on the transaction basis.

## [Tables 2 and 3 around here]

Table 3 presents the industry breakdown of intra-firm export share and invoice currency share.<sup>17</sup> First, the intra-firm export share varies across industries. The "Motor Vehicles, Parts and Accessories" industry has the highest intra-firm export share, 47.6 percent, among 17 industries. For instance, Yoshimi et al. (2024) found that more than 70 percent of Japanese automobile exports to France are intra-firm trade. However, Yoshimi et al. (2024) focused on only 17 automobile firms, while our study is much more comprehensive because we investigated 627 firms in the corresponding industry.

<sup>&</sup>lt;sup>16</sup> Shimizu et al. (2024) also found that the yen-invoiced (USD-invoiced) export share is always larger (smaller) in the transaction-based results than in the amount-based ones.

<sup>&</sup>lt;sup>17</sup> Table 3 follows the industry classification of the BSJBSA.

Second, the share of yen-invoiced exports is much higher than the USD-invoiced exports across all industries except the "Communication Equipment and Related Products" industry: only for the invoice currency share on an export amount basis, this industry's USD share (46.7 percent) is somewhat higher than the corresponding yen share (45.0 percent).

Overall, the invoice currency share we have presented in Tables 1–3 and Figure 2 differs markedly from the findings of previous studies, such as the information in Figure 1. The main reason is that we have observed a simple arithmetic average share across sample firms. Another intriguing finding is that the choice of invoice currency is closely related to the size of export firms and the intra-firm export share. These are the new stylized facts we have proposed and will be empirically examined in the following sections.

# 3. Empirical Analysis

#### 3.1 Invoice Currency Choice

Previous studies on invoice currency choice rely on the partial equilibrium model of export firms' profit maximization behavior (Giovannini, 1988; Donnenfeld and Zilcha, 1991; Friberg, 1998). The shape of demand and cost functions determines which currency choice yields the highest expected profits, a condition similar to that governing the ERPT. These studies indicated that the degree of product differentiation of export goods and the exchange rate volatility determine the choice of invoice currency.

The recent literature extended the previous work into the general equilibrium framework and elaborated the model for optimal currency choice to derive a structural empirical framework (Bacchetta and van Wincoop, 2005; Engel, 2006; Gopinath et al., 2010). This section relies on Amiti et al. (2022), which presented an export firm's optimal currency choice problem.

Suppose  $p_i$  is a log of firm *i*'s export price in the producer's currency (i.e., the yen), and its profit is  $\prod_i (p_i) \equiv \prod_i (p_i | \Omega)$ , where a vector  $\Omega$  shows the state of the world. The firm *i*'s desired price under the flexible price setting is:

$$\tilde{p}_i = \arg\max_{p_i} \prod_i (p_i). \tag{1}$$

Let  $e_l$  the log of the bilateral nominal exchange rate of a currency *l* against the home currency (yen). We then have the following relationship,  $\tilde{p}_i^l = \tilde{p}_i + e_l$ . The firm *i*'s optimal preset price,  $\bar{p}_i^l$ , is:

$$\overline{p}_{i}^{l} = \arg\max_{\overline{p}_{i}^{l}} E\Pi_{i} \left( \overline{p}_{i}^{l} - e_{l} \mid \Omega \right),$$
<sup>(2)</sup>

where the expectation, E, is based on all possible realizations of  $\Omega$ .

Consequently, the firm solves the optimal currency choice problem in the following equation (3)

by presetting an export price,  $\bar{p}_i^l$ , and choosing the currency *l*:

$$l = \arg\max_{l} \left\{ \max_{\overline{p}_{i}^{l}} E\Pi_{i} \left( \overline{p}_{i}^{l} - e_{l} \mid \Omega \right) \right\}.$$
(3)

Amiti et al. (2022) generalized the optimal currency choice problem in equation (3) by incorporating the fixed cost,  $F_{l,i}$ , where *l* denotes the invoice currency chosen by firm *i*:

$$l = \arg\max_{l} \left\{ \max_{\overline{p}_{i}^{l}} E\Pi_{i} \left( \overline{p}_{i}^{l} - e_{l} \mid \Omega \right) - F_{l,i} \right\}.$$
(4)

The fixed cost,  $F_{l,i}$ , is included in equation (4) to consider additional determinants of invoice currency choice.<sup>18</sup> The first possible determinant is intra-firm exports, which make the choice of the local currency or the USD more reasonable. Ito et al. (2012, 2018) conducted interviews and questionnaire surveys of Japanese export firms, which demonstrated that Japanese parent firms tend to choose the USD or the importer's currency as invoice currency in their exports to overseas subsidiaries. On the consolidated accounting basis, parent firms have no reason to pass on foreign exchange risks to their subsidiaries because they aim to pursue group-wide profit maximization.<sup>19</sup> Thus, Japanese firms generally choose USD invoicing or local currency invoicing (i.e., local currency pricing: LCP) in intra-firm trade, and they are willing to conduct yen-invoiced exports only to different firms with no capital ties. We include the intra-firm export share as a likely determinant of the invoice currency choice.

Second, operational hedging is another channel of invoice currency choice. On the one hand, if operational hedging works well, export firms can minimize foreign exchange risk irrespective of the currency choice, because they can offset their import payments with export revenues. In this case, export firms have little incentive to conduct yen-invoiced exports to avoid foreign exchange risk, and the USD tends to be chosen instead due to its dominance in world trade. On the other hand, operational hedging plays a limited role if an export firm has a larger trade imbalance. This may happen if a firm exports a lot and does not import much. In this case, the firm has a strong incentive to choose yen invoicing to avoid foreign exchange risk, especially when the firm exports its products mainly to other firms with no capital ties. The choice of invoice currency depends on which has stronger negotiation power, Japanese export firms or foreign import firms. In contrast, if a Japanese export firm has a larger trade deficit, it has more incentive to export its products in USD to pay for its deficits, mainly invoiced in USD. Thus, larger trade imbalances may impede operational hedging, and its impact on the invoice

<sup>&</sup>lt;sup>18</sup> The main purpose of Amiti et al. (2022) is to investigate the effect of "strategic complementarities" on invoice currency choice. The strategic complementarities capture the export firm's mark-up response to the competitor firm's prices in the destination market. Although this paper does not pay attention to the strategic complementarities, Yoshida et al. (2024) rigorously examined the effect of strategic complementarities on the invoice currency choice using the Japan Customs export and import declaration data.

<sup>&</sup>lt;sup>19</sup> For a rigorous analysis of intra-firm trade, we can proceed to the joint profit function, instead of the usual profit function discussed here, between exporters (parent firms) and importers (overseas subsidiaries). See, for instance, Neiman (2010) and Bacchetta and van Wincoop (2003).

currency choice can differ between trade surplus and deficits.

