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Micro, macro, and strategic forces in international trade invoicing: Synthesis and novel patterns☆

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ABSTRACT

The currency used in invoicing international trade matters for the impact of exchange rate movements in the presence of price rigidities. We present stylized facts on specific macro, micro and other drivers of invoicing based on 45 million Canadian import transactions. Four main results emerge. First, a large share of invoicing takes place in "vehicle" currencies that are neither the exporters nor the importers. Second, we document a novel link between the size of individual transactions and invoicing. Both the absolute value of a transaction and its relative size at the industry level matter. Third, the exchange rate plays an important role along three dimensions: exchange rate volatility, exchange rate regime, and currency transaction volumes in foreign exchange markets. Finally, we confirm the role of the market share of an exporting country at the industry level. Our results identify the most salient patterns in order to guide further developments in theoretical models of invoicing currency choice.

1. Introduction

The currency in which exporters set the price of their goods – the so-called "invoicing" currency – is a central feature of international economics. It determines who among the exporter or the customer bears exchange rate risk and the extent to which movements in exchange rates affect the relative prices of internationally traded goods, and hence influence the pattern of balance of payments adjustment.[5] The literature has demonstrated a close parallel between the choice of the invoicing currency in which prices are fixed and the degree of pass-through of exchange rate movements into prices when these can be adjusted ex-post (Engel, 2006; Goldberg and Tille, 2008). An analysis of U.S. imports further shows that the firms which only partially adjust their prices when they get an opportunity to do so are also the ones which set prices in US dollars between adjustments (Gopinath, Itskhoki and Rigobon, 2010).

In this paper, we use a novel detailed dataset to provide a concise discussion of the importance of three broad categories of drivers of invoicing currency. The first category covers macro-level considerations, such as the need of producers to hedge against unforeseen

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[5] The relevance of invoicing in international transmission is made clear through several theoretical works. These include Obstfeld and Rogoff (1995), where producer currency pricing is assumed, Betts and Devereux (2000) and Devereux and Engel (2003) where local currency pricing is assumed, and Corsetti and Pesenti (2004) where intermediate rates of exchange rate pass-through into traded goods prices are permitted. Goldberg and Tille (2006) discuss the consequences of asymmetric practices across countries for respective patterns of trade balance adjustment to exchange rate movements.

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movements in marginal costs, for instance due to exchange rate volatility or the presence of imported inputs priced in foreign currencies, as discussed in the literature section below. The second category reflects microeconomic and structural industry features, such as the price-sensitivity of demand and exporters' market shares. The final set of drivers covers transaction-level considerations that can only be assessed through a disaggregated dataset such as ours. Our analysis draws on a new highly disaggregated dataset of all Canadian import transactions between February 2002 and February 2009 (44.5 million observations). Our data contain information on the currency used in the invoicing of individual import transactions, and thus allows us to contrast not only the use of the exporter's currency (the so-called "producer currency pricing" – PCP – option) and the use of the Canadian dollar (the "local currency pricing" – LCP – option), but also the use of third currencies (the "vehicle currency pricing" – VCP – option). Even though the U.S. dollar is predominantly used as the invoicing currency for imports from the United States, which account for a little more than half of total Canadian imports, the Canadian experience is instructive as there is substantial heterogeneity in the use of invoicing currencies in imports from other countries of origin. There also is considerable heterogeneity in the composition of both exporting countries and export composition.

We identify several characteristics with a sizable impact on invoicing. Our most novel result is a link between the size of individual transactions and invoicing, an aspect that can only be identified in disaggregated data. The link is twofold. First, the *absolute* size of the transaction matters, with transactions of higher value showing more use of the LCP option (controlling for other determinants). This pattern could reflect lower hedging costs for large transactions, leading exporters to shoulder more exchange rate risk. Second, the *relative* size of transactions at the industry level plays a role. Specifically, transactions that are in the top 5th value percentile in an industry show a substantially larger use of the LCP option.

Among macro-level determinants, we show that the exchange rate and currency regimes are important along three dimensions. First, exchange rate volatility matters, with a higher volatility of an exporter's currency against the Canadian dollar leading to higher VCP use at the expense of PCP. Second, a higher transaction volume in foreign exchange markets between a country's currency and the Canadian dollar raises the use of PCP at the expense of VCP. Third, exchange rate regimes matter. In the Canadian experience, exporters in countries with a currency pegged to the euro (but which are not members of the eurozone) make more use of the PCP option; while exporters in countries with a currency pegged to the US dollar predominantly use the VCP option, which corresponds to the US dollar. In terms of micro-level determinants, we confirm that the market share of an exporting country in an industry matters, with a higher export market share reducing the reliance on LCP, but also more surprisingly of PCP.

