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Abstract

This study explores the evolution of invoicing currency choice, focusing on inertia in invoicing currency and the role of export experience. We theorize that inertia in the producer's currency pricing (PCP) weakens with lower forex risk management costs, whereas inertia in foreign currency pricing is more pronounced under similar conditions. For the export experience, exporters tend to adopt PCP when they start exporting if the costs are significant. Empirical analysis using firm-level export data in Thailand from 2007 to 2014 supports these predictions. Specifically, we show that the inertia in PCP diminishes with access to forward exchange contracts or when the importer's currency has a higher forex turnover than the Thai baht. We also show that the tendency to adopt PCP in first exports diminishes under these conditions. Our findings imply that exporters initially prefer invoicing in their own currency, but this preference decreases as export experience accumulates or if there are financial tools or favorable currency turnover conditions.

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Export Dynamics and Invoicing Currency*

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Abstract: This study explores the evolution of invoicing currency choice, focusing on inertia in invoicing currency and the role of export experience. We theorize that inertia in the producer's currency pricing (PCP) weakens with lower forex risk management costs, whereas inertia in foreign currency pricing is more pronounced under similar conditions. For the export experience, exporters tend to adopt PCP when they start exporting if the costs are significant. Empirical analysis using firm-level export data in Thailand from 2007 to 2014 supports these predictions. Specifically, we show that the inertia in PCP diminishes with access to forward exchange contracts or when the importer's currency has a higher forex turnover than the Thai baht. We also show that the tendency to adopt PCP in first exports diminishes under these conditions. Our findings imply that exporters initially prefer invoicing in their own currency, but this preference decreases as export experience accumulates or if there are financial tools or favorable currency turnover conditions.

Keywords: Invoicing currency; Export dynamics; Inertia; Learning effect; Customs data
JEL Classification: F1; F3

1. Introduction

The exchange rate exposure of trade prices depends on the invoicing currency, which is the currency in which the prices and total amounts are stated on an invoice. The invoicing currency determines who takes the forex risk in international transactions. Trade pricing can usually be classified into three types depending on the invoicing currency: producer currency pricing (PCP), local currency pricing (LCP), and third vehicle currency pricing (VCP). For VCP, the United States dollar (USD) is mostly used. Recent studies, including Gopinath et al. (2020), Amiti et al. (2022), and Boz et al. (2022), emphasize that most international transactions are invoiced in a limited number of international currencies, mainly USD. This phenomenon is called the "dominant currency paradigm."

As Gopinath et al. (2010) discuss, exchange rate changes are rarely passed through into the price denominated in the currency used for export invoicing, at least in the short run. In other words, exporters suffer forex risk when their currency is not used in invoicing. The effect of exchange rate movements on exporters' profits depends crucially on the invoicing currency, and exporters prefer PCP if they are averse to forex risk. Conversely, if exporters choose PCP and impose the forex risk on importers, importers may decrease their demand to avoid assuming a considerable forex risk. This risk-averse behavior by importers has not been discussed much in the literature, although it is naturally predicted from studies such as Wolak and Kolstad (1991) and Coppejans et al. (2007).[1] Therefore, an exporter faces a trade-off: although PCP frees the exporter from the forex risk, imposing that risk on an importer may reduce the importer's demand for the exporter's goods and export profit.

Considering this trade-off, we theoretically and empirically investigate the choice of invoicing currency and how it evolves over time. Specifically, we examine which currency tends to be chosen when firms start exporting and whether these firms change the currency once they have accumulated some export experience. We study the relationship between firms' export experience and their choice of invoicing currency. Export starters tend to begin with small sales to determine whether they are profitable in the destination market. They often suspend exporting if they expect their overseas business will not be successful based the first export results (Albornoz et al., 2016, 2023). Furthermore, Esteve-Pérez (2021) reveals that export experience positively impacts export survival. The novel insight behind this argument is that firms learn from their initial experiences and, given the knowledge they developed, decide on their next course of action. In this context, we focus on how firms' export experience affects their choice of invoicing currency. Recently, how firms expand their foreign sales has attracted the attention of researchers

[1] Wolak and Kolstad (1991) and Coppejans et al. (2007) theoretically demonstrate that risk-averse agents decrease the demand for products whose prices are uncertain in advance.

because increasing the number of exporters (i.e., extensive margin) is a key policy agenda in both developed and developing countries. Exploring how the choice of invoicing currency evolves over time provides insight into the monetary aspects of export dynamics, which have not been sufficiently analyzed.[2]

Theoretically, we model a small open economy in which the exporter dynamically chooses the invoicing currency and guides the empirical analysis. Our model introduces the cost of managing forex risk through a forward exchange contract with a bank. This cost appears when exporters use foreign currencies in invoicing and represents the effort of dealing with the risk of exchange rate fluctuations. Costs include hiring staff to collect the forex market information or finding an appropriate bank for a forex contract. It may also include the cost of assessing the forex risk and deciding on the proper number of foreign sales to be hedged. Exporters must cover these costs when they invoice in foreign currencies. We assume that cost is mitigated by overseas business experience and knowledge. In other words, we introduce a learning effect for forex risk management into exporters' choice of invoicing currency.

Using the developed model, we provide three testable propositions for two issues: the inertia in invoicing currency and the choice of the invoicing currency in the first export. For the former, the model shows that an exporter is likelier to keep adopting PCP in the second period once the exporter has chosen PCP in the first period when the cost to use the forward exchange contract is larger (Proposition 1). This proposition provides a potential determinant of inertia in the invoicing currency discussed in studies such as Ogawa and Sasaki (1998) and Cohen (2011). Furthermore, it is shown that the inertia in the invoicing currency becomes more significant for foreign currency pricing (FCP) compared with PCP if the cost for the forward exchange contract is more significant (Proposition 2). For the latter, the model predicts that exporters will likely choose PCP in their first exports when the cost of a foreign exchange contract is high (Proposition 3). This proposition reveals how exporters change their invoicing currency from the early stage of overseas business to the following stages.

We empirically test these propositions using firm-level export data in Thailand from 2007 to 2014. The data were obtained from the Customs Office of the Kingdom of Thailand and covered all commodity exports during this period. Our dataset contains customs clearing date, the HS eight-digit code, export destination country, firm identification code,

[2] To the best of our knowledge, Goto et al. (2023) is the only paper to examine the impact of export experience on the choice of invoicing currency. They conducted their analyses on the basis of a questionnaire survey of Japanese SMEs in the manufacturing industry. They focus on SMEs because we should consider other elements, such as product value chains and financial ties with trade partners for large companies, which makes it challenging to identify the effect of export experience on firms' activities. The clear advantage of this study is that we use comprehensive Customs data, including various companies and industries. Goto et al. (2023) can be regarded as a complement to this study.

Thai baht (THB) export values, and invoicing currency. As shown in Section 3.1, the share of exports in Thailand under the producer's currency (i.e., THB) is, on average, 17.8% in terms of the number of country–product pairs and 8.4% in terms of values during the sample period (see Table 1). Despite THB not being an international currency, the producer's currency plays a certain role in exporting, implying that Thai firms choose invoicing currency among the producer's and others. Therefore, we examine determining the invoicing currency by exporters who choose between the producer's and other currencies. In addition, the cost of the forward exchange contract (i.e., the cost to manage the forex risk) between the producer's currency and other currencies may be significant because THB is still a minor currency in the forex market. Thus, Thailand is a good sample country to examine the trade-offs involved in using the producer's currency mentioned above.

Empirically, to test Proposition 1, we employ a dummy variable that takes the value of one if the invoicing currency is the producer's currency as the dependent variable. We use a 1-year lagged-dependent variable for the explanatory variable at the firm–country–product level. The variable's coefficient is positively estimated, which supports the presence of inertia in the invoicing currency in the case of PCP. The coefficient is larger for importing countries for whose currencies Thai local banks provide forward exchange rates with THB. When Thai firms export to such countries, managing the forex risk through the forward exchange contract is relatively easy. We find similar results for importing countries whose currencies have a higher turnover in the forex market than THB. Higher turnover indicates lower transaction costs, indicating lower exchange rate risk management costs. These results support Proposition 1. In the empirical test of Proposition 2, we also investigate the case of the local currency dummy as a dependent variable and its one-period lag as an explanatory variable. The degree of inertia is more vital for the local currency than the producer's currency, especially for importing countries where the forward exchange contract is available or their currencies have higher turnover than THB. These findings support Proposition 2.

Proposition 3 is related to the choice of the invoicing currency in the first export. To test the proposition, we use a dummy variable that takes the value one if a concerned export transaction is the first one for firms as a main explanatory variable. The PCP dummy variable is used as the dependent variable in the same way as in the above tests for Proposition 1. This explanatory variable's coefficient is estimated to be positive, indicating that PCP is likelier to be chosen in the first export than in the following exports. In our baseline estimation, the probability of selecting PCP in the first export is 5.8 percent points higher than in the export of the second and subsequent products/destinations. The coefficient becomes lower for importing countries whose currencies Thai local banks provide forward exchange rates with THB or if the turnover of the importing country's currency is higher than that of THB. These results imply that the tendency for PCP to be

adopted in the first export is mitigated for importing countries with lower costs for forex risk management, which is consistent with Proposition 3.

Our study is related to at least two strands of literature. The first is the choice of invoicing currency. Engel (2006) investigates the link between the choice of invoicing currency and the decision on export prices. Gopinath et al. (2010) extended Engel's (2006) framework by introducing a dynamic perspective and conducted a detailed empirical analysis of the choice of invoicing currency. We also focus on the dynamic choice of invoicing currency, yet consider how firms' experiences affect currency choice. Several papers examine the firm-level choice of invoicing currency. Chung (2016) considers how exporters' dependence on imported inputs affects their choice of invoicing currency using data for the UK, while Devereux et al. (2017) investigated how firms' market share affects the choice of invoicing currency using data for Canada.[3] The primary contribution of this paper lies in the analysis of the relationship between export experience and choice of invoicing currency. Additionally, it makes a secondary contribution by being the first study to utilize Thai customs data in researching invoicing currencies.

The other strand of literature is on export dynamics because we examine how invoicing currency in firm-level exports evolves over time. Recent studies have empirically examined how firms' volume, duration, export destination countries, and export products change.[4] For example, *new exporters tend to start small and focus on a single, usually neighboring, country. Once they outlive their entry year, they tend to expand their sales abroad and reach a larger number of destinations* (Albournoz et al., 2016). Albornoz et al. (2023) further investigated firms' export dynamics regarding product scope and destination. They found that new exporters are likelier to expand by introducing new products in their first export market than by entering new markets with their first product. In contrast, our study examines firms' invoice currency choice over time. In particular, we show that new exporters tend to adopt PCP. However, in their second and subsequent exports, PCP is less likely to be chosen, perhaps because of the knowledge about forex risk management developed through their overseas business experience.

The rest of this paper is organized as follows. The next section presents a theoretical model demonstrating the relationship between export experience and currency invoicing.

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[3] Goldberg and Tille (2013) consider how bargaining between exporters and importers affects the choice of invoicing currency and export prices. Although our dataset does not enable us to identify importers' information at a firm level and investigate the bargaining aspect precisely, we attempt to control importers' characteristics using a variety of fixed effects.

[4] Early work on export dynamics includes Baldwin (1988) and Baldwin and Krugman (1989). The long list of firm-level studies includes Aeberhardt et al. (2014), Albornoz et al. (2012), Albornoz et al. (2016), Araujo et al. (2016), Bekes and Murakozy (2012), Berman et al. (2015), Berthou and Vincent (2015), Blum et al. (2013), Buono and Fadinger (2012), Defever et al. (2015), Fernandes and Tang (2014), Lawless (2009), and Vannoorenberghe et al. (2016). Alessandria et al. (2021) present a review of recent studies on export dynamics.

Section 3 empirically investigates the relationship between firms' export experience and the choice of invoicing currency. Finally, Section 4 concludes this paper.

2. Theoretical Underpinnings

This section provides theoretical guidance for conducting our empirical investigations. We examine how an exporter selects the first-period invoicing currency for exporting and whether that exporter uses the same type of invoicing currency given the export results in the first period.