#### 3.2 Empirical Strategy

The main purpose of this study is to test whether the firm size and intra-firm trade affect the choice of invoice currency. We set up the following fixed-effect model for a Japanese firm i's export transaction of product p in year t to destination country c. As a product category, p, we use the H.S. 6-digit classification, a highly disaggregated product category. The whole sample includes 4,408,033 observations for a six-year period from 2014 to 2019, 8,644 firms, and 233 destinations.

$$y_{i,p,c,t} = \mathbf{\beta}' \mathbf{X}_{i,t} + e_p + e_{ct} + \mathcal{E}_{i,p,c,t},$$
(5)

where  $y_{i,p,c,t}$  is the invoice currency share aggregated in the four dimensions of firm-product-countryyear. The share of USD-invoiced and yen-invoiced exports is calculated for each year on an export amount basis.  $\mathbf{X}_{i,t}$  is a vector that includes firm-specific explanatory variables described below.  $e_p$  and  $e_{ct}$  include product fixed effect (FE) and country-year FE, respectively. We use the country-year FE to consider the effect of bilateral exchange rate changes or volatilities between the yen and the destination country's currency.<sup>20</sup> We do not include the firm FE because we use the cluster standard errors at the industry classification.<sup>21</sup>

 $X_{i,t}$  includes the following explanatory variables for the baseline estimation. First, we use the natural log of the export amounts as a proxy for the firm size,  $ln(Export_{i,t})^{22}$  and the intra-firm export share,  $Intra-firm_{i,t}$ , for each firm and each year. The former variable,  $ln(Export_{i,t})$ , is constructed from the export amounts obtained from the Japan Customs export declaration data. The latter variable,  $Intra-firm_{i,t}$ , is calculated from the firm-level survey data, the BSJBSA data. Ideally, we should use the information on destination country-specific intra-firm export shares for each export transaction. However, it is very difficult to identify whether it is an intra-firm export for each product and destination country using the Japan Customs data, as mentioned earlier. Alternatively, we use the firm's intra-firm export share for each year obtained from the BSJBSA. In addition, instead of including the yen's bilateral nominal exchange rate volatility against the importer's currency, we include the country-year FE in the baseline estimation.

Second, we include a proxy variable for firm performance in the baseline model: the R&D intensity, a ratio of firm's R&D expenditures to the firm's total sales,  $(R\&D/Total Sales)_{i,t}$ . The R&D intensity may have opposing impacts on the choice of invoice currency. On the one hand, the larger the R&D

<sup>&</sup>lt;sup>20</sup> As shown in the next section, we tried other combinations of FEs and confirmed that our choice of the product and country-year FEs is robust.

<sup>&</sup>lt;sup>21</sup> The industry classification is presented in Table 3.

<sup>&</sup>lt;sup>22</sup> We used several types of firm size proxies such as the total sales, which will be discussed in the next section.

intensity, the more likely Japanese firms are to expand their exports or overseas sales, which increases the volume of transactions along supply chains, where not the yen but the USD or local currencies will be chosen for export invoicing. On the other hand, the larger the firms' R&D intensity, the more likely they are to increase their non-price export competitiveness, which may promote yen-invoiced exports from Japan.

Third, we use a proxy for the firm's operational hedging as another likely effect on the invoice currency choice. We calculate the trade balance for each firm by dividing the absolute value of the firm's exports minus imports by the sum of the firm's exports and imports, named "T.B. Ratio." The larger the T.B. Ratio, the greater the firm's trade imbalance and foreign exchange exposures, likely forcing the firm to avoid choosing foreign currency invoicing. We also include an interaction term between a firm's T.B. Ratio and its trade surplus dummy ("Surplus") to investigate whether the surplus or deficit of a firm's trade balance has a different impact on the choice of invoice currency.

## 4. Empirical Results

#### 4.1 Baseline Results

This paper sets up a panel dataset and conducts ordinary least squares (OLS) estimation to investigate how the firm size and intra-firm exports affect the choice of invoice currency in Japanese exports. As discussed in Sections 2 and 3, the hypothesis to be tested is whether the coefficients of the firm size and the intra-firm export share negatively (positively) affect the choice of the yen (the USD) for export invoicing.

Table 4 presents the results of OLS estimation for equation (5), including the firm size, intra-firm export share, and several combinations of fixed effects, where the dependent variable is either yeninvoiced export share or USD-invoiced export share.<sup>23</sup> In columns (1) and (2), we included HS6 FE, country FE, and year FE and confirmed that estimated coefficients for the firm size,  $ln(Export_{i,t})$ , and the intra-firm export share were significantly negative. When including the country-year FE instead of the individual country and year FEs (column (3)), the estimated coefficients for  $ln(Export_{i,t})$  and the intra-firm export share remained significantly negative. When including the yen's nominal exchange rate volatility against the USD as an additional explanatory variable and including the HS6 FE and country FE (column (4)), the estimated coefficients for  $ln(Export_{i,t})$  and the intra-firm export share remained significantly negative, although the estimated coefficient for the exchange rate volatility was not statistically significant.<sup>24</sup>

<sup>&</sup>lt;sup>23</sup> We do not include the firm fixed effect (FE) because we use cluster standard errors at the industry classification. The industry classification follows the BSJBSA data that has 17 industries presented in Table 3.

<sup>&</sup>lt;sup>24</sup> We calculated the standard deviation of the weekly series of the Japan Customs-declared exchange rate, which is the yen's bilateral nominal exchange rate vis-à-vis the USD, for the annual exchange rate volatility variable.

#### [Table 4 around here]

In columns (5)–(8), we use the USD-invoiced export share as a dependent variable. The estimated coefficients were opposite to those when using the yen-invoiced share as a dependent variable (columns (1)–(4) in Table 4). Both  $ln(Export_{i,t})$  and the intra-firm export share show positive and significant coefficients. These estimated results suggest that the larger the firm size measured by its export amounts and/or the intra-firm export share, the more likely export firms are to choose USD-invoiced exports. In addition, when the yen becomes more volatile against the USD, Japanese firms tend to raise the USD-exports share (column (8) in Table 4). This result is consistent with Japanese export firms' pricing-to-market (PTM) strategy. Specifically, to stabilize the selling price in destination markets, Japanese firms choose not the yen but the USD as the invoice currency.

As shown in Table 1, the larger the firm size measured by export amounts, the more likely Japanese export firms are to conduct intra-firm exports, which might cause multi-collinearity in our baseline estimation.<sup>25</sup> However, the estimated coefficient of  $ln(Export_{i,t})$  in column (1) of Table 4 is almost the same as the corresponding coefficient in columns (2) and (3) where the intra-firm export share is included together as another explanatory variable. In columns (1)–(4) and (5)–(8), the estimated coefficients of  $ln(Export_{i,t})$  and the intra-firm export share are stable and statistically significant. Thus, it is safe to include both  $ln(Export_{i,t})$  and the intra-firm export share as explanatory variables for the additional empirical analysis below.<sup>26</sup>

#### 4.2 Additional Analysis

# 4.2.1 Firm Performance and Operational Hedging

Table 5 presents the estimated results, which includes additional explanatory variables: the R&D intensity,  $(R\&D/Total Sales)_{i,t}$ , as a firm performance variable and the firm's trade balance ratio (T.B. Ratio) as a proxy for operational hedging. The country-year FE is included to consider the likely effects of the yen's bilateral exchange rate changes or volatilities against the destination country's currency.