In addition to these main results, we also find evidence for other factors. The hedging properties of currency play tilt invoicing towards currencies that tend to appreciate when exporters' costs are higher. Among micro-level determinants, the price sensitivity of demand matters. Specifically, invoice currency choice coalesces more in industries where goods are more homogeneous, with coalescing forces strongest among major currencies such as the US dollar. The US dollar, the VCP option for imports from countries other than the United States, is also more readily used in industries where commodities are a larger share of inputs. This pattern of invoice currency use supports a hedging benefit as commodities are predominantly priced in US dollars. We also document a novel role of the structure of the buyer side of the market. Industries where the top ten importers account for a larger share of imports show a larger reliance on the LCP option at the expense of VCP. Finally our analysis provides some evidence that invoicing is affected by the extent of foreign ownership of Canadian firms in the industry, with a higher extent of foreign ownership reducing the use of VCP.[6]

The remainder of the paper is structured as follows. Section 2 offers a brief review of the determinants of invoicing identified in the literature, separating them in three groups, namely macro-level, micro-level, and transaction-level. The data are presented in Section 3, which also documents the main summary statistics of invoicing choices. In Section 4, we then assess how the empirical pattern lines up with the macro-level determinants. Section 5 assesses the strength of micro-level determinants, and the transaction-level determinants are considered in Section 6. For each category of determinants we discuss both the ones already identified in the literature and novel ones that emerge from our analysis. An econometric analysis is presented in Section 7, formally confirming the impact of the drivers. Section 8 concludes.

2. What is known about invoicing? A focused literature review

The determinants of currency invoicing are the object of a large and growing literature. In this section we provide a brief review of the main insights from theoretical and empirical studies as a background for our subsequent analysis of Canadian international trade data. We structure our discussion along three categories of determinants. The first covers macro-level determinants like the impact of macroeconomic conditions and policies (for instance exchange rate volatility). The second groups micro-level (or industry-level) determinants such as the features of specific sectors and markets (including the degree of differentiation across goods or the market shares of countries). The final one covers firm-level, or even transaction-level determinants. The analysis of this last category is a recent development of the literature, enabled by the growing availability of transaction-level data on international trade.

Several theoretical papers have analyzed the macro-level determinants. Devereux et al. (2004) stress the volatility of macroeconomic conditions in a model where it differs across countries. They show that exporters in all countries tilt their invoicing choice towards the currency of the country where macroeconomic fundamentals are more stable. More volatile macroeconomic conditions in an exporting country are likely to translate into a more volatile exchange rate. The co-movements of exchange rates and production costs also matters. When exporters want to stabilize their unit profit margins, they have an incentive to invoice sales in a foreign currency that appreciates when their own costs increase, thus obtaining a hedge of their cost. Another line of modeling focuses on transaction costs in exchange rate markets, as exporters can save on these costs when invoicing in a currency, such as the US dollar, that is broadly traded against other currencies in liquid markets (Portes and Rey, 1998). Devereux and Shi (2013) show that such transaction costs can lead some currency to take a prominent role given network externalities.

In terms of empirical evidence, Goldberg and Tille (2008) consider several determinants and find some evidence of the invoicing currency being used as a hedge for production costs, as well as of transaction costs considerations.[7] In an empirical analysis of Japanese exporters, Ito et al. (2010) find that hedging costs matter. Specifically, exporters are more likely to invoice in the destination currency when the cost of hedging the exchange rate risk through a forward contract is low.

Micro-level determinants capture drivers that arise more specifically from the conditions of the various industries. Friberg (1998) shows how the price-elasticity of demand and the marginal cost function impact the invoicing choice. Goldberg and Tille (2008) point to the "coalescing effect" arising from the degree to which different goods in the industry are substitutable with each other. In industries where goods are close substitutes (and thus the demand is very price elastic) an exporter

[6] The impact of ownership is however found to be significant in a formal regression analysis.

[7] Assessing the role of this determinant is an imprecise exercise as it requires building proxies to capture them.