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Price dispersion across US districts of entry

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HIGHLIGHTS

- Markups explain about 31% of price dispersion.
- Marginal costs explain about 69% of price dispersion.
- Trade costs have no effects on price dispersion.

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ABSTRACT

Price dispersion of US imports are investigated across US districts of entry. Markups explain about 31% of price dispersion, while marginal costs of production explain about 69%; effects of trade costs, for which we have actual data, are almost none.

1. Introduction

In international economics, typical components of prices are marginal costs of production (excluding trade costs), markups, and trade costs. Therefore, decomposing prices into their components is the key in understanding the price dispersion across locations and thus the deviations from the Law of One Price (LOP).[1] However, this is not an easy task, since data for such components are mostly not available; this has led researchers to rather focus on the implications of economic models for estimating these components. For instance, in an influential study, Engel and Rogers (1996) have estimated the effects of trade barriers/costs on the price dispersion using variables such as distance and/or an international border and shown that such variables are highly significant in explaining the price dispersion across locations at the good-category level.

Using actual data on trade costs (i.e., cost, insurance, freight, and duties/tariffs), together with a simple model based on variable markups, this paper shows that marginal costs of production and markups are the main sources of variation in prices; the effects of trade costs are almost none. In particular, marginal costs of production explain about 69% and markups about 31% of the price dispersion of US imports across US districts of entry (i.e., the district in which merchandise clears customs) on average. The results are robust to the consideration of possible endogeneity problems, multiplicative versus additive trade costs (due to having actual data on trade costs), and measurement errors in prices. Therefore, studies that proxy the actual data on trade costs by distance/border effects may well be capturing any unmodeled part of preferences in utility functions, such as dyadic demand shifters, rather than actual trade costs. If preferences are the main source of trade barriers, policies aimed to increase welfare-improving trade would require more than just reducing duties/tariffs.

2. A simple model

We have a demand-side model where we distinguish between the utilities of importers located at different US districts of entry. In particular, a typical importer located at district d of entry in the

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[1] Isard (1977) is one of the earliest studies showing such deviations from LOP.

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US has the following utility U_d^g maximization out of consuming varieties of good g coming from different source countries, each denoted by s:

$$\max U_d^g = \sum_s \kappa_{ds}^g \left(1 - e^{-\alpha^g q_{ds}^g}\right) \tag{1}$$

where q_{ds}^g is the quantity traded, α^g is a good-specific parameter (to be connected to markups, below), and κ_{ds}^g represents preferences (i.e., demand shifters).[2] Maximization of this utility function results in the following demand function:

$$q_{ds}^g = \frac{E_d^g - \frac{1}{\alpha^g}\sum_{s'} \ln\left(\frac{p_{ds}^g \kappa_{ds'}^g}{p_{ds'}^g \kappa_{ds}^g}\right) p_{ds'}^g}{\sum_{s'} p_{ds'}^g} \tag{2}$$

where p_{ds}^g represents the price per unit of q_{ds}^g. Taking the demand function into account, source country s follows a pricing-to-market strategy by maximizing its profits given by:

$$\pi_{ds}^g = q_{ds}^g \left(p_{ds}^g - c_{ds}^g\right)$$

where c_{ds}^g represents marginal costs of exporting given by:

$$c_{ds}^g = w_s^g \tau_{ds}^g$$

where w_s^g represents source-specific marginal costs of production, and τ_{ds}^g represents trade costs. The profit maximization results in the following price expression:

$$p_{ds}^g = w_s^g \mu_{ds}^g \tau_{ds}^g \tag{3}$$

where $\mu_{ds}^g = \left(1 - \alpha^g q_{ds}^g\right)^{-1}$ represents gross variable markups (that change with quantity traded).

3. Data

The US imports data are from the US International Trade Commission (http://dataweb.usitc.gov/) covering imports from 232 source countries for 443 good categories[3] at the SITC 4-digit level measured at 41 US districts of entry (i.e., the districts in which merchandise clears customs)[4] for the most recent year of 2012. The data set includes (i) customs value (quantity times price charged by exporters) measured at the dock of the source country, (ii) quantity traded, (iii) general import charges in values (i.e., the aggregate cost of all freight, insurance, and other charges incurred, excluding US import duties), and (iv) calculated duties in values (i.e., the estimated import duties collected based on the applicable rates of duty as shown in the Harmonized Tariff Schedule).

Overall trade costs in multiplicative terms are calculated by dividing the sum of general import charges and calculated duties by the customs value; this calculation methodology effectively converts any type of trade costs (either additive or multiplicative) into multiplicative terms. For robustness, overall trade costs are decomposed into duties/tariffs and freight-related costs; duties/tariffs are calculated by dividing the calculated duties by the customs value, while freight-related costs are calculated by dividing the general import charges (excluding duties/tariffs) by the customs value.