First, estimated coefficients for the firm size,  $ln(Export_{i,t})$ , and the intra-firm export share are almost similar to those in Table 4, even when including any combinations of additional explanatory variables. This supports our findings of the significantly negative (positive) effects of the firm size and the intra-firm export share on yen-invoiced (USD-invoiced) exports.

[Table 5 around here]

<sup>&</sup>lt;sup>25</sup> Matsuura et al. (2023) empirically showed that firm size significantly affects the Japanese intra-firm trade share.
<sup>26</sup> We conducted an estimation replacing the log of export amounts with other proxies for firm size: the log of the firm's total sales, the log of the number of the firm's export transactions, and the number of the firm's export products. Appendix Table A2 shows that the estimated results using alternative firm size variables are similar to those presented in Table 4.

Second, the R&D intensity,  $(R\&D/Total Sales)_{i,t}$ , has a negative (positive) effect on the yeninvoiced (USD-invoiced) export share (columns (1) and (6) in Table 5).<sup>27</sup> One may assume that larger R&D intensity strengthens a firm's non-price export competitiveness, which likely increases (decreases) the yen-invoiced (USD-invoiced) export share. However, our estimated results do not support such a positive (negative) impact on the yen-invoiced (USD-invoiced) exports. Rather, the R&D intensity significantly reduces (increases) the yen-invoiced (USD-invoiced) export share, likely because Japanese firms with higher R&D intensity enhance global production and sales with overseas subsidiaries, which may further promote efficient trade settlement in the USD within group firms.

Third, in columns (2) and (7) in Table 5, we consider the effect of operational hedging by including the firm's trade balance ratio (T.B. Ratio) as another explanatory variable. An increase in the T.B. Ratio means a larger trade imbalance. The larger the estimated T.B. Ratio coefficient is, the more exchange rate risk export firms undertake. To avoid such an exchange rate risk, export firms will have more incentive to choose yen invoicing, i.e., PCP, given that they have a trade surplus. The estimated results suggest that the trade imbalance has a significantly positive (negative) effect on the yen-invoiced (USD-invoice) exports.

Fourth, in columns (3) and (8) in Table 5, we include an interaction term between the T.B. Ratio and the dummy for trade surplus. While the coefficient for the T.B. Ratio becomes insignificant, the coefficient for its interaction term with the trade surplus dummy becomes positive (negative) and statistically significant when the dependent variable is the yen-invoiced (USD-invoiced) export share, which suggests that export firms with a large trade surplus tend to choose yen-invoiced exports.

Fifth, when including the R&D intensity and the T.B. Ratio, the coefficient of the R&D intensity is significantly negative (positive) and that of the T.B. Ratio is significantly positive (negative) in column (4) of Table 5 (column (9) of Table 5). When adding the interaction term between the T.B. Ratio and the trade surplus dummy, the coefficient for the R&D intensity remains negative (positive) in column (5) of Table 5 (column (10) of Table 5). However, the coefficient of the T.B. Ratio becomes insignificant, while the coefficient for its interaction term becomes significantly positive (negative) when the dependent variable is the yen-invoiced (USD-invoiced) export share. This indicates that export firms with trade surplus tend to choose the yen, not the USD, for export invoicing, while a trade deficit has an insignificant impact on trade invoicing.

For a robustness check, we divide the entire sample of firms into two sub-samples: one includes firms in the wholesale industry that conform to Japanese large trading companies, "Sogo Shosha," and the other includes the rest of the firms (i.e., firms excluding the wholesale industry). Previous studies, such as Kawai (1996), emphasized the role of Sogo Shosha in the choice of invoice currency by

<sup>&</sup>lt;sup>27</sup> Although not reported in this paper, we included the R&D expenditures instead of the R&D intensity in estimation and obtained similar results. We also tried to use the natural log of labor productivity instead of the R&D intensity, but the estimated results are not statistically significant in most cases.

Japanese export firms. Sogo Shosha can manage foreign exchange risk efficiently by offsetting its large volume of exports and imports. Appendix Table A3-A presents the estimated results, limiting the sample firms to the wholesale industry. The estimated coefficients for the R&D intensity and the T.B. Ratio are not statistically significant. Only the estimated coefficient for the interaction term between the T.B. Ratio and the trade surplus dummy is statistically significant. In contrast, Appendix Table A3-B shows that the estimated results focusing on the firms excluding the wholesale industry are consistent with what we found in Table 5. Hence, we may say that our estimated results are robust after excluding the role of Sogo Shosha.

Thus, R&D intensity and firm-level trade balance, a proxy for operational hedging, significantly affect Japanese export firms' choice of invoice currency. Even when including these variables, the significant effects of the firm size and the intra-firm export share on invoice currency choice do not change. In the next sub-section, we conduct further empirical analysis by different firm-size groups.

#### 4.2.2 Different Firm Size Groups

For further investigation on the effect of the firm size on the invoice currency choice, we divide the whole sample into three sub-samples. Specifically, according to the Act, firms capitalized at one billion yen or more are categorized into "large-size" firms; Firms capitalized at 100 million yen or more and less than one billion yen are categorized into "medium-size" firms; Firms capitalized at less than 100 million yen are categorized into "small-size" firms.

We then conduct the same estimation for each group as we did in the previous subsections, and the estimated results are presented in Table 6.

## [Table 6 around here]

First, in Table 6, the firm size variable,  $ln(Export_{i,t})$ , and the intra-firm export share show negative and statistically significant coefficients for the three different firm size groups. The magnitude of the estimated coefficients is stable when including various combinations of additional explanatory variables presented below. Thus, the effects of the firm size measured by the export amounts and the intra-firm export share are robust across the three different firm-size groups measured by capital stock.

Second, focusing on the small-size firms (Table 6A), we found that the R&D intensity does not have a significant impact on the invoice currency choice for both the yen and the USD (columns (2) and (8) in Table 6A). As discussed earlier, the R&D intensity may have two opposing impacts on invoice currency choice, but no significant impacts are observed for small-size firms.

The trade balance ratio, a proxy for operational hedging, does not have significant effects on invoice currency choice, either (columns (3) and (9) in Table 6A). However, when including both the trade balance ratio and its interaction term with the trade surplus dummy, the coefficient of the trade

balance ratio becomes significantly negative, while that of the interaction term becomes significantly positive (column (4) in Table 6A). Such opposing signs of the estimated coefficients remain the same when including the R&D intensity together (column (6) in Table 6A), whereas both the R&D intensity and the trade balance ratio are not statistically significant without including the interaction term (column (5) in Table 6A).

Thus, small-size firms with few or no overseas subsidiaries cannot benefit from operational hedging. Since small-size firms generally have little advantage in financial hedging, they tend to conduct yen-invoiced exports when they have a larger trade surplus to make their export revenues less exposed to foreign exchange risk. In contrast, when they have larger trade deficits, small-size firms tend to choose USD-invoiced exports to pay for their imports invoiced in USD. This discussion can be applied to the determinants of USD-invoiced exports, where we found the opposite sign of coefficients (columns (10)–(12) in Table 6A).