2.1. Setup

The literature has observed that less capable exporters prefer PCP in their exports to avoid forex risks. For instance, Fabling and Sanderson (2015) found that exporters with lower performances are likelier to adopt PCP based on New Zealand's firm-level export data, which is, in turn, associated with greater exchange rate pass-through into import prices. In addition, Goto et al. (2021) concluded that the share of PCP is higher for small and medium enterprises (SMEs) compared to the large listed companies based on a questionnaire survey of Japanese SMEs. They also revealed that firms with deteriorated capital ratios depend more on PCP. These studies suggest there is a tendency that less capable exporters tend to prefer invoicing in their home currencies.

Based on these arguments, a straightforward prediction for dynamic choice of invoicing currency is that firms may choose PCP in the early export stage since they do not have sufficient financial knowledge to hedge the forex risk. Then, they may consider what currency to use in the following period, given the knowledge and resources that they obtained in past experiences. In other words, we expect that exporters' capability will be improved by their export experiences, affecting their choice of invoicing currencies onward. To determine the theoretical accuracy of this prediction and provide specific testable propositions for the empirical analysis, we build a simple model of the dynamic choice of invoicing currency. Our model consists of two periods of time ($t = 1, 2$). Between the home and foreign countries, the home country is so small that home country exporters do not affect the variables of the foreign country. The home and foreign countries have their own currencies.[5] At $t = 1$, a home country firm starts exporting to

[5] We focus on the case where exporters choose between two currencies (producer's currency and one foreign currency) to obtain simple testable propositions. Regarding the ternary choice, Chung (2016) investigates the choice of invoicing currency when the third vehicle currency is present in addition to the producer's and importer's currency and obtains similar results in the VCP and LCP cases. We did not show the case with multiple destinations and products while we investigated those cases in the

the foreign country, which we call the *first export*. The firm continues to export at $t = 2$. Each firm produces and exports one homogeneous product.

The price denominated in the foreign country's currency, which we call the customer price, is exogenous to each exporter in the home country because each exporter is so small that it does not impact the foreign country's market. There are two-time points in each period: the beginning of the period when the export contract is signed and the end when the payment is settled. Figure 1 illustrates the model's time flow. The spot exchange rate at the beginning and end of period t is represented by e_t and e_t', respectively. At the beginning of each period, exporters simultaneously determine the invoicing currency and export quantity to maximize expected profit by taking the customer price as given. Exporters receive payment at the end of each period. Thus, exporters suffer the risk of exchange rate changes between the beginning and end of each period if they employ FCP. To hedge this forex risk, exporters offer forward exchange contracts to banks. In this case, exporters use the prefixed forward exchange rate, paying a positive fixed cost.[6] This fixed cost captures the cost of forex risk management and comprises various costs that do not depend on the export value. For example, the fixed cost may capture the cost of hiring staff who deal with forex risk in the exporting company and the cost of preparing documentation for preliminary review by a bank. The cost also consists of collecting information and knowledge about the forex market. Under PCP, exporters determine the invoicing currency and export quantity to maximize the expected profit calculated based on the expected exchange rate.

=== Figure 1 ===

2.2. Importer Risk Aversion and Customer Price

We assume that importers are risk averse. Studies such as Wolak and Kolstad (1991) and Coppejans et al. (2007) have argued that risk-averse agents decrease the demand for products with uncertain prices. If an exporter selects PCP at the beginning of each period, the customer price that an importer pays at the end is uncertain. As a result, demand for export products becomes smaller under PCP than FCP. To incorporate this mechanism most simply, we employ the following form of the demand function:

$$q(p) = \mu - 1_{\{PCP\}}\sigma - p,$$

where μ is the exogenous demand component, and p is the customer price. $1_{\{PCP\}}$ represents the indicator function, which is one under PCP and zero under FCP. The

earlier version of this paper (see Hayakwa et al., 2019)

[6] Variable costs for forex risk management are interpreted to be imputed on the forward exchange rate.

positive parameter σ captures the degree of the importers' risk aversion, implying that the gap between demand under PCP and FCP is larger if the importer is more risk averse.

Destination markets are competitive, and importers are risk averse. Thus, no importers purchase products invoiced in the exporter's currency if the customer price is the same for PCP and FCP cases. In other words, the customer price must be lower under PCP than FCP so that an exporter gains a positive demand under PCP. Specifically, an exporter gains the same level of demand under PCP as in the case of FCP ($q^P = q^F$) when the PCP price is lower than the FCP price in the following manner:[7]

$$p^P = p^F - \sigma. \tag{1}$$

p^P and p^F are customer prices under PCP and FCP, respectively. This equation indicates that the customer price must be discounted under PCP compared with FCP to gain the same demand level. The gap between p^P and p^F is present because the importer is risk averse.

Under PCP, the exporter receives the unit price $e_t p^P$ at the end of period t. The foreign country's market is competitive, so the customer price p^P is given to the exporter even under PCP. Nevertheless, the exporter can fix the unit value that it receives at the end of the period by converting the exogenous customer price p^P into the price denominated in the producer's currency using the spot exchange rate at the beginning of the period. In other words, $e_t p^P$ is the contract price under PCP. From the importer's perspective, the payment in terms of the importer's currency becomes larger or smaller if the exchange rate changes from the beginning to the end of the period (i.e., $p^P \neq e_t p^P / e_t'$ if $e_t \neq e_t'$). Alternatively, the importer may utilize the forward exchange contract paying an additional cost to avoid the forex risk, as the exporter in our model does. As compensation for that forex risk or the use cost of the forward exchange contract, the importer offers a lower customer price under PCP than the FCP case, as shown in equation (1).[8] Meanwhile, under FCP, the contract customer price is p^F. The exporter receives p^F units of the foreign currency at the end of the period and converts it into the producer's currency using the forward exchange rate f_t.

2.3. Cost Structure

Each exporter produces one homogeneous product, incurring the unit production

[7] To support this outcome, Table B1 in the Appendix shows that unit prices are lower for PCP than FCP even after controlling for various fixed effects using the same dataset used in our empirical sections.

[8] The importer may not sign a contract with the exporter under PCP if the importer is extremely vulnerable to forex risk. In the same way, vulnerable exporters may not be able to accept the forex risk under the FCP. From this perspective, we focus on the case where both exporter and importer have a certain degree of capability to accept the exchange rate risk or the forex risk is not extremely large.

cost $\hat{c}$. Hatted variables are denominated in the producer's currency. We also assumed that exporters pay a fixed cost when they employ FCP using a foreign exchange contract with a bank. We let $\hat{F}$ represent this first-period fixed cost. Under PCP, exporters do not pay this fixed cost. In the second period, exporters pay the same type of fixed cost if they employ FCP. We assume that the level of fixed cost in the second period depends on the choice of first-period invoicing currency. Specifically, the second-period fixed cost is $\hat{F}$ if the exporter has employed PCP during the first period, while it is $\beta\hat{F}$ if the exporter has chosen FCP during the first period. β is the positive constant and is lower than one ($0 < \beta < 1$). This setup reflects the learning effect, which reduces the second-period fixed cost through the first-period results of proceeding with the forward exchange contract with a bank. For instance, the exporter's burden to proceed with this type of contract, such as documentation preparation, may be lighter if the exporter has experienced the same process in the previous period.

2.4. Determining the Invoicing Currency

We solve for firm decisions using backward induction to provide testable implications. In other words, we derive the subgame perfect equilibrium. $t = 2$ exporters determine export quantities and the invoicing currency given the export experience at $t = 1$. At $t = 1$, exporters determine the export quantity and invoicing currency considering the expected profits at $t = 2$.

2.4.1. Inertia in Invoicing Currency: Currency Choice in the Second Period

Export profit in the second period depends on the first-period invoicing currency selected, as the second-period fixed cost for the forward exchange contract depends on the first-period currency choice. Suppose that the exporter has chosen PCP at $t = 1$. Then, the export profits at $t = 2$ when the exporter exports q unit of the product under PCP and FCP are given by

$$\hat{\pi}^{P}_{2|P} = (e_2 p^{P} - \hat{c})q = e_2\left(\mu - \sigma - q - \frac{\hat{c}}{e_2}\right)q \quad \text{for PCP,}$$

$$\hat{\pi}^{F}_{2|P} = (f_2 p^{L} - \hat{c})q - \hat{F} = f_2\left(\mu - q - \frac{\hat{c}}{f_2}\right)q - \hat{F} \quad \text{for FCP.}$$

We abstract from the usual trade costs, such as tariff and transportation costs, without loss of generality of our statements. Profit-maximizing export quantities under respective invoicing currencies are derived as follows:

$$q^{P}_{2|P} = \frac{1}{2}\left(\mu - \sigma - \frac{\hat{c}}{e_2}\right) \quad \text{for PCP,} \tag{2}$$

$$q_{2|P}^{F} = \frac{1}{2}\left(\mu - \frac{\hat{c}}{f_2}\right) \quad \text{for FCP.}$$

Inserting these quantities into the profits, we obtain the maximized export profits as follows:

$$\begin{aligned} \hat{\pi}_{2|P}^{P} &= e_2\left(\frac{1}{2}\left[\mu - \sigma - \frac{\hat{c}}{e_2}\right]\right)^2 \quad \text{for PCP,} \\ \hat{\pi}_{2|P}^{F} &= f_2\left(\frac{1}{2}\left[\mu - \frac{\hat{c}}{f_2}\right]\right)^2 - \hat{F} \quad \text{for FCP.} \end{aligned} \tag{3}$$

The exporter chooses PCP during the second period if $\hat{\pi}_{2|P}^{F} < \hat{\pi}_{2|P}^{P}$. For the exchange rate evolution, we assume three alternative scenarios: depreciation ($e_t' = (1+\varepsilon)e_t$), appreciation ($e_t' = (1-\varepsilon)e_t$) and stable ($e_t' = e_t$) scenarios, where ε is a positive constant ($0 < \varepsilon < 1$). Each scenario is realized with an equal probability of one-third. As a result, the unconditional expectation for the exchange rate at the end of each period equals the rate at the beginning of each period ($E_t[e_t'] = e_t$). In addition, we assume that the forward exchange rate fully reflects the market expectation for the spot exchange rate at the end of each period ($f_t = E_t[e_t']$). Therefore, the future exchange rate equals the current exchange rate (i.e., $f_t = e_t$).[9] As a result, the condition that the exporter selects PCP, given that it has chosen PCP in the first export ($\hat{\pi}_{2|P}^{F} < \hat{\pi}_{2|P}^{P}$), can be rewritten as

$$\hat{F} > \frac{\sigma}{4}(e_2[2\mu - \sigma] - 2\hat{c}). \tag{4}$$

Note that the right-hand side of this condition is always positive, indicating that PCP inertia (i.e., an exporter adopts PCP at both the first and second periods) occurs when the fixed cost for the forward exchange contract ($\hat{F}$) is significantly large. This is because an exporter cannot gain enough profit to cover the fixed cost if it is large, given the exporter's production cost ($\hat{c}$). In summary, we state the following testable proposition:

Proposition 1. Fixed cost for the forward exchange contract and PCP inertia: *Given that an exporter has chosen PCP during the first period, the exporter is likelier to choose PCP during the second period when the forward exchange contract fixed cost ($\hat{F}$) is larger.*

From a different angle, we can interpret condition (4) as indicating that an exporter who has adopted PCP during the first period may switch to FCP if the exporter is cost-efficient (i.e., low $\hat{c}$) upon realizing that FCP is more profitable during the second period.

[9] These setups pin down the forward exchange rate and dramatically simplify our model. Relaxing these assumptions may alter or complicate the consequences of the model. Nevertheless, we stick to the current tractable setup so that we focus on the impact of export experience on the choice of invoicing currency and obtain testable propositions.

