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New evidence for exchange rate pass-through: Disaggregated trade data from local ports☆

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ABSTRACT

For the estimation of exchange rate pass-through (henceforth ERPT), except for some evidence based on firm-level data, even the most disaggregated level of national export data is still biased with aggregation over sub-regions within an exporting country. We investigate to what extent this aggregation within product category is biased by comparing ERPT estimates across local ports. We use monthly exports at the HS 9-digit level from January 1988 to December 2005 for five major Japanese ports. Using a panel data regression framework, we control for exporting industry and importing country. Statistical tests provide strong evidence that export prices are set at different levels across local ports and that they correspond differently with respect to fluctuations of exchange rates.

1. Introduction

Exchange rate pass-through (ERPT) measures the change in the price of traded goods corresponding to changes in the exchange rate. The empirical evidence for ERPT prior to the 1980s was based on aggregated data more focused on macroeconomic phenomena, such as domestic inflation. Since then, the seminal work by Dornbusch (1987) has suggested that several features of imperfect competition, namely the number of competitors, finite demand elasticity, and others, lead to incomplete pass-through. Krugman (1987), on the other hand, extrapolated the decades-old literature differently, suggesting that the same features affecting incomplete pass-through can explain the international price differentials arising from exchange rate fluctuations. This phenomenon has been termed "pricing-to-market." Enormous amounts of research, both theoretical and empirical, have since followed these studies.[1]

More recent empirical evidence is provided with more disaggregated data to incorporate the microeconsomic behavior of exporting firms. Takagi and Yoshida (2001) investigated the exchange rate pass-through of Japanese exports and imports to and from the Asian countries using HS (Harmonized Commodity Description and Coding System) 9-digit products, which constitute the most detailed international trade dataset of Japan. Gaulier, Lahrèche-Révil, and Méjean (2008) used the entire HS 6-digit product dataset and covered a broad range of exporting countries.

Some empirical research chooses to focus more on a particular market in order to emphasize the role of the exporting firms' price setting behaviors. Kadiyali (1997) used a structural econometric framework to study interacting effects of market structures and pricing strategies in the US photographic industry. Bernhofen and Xu (2000) examined the effect of market shares in an exporting market in the pass-through equation and found that German and Japanese firms exercised significant market power in the US petrochemical market.

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[1] See Goldberg and Knetter (1997) for a survey.

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However, apart from the occasional evidence based on firm-level data, even the most disaggregated level of HS trade data can still be suspected of aggregation bias within a category over exports of different firms, over differentiated products, and across local ports of the country. Although many researchers are well aware of this problem, no single empirical study has been carried out to investigate the bias of the most finely disaggregated datasets, such as the HS 9-digit code for Japan and the HS 10-digit code for the US, as this has been practically impossible.[2] Our study attempts to address this problem.

In this paper, we disaggregate Japanese exports at the HS 9-digit level further than has been previously done by breaking up national trade into port-level trade. We investigate the exchange rate pass-through of Japanese local-port international trade at the HS 9-digit level. The Ministry of Finance of Japan provides the trade statistics for each customs jurisdiction and international port.[3] We believe that investigations of port-level trade data at this disaggregation level are still few and far between, if they can be found at all, in the field of international economics.

Although there is growing evidence of heterogeneity in the exchange rate pass-through in terms of product categories, exporting countries, and importing countries (Knetter, 1993), it is still interesting to further investigate whether the exchange rate pass-through is homogeneous across local regions within an exporting country. We can expect to find heterogeneity in the exchange rate pass-through in local ports, even at the most disaggregated product level, if (1) competing companies choose different regions for their production of vertically differentiated products, or (2) a firm chooses to produce different quality models in different regions. In the empirical section, we formally test the null hypothesis of homogeneous pricing in Japanese ports. We find strong evidence that export prices are set at different levels in Japanese local ports and respond differently to exchange rate fluctuations, even when we control for the HS4 industries and importing countries. We emphasize the importance of our empirical evidence that production locations within a country, in addition to other factors already considered, are very important practical measures of product differentiations.

In the remainder of this paper, we present a simple model in the next section, describe the dataset structure (Section 3) and provide evidence of the heterogeneity of ERPT behaviors in local Japanese ports (Section 4). Section 5 provides a robustness check on the estimation methodology and discusses the possible underlying structures that may cause ERPT differentials across the different ports. The final section summarizes our findings.

2. The model for estimation

In this section, we present a simple model for an export price equation to estimate the exchange rate pass-through in a panel data model. We extend the empirical framework of the two-way fixed effect panel model used in Knetter (1989) and Takagi and Yoshida (2001). We pay particular attention to the estimated coefficients of local-port fixed effects, which may reflect a price differential due to heterogeneity among local ports.

Consider an exporting firm manufacturing product k located in region $j \in J$ within an exporting country.[4] After profit maximization, the exporter sets price (P_{ijkt}), in terms of exporter's currency, in a foreign country i on the basis of the demand conditions (D_{ijkt}), marginal cost (MC_{ijkt}) and the exchange rate (S_{it}), see Knetter (1989), Athukorala and Menon (1994), and Takagi and Yoshdia (2001).

$$P_{ijkt} = f\left(D_{ijkt}, MC_{ijkt}, S_{it}\right) \tag{1}$$

By restricting products to a narrowly defined industry, e.g., HS 4-digit industry, we assume that across-product variation in marginal cost is negligible. Therefore, marginal cost can be represented by time-variant region-importer specific marginal cost (MC_{ijt}), common for all products k belonging to the same industry. The demand conditions are assumed to be divided into three components: region specific demand condition (D_{ij}), product specific demand condition (D_{ik}), and time-variant demand condition for an industry (D_{it}). Note that there is no variation in (D_{ij}) if all exporters, regardless of regions, face the same demand conditions.

$$P_{ijkt} = f\left(D_{ij}, D_{ik}, D_{it}, MC_{ijt}, S_{it}\right) \tag{2}$$

By holding importing country fixed for a narrowly defined industry, the export price equation in log linear form is:

$$lnP_{jkt} = \alpha_j + \alpha_k + \lambda_t + \beta lnMC_{jt} + \gamma_j lnS_t + \varepsilon_{jkt} \tag{3}$$

where the regional dummies α_j, the product dummies α_k, and time effect λ_t are assumed to reflect the demand conditions.[5] The export price P_{jkt} for a HS 9-digit product k from a regional port j is set in Japanese yen at time t. The exchange rate, S_t, is the value of the importing country's currency in Japanese yen. So γ_j represents region-specific exchange rate pass-through elasticity and is equal to zero for the case of *complete* pass-through and one for the case of *no* pass-through. ε_{jkt} is a disturbance term.

[2] For example, Takagi and Yoshida (2001) investigate 11 Japanese HS 9-digit export products at the *national* level while Parsons and Sato (2008) cover for 27 export products. Banik and Biswas (2007) use cointegration techniques to analyze two US HS10 import products.

[3] Because original datasets are dispersed over eight hundred files for each custom jurisdiction, we had to reconstruct the local port international trade dataset.

[4] In this section we abuse the notation k to represent both regions and individual exporters.

[5] We should note that subscript i is deleted because importing country is fixed in each regression.