Third, for the medium-size firms (Table 6B), the estimated coefficients are similar to those of the small-size firms, except for the trade balance ratio and its interaction term with the trade surplus dummy. The R&D intensity does not significantly affect the invoice currency choice for both yen and USD invoicing. In columns (3)–(6) in Table 6B, where the dependent variable is the yen-invoiced export share, the coefficient of the trade balance ratio is solely positive and statistically significant when including or not including the R&D intensity. More notably, when including both the trade balance ratio becomes negligible and insignificant, while that of the interaction term becomes significantly positive. This indicates that firms' trade deficits do not affect the invoice currency choice for medium-size firms, while their trade surplus significantly promotes yen-invoiced exports. We also have opposing results of estimated coefficients when using the USD-invoiced export share for the dependent variable (columns (9)–(12) in Table 6B). Thus, medium-size firms have more incentive to avoid foreign exchange risk when they have a trade surplus.

Fourth, the estimated results for large-size firms (Table 6C) differ from those for small and medium-sized firms. Specifically, the coefficient of the R&D intensity is significantly negative (positive) for the yen-invoiced (USD-invoiced) export share, which suggests that Japanese large-size firms with larger R&D investments tend to conduct USD-invoiced exports.<sup>28</sup> More intriguingly, the coefficient of the trade balance ratio is not statistically significant when the dependent variable is the yen-invoiced export share. Only the coefficient of the interaction term becomes significantly positive, although the significance level is weaker than the corresponding coefficient for medium-size firms. Since large-size firms have well-developed supply chains, they will take full advantage of operational hedging, which likely makes the estimated coefficients of the trade balance ratio and its interaction

<sup>&</sup>lt;sup>28</sup> Amiti et al. (2022) also found that the R&D intensity significantly promotes foreign currency invoicing.

term less significant.

When conducting the same estimation using the USD-invoiced export share as the dependent variable, we found that the estimated coefficients of the trade balance ratio become significantly negative (columns (9) and (11) in Table 6C), which is somewhat different from the estimated results when using the yen-invoiced export share. However, when including both the trade balance ratio and the trade surplus dummy, only the estimated coefficients of the interaction term are significantly negative (columns (10) and (12) in Table 6C). Large firms will reduce USD-invoiced exports only if they have a larger trade surplus.

Finally, we conducted the same estimation focusing on Japanese exports to Asia since Asian countries are Japanese firms' most important trading partners. The estimated results are presented in Appendix Table A4, which are very similar to those in Table 6. As shown in Figure 2, Japanese firms have two main choices for invoice currency, the yen (PCP) and the USD (VCP), for their exports to Asian countries. The larger the firm size and the higher the share of intra-firm exports, the more likely Japanese export firms are to choose USD-invoiced transactions. Since larger firms have an advantage in operational hedging based on their global production network and supply chains, large Japanese firms tend to use more USD when increasing both exports to and imports from Asian countries. If smaller Japanese firms increased their exports to Asian countries but did not increase their imports from Asia, the smaller firms would continue to choose yen-invoiced exports.

#### 5. Conclusion

It has long been believed that Japanese exports are mainly invoiced in USD. Due to its vehicle role in foreign exchange transactions and well-developed financial markets, the USD is typically considered the most extensively used currency in Japanese exports, supported by the aggregated invoice currency share of Japanese exports presented in Figure 1. However, this study has presented contrary evidence that most Japanese firms choose yen-invoiced exports, based on the Japan Customs export declaration data. Only the top one percent (or possibly the top 12.5 percent) of Japanese firms in size tend to choose USD-invoiced exports.

To explain why most Japanese firms choose yen-invoiced exports, we have conducted panel estimation with fixed effects and demonstrated that intra-firm exports likely facilitate (prevent) USD-invoiced (yen-invoiced) exports. As Ito et al. (2018) demonstrated, large Japanese firms tend to concentrate group-wide credits and debts arising from international trade on their parent firms to conduct operational hedging, where a single currency, typically the USD, was chosen as invoice currency for efficient foreign exchange risk management. In contrast, small firms are unlikely to have a global production/sales network with many overseas subsidiaries. In this case, small firms are

strongly incentivized to pass on exchange rate risk to importers by conducting yen-invoiced exports.

The question is how small firms can invoice their exports in yen, not USD. Without strong bargaining power, small firms would have difficulty pursuing yen-invoiced exports to pass on the exchange rate risk to importers. One likely reason is that small firms can export their products to foreign countries because their export products have strong non-price competitiveness, which is a source of their strong bargaining power and enables small firms to choose yen-invoiced exports. Another likely reason is that small Japanese firms may accept a bad deal with importers, such as an ex-post risk sharing of large exchange rate changes, in return for yen-invoiced exports. Since small firms are disadvantaged in foreign exchange risk management, they have strong incentives to persist in yen-invoiced exports.

Given that large Japanese firms take advantage of operational hedging, such dependence on USD would not be changed. In contrast, smaller firms with fewer overseas subsidiaries have strong incentives to avoid exchange rate risk by conducting yen-invoiced exports since most of their counterparts are foreign firms with no capital ties. It is crucial for smaller firms to avoid exchange rate risk in their exports since they are disadvantaged in operational hedging with fewer overseas subsidiaries and, hence, fewer intra-firm exports. Thus, smaller firms would continue to rely on yen-invoiced exports unless they can utilize financial hedging.

This study has focused on how invoice currency choice is affected by firm size, intra-firm exports, and operational hedging. Financial hedging has not yet been fully considered, mainly due to the limitation of data availability. This financial aspect of invoice currency choice needs to be empirically examined, which is left for our future research.

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Figure 1. Invoice Currency Choice in Japanese Exports (Percent): 1980–2023

*Note*: The share for 2023 in exports to the United States is computed based on Japanese exports to North America. "EU currencies" include the euro and other European currencies.

Source: The website of Japan Customs, Ministry of Finance.



## Figure 2. Firm Size and Invoice Currency Choice in Japanese Exports

*Note*: Octiles are based on the ranking of the firm size for 8,644 Japanese export firms. The firm size is measured by the export amounts of individual firms. Each bin shows a simple arithmetic average of individual firms' invoice currency shares in 2014–2019. For instance, the lowest octile ("1" on the horizontal axis) represents the simple averaged invoice currency share for the smallest 12.5 percent of firms measured in export amounts. PCP denotes the yen-invoiced share, DCP denotes the USD-invoiced share, and Others include other invoice currency shares. Others account for, at the most, 7.6 percent of all destinations and 5.6 percent of Asian countries in the second highest octile ("7" on the horizontal axis). *Source*: Authors' calculation from the Japan Customs export declaration data.