In Appendix A1, we obtain the condition for FCP inertia analogous to the case of PCP shown in condition (4). Specifically, the condition that the exporter employs FCP in the second period, given that it has chosen FCP in the first period, is derived as follows:

$$\beta\hat{F} < \frac{\sigma}{4}(e_2[2\mu - \sigma] - 2\hat{c}). \tag{5}$$

Notably, the left-hand side of condition (5) is smaller than that of condition (4), whereas the right-hand side is the same. This is because the learning effect for the fixed cost of the forward exchange contract is the only essential difference between FCP and PCP in our model. The learning effect works only when an exporter has chosen FCP during the first period. Conditions (4) and (5) jointly imply that inertia may occur regardless of an exporter's first-period choice of invoicing currency if the right-hand side of those equations is between $\beta\hat{F}$ and $\hat{F}$. In other words, the learning effect of export experience under FCP enables the model to replicate the observation that the inertia of PCP and FCP coexists for the same exporter, product, and destination country. Notably, conditions (4) and (5) become stricter and looser when the forward exchange contract fixed cost ($\hat{F}$) is lower. In other words, FCP inertia is likelier to occur compared with that of PCP when the cost is less significant. As a result, we state the following proposition:

Proposition 2. Comparing PCP and FCP inertia: *Inertia in the invoicing currency is likelier to occur for FCP than for PCP if the forward exchange contract fixed cost between home and foreign currencies is lower.*

2.4.2. Invoicing Currency in the First Export

The expected profits in the first period when the exporter exports q units of its product employing PCP and FCP are, respectively, given by

$$\begin{aligned}
\hat{\pi}_1^P &= (e_1 p^P - \hat{c})q + E_1[\hat{\pi}_{2|P}] = e_1\left(\frac{1}{2}\left[\mu - \sigma - \frac{\hat{c}}{e_1}\right]\right)^2 + E_1[\hat{\pi}_{2|P}] \quad \text{for PCP,} \\
\hat{\pi}_1^F &= (f_1 p^F - \hat{c})q - \hat{F} + E_1[\hat{\pi}_{2|F}] = e_1\left(\frac{1}{2}\left[\mu - \frac{\hat{c}}{e_1}\right]\right)^2 - \hat{F} + E_1[\hat{\pi}_{2|F}] \quad \text{for FCP.}
\end{aligned} \tag{6}$$

I is the first-period invoicing currency selected by the exporter ($I = P, F$), and $E_1[\hat{\pi}_{2|I}]$ represents the expectation of the second-period profit in the first period based on having selected invoicing currency I. We ignored the discount for future profit for simplicity. In the second equality of these equations, we used the profit-maximizing export quantity that can be obtained analogously to equation (2), given that $E_1[\hat{\pi}_{2|I}]$ is not affected by the first-period export quantity. The exporter selects PCP (FCP) if $\hat{\pi}_1^P > \hat{\pi}_1^F$ ($\hat{\pi}_1^P < \hat{\pi}_1^F$) at the first period.

$E_1[\hat{\pi}_{2|I}]$ is derived as the weighted average of second-period profits with each type

of invoicing currency and is expressed as

$$E_1[\hat{\pi}_{2|I}] = Prob[\hat{\pi}^P_{2|I} > \hat{\pi}^F_{2|I}]E_1[\hat{\pi}^P_{2|I}] + (1 - Prob[\hat{\pi}^P_{2|I} > \hat{\pi}^F_{2|I}])E_1[\hat{\pi}^F_{2|I}]. \quad (7)$$

The weights are the probabilities that each invoicing currency is chosen during the second period. The second-period profits ($\hat{\pi}^P_{2|I}$ and $\hat{\pi}^L_{2|I}$ for $I = P, L$) depend on the spot exchange rate at the beginning of the second period, as shown in Equations (3) and (A1) in Appendix A. Therefore, we need an additional setup for the exchange rate evolution between the beginning of $t = 1$ to the beginning of $t = 2$ to derive $E_1[\hat{\pi}_{2|I}]$. Again, we assume three alternative scenarios for exchange rate changes between these two-time points: depreciation ($e_2 = (1 + \delta)e_1$), appreciation ($e_2 = (1 - \delta)e_1$), and stable ($e_2 = e_1$) scenarios, where δ is a positive constant $0 < \delta < 1$. Similar to the case between each period's beginning and end, we assume that each scenario is realized with an equal one-third probability. As a result, $E_1[\hat{\pi}^P_{2|I}]$ and $E_1[\hat{\pi}^F_{2|I}]$ are, respectively, given by[10]

$$\begin{aligned} E_1[\hat{\pi}^P_{2|I}] &= \frac{e_1}{4}\left\{(\mu - \sigma)^2 - 2(\mu - \sigma)\frac{\hat{c}}{e_1} + \frac{1 - \delta^2/3}{1 - \delta^2}\left[\frac{\hat{c}}{e_1}\right]^2\right\}, \\ E_1[\hat{\pi}^F_{2|I}] &= \frac{e_1}{4}\left\{\mu^2 - 2\mu\frac{\hat{c}}{e_1} + \frac{1 - \delta^2/3}{1 - \delta^2}\left[\frac{\hat{c}}{e_1}\right]^2\right\} - \hat{F}_{2|I}. \end{aligned} \quad (8)$$

Note that $\hat{F}_{2|P} = \hat{F}$ and $\hat{F}_{2|F} = \beta\hat{F}$.

From conditions (4) and (5), the probability that PCP is chosen in the second period, given that the exporter has chosen invoicing currency I in the first period, is given by

$$Prob[\hat{\pi}^P_{2|I} > \hat{\pi}^F_{2|I}] = Prob\left[\hat{F}_{2|I} > \frac{\sigma}{4}(e_2[2\mu - \sigma] - 2\hat{c})\right].$$

Notably, PCP is likelier to be chosen when the value of the exporter's currency is higher (i.e., e_2 is lower), regardless of the first-period invoicing currency . The interpretation is that the exporter is willing to receive the high-value home currency. Specifically, PCP is chosen when the second-period exchange rate is lower than the following thresholds according to the first-period currency:

$$\bar{e}_{2|P} = \frac{\sigma\hat{F}/4 + 2\hat{c}}{2\mu - \sigma} \quad \text{if PCP has been chosen at } t = 1,$$

$$\bar{e}_{2|F} = \frac{\beta\sigma\hat{F}/4 + 2\hat{c}}{2\mu - \sigma} \quad \text{if FCP has been chosen at } t = 1.$$

PCP is chosen at the beginning of the second period when $\bar{e}_{2|I} > e_2$ given that the exporter has chosen invoicing currency I at the first period. Note that $\bar{e}_{2|P}$ is higher than $\bar{e}_{2|F}$ due to the learning effect for the fixed cost under FCP. For empirical consistency that there are always positive shares of PCP and FCP in the data, we assume that depreciation

[10] The derivation of these equations is given in Appendix A2.

(appreciation) of the exporter's currency in the depreciation (appreciation) scenario is significant so that FCP (PCP) can be chosen in the second period. Specifically, we assume that $(1 + \delta)e_1 > \bar{e}_{2|I}$ and $\bar{e}_{2|I} > (1-\delta)e_1$ for $I = P, F$.

For the stable scenario ($e_2 = e_1$), the exporter would choose the same invoicing currency as in the first period because macroeconomic conditions that affect the currency choice do not change. When the exporter selects FCP in the first period, the second-period fixed cost for the forward exchange contract is reduced through the learning effect. Therefore, the inertia must be more significant when the exporter chooses FCP during the first period. As a result, the choice probabilities are given by

$$Prob\left[\hat{\pi}^P_{2|P} > \hat{\pi}^F_{2|P}\right] = \frac{2}{3} \quad \text{and} \quad Prob\left[\hat{\pi}^P_{2|F} > \hat{\pi}^F_{2|F}\right] = \frac{1}{3}. \tag{9}$$

Combining Equations (7), (8), and (9), the second-period expected profit is derived as follows:

$$\begin{aligned} E_1\left[\hat{\pi}_{2|P}\right] &= \frac{e_1}{12}\left[2\left\{(\mu-\sigma)^2 - 2(\mu-\sigma)\frac{\hat{c}}{e_1}\right\} + \left(\mu^2 - 2\mu\frac{\hat{c}}{e_1}\right) + \frac{3-\delta^2}{1-\delta^2}\left(\frac{\hat{c}}{e_1}\right)^2\right] - \frac{1}{3}\hat{F}, \\ E_1\left[\hat{\pi}_{2|F}\right] &= \frac{e_1}{12}\left[\left\{(\mu-\sigma)^2 - 2(\mu-\sigma)\frac{\hat{c}}{e_1}\right\} + 2\left(\mu^2 - 2\mu\frac{\hat{c}}{e_1}\right) + \frac{3-\delta^2}{1-\delta^2}\left(\frac{\hat{c}}{e_1}\right)^2\right] \\ &\quad - \frac{2}{3}\beta\hat{F}. \end{aligned} \tag{10}$$

As a result, by combining Equations (6) and (10), the condition that PCP is chosen in the first export ($\hat{\pi}^P_1 > \hat{\pi}^F_1$) is rearranged as

$$\hat{\pi}^P_1 > \hat{\pi}^F_1 \rightarrow e_1\mu\sigma - \frac{1}{2}e_1\sigma^2 - \hat{c}\sigma < (1 + \beta)\hat{F}. \tag{11}$$

This condition indicates that PCP is likelier to be chosen in the first period when the fixed cost for the forward exchange contract ($\hat{F}$) is small. The exporter hesitates to employ FCP if the fixed cost is large. As a result, we state the following proposition based on condition (11)

Proposition 3. Invoicing Currency in First Exports: *Exporters will likely choose PCP in first exports when the fixed cost for the forward exchange contract ($\hat{F}$) is large.*

3. Empirical Analysis

This section empirically investigates the implications derived in the previous section. We first overview the data. Second, we investigate the inertia in the invoicing currency in the current year, which will likely be chosen again next year. Third, we examine the

relationship between export experience and the choice of invoicing currency by comparing the first and subsequent exports.

3.1. Data Overview

This section provides an overview of our dataset. As mentioned in the introductory section, we employ transaction-level export data in Thailand during the 2007–2014 period, obtained from the Customs Office of the Kingdom of Thailand. Our data cover all commodity exports during this period, including customs clearing date, the HS eight-digit code, export destination country, firm identification code, export values, and invoicing currency.

Table 1 presents shares of each invoicing currency in exports from Thailand in terms of number and value. Panel (A) shows the results for a full sample. Panel (B) presents those shares focusing on exporters first observed in the dataset (i.e., export starters) because the theoretical framework of this paper focuses on firms that have started exporting. Panel (B) does not show the share in 2007 as we define the firm that did not export in 2007 but did export after 2007 as a new exporter in our baseline estimation. In Panel A1, which shows the share based on the number of transactions, the share of VCP ranges between 66.8 % and 68.9% and is highest among PCP, LCP, and VCP. VCP is the currency other than exporters' and importers' currencies, and USD is the majority currency in VCP. During the sample period, the average share of export transactions under PCP (i.e., THB pricing) was 17.8%. Thus, a considerable share of exports is conducted under PCP, implying that exporters in Thailand face the choice between PCP and FCP. Therefore, Thailand is a fair sample country to examine the trade-off in the use of PCP discussed in the theoretical section. As shown in Panel A2, the average PCP share decreases in terms of values (compared with the number of transactions). This is 8.3%, indicating that THB will likely be used in transactions with small values. This observation is consistent with Goldberg and Tille (2016), which revealed that LCP is used more in transactions of higher value using Canadian import data. Panels A3 and A4 compare currency shares in the size quartiles of transaction value to examine the relationship between transaction value and currency choice. PCP has the lowest number and value of transactions in the fourth quartile. The PCP's share is highest in the first quartile for transaction value (Panel A4). For the number of transactions, PCP's share is the second highest in the first quartile (Panel A3). Therefore, PCP is likelier to be chosen in transactions with small values.