We calculate unit destination prices by dividing the sum of customs value, general import charges and calculated duties by the quantity traded. Two typical examples are the prices of a kilogram of coffee (with an SITC code 711) exported by Argentina and Brazil to the US where Chicago, IL and Miami, FL are the US districts of entry, respectively; in this particular example, we are interested in understanding the sources of price dispersion between Chicago, IL and Miami, FL regarding coffee prices. Since these unit prices are subject to measurement errors, for robustness, while decomposing the destination prices into their components below, we will consider only the fitted value of prices obtained by our empirical methodology.

4. Empirical methodology

We are interested in decomposing the destination prices p_{ds}^g into source-specific marginal costs of production w_s^g, markups μ_{ds}^g, and trade costs τ_{ds}^g. Accordingly, we consider the stochastic version of Eq. (2) to estimate the key parameter α^g at the good level (that we need to obtain implied markups):

$$\underbrace{q_{ds}^g}_{\text{Quantity Traded}} = \underbrace{\left(\frac{E_d^g + \frac{1}{\alpha^g}\sum_{s'} \ln\left(p_{ds'}^g\right) p_{ds'}^g}{\sum_{s'} p_{ds'}^g}\right)}_{\text{Destination-and-Good Fixed Effects}} - \underbrace{\frac{\ln p_{ds}^g}{\alpha^g}}_{\text{Prices}} + \underbrace{\frac{\ln \kappa_{ds}^g}{\alpha^g}}_{\text{Residuals}}$$

where we employ preferences as residuals (as in Yilmazkuday, 2012). However, since prices p_{ds}^g also depend on quantity traded q_{ds}^g according to Eq. (3) (due to markups), there is a potential endogeneity/simultaneity problem. Accordingly, we use two stage least squares (TSLS) as an estimation methodology, and estimate the reduced form of log destination prices in the first stage of TSLS estimation approximated by the following stochastic version of Eq. (3):

$$\underbrace{\ln p_{ds}^g - \frac{\ln \tau_{ds}^g}{2}}_{\text{Data on Prices and Trade Costs}} \approx \underbrace{\frac{\ln w_s^g}{2}}_{\text{Source-and-Good Fixed Effects}} + \underbrace{\left(\frac{\alpha^g E_d^g + \sum_{s'} \ln\left(p_{ds'}^g\right) p_{ds'}^g}{2\sum_{s'} p_{ds'}^g}\right)}_{\text{Destination-and-Good Fixed Effects}} + \underbrace{\frac{\ln \kappa_{ds}^g}{2}}_{\text{Residuals}} \tag{4}$$

where we have used $\ln \mu_{ds}^g \approx \alpha^g q_{ds}^g$ (for simplicity) in order to obtain a linear relationship between q_{ds}^g and $\ln p_{ds}^g$.[5] It is important to emphasize that preferences κ_{ds}^g's enter into the price expression as residuals; if κ_{ds}^g's depend on any source- or destination-specific measures, such as quality, these would be captured by source and destination fixed effects as well. However, any unmodeled dyadic demand shifter (at the good level), including any distance/border

[2] Behrens and Murata (2007) have shown that the type of this utility function, namely constant absolute risk aversion, implies variable markups. In the absence of actual data on trade costs, Yilmazkuday (2013) has used a similar utility function to investigate the deviations from LOP by including more structure on preferences; this paper deviates from Yilmazkuday (2013) by considering actual data on trade costs and source-specific marginal costs of production for the identification of markups versus marginal costs of production.

[3] These are the good categories for which we have at least 120 observations for a robust estimation at the good level. The complete list of good categories is available upon request.

[4] The list of districts of entry is as follows: Anchorage, AK; Baltimore, MD; Boston, MA; Buffalo, NY; Charleston, SC; Charlotte, NC; Chicago, IL; Cleveland, OH; Port of Portland, OR Fort Worth, TX; Detroit, MI; Duluth, MN; El Paso, TX; Great Falls, MT; Honolulu, HI; Houston, TX; Laredo, TX; Los Angeles, CA; Miami, FL; Milwaukee, WI; Minneapolis, MN; Mobile, AL; New Orleans, LA; New York, NY; Nogales, AZ; Norfolk, VA; Ogdensburg, NY; Pembina, ND; Philadelphia, PA; Port Arthur, TX; Portland, ME; Providence, RI; San Diego, CA; San Francisco, CA; San Juan, Puerto Rico Savannah, GA; Seattle, WA; St. Albans, VT; St. Louis, MO; Tampa, FL; Washington, DC.

[5] The fixed effects on the right hand side correspond to the instruments of TSLS.