Firm Size	Averaged	Averaged Averaged Number		Averaged	Invoice Curre	ency Share
(Percentile Rank)	Export Amount (in Yen)	of Export Transactions	Intra-firm Export Share	JPY	USD	EUR
(1) Rank in Ex	port Amounts			Shar	e on amount-	basis
0–25	8,851,726	1,702	0.146	0.747	0.206	0.024
25-50	104,906,848	25,826	0.235	0.707	0.236	0.020
50-75	588,524,827	275,214	0.293	0.649	0.287	0.025
75–100	10,687,980,237	34,634,996	0.390	0.523	0.393	0.044
99–100	476,374,012,441	11,507,817,222	0.478	0.296	0.558	0.077
(2) Rank in Nu	mber of Export Tran	sactions		Share	on transaction	n-basis
0–25	85,818,134	162	0.122	0.767	0.193	0.020
25-50	370,991,817	5,897	0.222	0.712	0.233	0.025
50-75	1,214,151,319	104,756	0.294	0.668	0.272	0.031
75–100	11,958,423,045	21,368,822	0.424	0.584	0.316	0.061
99–100	419,893,711,493	11,743,538,059	0.540	0.421	0.351	0.138

Table 1. Averaged Intra-firm Export Share and Invoice Currency Share by Firm Size

*Note*: All figures are arithmetic averages for the 8,644 sample firms from 2014 to 2019. The first column shows the percentile rank used to measure firm size. "0–25" denotes the lowest quartile. "20–50" denotes the second lowest quartile. "50–75" denotes the second highest quartile. "75–100" denotes the highest quartile. "99–100" denotes the top one percent group of firms.

*Source*: Authors' calculation based on the Japan Customs export declaration data and the Basic Survey of Japanese Business Structure and Activities (BSJBSA) data compiled by the Ministry of Economy, Trade and Industry (METI).

	Averaged	Averaged	Averaged		Avera	aged Invoic	e Currency	Share	
	Export Amount	Number of	Intra-firm	Japane	ese Yen	U.S.	Dollar	E	uro
Export	(in Van)	Export	Export	Amount-	Transactio	Amount-	Transactio	Amount-	Transactio
Destination:	(III Tell)	Transactions	Share	basis	n-basis	basis	n-basis	basis	n-basis
Africa	1,958,886,567	373,056	0.303	0.550	0.556	0.347	0.345	0.089	0.086
Americas	13,396,869,174	8,078,417	0.279	0.459	0.489	0.530	0.496	0.006	0.007
Asia	20,803,266,721	12,961,224	0.263	0.708	0.724	0.245	0.240	0.005	0.007
Europe	7,634,744,312	1,815,258	0.271	0.569	0.585	0.183	0.192	0.222	0.199
Oceania	3,405,496,896	512,346	0.290	0.639	0.651	0.279	0.278	0.018	0.017
Others	128,740,375	2,583	0.350	0.604	0.617	0.283	0.273	0.111	0.106

Table 2. Averaged Intra-firm Export Share and Invoice Currency Share by Export Destination

Note: All figures are annually averaged for the 8,644 sample firms from 2014 to 2019. We chose six regions as

Japanese firms' export destinations.

Source: Authors' calculation based on the Japan Customs export declaration data and the Basic Survey of Japanese

Business Structure and Activities (BSJBSA) data compiled by the Ministry of Economy, Trade and Industry (METI).

	Averaged	Averaged	Averaged		Avera	aged Invoid	ce Currency S	Share		Number
Industry Classification:	Export Amount	Number of	Intra-firm	Japane	ese Yen	U.S.	Dollar	Е	uro	of
	(in Yen)	Export Transactions	Export Share	Amount- basis	Transaction -basis	Amount- basis	Transaction -basis	Amount- basis	Transaction -basis	Firms
Livestock Products	2,060,601,587	46,988	0.150	0.739	0.767	0.208	0.188	0.019	0.020	293
Textiles	3,201,224,806	930,172	0.258	0.595	0.612	0.339	0.320	0.041	0.047	149
Chemicals	26,582,896,786	4,565,605	0.217	0.599	0.621	0.327	0.308	0.033	0.045	615
Plastic Products	5,836,499,360	647,111	0.343	0.666	0.702	0.288	0.255	0.014	0.018	347
Glass and its Products	15,058,460,588	1,067,382	0.153	0.659	0.666	0.279	0.271	0.039	0.047	159
Iron and Steel	12,440,570,633	1,476,583	0.182	0.650	0.693	0.307	0.263	0.026	0.028	152
Non-Ferrous Metal Products	30,105,480,168	5,813,825	0.304	0.641	0.663	0.313	0.291	0.019	0.025	185
Fabricated Architectural Metal Products	3,438,609,359	676,384	0.268	0.695	0.714	0.246	0.233	0.018	0.022	427
Boilers, Engines and Turbines	18,317,304,394	7,021,622	0.265	0.736	0.776	0.204	0.160	0.028	0.036	339
Metal Working Machinery	29,602,835,439	6,628,036	0.242	0.774	0.791	0.171	0.147	0.027	0.037	735
Office, Service Industry and Household Machines	56,969,067,897	12,086,372	0.275	0.616	0.637	0.280	0.265	0.068	0.066	278
Electronic Parts and Devices	56,857,749,324	49,523,908	0.362	0.486	0.506	0.465	0.439	0.019	0.036	339
Industrial Electrical Equipment Manufacturing	47,097,872,568	66,673,906	0.314	0.630	0.661	0.290	0.273	0.025	0.033	399
Communication Equipment and Related Products	32,334,605,552	5,591,424	0.332	0.450	0.493	0.467	0.438	0.045	0.042	121
Motor Vehicles, Parts and Accessories	157,360,938,441	100,020,047	0.476	0.677	0.739	0.241	0.186	0.021	0.030	627
Miscellaneous Manufacturing Industries	23,086,446,140	3,984,969	0.250	0.674	0.685	0.261	0.254	0.028	0.032	187
Shosha (Trading Company)	33,842,910,929	19,078,570	0.226	0.648	0.653	0.289	0.281	0.030	0.041	2,349

Table 3. Averaged Intra-firm Export Share and Invoice Currency Share by Industry

Note: All figures are annually averaged for the 8,644 sample firms from 2014 to 2019. We chose six regions as Japanese firms' export destinations.

Source: Authors' calculation based on the Japan Customs export declaration data and the Basic Survey of Japanese Business Structure and Activities (BSJBSA) data compiled by the Ministry of Economy, Trade and Industry (METI).

Dependent Var.	Y	en-invoiced	l export sha	re	USD-invoiced export share				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
ln(Export)	-0.021**	-0.020**	-0.020**	-0.020**	0.015**	0.014**	0.014**	0.014**	
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	
Intra-firm		-0.163**	-0.163**	-0.163**		0.113**	0.113**	0.113**	
		(0.034)	(0.033)	(0.034)		(0.025)	(0.025)	(0.025)	
Yen-USD Volatility				0.000				0.002**	
				(0.0007)				(0.0006)	
HS6 FE	YES	YES	YES	YES	YES	YES	YES	YES	
Country FE	YES	YES	NO	YES	YES	YES	NO	YES	
Year FE	YES	YES	NO	NO	YES	YES	NO	NO	
$Country \times Year \ FE$	NO	NO	YES	NO	NO	NO	YES	NO	
R-squared	0.142	0.158	0.159	0.158	0.193	0.202	0.203	0.202	
No. Observations	4,101,607	4,101,607	4,101,586	4,101,607	4,101,607	4,101,607	4,101,586	4,101,607	
No. Firms	8,496	8,496	8,496	8,496	8,496	8,496	8,496	8,496	