=== Table 1 ===

We next focus on new exporters. As shown in Panel B1, the PCP share in terms of the number of transactions is much higher among new exporters than among all exporters (i.e.,

Panel A1). This implies that firms are likelier to adopt PCP when they first export than when they export again. However, the PCP share in terms of value is not so different between new exporters and all exporters, as shown in Panel B2. In many sample years, the share of PCP for new exporters was even lower than that for all exporters because the value of new exports invoiced in THB usually is considerably smaller than that of new exports invoiced under VCP. As a result, the PCP share in value does not differ much across new and all exporters, whereas the VCP share is significantly higher for new exporters. Panels B3 and B4 confirm the relationship between transaction value size and currency share for export starters. Notably, the share of PCP in the first quartile of transaction value is approximately 30%, which is higher than that in Panels A3 and A4. This suggests that the relationship between currency choice and transaction size is greater for export starters.

Figure 2 shows the number of firms appearing for the first time in the dataset in respective years. Most export firms appear from the beginning of our sample period, i.e., 2007. Nevertheless, we can see a non-negligible number of new exporters afterward. In the baseline estimations of the empirical part of this paper, we define a new exporter as a firm that did not export in 2007 but did export after 2007. One may use alternative definitions of new exporters. For instance, firms that did not export during 2007–2009 but did export after 2009 (i.e., three-year window) are defined as new exporters. This definition is more conservative than our 1-year definition. We employ definitions based on a two- to six-year window and confirm that our empirical results are qualitatively unchanged. However, we must consider the possibility that such a new exporter may have experience in exporting before 2007.

=== Figure 2 ===

This study focuses on exporters' decisions about invoicing currency. From the exporters' perspective, PCP differs from other currencies because it frees them from forex risks. Because a critical difference exists between PCP and FCP for exporting firms, we first classify invoicing currency into two types, PCP and FCP, the latter of which includes LCP and VCP as a baseline. We will differentiate between LCP and VCP in the later sections.

Our theoretical propositions are related to the time-series change of invoicing currency, so we briefly examine that aspect of our data. Table 2 shows how the invoicing currency within a firm–country–product pair changes over the sample period. For each firm–product–country pair, we identify the first and last years with positive exports during our sample period and then examine whether the invoicing currency differs between the two years. In this analysis, we drop the observations where multiple invoicing currencies can be detected at the firm–product–country–year level. Table 2 shows how many percentages of firm–product–country pairs use different invoicing currencies

between the first and last years . The first appearance year is shown in the first row of the table, and the last appearance year is shown in the first column. The table shows many firm–country–product pairs change invoicing currency. At the maximum, the rate of change is 18% from 2008 to 2013 for firms that started exporting in 2008. In our dataset, information on trading partner firms is unavailable. We cannot identify the change in trading partner firms over time Within a firm–country–product pair. Accordingly, in Table 2, the invoicing currency change may occur due to the shift in trading partners within a firm–product–country pair. Therefore, it should be noted that the inertia in the invoicing currency can be undervalued in Table 2.

=== Table 2 ===

3.2. Invoicing Currency Inertia

In this subsection, we empirically investigate the inertia in invoicing currency within a firm–product–country pair. We examine whether exporters tend to adopt PCP in the next two years, then investigate the case for LCP and VCP.

3.2.1. Baseline Results

To empirically investigate the choice of invoicing currency, we estimate the following lagged-dependent variable model:

$$PCP_{fipt} = \alpha PCP_{fipt-} + \beta \ln Value_{fipt} + u_{ft} + u_{it} + u_{st} + \epsilon_{fipt}$$

The dependent variable is a dummy variable that takes the value of one if firm f adopts PCP in the export transaction of product p to country i in year t and zero otherwise. The positive coefficient for the lagged variable (lagged THB dummy) indicates that inertia is present for PCP. We utilized all firm-export destination-HS eight-digit level observations during 2007–2014 while we dropped the observations where multiple invoicing currencies can be detected in any year within a firm–product–country pair. In the previous subsection, we observed that PCP is likelier to be used in small transactions. To control for this "size effect" on invoicing currency choice, we introduce the natural log of the export value of a concerned transaction ($\ln Value$) in our estimation.

We also introduce export firm–year fixed effects, which control for time-variant firm-specific characteristics such as productivity. We also control for import country–year and HS six-digit code (denoted by s)-year fixed effects. For example, the former fixed effect controls for time-variant country pair-specific elements such as exchange rates. Similarly, the latter fixed effect captures the effects of time-variant sector-specific elements in the export country, e.g., production cost. Due to the introduction of several fixed effects, we

estimate this model using the ordinary least square (OLS) method (i.e., a linear-probability model) to avoid the incidental parameter problem.

The baseline estimation results are presented in column (I) in Panel (A) of Table 3. The lagged-dependent variable's coefficient is estimated to be significantly positive. Its magnitude is approximately 0.84, which is economically high. We can see the strong PCP inertia. Note that we cannot exclude the case of the invoicing currency change due to the change of trading partners within a firm–product–country pair. Thus, the degree of inertia may even be undervalued in our estimation. The coefficient for a log of *Value* is significantly negative, indicating that PCP is less likely to be chosen when the export value is larger, consistent with the observations in Table 1.

=== Table 3 ===

Proposition 1 states that PCP inertia is more significant when the cost of forward exchange contracts is large. To test this proposition, we use two potential measures for that cost: the availability of the forward exchange rate of the importer's currency against THB and the turnover of the importer's currency in the forex market. Accessibility to the forward exchange rate vis-à-vis the importer's currency may significantly reduce the cost of managing forex risk. In addition, the transaction cost in the forex market for the importer's currency must be low if that currency's turnover is large. In columns (II) and (III) of Panel (A) of Table 3, we restrict sample export destination countries based on the availability of forward exchange rates for their official currency in Thailand.[11] These columns show that the lagged PCP dummy coefficient is lower for importing countries with forward rates (column III) than for countries without forward rates (column II). In other words, PCP inertia is weaker in exports to countries with accessible forward exchange rates. Columns (IV) and (V) show the estimation results for countries that have currencies with lower and higher turnovers than THB, respectively. The turnover data were obtained from the Triennial Central Bank Survey by the Bank for International Settlements. The lagged PCP dummy coefficient is slightly smaller for the latter country group. These results support Proposition 1, indicating that exporters are likelier to switch to a foreign currency if they can use the forward exchange rate between THB and the importer's currency or if the importer's currency is more prevalent in the forex market.

To test Proposition 2, we also investigate LCP inertia. The results are shown in Panel (B) of Table 3. As shown in column (I) of the panel, inertia is also significant for LCP. The impact of the export value is estimated to be negative for LCP, although the impact

[11] Through a telephone survey of the headquarters of major Thai city banks, we confirmed that most banks provide forward exchange contracts between THB and the following currencies: EUR, GBP, JPY, AUD, CHF, HKD, SGD, CAD, DKK, NOK, SEK, NZD, CNY, and USD.

becomes insignificant in other columns. These results imply that VCP is used more in large-value transactions than PCP and LCP. Comparing the coefficients in column (II) of Panels (A) and (B), the degree of inertia is higher in PCP than in LCP for countries without access to forward exchange rates. As shown in column (III), the inertia is lower in PCP for countries without forward rates. We observe the same tendency for turnover: inertia is more and less prevalent for PCP than LCP for countries without and with forward rates, respectively, as shown in columns (IV) and (V). These results are consistent with the statement in Proposition 2 that inertia would be more significant for FCP than PCP when the cost to use the forward exchange rate is low.

Table 4 uses the instrumental variable (IV) method. Since the transaction value and the invoicing currency are simultaneously determined in practice, unobservable shocks to the transaction value also influence the choice of invoicing currency. The import country's total imports of a concerned product from the world except for Thailand are used to address this endogeneity issue.[12] This instrument captures the demand size in import countries and is, thus, related to the transaction size in exporting from Thailand. We identify the demand-driven component of transactions. Thus, our instrument is not directly related to firms' choice of invoicing currency. Indeed, the results show that our instrument is not weak as indicated by Kleibergen–Paap rk LM statistics and Cragg–Donald Wald F statistics. Compared with our baseline estimation shown in Panel (A) of Table 3, the results in the lagged-dependent variable are qualitatively and quantitatively unchanged, although the coefficients for transaction values are insignificant.

=== Table 4 ===

3.2.2. Robustness Checks

Below, we conduct various robustness checks. Due to space limitations, we briefly introduce these results in this section, while the tables for robustness checks are presented in Appendix B. To determine the differences across industries, we estimate our equation using the one-digit Standard International Trade Classification (SITC) code, presented in Table B2. All industries show positively significant coefficients for the lagged-dependent variable. Manufactured goods classified chiefly by material (category 6) have a relatively small coefficient, whereas a relatively large coefficient is found in food and live animals (category 0 & 1). We also estimate trade in parts and finished products separately in Panel (A) of Table B3. Both products have significantly positive coefficients for the lagged-dependent variable, *although* its coefficient is somewhat smaller for finished products. This can happen if intrafirm trade is more relevant for parts, and inertia becomes

[12] Data on these imports were obtained from the UN Comtrade.

stronger for parts because there may be a rigid rule for determining the invoicing currency. Finally, we estimate for the high- and low-income import countries separately, and the results are shown in Panel (B). Both cases show significantly positive coefficients for the lagged-dependent variable, although the coefficient is slightly larger in low-income import countries. Low-income Asian countries, typically Cambodia and Lao PDR, are likelier to accept THB-invoiced imports because of their close economic relationship with Thailand. This may enhance the stable use of THB and result in greater inertia for Thai exports to low-income countries.

Because estimating a discrete choice model with a linear model faces problems such as heteroskedasticity, Table B4 uses random effect estimation and instrumental variable probit.[13] We find a significantly positive coefficient for the lagged PCP dummy in all estimations. The coefficient becomes larger for countries without forward rates or low-turnover currencies, consistent with Proposition 2.

Thus far, we have estimated binary choice models, i.e., "PCP or non-PCP" or "LCP or non-LCP." In Table B5, we use a multinomial logit model because firms in practice choose between PCP, LCP, and VCP as their invoice currencies. Table 5B contains five panels: estimates for the full sample (Panel A), countries with forward rates (Panel B), countries without forward rates (Panel C), countries with high-turnover currencies (Panel D), and countries without high-turnover currencies (Panel E). In all panels, lagged-dependent variables had a significantly positive impact, indicating inertia for all types of invoicing currency. Comparing Panels B and C, we find that PCP inertia is less significant, whereas the LCP and VCP inertia are more significant for countries with forward rates. Similarly, by comparing Panels D and E, we find a less significant PCP inertia for countries with high-turnover currencies. These results are consistent with Proposition 2.

As in our theoretical analysis, we narrow down the sample to new exporters in Table B6. Panel (A) displays the results of the OLS analysis and Panel (B) shows those of the IV analysis. In all results, the lagged-dependent variable coefficient is positive and significant, indicating that even in analyses restricted to new exporters, a significant and robust PCP inertia is observed. Furthermore, regardless of whether it is OLS or IV, the PCP inertia weakens when there is a forward exchange rate for the 'importer's currency (see columns II and III) or when the turnover of the 'importer's currency is larger than THB (see columns IV and V). These results are consistent with the baseline analysis.

[13] To estimate lagged-dependent variable models in panel data with nonlinear models such as probit or logit, we need to address the so-called initial conditions problem. Following Wooldridge (2005), we introduce the initial values of the dependent and independent variables as additional regression variables.

3.3. Export Experience

This subsection examines the relationship between export experience and the choice of invoicing currency. Specifically, we investigate whether the choice differs between the first and subsequent exports. After introducing our empirical specification, we show our baseline estimation result and the results of various robustness checks.

3.3.1. Baseline Results

To empirically investigate the choice of invoicing currency, we estimate the following reduced-form equation:

$$PCP_{fipt} = \alpha First_{fipt} + \beta \ln Value_{fipt} + u_{it} + u_{st} + \epsilon_{fipt}$$

In this analysis, our primary independent variable is a dummy variable "*First*," which takes the value of one if an observation is the first export of a firm and zero otherwise. Coefficient α takes a positive value if new and less-experienced exporters tend to adopt PCP. The firm-export destination-HS eight-digit level observations are restricted to those that appear after 2007 in our dataset. Furthermore, we include only those that appear in the first year of the dataset.[14] Thus, each firm-export destination-HS eight-digit observation appears in our dataset for estimation only once.[15] We also drop the observations where multiple invoicing currencies can be detected in any year within a firm–product–country pair. As a result, we exclude firm–year fixed effects because of the more minor variation in observations. We estimate this model using the OLS method.

The baseline estimation results are reported in column (I) of Table 5. The coefficient for *First* is estimated to be significantly positive, indicating that PCP is likelier to be chosen when firms export for the first time than when they export subsequent products or to subsequent destinations. This may indicate that adopting FCP becomes less costly for exporters because of their experience in overseas business, and, thus, experienced exporters tend to use foreign currencies.[16] The log of the *Value* coefficient is negatively significant, which is consistent with the results in the last subsection on inertia.

=== Table 5 ===

[14] Therefore, our sample also includes observations that appeared in only 1 year.

[15] Thus, unlike the case in Section 3.2, our sample includes the firm-export destination-HS eight-digit pairs that appear after 2007 in. the dataset even if the firm has an export record in other export destination-HS eight-digit pairs in 2007.

[16] Another possibility is that by starting exporting, firms may improve their productivity or cost efficiency and then be able to choose foreign currencies. In our framework, we cannot introduce the firm–year fixed effect because it has a perfect correlation with our main explanatory variable. First, we control for this factor. In addition, we cannot match firm- or plant-level data in Thailand with our dataset. Thus, we cannot control firm characteristics such as productivity.

Columns (II) and (III) of the table show the results for countries without and with forward rates, respectively. The first export dummy coefficient is larger in column (II) than in column (III), indicating that new exporters are likelier to adopt PCP when there is no accessibility to the forward exchange rate of the importer's currency. In addition, as shown in columns (IV) and (V), the coefficient is larger for countries with low-turnover currencies. Therefore, the transaction cost of the forward exchange rate may matter for the choice of invoicing currency in first exports. These results are consistent with Proposition 3.

Table 6 uses the IV method, whose instruments are the same as those in the previous subsection. Columns (I)–(V) of the panel show the results for the IV method. The first export dummy has a positive impact on all cases. The coefficient becomes slightly larger for countries without forward rates than those with forward rates. Furthermore, the coefficient is larger for countries with low-turnover currencies. These results are consistent with the baseline case shown in Table 5. These estimations show that the coefficient for a log of *Value* is estimated to be significantly negative.

=== Table 6 ===

3.3.2. Robustness Checks

We conduct various robustness checks. Table B7 shows the analysis results for new exporters, as we did in Table B6. Panel (A) presents the outcomes of the OLS analysis, while Panel (B) displays the results obtained using the IV method and probit models. These results differ from those of the baseline analysis in the following aspects. In the OLS analysis, the *First* dummy coefficient becomes insignificant when there is a forward rate for the importer's currency (as shown in column III of Panel A) and when the turnover of the importer's currency is greater than that of THB (as indicated in column V of Panel (A). Therefore, in these cases, it cannot be conclusively stated that export starters always choose PCP for their first export. We interpret these findings that the currency choice for new exports might exhibit greater flexibility than that of continuous exporters because of a lower probability of being bound by inertia. Consequently, if the usage cost of the importer's currency is sufficiently low, selecting a currency other than PCP for the first export may be more likely. These results are robust in the analysis using the probit model, as shown in columns (VI)–(VIII) of Panel B; however, they are not robust with the IV method, as indicated in columns (II)–(V) of Panel B.

Table B8 shows the results based on the probit model because our dependent variable is a binary variable. In this nonlinear estimation, we cannot introduce detailed fixed effects. Therefore, we control for a log of GDP per capita in export destination countries in addition to section and year fixed effects. Columns (I)–(III) show the

estimation results with the probit model for all countries, those with forward rates and high turnover, respectively. Consistent with our baseline case, columns (II) and (III) show a lower coefficient than column (I). Columns (IV)–(VI) show analogous results for new exporters. Notably, the impact of *First* becomes insignificant for countries with forward rates or high-turnover currencies. These results support our propositions.

Next, we change the definition of new transactions. In the baseline estimation, we restricted firm-export destination-HS eight-digit level observations to new transactions, defined as those that appeared in our dataset after 2007. However, those not traded only in 2007 are also regarded as "new transactions" in this definition. In this robustness check, we adopt a more conservative definition by changing "2007" to "2008," "2009," "2010," "2011," or "2012." For instance, we define a new transaction for " > 2008" as the observation that does not appear in both 2007 and 2008 but does appear after 2008. The results are shown in Panel (A) of Table B9. The significance and sign of our variables are unchanged compared with the case in the previous tables. Thus, our result is somewhat robust to the definition of new transactions. Furthermore, the *First* coefficient increases with the threshold year. Panel (B) shows the results of the IV estimations. The *First* coefficient becomes larger than that for the OLS case regardless of the definition of the start year. As in the OLS case, the coefficient increases with the threshold year.

Table B10 considers that non-PCP includes VCP And LCP in our analysis. We estimate the multinomial logit model on the choice of invoicing currency. The categorical-dependent variables consider all pricing strategies, including PCP (the default option), LCP, and VCP.[17] As independent variables, we again include *First* and a log of *Value* in addition to GDP per capita of the importing country. Table 1 shows the marginal effects . Panel (A) presents the result for all samples. The *First* coefficient is positive with statistical significance for both PCP and LCP, whereas it becomes negative for VCP. Thus, VCP is less likely to be used in first exports than PCP and LCP. Notably, the coefficient becomes significantly higher for PCP than LCP, indicating that exporters tend to adopt PCP the most among the three options. Panels (B) and (C) show the results for countries with and without forward rates, respectively. Panels (D) and (E) show the results for countries with high and low turnover, respectively. The marginal effect of *First* is smaller for PCP for countries with forward rates or high turnover than for those without forward rates or low turnover, which is consistent with Proposition 3. The *First* coefficient is significantly positive for LCP when forward exchange rates of local currencies are accessible in Thailand, whereas the significance disappears when forward rates are not accessible. This result implies that Thai exporters may choose the local currency for invoicing in their first exports if they utilize the forward exchange rate between THB and the local currency.

[17] The observations under PCP, LCP, and VCP account for 28%, 15%, and 57%, respectively.

In Table B10, we consider the effect of the global financial crisis. In particular, it may induce firms to choose non-USD because the risk of USD is expected to increase during the global financial crisis (Ogawa and Muto, 2017). To observe its effects, we introduce the interaction terms of the *First* dummy with year dummy variables. As shown in Table B11, the coefficients for most interaction terms are significantly negative, indicating that PC is likelier to be chosen in 2008 than in other years, implying that exporters tried to avoid forex risks immediately after the global financial crisis by using their home currency.

We estimate our equation by the one-digit code of SITC to determine the differences across industries. Table B12 shows that all industries show positively significant coefficients for the *First* dummy. Food and live animals (category 0 & 1) have a relatively small coefficient, whereas a larger coefficient is found in material (category 6). As shown in the left panel of Table B13, we estimate trade in parts and finished products separately. Both products have significantly positive coefficients for the *First* dummy, although its coefficient is slightly larger in finished products. Firms tend to start exporting to less developed countries, and PCP is likelier to be used for these countries because exporters can force importers to accept the exporters' currency (PCP). We estimate the high- and low-income import countries separately to eliminate this possibility. The results are shown in the right panel of Table B13. Both cases show significantly positive coefficients for the *First* dummy, although its coefficient is slightly larger in low-income import countries.

4. Conclusion

International business activities affect firms' behavior in many aspects. We focused on the effect of firms' export experience on the choice of invoicing currency. Employing transaction-level export data in Thailand during the 2007–2014 period, we revealed a significant degree of inertia in the invoicing currency for the same product/destination. PCP inertia becomes more (less) significant than that of LCP when exporters cannot (can) access the forward exchange rate of the currency of the importing country or the turnover of the currency of the importing country in the forex market is smaller (larger) than THB. We also found that the probability of choosing PCP in the first export is significantly higher than that in the second and subsequent products/destinations. This finding implies that firms' export experience enhances the use of foreign currency in international transactions. We also found that the probability of PCP in the first export is higher when exporters do not have access to the forward exchange rate of the currency of the importing country or the turnover of the importer's currency is smaller than THB.

Firms benefit from using their home currency because they can be free from forex risk and do not need to make efforts to manage the risk of exchange rate fluctuations (e.g., Ito et al., 2016). If firms feel that those efforts are burdensome, internationalizing the home currency may benefit the country's welfare and may become an obvious policy objective to

pursue. In this study, we examined firms' dynamic choice of invoicing currency in exports, discussing the possibility that PCP decreases the demand of risk-averse importers. Exporters should determine which currency to use in invoicing, considering the trade-off between the benefit of avoiding forex risk and a potential negative impact on demand. Our theoretical model provides insights into this trade-off mechanism in the dynamic decision of invoicing currency and provides parsimonious guidance for empirical investigations. The model reveals the potential impact of the cost of managing the forex risk on the inertia in invoicing currency and the dynamic choice of the currency.

Our empirical findings indicated that the exporter's currency tends *not* to be used in international transactions once firms accumulate export experience. This consequence is consistent with conventional findings in the literature that more capable exporters tend to use foreign currencies for invoicing. Since firms make the decision about invoicing currency, exporters feel some benefits from using foreign currencies in their exports to attract their foreign customers. In particular, they are willing to use foreign currencies once they acquire the knowledge to manage forex risks. Mitigating the cost of forex risk management may enhance exporters' choice of an appropriate invoicing currency to attract their customers without shouldering the burden of dealing with forex risk. This issue is especially important in emerging countries, whose currencies are relatively minor and whose financial markets are still under development.

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Table 1. Shares of Each Invoicing Currency in Exports from Thailand (%)

(A) All exporters

A1. Currency shares by year based on the number of transactions

	2007	2008	2009	2010	2011	2012	2013	2014	Total
PCP	16	16	17	18	18	19	20	20	18
LCP	16	16	15	15	14	14	13	13	14
VCP	69	69	68	68	67	67	67	67	68

A2. Currency shares by year based on the value of transactions

	2007	2008	2009	2010	2011	2012	2013	2014	Total
PCP	8	7	7	8	8	9	10	10	8
LCP	24	21	21	20	18	20	19	19	20
VCP	68	71	72	72	74	71	71	71	71

A3. Currency shares by quartile based on the number of transactions

	1st quartile	2nd quartile	3rd quartile	4th quartile	Total
PCP	21	21	17	13	18
LCP	15	14	14	15	14
VCP	64	65	69	72	68

A4. Currency shares by quartile based on the value of transactions

	1st quartile	2nd quartile	3rd quartile	4th quartile	Total
PCP	22	20	16	8	17
LCP	14	14	14	20	15
VCP	64	66	70	72	68

(B) New exporters

B1. Currency shares by year based on the number of transactions

	2008	2009	2010	2011	2012	2013	2014	Total
PCP	26	28	29	27	27	28	27	27
LCP	16	14	13	13	13	12	11	13
VCP	58	58	58	60	59	60	62	60

B2. Currency shares by year based on the value of transactions

	2008	2009	2010	2011	2012	2013	2014	Total
PCP	14	10	7	5	7	7	6	8
LCP	16	11	8	10	9	11	8	10
VCP	70	79	86	85	84	83	85	82

B3. Currency shares by quartile based on the number of transactions

	1st quartile	2nd quartile	3rd quartile	4th quartile	Total
PCP	30	32	27	19	27
LCP	14	12	13	12	13
VCP	56	56	60	69	60

B4. Currency shares by quartile based on the value of transactions

	1st quartile	2nd quartile	3rd quartile	4th quartile	Total
PCP	33	32	26	6	24
LCP	13	12	13	9	12
VCP	55	56	61	84	64

Source: Customs in Kingdom of Thailand

Table 2. Time-series Change of Invoicing Currency within a Firm–country–product Pair (%)

	2008	2009	2010	2011	2012	2013
2009	10					
2010	13	6				
2011	14	9	6			
2012	12	10	9	8		
2013	18	14	15	8	8	
2014	13	10	10	7	6	4
Total	13	9	9	7	7	4

Note: The table shows the share (percent) of firm–product–country pairs that use different invoicing currencies between the first year (shown in columns) and the following years (shown in rows).