Table 4. Determinants of Invoice Currency Share: Baseline Results

Dependent Var.	Yen-invoiced export share					USD-invoiced export share					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
ln(Export)	-0.020**	-0.020**	-0.020**	-0.019**	-0.020**	0.014**	0.014**	0.014**	0.013**	0.014**	
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	
Intra-firm	-0.146**	-0.162**	-0.164**	-0.144**	-0.146**	0.102**	0.112**	0.114**	0.100**	0.101**	
	(0.033)	(0.033)	(0.033)	(0.032)	(0.032)	(0.023)	(0.024)	(0.023)	(0.022)	(0.021)	
R&D/Total Sales	-0.733**			-0.758**	-0.815**	0.486*			0.515*	0.565**	
	(0.197)			(0.206)	(0.217)	(0.200)			(0.207)	(0.215)	
Trade Balance (T.B.) Ratio	)	0.061*	-0.001	0.069**	-0.011		-0.075**	-0.016	-0.080**	-0.009	
		(0.026)	(0.028)	(0.026)	(0.027)		(0.023)	(0.028)	(0.023)	(0.027)	
T.B.Ratio × Surplus			0.064**		0.082**			-0.060**		-0.073**	
			(0.021)		(0.022)			(0.022)		(0.022)	
HS6 FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	
Country $\times$ Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	
R-squared	0.164	0.160	0.161	0.165	0.167	0.205	0.205	0.206	0.208	0.209	
No. Observations	4,101,586	4,101,586	4,101,586	4,101,586	4,101,586	4,101,586	4,101,586	4,101,586	4,101,586	4,101,586	
No. Firms	8,496	8,496	8,496	8496	8496	8,496	8,496	8,496	8496	8496	

Table 5. Determinants of Invoice Currency Share: Firm Performance and Operational Hedging

6A. Small-size firm	ns											
Dependent Var.		γ	en-invoiced	l export sha	re		USD-invoiced export share					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ln(Export)	-0.011**	-0.011**	-0.011**	-0.012**	-0.011**	-0.012**	0.008**	0.008**	0.008**	0.008**	0.008**	0.008**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Intra-firm	-0.104**	-0.104**	-0.104**	-0.098**	-0.104**	-0.098**	0.068**	0.068**	0.066**	0.060**	0.067**	0.060**
	(0.023)	(0.023)	(0.024)	(0.024)	(0.024)	(0.024)	(0.019)	(0.019)	(0.019)	(0.020)	(0.019)	(0.020)
R&D/Total Sales		0.011			0.010	-0.065		0.132			0.135	0.208
		(0.373)			(0.373)	(0.373)		(0.310)			(0.307)	(0.303)
Trade Balance (T.B.	) Ratio		0.006	-0.102*	0.006	-0.102**			-0.038	0.067#	-0.039	0.067*
			(0.034)	(0.039)	(0.034)	(0.039)			(0.024)	(0.034)	(0.024)	(0.034)
T.B.Ratio × Surplus				0.106**		0.106**				-0.103**		-0.104**
				(0.027)		(0.027)				(0.025)		(0.024)
HS6 FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
$Country \times Year FE$	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	0.156	0.156	0.156	0.160	0.156	0.160	0.187	0.187	0.187	0.192	0.187	0.192
No. Observations	686,511	686,511	686,511	686,511	686,511	686,511	686,511	686,511	686,511	686,511	686,511	686,511
No. Firms	3,786	3,786	3,786	3,786	3786	3786	3,786	3,786	3,786	3,786	3786	3786

Table 6. Determinants of Invoice Currency Share by Firm Size Group

6B. Medium-size	firms											
Dependent Var.		Y	l'en-invoiced	l export sha	re		USD-invoiced export share					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ln(Export)	-0.014**	-0.014**	-0.014**	-0.014**	-0.014**	-0.014**	0.012**	0.012**	0.012**	0.012**	0.012**	0.012**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Intra-firm	-0.129**	-0.129**	-0.125**	-0.124**	-0.125**	-0.124**	0.085**	0.085**	0.080**	0.080**	0.080**	0.079**
	(0.026)	(0.026)	(0.024)	(0.024)	(0.024)	(0.024)	(0.021)	(0.022)	(0.019)	(0.019)	(0.019)	(0.019)
R&D/Total Sales		-0.128			-0.139	-0.167		0.105			0.118	0.142
		(0.156)			(0.164)	(0.180)		(0.132)			(0.140)	(0.154)
Trade Balance (T.B.	.) Ratio		0.087**	-0.000	0.088**	-0.001			-0.107**	-0.034	-0.108**	-0.033
			(0.030)	(0.035)	(0.030)	(0.035)			(0.028)	(0.036)	(0.028)	(0.036)
T.B.Ratio × Surplus				0.091**		0.093**				-0.076**		-0.078**
				(0.026)		(0.027)				(0.025)		(0.026)
HS6 FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country $\times$ Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	0.181	0.181	0.183	0.186	0.183	0.186	0.218	0.219	0.223	0.225	0.223	0.225
No. Observations	950,683	950,683	950,683	950,683	950,683	950,683	950,683	950,683	950,683	950,683	950,683	950,683
No. Firms	2,920	2,920	2,920	2,920	2920	2920	2,920	2,920	2,920	2,920	2920	2920

Table 6 (cont.) Determinants of Invoice Currency Share by Firm Size Group

*Note*: The dependent variable is an invoice currency share of the yen or the U.S. dollar (USD). Results of OLS estimation with cluster standard errors at the industry level are presented in parentheses. The industry classification is based on the BSJBSA classification. See Table 3 for the BSJBSA classification. Double asterisks (\*\*), a single asterisk (\*), and a sharp (#), respectively, denote one percent, five percent, and 10 percent significance levels.

6C. Large-size firm	ms											
Dependent Var.		Y	en-invoiced	l export sha	re		USD-invoiced export share					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ln(Export)	-0.019**	-0.019**	-0.019**	-0.019**	-0.019**	-0.019**	0.013**	0.013**	0.013**	0.013**	0.013**	0.013**
	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Intra-firm	-0.146**	-0.127**	-0.147**	-0.151**	-0.128**	-0.132**	0.111**	0.099**	0.112**	0.116**	0.100**	0.103**
	(0.050)	(0.049)	(0.049)	(0.050)	(0.048)	(0.048)	(0.036)	(0.033)	(0.035)	(0.035)	(0.032)	(0.032)
R&D/Total Sales		-0.727**			-0.768**	-0.832**		0.468 #			0.520*	0.575*
		(0.171)			(0.182)	(0.187)		(0.241)			(0.245)	(0.251)
Trade Balance (T.B.	) Ratio		0.036	-0.021	0.053	-0.028			-0.055#	-0.001	-0.066*	0.004
			(0.035)	(0.042)	(0.035)	(0.042)			(0.031)	(0.037)	(0.031)	(0.036)
T.B.Ratio × Surplus				0.059#		0.085*				-0.056#		-0.073*
				(0.034)		(0.034)				(0.032)		(0.033)
HS6 FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
$Country \times Year  FE$	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	0.158	0.162	0.158	0.159	0.163	0.164	0.219	0.221	0.220	0.221	0.222	0.223
No. Observations	2,463,314	2,463,314	2,463,314	2,463,314	2,463,314	2,463,314	2,463,314	2,463,314	2,463,314	2,463,314	2,463,314	2,463,314
No. Firms	1,789	1,789	1,789	1,789	1789	1789	1,789	1,789	1,789	1,789	1789	1789

Table 6 (cont.) Determinants of Invoice Currency Share by Firm Size Group

*Note*: The dependent variable is an invoice currency share of the yen or the U.S. dollar (USD). Results of OLS estimation with cluster standard errors at the industry level are presented in parentheses. The industry classification is based on the BSJBSA classification. See Table 3 for the BSJBSA classification. Double asterisks (\*\*), a single asterisk (\*), and a sharp (#), respectively, denote one percent, five percent, and 10 percent significance levels.