Table 3. Inertia

(A)Inertia of PCP

	(I)	(II)	(III)	(IV)	(V)
Lagged PCP Dummy	0.838***	0.838***	0.795***	0.842***	0.811***
	(0.002)	(0.003)	(0.005)	(0.003)	(0.004)
ln Value	−0.0004***	−0.0005***	−0.0003***	−0.0005***	−0.0003***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Forward rate	ALL	NO	YES	ALL	ALL
Higher turnover than THB	ALL	ALL	ALL	NO	YES
Number of observations	738,411	361,101	359,590	281,049	441,150
R-squared	0.925	0.940	0.923	0.917	0.935

(B) Inertia of LCP

	(I)	(II)	(III)	(IV)	(V)
Lagged LCP Dummy	0.882***	0.760***	0.867***	0.775***	0.874***
	(0.002)	(0.020)	(0.003)	(0.022)	(0.002)
ln Value	−0.00008*	−0.00002	−0.00003	−0.00003	−0.00007
	(0.00005)	(0.00002)	(0.00009)	(0.00002)	(0.00008)
Forward rate	ALL	NO	YES	ALL	NO
Higher turnover than THB	ALL	ALL	ALL	NO	YES
Method	OLS	OLS	OLS	OLS	OLS
Number of observations	738,411	361,101	359,590	441,150	68,113
R-squared	0.945	0.765	0.945	0.946	0.620

Notes: The dependent variables are dummy variables that take the value one if the invoicing currency is PCP and LCP in panels (A) and (B), respectively. "Lagged PCP Dummy" and "Lagged LCP Dummy" are 1-year lagged-dependent variables. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Parentheses contain the heteroscedasticity-consistent standard error. Standard errors are clustered at country–product pairs. We employ OLS in all estimations. All specifications include export firm–year, import country–year, and HS six-digit code–year fixed effects. In columns (II) and (III) of both panels, we restrict sample export destination countries according to the availability of forward exchange rates for their official currency in Thailand. In columns (IV) and (V), we restrict sample export destination countries considering whether the turnover of the currency of the destination country in the forex market is smaller than THB or not.

Table 4. Inertia: Instrument Variable Method

	(I)	(II)	(III)	(IV)	(V)
Lagged PCP Dummy	0.838***	0.838***	0.795***	0.842***	0.811***
	(0.002)	(0.003)	(0.005)	(0.003)	(0.004)
ln Value	−0.0002	−0.0006	−0.0005	0.0005	−0.0005
	(0.0010)	(0.0017)	(0.0013)	(0.0021)	(0.0011)
Forward rate	ALL	NO	YES	ALL	ALL
Higher turnover than THB	ALL	ALL	ALL	NO	YES
Number of observations	738,411	361,101	359,590	281,049	441,150
Kleibergen–Paap rk LM statistic	551.4	358.9	135.7	267.2	219.9
Cragg–Donald Wald F statistic	556.8	315.9	148.2	230.9	234.4
Centered R-squared	0.693	0.695	0.616	0.703	0.642

Notes: The dependent variable is the dummy variable that takes the value one if the invoicing currency is PCP. "Lagged PCP Dummy" is 1-year lagged-dependent variables. ***, **, and * represent significance at the 1%, 5%, and 10% statistical levels, respectively. Parentheses contain the heteroscedasticity-consistent standard error. Standard errors are clustered at country–product pairs. We employ IV estimation method in all estimations. All specifications include export firm–year, import country–year, and HS six-digit code–year fixed effects. In columns (II) and (III), we restrict sample export destination countries according to the availability of forward exchange rates for their official currency in Thailand. In columns (IV) and (V), we restrict sample export destination countries considering whether the turnover of the currency of the destination country in the forex market is smaller than THB or not.

Table 5. Export Experience

	(I)	(II)	(III)	(IV)	(V)
First	0.058***	0.062***	0.052***	0.071***	0.048***
	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
ln Value	−0.004***	−0.003***	−0.004***	−0.003***	−0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Forward rate	ALL	NO	YES	ALL	ALL
Higher turnover than THB	ALL	ALL	ALL	NO	YES
Number of observations	894,997	465,443	424,262	372,718	517,015
R-squared	0.179	0.246	0.123	0.258	0.120

Notes: The firm-export destination-HS eight-digit level observations are restricted only to those that appear after 2007 in our dataset. Furthermore, we include those in only the first year of appearance in the dataset. The dependent variable is a dummy variable that takes the value one if invoicing currency is THB and zero otherwise. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Parentheses contain the heteroscedasticity-consistent standard error. Standard errors are clustered at country–product pairs. We employ the OLS method. All specifications include import country–year and HS six-digit code–year fixed effects. In columns (II) and (III), we restrict sample export destination countries according to the availability of forward exchange rates for their official currency in Thailand. In columns (IV) and (V), we restrict sample export destination countries considering whether the turnover of the currency of the destination country in the forex market is smaller than THB.

Table 6. Export Experience: Instrument Variable Method

	(I)	(II)	(III)	(IV)	(V)
First	0.074***	0.077***	0.076***	0.084***	0.067***
	(0.003)	(0.004)	(0.005)	(0.004)	(0.004)
ln Value	−0.031***	−0.030***	−0.041***	−0.035***	−0.032***
	(0.003)	(0.005)	(0.007)	(0.006)	(0.005)
Forward rate	ALL	NO	YES	ALL	ALL
Higher turnover than THB	ALL	ALL	ALL	NO	YES
Number of observations	861,442	435,166	421,054	364,931	491,329
Kleibergen–Paap rk LM statistic	1,245.0	759.2	234.8	618.0	349.8
Cragg–Donald Wald F statistic	1,403.0	775.9	262.9	616.9	399.4
Centered R-squared	−0.036	−0.031	−0.074	−0.041	−0.042

Notes: The firm-export destination-HS eight-digit level observations are restricted only to those that appear after 2007 in our dataset. Furthermore, we include those in only the first year of appearance in the dataset. The dependent variable is a dummy variable that takes the value one if invoicing currency is THB and zero otherwise. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Parentheses contain the heteroscedasticity-consistent standard error. Standard errors are clustered at country–product pairs. The IV method is employed in all columns. Our instrument in the IV estimation is import country's total imports of a concerned product from the world except for Thailand. All columns include import country–year and HS six-digit code–year fixed effects. In columns (II) and (III), we restrict sample export destination countries according to the availability of forward exchange rates for their official currency in Thailand. In columns (IV) and (V), we restrict sample export destination countries considering whether the turnover of the currency of the destination country in the forex market is smaller than THB or not.

Figure 1. Time Flow

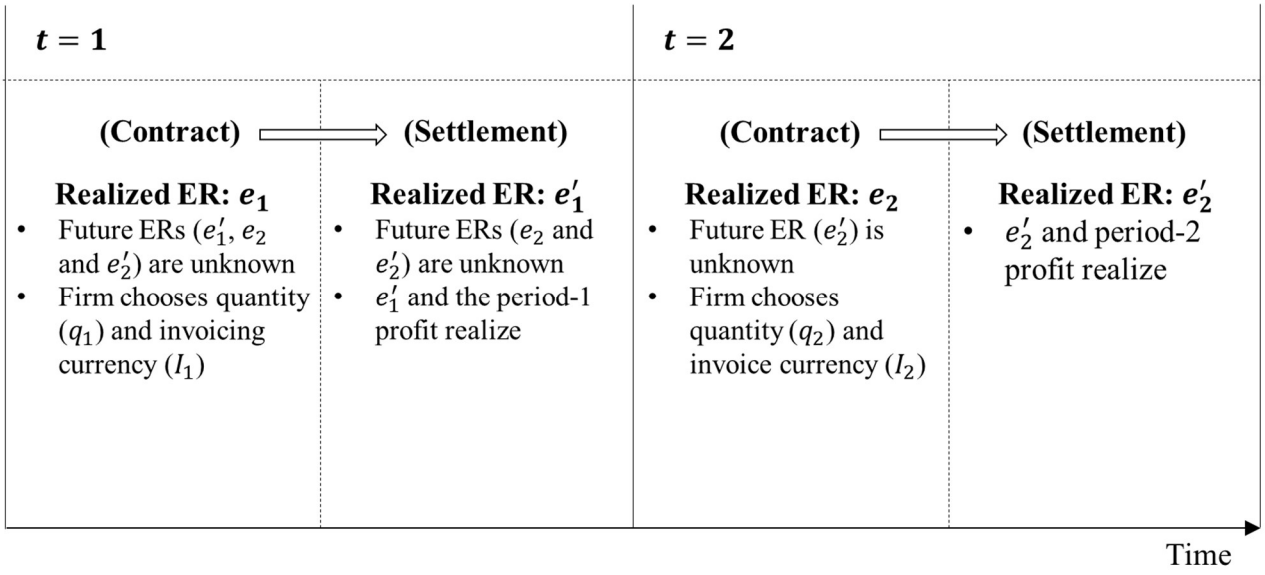
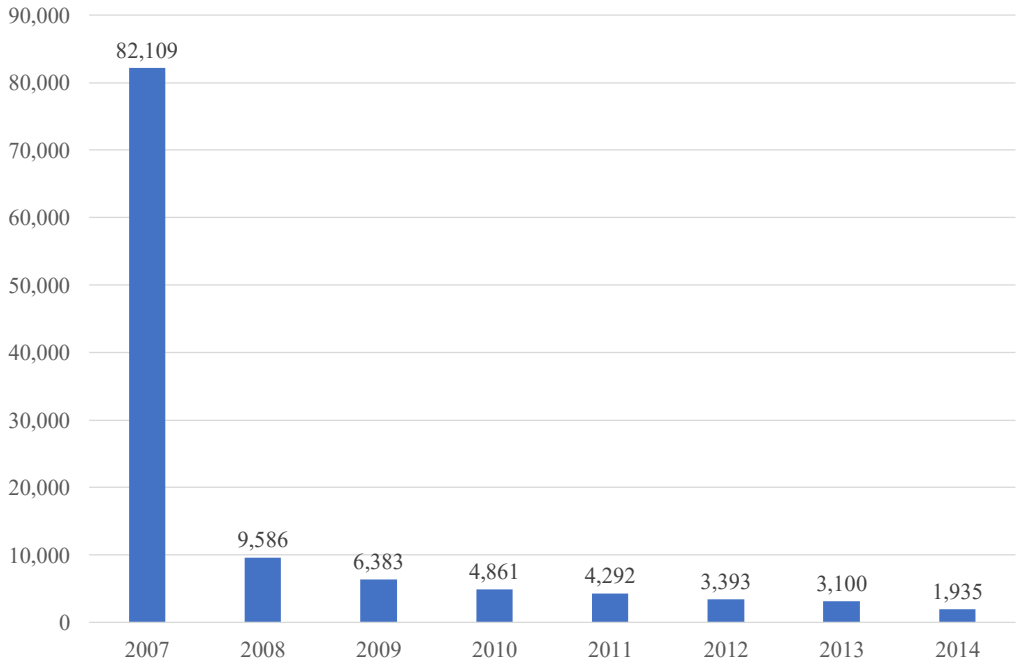


Figure 2. The First Appearance Year of Export Firms



Source: Authors' compilation

Table B2. Inertia: Estimation by SITC Sectors

	(I)	(II)	(III)	(IV)	(V)	(VI)
Lagged PCP Dummy	0.902***	0.867***	0.871***	0.884***	0.843***	0.860***
	(0.012)	(0.015)	(0.023)	(0.005)	(0.005)	(0.004)
ln Value	−0.0008**	0.0000	−0.0002	−0.0002	−0.0005***	−0.0002*
	(0.0003)	(0.0002)	(0.0003)	(0.0002)	(0.0001)	(0.0001)
SITC	0&1	2&3	4	5	6	7
Number of observations	18,546	27,275	17,589	104,856	168,746	159,218
R-squared	0.971	0.967	0.966	0.954	0.935	0.925

Notes: The dependent variable is a dummy variable that takes the value of one for PCP and zero otherwise. "Lagged PCP Dummy" is a 1-year lagged-dependent variable. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Parentheses contain the heteroscedasticity-consistent SE. We estimate using the OLS method. All specifications include export firm–year, import country–year, and HS six-digit code–year fixed effects.

Table B3. Inertia: Production Stages and Income Levels of Importers

	(A) Production stage		(B) Income level	
	Parts and components	Finished	Low	High
Lagged PCP Dummy	0.861***	0.819***	0.838***	0.810***
	(0.003)	(0.004)	(0.003)	(0.004)
ln Value	−0.0004***	−0.0003***	−0.0005***	−0.0003***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Number of observations	342,838	384,413	298,034	423,009
R-squared	0.929	0.928	0.941	0.923

Notes: The dependent variable is a dummy variable that takes the value of one for PCP and zero otherwise. "Lagged PCP Dummy" is a 1-year lagged-dependent variable. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Parentheses contain the heteroscedasticity-consistent SE. We estimate using the OLS method. All specifications include export firm–year, import country–year, and HS six-digit code–year fixed effects. In Panel (A), finished products are defined as items categorized into 112, 122, 41, 51, 52, 61, 62, or 63 in. the BEC classification, while the rest are parts. To differentiate between high- and low-income countries in Panel (B), we follow the World Bank classification. Specifically, high-income countries include ABW, AND, ARE, ATG, AUS, AUT, BEL, BHR, BHS, BMU, BRB, BRN, CAN, CHE, CYM, CYP, CZE, DEU, DNK, ESP, EST, FIN, FRA, FRO, GBR, GNQ, GRC, GRL, HKG, HUN, IRL, ISL, ISR, ITA, JPN, KOR, KWT, LUX, MAC, MLT, MNP, NCL, NLD, NOR, NZL, OMN, PRI, PRT, PYF, QAT, SAU, SGP, SMR, SVK, SVN, SWE, TTO, TWN, and USA.

Table B4. Inertia: RE and IV Probit

(A) RE Probit

	(I)	(II)	(III)	(IV)	(V)
Lagged PC Dummy	0.090***	0.097***	0.083***	0.105***	0.080***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
ln Value	−0.0013***	−0.0012***	−0.0015***	−0.0011***	−0.0015***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Initial PC dummy	0.061***	0.059***	0.063***	0.060***	0.063***
	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
Initial ln Value	−0.0010***	−0.0012***	−0.0002*	−2.66E-11	−5.88E-13
	(0.0001)	(0.0001)	(0.0001)	(1.81e-11)	(2.00e-12)
Capita	0.086***	0.094***	0.018	0.115***	0.0114
	(0.019)	(0.023)	(0.037)	(0.026)	(0.032)
Average Capita	−0.087***	−0.110***	0.009	−0.151***	0.015
	(0.019)	(0.023)	(0.036)	(0.026)	(0.032)
Forward rate	ALL	NO	YES	ALL	ALL
Higher Turnover	ALL	ALL	ALL	NO	YES
Number of observations	736,033	357,555	378,478	294,552	441,481
Log-likelihood	−48,292.3	−24,586.2	−23,522.3	−21,338.6	−26,873.0

(B) IV Probit

	(I)	(II)	(III)	(IV)	(V)
Lagged PC Dummy	0.103***	0.107***	0.101***	0.113***	0.095***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
ln Value	−0.0016**	−0.0051***	0.0033**	−0.0093***	−0.0025***
	(0.0007)	(0.0010)	(0.0015)	(0.0007)	(0.0006)
Initial PC dummy	0.030***	0.031***	0.030***	0.032***	0.026***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Initial ln Value	−0.0007***	−0.0006***	−0.0008***	5.33e-11**	7.57E-11
	(0.0001)	(0.0001)	(0.0002)	(2.71e-11)	(3.88e-11)
Capita	0.082***	0.096***	0.023	0.104***	0.0227
	(0.017)	(0.021)	(0.032)	(0.024)	(0.027)
Average Capita	−0.084***	−0.115***	0.010	−0.142***	−0.004
	(0.017)	(0.021)	(0.032)	(0.024)	(0.027)
Forward rate	ALL	NO	YES	ALL	ALL
Higher Turnover	ALL	ALL	ALL	NO	YES
Number of observations	736,033	357,555	378,478	294,552	441,481
Log-likelihood	−1,904,281.5	−914,269.5	−987,547.5	−745,415.4	−1,146,872.6

Notes: The dependent variable is a dummy variable that takes the value of one for PCP and zero otherwise. "Lagged PCP Dummy" is a 1-year lagged-dependent variable. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Marginal effects are reported. Parentheses contain the heteroscedasticity-consistent standard error. Standard errors are clustered at country–product pairs. All specifications include export firm–year, import country–year, and HS six-digit code–year fixed effects.

Table B5. Inertia: Multilateral Logit Model

(A) Full sample

	(I)	(II)	(III)
Dependent variable	PCP Dummy	LCP Dummy	VCP Dummy
Lagged PCP Dummy	0.445***	−0.056***	−0.390***
	(0.002)	(0.003)	(0.004)
Lagged LCP Dummy	−0.024***	0.405***	−0.381***
	(0.004)	(0.006)	(0.007)
Lagged VCP Dummy	−0.268***	−0.225***	0.493***
	(0.002)	(0.005)	(0.004)
ln Value	−0.0042***	−0.0024***	0.0066***
	(0.0001)	(0.0002)	(0.0002)
Number of observations		2,020,199	

(B) Forward rate = YES

	(I)	(II)	(III)
Dependent variable	PCP Dummy	LCP Dummy	VCP Dummy
Lagged PCP Dummy	0.398***	−0.094***	−0.304***
	(0.003)	(0.006)	(0.006)
Lagged LCP Dummy	−0.068***	0.571***	−0.504***
	(0.003)	(0.006)	(0.007)
Lagged VCP Dummy	−0.186***	−0.390***	0.576***
	(0.003)	(0.007)	(0.005)
ln Value	−0.0054***	−0.0012***	0.0066***
	(0.0001)	(0.0003)	(0.0003)
Number of observations		998,419	

(C) Forward rate = NO

	(I)	(II)	(III)
Dependent variable	PCP Dummy	LCP Dummy	VCP Dummy
Lagged PCP Dummy	0.486***	−0.001*	−0.485***
	(0.003)	(0.001)	(0.003)
Lagged LCP Dummy	0.014	0.020***	−0.034
	(0.023)	(0.001)	(0.023)
Lagged VCP Dummy	−0.358***	−0.005***	0.363***
	(0.003)	(0.000)	(0.003)
ln Value	−0.0036***	−0.0003***	0.0039***
	(0.0002)	(0.0000)	(0.0002)
Number of observations		1,019,514	

(D) Higher Turnover =YES

	(I)	(II)	(III)
Dependent variable	PC Dummy	LC Dummy	VC Dummy
Lagged PC Dummy	0.382***	−0.066***	−0.316***
	(0.002)	(0.005)	(0.005)
Lagged LC Dummy	−0.039***	0.532***	−0.493***
	(0.003)	(0.007)	(0.007)
Lagged VC Dummy	−0.187***	−0.352***	0.539***
	(0.002)	(0.006)	(0.005)
ln Value	−0.0052***	−0.0016***	0.0068***
	(0.0001)	(0.0003)	(0.0003)
Number of observations		1,208,492	

(E) Higher Turnover = NO

	(I)	(II)	(III)
Dependent variable	PC Dummy	LC Dummy	VC Dummy
Lagged PC Dummy	0.523***	−0.001	−0.522***
	(0.004)	(0.001)	(0.004)
Lagged LC Dummy	0.040	0.020***	−0.060**
	(0.026)	(0.001)	(0.027)
Lagged VC Dummy	−0.398***	−0.004***	0.402***
	(0.004)	(0.000)	(0.004)
ln Value	−0.0039***	−0.0003***	0.0043***
	(0.0002)	(0.0000)	(0.0002)
Number of observations		807,666	

Notes: ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Marginal effects are reported. Parentheses contain the heteroscedasticity-consistent SE. Standard errors are clustered at country–product pairs. All specifications include section fixed effects and year fixed effects. We used all samples in panel (A). Panels (B) and (C) narrow down the sample to destination countries where the forward exchange rates between THB and the local currency of that country are available and unavailable, respectively. Panels (D) and (E) narrow down the sample to destination countries where the turnover of the local currency of that country in the forex market is larger and smaller than THB, respectively.

Table B6. Inertia: New Exporters

(A) OLS

	(I)	(II)	(III)	(IV)	(V)
Lagged PCP Dummy	0.735***	0.758***	0.632***	0.765***	0.650***
	(0.012)	(0.017)	(0.025)	(0.018)	(0.021)
ln Value	−0.0008***	−0.0005	−0.0010**	−0.0006	−0.0009***
	(0.0003)	(0.0004)	(0.0004)	(0.0004)	(0.0003)
Forward rate	ALL	NO	YES	ALL	ALL
Higher turnover than THB	ALL	ALL	ALL	NO	YES
Number of observations	48,093	24,844	19,170	19,727	24,449
R-squared	0.958	0.971	0.954	0.973	0.950

(B) IV

	(I)	(II)	(III)	(IV)	(V)
Lagged PCP Dummy	0.735***	0.760***	0.632***	0.768***	0.650***
	(0.012)	(0.017)	(0.024)	(0.019)	(0.021)
ln Value	0.0013	0.0170	−0.0007	0.0218	−0.0002
	(0.0055)	(0.0163)	(0.0046)	(0.0184)	(0.0057)
Forward rate	ALL	NO	YES	ALL	ALL
Higher turnover than THB	ALL	ALL	ALL	NO	YES
Number of observations	48,093	24,844	19,170	19,727	24,449
R-squared	0.533	0.497	0.401	0.47	0.425
Kleibergen–Paap rk LM statistic	67.62	12.4	50.42	12.41	37.31
Cragg–Donald Wald F statistic	51.8	8.669	40.39	8.43	28.08
Centered R-squared	0.533	0.497	0.401	0.47	0.425

Notes: The dependent variable is a dummy variable that takes the value of one for PCP and zero otherwise. "Lagged PCP Dummy" is a 1-year lagged-dependent variable. The sample is narrowed down to new exporters. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Parentheses contain the heteroscedasticity-consistent standard error. Standard errors are clustered at country–product pairs. All specifications include export firm–year, import country–year, and HS six-digit code–year fixed effects. We employ the OLS method in panel (A). In panel (B), we estimate using the IV method by using as an instrument the import country's total imports of a concerned product from the world except for Thailand. In columns (II) and (III) of both panels, we restrict sample export destination countries according to the availability of forward exchange rates for their official currency in Thailand. In columns (IV) and (V) of both panels, we restrict sample export destination countries by considering whether the turnover of the currency of the destination country in the forex market is smaller than THB or not.