# Appendix Table A1. Descriptive Statistics

		All F	firms		Large-size Firms				
	Number of Observations	Mean	Standard Deviation	Number of firms	Number of Observations	Mean	Standard Deviation	Number of firms	
Yen-invoiced export share	4,408,033	0.588	0.478	8,644	762,530	0.708	0.445	3,859	
USD-invoiced export share	4,408,033	0.310	0.449	8,644	762,530	0.226	0.409	3,859	
Log of export amount	4,408,033	14.142	2.564	8,644	762,530	13.606	2.304	3,859	
Intra-firm export share	4,408,033	0.423	0.385	8,644	762,530	0.286	0.382	3,859	
Yen NER volatility against USD	4,408,033	3.102	1.685	8,644	762,530	3.098	1.687	3,859	
Log of total sales amount	4,408,033	11.006	2.074	8,644	762,530	8.733	0.965	3,859	
Log of number of transactions	4,408,033	9.249	2.800	8,644	762,530	7.102	2.114	3,859	
Log of number of HS6 products	4,408,033	2.375	2.004	8,644	762,530	1.747	1.643	3,859	
R&D intensity	4,408,033	0.030	0.050	8,644	762,530	0.010	0.024	3,859	
Trade balance ratio	4,408,033	0.702	0.276	8,644	762,530	0.763	0.270	3,859	
Trade surplus dummy	4,408,033	0.780	0.414	8,644	762,530	0.750	0.433	3,859	

		Medium-	size Firms		Small-size Firms				
	Number of Observations	Mean	Standard Deviation	Number of firms	Number of Observations	Mean	Standard Deviation	Number of firms	
Yen-invoiced export share	1,043,241	0.658	0.462	2,979	2,602,262	0.525	0.483	1,806	
USD-invoiced export share	1,043,241	0.270	0.433	2,979	2,602,262	0.350	0.462	1,806	
Log of export amount	1,043,241	13.881	2.429	2,979	2,602,262	14.403	2.653	1,806	
Intra-firm export share	1,043,241	0.336	0.378	2,979	2,602,262	0.498	0.370	1,806	
Yen NER volatility against USD	1,043,241	3.084	1.678	2,979	2,602,262	3.110	1.688	1,806	
Log of total sales amount	1,043,241	9.800	1.143	2,979	2,602,262	12.155	1.753	1,806	
Log of number of transactions	1,043,241	7.872	2.065	2,979	2,602,262	10.430	2.599	1,806	
Log of number of HS6 products	1,043,241	1.954	1.738	2,979	2,602,262	2.727	2.120	1,806	
R&D intensity	1,043,241	0.014	0.049	2,979	2,602,262	0.042	0.051	1,806	
Trade balance ratio	1,043,241	0.722	0.274	2,979	2,602,262	0.676	0.275	1,806	
Trade surplus dummy	1,043,241	0.741	0.438	2,979	2,602,262	0.805	0.396	1,806	

Source: Authors' calculation based on Japan Customs export and import declaration data.

Dependent Var.	Yen-in	voiced expo	rt share	USD-invoiced export share				
	(1)	(2)	(3)	(4)	(5)	(6)		
ln(Total Sales)	-0.025**			0.016**				
	(0.004)			(0.003)				
ln(N_transact)		-0.027**			0.018**			
		(0.004)			(0.003)			
ln(N_product)			-0.031**			0.023**		
			(0.004)			(0.002)		
Intra-firm	-0.143**	-0.123**	-0.150**	0.102**	0.087**	0.104**		
	(0.033)	(0.033)	(0.033)	(0.023)	(0.022)	(0.024)		
HS6 FE	YES	YES	YES	YES	YES	YES		
$Country \times Year \ FE$	YES	YES	YES	YES	YES	YES		
R-squared	0.161	0.171	0.163	0.203	0.208	0.206		
No. Observations	4,101,586	4,101,586	4,101,586	4,101,586	4,101,586	4,101,586		
No. Firms	8496	8496	8496	8496	8496	8496		

Appendix Table A2. Determinants of Invoice Currency Share: Various Firm Size Variables

A3-A. Wholesale	Industry Or	nly										
Dependent Var.		Y	en-invoiced	l export sha	re			U	SD-invoice	d export sha	re	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ln(Export)	-0.015**	-0.015**	-0.015**	-0.015**	-0.015**	-0.015**	0.012**	0.012**	0.012**	0.012**	0.012**	0.012**
	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Intra-firm	-0.135**	-0.130**	-0.134**	-0.136**	-0.129**	-0.130**	0.111**	0.109**	0.110**	0.112**	0.109**	0.109**
	(0.031)	(0.029)	(0.029)	(0.029)	(0.028)	(0.028)	(0.024)	(0.024)	(0.022)	(0.023)	(0.022)	(0.022)
R&D/Total Sales		-0.398			-0.397	-0.469		0.133			0.132	0.196
		(0.382)			(0.384)	(0.382)		(0.324)			(0.324)	(0.330)
Trade Balance (T.B	.) Ratio		0.043	-0.030	0.043	-0.032			-0.040	0.026	-0.040	0.027
			(0.034)	(0.033)	(0.034)	(0.032)			(0.030)	(0.033)	(0.029)	(0.034)
$T.B.Ratio {\times} Surplus$				0.088*		0.091**				-0.080*		-0.081*
				(0.031)		(0.031)				(0.033)		(0.034)
HS6 FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country×Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	0.220	0.220	0.221	0.224	0.221	0.224	0.259	0.259	0.259	0.262	0.259	0.262
No. Observations	1,216,332	1,216,332	1,216,332	1,216,332	1,216,332	1,216,332	1,216,332	1,216,332	1,216,332	1,216,332	1,216,332	1,216,332
No. Firms	2,068	2,068	2,068	2,068	2,068	2,068	2,068	2,068	2,068	2,068	2,068	2,068

Appendix Table A3. Determinants of Invoice Currency Share: Wholesale Industry Only and All Firms Excluding Wholesale Industry