Table B7. Export Experience: New Exporters

(A) OLS

	(I)	(II)	(III)	(IV)	(V)
First	0.006**	0.015***	−0.002	0.018***	−0.001
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)
ln Value	−0.004***	−0.004***	−0.004***	−0.005***	−0.003***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Forward rate	ALL	NO	YES	ALL	ALL
Higher turnover than THB	ALL	ALL	ALL	NO	YES
Number of observations	170,559	91,979	73,250	75,085	90,148
R-squared	0.317	0.4	0.258	0.41	0.254

(B) IV

	(I)	(II)	(III)	(IV)	(V)
First	0.017***	0.027***	0.028***	0.031***	0.015**
	(0.004)	(0.006)	(0.009)	(0.007)	(0.006)
ln Value	−0.029***	−0.036***	−0.069***	−0.042***	−0.037***
	(0.008)	(0.013)	(0.016)	(0.016)	(0.011)
Forward rate	ALL	NO	YES	ALL	ALL
Higher turnover than THB	ALL	ALL	ALL	NO	YES
Number of observations	163,993	86,128	72,663	73,817	84,977
Kleibergen–Paap rk LM statistic	−0.024	−0.036	−0.182	−0.048	−0.051
Cragg–Donald Wald F statistic	402.8	198.4	91.84	138.8	158.4
Log-likelihood	392	177	88	121	156
Centered R-squared	−0.0238	−0.0363	−0.182	−0.0482	−0.0508

Notes: The firm-export destination-HS eight-digit level observations are restricted only to those that appear after 2007 in. our dataset. Furthermore, we include only those in the first year of appearance in the dataset. The dependent variable is a dummy variable that takes the value one if the invoicing currency is THB and zero otherwise. The sample is narrowed down to new exporters. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Parentheses contain the heteroscedasticity-consistent standard error. Standard errors are clustered at country–product pairs. We employ the OLS method in panel (A). The IV method is employed in columns (I)–(V) of panel (B). Our instrument in the IV estimation is the import country's total imports of a concerned product from the world except for Thailand. In all columns, import country–year and HS six-digit code–year fixed effects are included. In columns (II) and (III) of both panels, we restrict sample export destination countries according to the availability of forward exchange rates for their official currency in Thailand. In columns (IV) and (V) of both panels, we restrict sample export destination countries by considering

whether the turnover of the currency of the destination country in the forex market is smaller than THB or not.

Table B8. Export Experience: Probit

	(I)	(II)	(III)	(IV)	(V)	(VI)
First	0.081***	0.055***	0.0531***	0.027***	−0.004	−0.003
	(0.002)	(0.003)	(0.002)	(0.003)	(0.004)	(0.003)
ln Value	−0.006***	−0.007***	−0.007***	−0.010***	−0.008***	−0.008***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
ln GDP per capita	−0.025***	0.028***	0.017***	−0.034***	0.031***	0.019***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.003)	(0.002)
Sample	ALL	ALL	ALL	New Exporter	New Exporter	New Exporter
Forward rate	ALL	YES	ALL	ALL	YES	ALL
Higher turnover than THB	ALL	ALL	YES	ALL	ALL	YES
Number of observations	868,415	425,979	496,920	170,044	77,982	90,515
Log-likelihood	−429,625.1	−191,407.9	−218,376.4	−97,937	−40,218	−45,782
Centered R-squared	0.027	0.027	0.028	0.0347	0.0454	0.0468

Notes: The firm-export destination-HS eight-digit level observations are restricted only to those that appear after 2007 in. our dataset. Furthermore, we include only those in the first year of appearance in the dataset. The dependent variable is a dummy variable that takes the value one if the invoicing currency is THB and zero otherwise. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Parentheses contain the heteroscedasticity-consistent standard error. Standard errors are clustered at country–product pairs. We employ the probit method in all columns, and marginal effects are reported. Columns (I)–(III) show the results for all samples, while columns (IV)–(VI) show the results for new exporters. Section fixed effects and year fixed effects are included. Columns (II) and (V) present the analysis results when the sample is narrowed down to export destination countries where forward exchange rates between THB and the local currency of that country are available. In columns (III) and (VI), we narrow down the sample to export destination countries where the turnover of the local currency of that country in the forex market is larger than THB.

Table B9. Export Experience: Different Definitions of New Transactions

(A) OLS

	(I)	(II)	(III)	(IV)	(V)
First	0.053***	0.055***	0.060***	0.0780***	0.084***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.004)
ln Value	−0.004***	−0.003***	−0.003***	−0.003***	−0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
	year >	year >	year >	year >	year >
First year	2008	2009	2010	2011	2012
Number of observations	737,500	608,822	485,791	356,350	234,705
R-squared	0.181	0.182	0.185	0.187	0.184

(B) IV

	(I)	(II)	(III)	(IV)	(V)
First	0.0720***	0.0740***	0.078***	0.093***	0.098***
	(0.003)	(0.003)	(0.004)	(0.004)	(0.005)
ln Value	−0.033***	−0.032***	−0.031***	−0.028***	−0.024***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.006)
	year >	year >	year >	year >	year >
First year	2008	2009	2010	2011	2012
Number of observations	710,241	586,373	468,040	343,588	226,502
R-squared	−0.042	−0.038	−0.036	−0.025	−0.016
Kleibergen–Paap rk LM statistic	1,116	1,021	866	683	488
Cragg–Donald Wald F statistic	1,241	1,127	947	732	511
Centered R-squared	−0.0417	−0.0382	−0.0362	−0.0255	−0.0163

Notes: The firm-export destination-HS eight-digit level observations in ">X" of row "First year" are restricted only to those that appear after year X in our dataset. The dependent variable is a dummy variable that takes the value one if the invoicing currency is PC and zero otherwise. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Parentheses contain the heteroscedasticity-consistent SE. Standard errors are clustered at country–product pairs. We employ the OLS method in panel (A). In panel (B), we estimate using the IV method by using as an instrument the import country's total imports of a concerned product from the world except for Thailand. All specifications include import country–year and HS six-digit code–year fixed effects.

Table B10. Export Experience: Multinomial Logit Results

(A) Full sample

	(I) PCP	(II) LCP	(III) VCP
First	0.081***	0.011***	−0.092***
	(0.002)	(0.002)	(0.002)
ln Value	−0.006***	−0.002***	0.008***
	(0.000)	(0.000)	(0.000)
Capita	−0.045***	0.164***	−0.119***
	(0.001)	(0.002)	(0.002)
Number of observations		868,415	

(B) Forward rate = YES

	(I) PCP	(II) LCP	(III) VCP
First	0.055***	0.023***	−0.079***
	(0.002)	(0.003)	(0.004)
ln Value	−0.007***	−0.003***	0.009***
	(0.000)	(0.000)	(0.000)
Capita	0.004**	0.194***	−0.199***
	(0.002)	(0.005)	(0.004)
Number of observations		425,979	

(C) Forward rate = NO

	(I) PCP	(II) LCP	(III) VCP
First	0.102***	0.000	−0.101***
	(0.003)	(0.000)	(0.003)
ln Value	−0.005***	−0.001***	0.006***
	(0.000)	(0.000)	(0.000)
Capita	−0.041***	0.003***	0.038***
	(0.001)	(0.000)	(0.001)
Number of observations		442,436	

(D) Higher Turnover =YES

	(I) PCP	(II) LCP	(III) VCP
First	0.0538***	0.0198***	−0.0737***
	(0.00222)	(0.00298)	(0.00338)
ln Value	−0.00664***	−0.00239***	0.00902***
	(0.000204)	(0.000318)	(0.000345)
Capita	−0.0175***	0.225***	−0.208***
	(0.00130)	(0.00429)	(0.00339)
Number of observations		496,920	

(E) Higher Turnover =NO

	(I) PCP	(II) LCP	(III) VCP
First	0.110***	−0.000493	−0.109***
	(0.00293)	(0.000509)	(0.00295)
ln Value	−0.00546***	−0.000536***	0.00599***
	(0.000322)	(4.77e−05)	(0.000325)
Capita	−0.0417***	0.00308***	0.0387***
	(0.00108)	(0.000126)	(0.00109)
Number of observations		371,495	

Notes: This table reports the estimation results (marginal effects) of the multinomial logit model on the choice of invoicing currency. The categorical-dependent variables consider all pricing strategies, including PCP (the default option), LCP, and VCP. In all specifications, we introduce year fixed effects and dummy variables on Section of the HS tariff classification. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Parentheses contain the heteroscedasticity-consistent standard error. Standard errors are clustered at country–product pairs. We used all samples in panel (A). Panels (B) and (C) narrow down the sample to destination countries where the forward exchange rates between THB and the local currency of that country are available and unavailable, respectively. Panels (D) and (E) narrow down the sample to destination countries where the turnover of the local currency of that country in the forex market is larger and smaller than THB, respectively.

Table B11. Export Experience: Interaction with Year Dummy Variables

	(I)	(II)
First	0.083***	0.096***
	(0.005)	(0.005)
First*Year2009	−0.038***	−0.039***
	(0.007)	(0.007)
First*Year2010	−0.051***	−0.049***
	(0.008)	(0.008)
First*Year2011	−0.075***	−0.066***
	(0.006)	(0.007)
First*Year2012	−0.021***	−0.017**
	(0.007)	(0.007)
First*Year2013	0.023***	0.027***
	(0.007)	(0.007)
First*Year2014	−0.022***	−0.018**
	(0.007)	(0.007)
ln Value	−0.004***	−0.031***
	(0.000)	(0.003)
Method	OLS	IV
Number of observations	894,997	861,442
R-squared	0.179	−0.035
Kleibergen–Paap rk LM statistic		1,245
Cragg–Donald Wald F statistic		1,403
Centered R-squared		−0.0354

Notes: The firm-export destination-HS eight-digit level observations are restricted only to those that appear after 2007 in. our dataset. Furthermore, we include only those in the first year of appearance in the dataset. The dependent variable is a dummy variable that takes the value one if the invoicing currency is THB and zero otherwise. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Parentheses contain the heteroscedasticity-consistent SE. All specifications include import country–year and HS six-digit code–year fixed effects. We employ the OLS method in column (I). In column (II), we estimate using the IV method by using as an instrument the import country's total imports of a concerned product from the world except for Thailand.

Table B12. Export Experience: Estimation by SITC Sectors

	(I)	(II)	(III)	(IV)	(V)	(VI)
First	0.034**	0.038***	0.051**	0.037***	0.080***	0.019***
	(0.015)	(0.011)	(0.020)	(0.006)	(0.004)	(0.004)
ln Value	−0.004***	−0.006***	−0.002	−0.003***	−0.003***	−0.003***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
SITC	0&1	2&3	4	5	6	7
Number of observations	15,667	24,610	10,300	98,609	218,361	234,413
R-squared	0.286	0.277	0.293	0.229	0.199	0.201

Notes: The firm-export destination-HS eight-digit level observations are restricted only to those that appear after 2007 in our dataset. Furthermore, we include only those in the first year of appearance in the dataset. The dependent variable is a dummy variable that takes the value one if the invoicing currency is THB and zero otherwise. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Parentheses contain the heteroscedasticity-consistent SE. All specifications include import country–year and HS six-digit code–year fixed effects. We estimate using the OLS method.

Table B13. Export Experience: Production Stages and Income Levels of Importers

	(A) Production stage		(B) Income level	
	Parts and components	Finished	Low	High
First	0.047***	0.067***	0.061***	0.055***
	(0.003)	(0.003)	(0.003)	(0.003)
ln Value	−0.003***	−0.005***	−0.003***	−0.004***
	(0.0002)	(0.0002)	(0.0003)	(0.0002)
Number of observations	409,792	485,122	402,414	487,269
R-squared	0.200	0.166	0.258	0.122

Notes: The firm-export destination-HS eight-digit level observations are restricted only to those that appear after 2007 in. our dataset. Furthermore, we include only those in the first year of appearance in the dataset. The dependent variable is a dummy variable that takes the value one if the invoicing currency is THB and zero otherwise. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively. Parentheses contain the heteroscedasticity-consistent SE. All specifications include import country–year and HS six-digit code–year fixed effects. We estimate using the OLS method. Finished products are defined as items categorized into 112, 122, 41, 51, 52, 61, 62, or 63 in the BEC classification, while the rest are parts. In differentiating between high- and low-income countries, we follow the World Bank classification. Specifically, high-income countries include ABW, AND, ARE, ATG, AUS, AUT, BEL, BHR, BHS, BMU, BRB, BRN, CAN, CHE, CYM, CYP, CZE, DEU, DNK, ESP, EST, FIN, FRA, FRO, GBR, GNQ, GRC, GRL, HKG, HUN, IRL, ISL, ISR, ITA, JPN, KOR, KWT, LUX, MAC, MLT, MNP, NCL, NLD, NOR, NZL, OMN, PRI, PRT, PYF, QAT, SAU, SGP, SMR, SVK, SVN, SWE, TTO, TWN, and USA.