A3-B. Firms Excluding Wholesale Industry													
Dependent Var.		Ţ	Yen-invoiced	l export shar	e		USD-invoiced export share						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
ln(Export)	-0.021**	-0.021**	-0.021**	-0.021**	-0.021**	-0.021**	0.014**	0.014**	0.014**	0.014**	0.014**	0.014**	
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	
Intra-firm	-0.154**	-0.143**	-0.150**	-0.152**	-0.138**	-0.139**	0.106**	0.098**	0.101**	0.102**	0.092**	0.093**	
	(0.045)	(0.043)	(0.044)	(0.044)	(0.042)	(0.042)	(0.031)	(0.029)	(0.030)	(0.030)	(0.028)	(0.027)	
R&D/Total Sales		-0.694**			-0.714**	-0.751**		0.508*			0.532*	0.562*	
		(0.220)			(0.228)	(0.237)		(0.220)			(0.229)	(0.236)	
Trade Balance (T.B.) Ratio			0.087**	0.029	0.092**	0.015			-0.105**	-0.057#	-0.109**	-0.047	
			(0.033)	(0.038)	(0.034)	(0.038)			(0.027)	(0.034)	(0.028)	(0.033)	
$T.B.Ratio \times Surplus$				0.056#		0.075**				-0.046#		-0.060*	
				(0.028)		(0.028)				(0.027)		(0.027)	
HS6 FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	
$\operatorname{Country} \times \operatorname{Year} \operatorname{FE}$	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	
R-squared	0.152	0.156	0.154	0.154	0.159	0.160	0.199	0.202	0.202	0.202	0.205	0.206	
No. Observations	2,884,865	2,884,865	2,884,865	2,884,865	2,884,865	2,884,865	2,884,865	2,884,865	2,884,865	2,884,865	2,884,865	2,884,865	
No. Firms	6,427	6,427	6,427	6,427	6,427	6,427	6,427	6,427	6,427	6,427	6,427	6,427	

Appendix Table A3 (cont.) Determinants of Invoice Currency Share: Wholesale Industry Only and All Firms Excluding Wholesale Industry

A4-A. Small-size firms												
Dependent Var.		Y	en-invoiced	l export sha	re		USD-invoiced export share					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ln(Export)	-0.010**	-0.010**	-0.010**	-0.011**	-0.010**	-0.011**	0.008**	0.008**	0.008**	0.009**	0.008**	0.009**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Intra-firm	-0.084**	-0.084**	-0.083**	-0.075**	-0.083**	-0.075**	0.063**	0.063**	0.061**	0.053*	0.061**	0.053**
	(0.021)	(0.021)	(0.021)	(0.022)	(0.021)	(0.022)	(0.020)	(0.019)	(0.020)	(0.020)	(0.020)	(0.020)
R&D/Total Sales		-0.332			-0.332	-0.405		0.340			0.340	0.416
		(0.364)			(0.362)	(0.359)		(0.333)			(0.330)	(0.325)
Trade Balance (T.B.) Ratio			0.017	-0.089*	0.017	-0.091*			-0.039#	0.070*	-0.039#	0.072*
			(0.029)	(0.037)	(0.029)	(0.036)			(0.021)	(0.033)	(0.021)	(0.033)
T.B.Ratio × Surplus				0.106**		0.107**				-0.109**		-0.111**
				(0.028)		(0.028)				(0.027)		(0.027)
HS6 FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
$Country \times Year  FE$	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	0.114	0.114	0.114	0.119	0.114	0.119	0.132	0.132	0.133	0.139	0.133	0.140
No. Observations	501,389	501,389	501,389	501,389	501,389	501,389	501,389	501,389	501,389	501,389	501,389	501,389
No. Firms	3679	3679	3679	3679	3679	3679	3679	3679	3679	3679	3679	3679

Appendix Table A4. Determinants of Invoice Currency Share in Exports to Asia by Different Firm Size Groups

A4-B. Medium-size firms												
Dependent Var.		Y	en-invoiced	l export sha	re		USD-invoiced export share					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ln(Export)	-0.014**	-0.014**	-0.014**	-0.014**	-0.014**	-0.014**	0.013**	0.013**	0.012**	0.013**	0.013**	0.013**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)
Intra-firm	-0.116**	-0.115**	-0.110**	-0.107**	-0.109**	-0.107**	0.084**	0.084**	0.077**	0.075**	0.077**	0.074**
	(0.026)	(0.026)	(0.024)	(0.023)	(0.024)	(0.023)	(0.025)	(0.025)	(0.023)	(0.022)	(0.023)	(0.022)
R&D/Total Sales		-0.147			-0.156	-0.178		0.132			0.143	0.164
		(0.173)			(0.180)	(0.192)		(0.154)			(0.161)	(0.172)
Trade Balance (T.B.) Ratio			0.094**	-0.006	0.095**	-0.007			-0.111**	-0.015	-0.112**	-0.015
			(0.032)	(0.038)	(0.032)	(0.038)			(0.033)	(0.042)	(0.033)	(0.042)
T.B.Ratio × Surplus				0.106**		0.107**				-0.101**		-0.102**
				(0.028)		(0.028)				(0.026)		(0.026)
HS6 FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
$Country \times Year  FE$	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	0.129	0.130	0.133	0.137	0.133	0.137	0.150	0.150	0.155	0.160	0.155	0.160
No. Observations	692,928	692,928	692,928	692,928	692,928	692,928	692,928	692,928	692,928	692,928	692,928	692,928
No. Firms	2837	2837	2837	2837	2837	2837	2837	2837	2837	2837	2837	2837

Appendix Table A4 (cont.) Determinants of Invoice Currency Share in Exports to Asia by Different Firm Size Groups

A4-C. Large-size firms												
Dependent Var.		γ	en-invoiced	l export shai	re		USD-invoiced export share					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ln(Export)	-0.018**	-0.018**	-0.018**	-0.019**	-0.018**	-0.019**	0.014**	0.014**	0.014**	0.014**	0.014**	0.014**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Intra-firm	-0.166**	-0.142**	-0.167**	-0.171**	-0.142**	-0.146**	0.150**	0.130**	0.151**	0.155**	0.130**	0.134**
	(0.048)	(0.047)	(0.048)	(0.048)	(0.046)	(0.046)	(0.038)	(0.035)	(0.037)	(0.037)	(0.035)	(0.035)
R&D/Total Sales		-0.971**			-1.019**	-1.102**		0.782**			0.841**	0.913**
		(0.203)			(0.215)	(0.219)		(0.282)			(0.289)	(0.298)
Trade Balance (T.B.) Ratio			0.043	-0.015	0.062	-0.026			-0.060#	-0.007	-0.077*	0.001
			(0.038)	(0.043)	(0.038)	(0.042)			(0.036)	(0.041)	(0.036)	(0.040)
Г.B.Ratio × Surplus				0.061#		0.094**				-0.056		-0.084*
				(0.036)		(0.036)				(0.036)		(0.036)
HS6 FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country  imes Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	0.134	0.141	0.134	0.135	0.142	0.144	0.152	0.157	0.153	0.154	0.159	0.161
No. Observations	1,588,509	1,588,509	1,588,509	1,588,509	1,588,509	1,588,509	1,588,509	1,588,509	1,588,509	1,588,509	1,588,509	1,588,509
No. Firms	1765	1765	1765	1765	1765	1765	1765	1765	1765	1765	1765	1765

Appendix Table A4 (cont.) Determinants of Invoice Currency Share in Exports to Asia by Different Firm Size Groups