Unexpected Pricing-To-Market In Goods Classified As Homogeneous

Valentina Rollo*

The Graduate Institute of International and Development Studies

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Abstract. This paper uses cross-country, firm-level, panel data to verify the widely used assumption that small open economies are price takers. By studying how exporters from Low Income Countries (LICs) adjust their prices according to their trade partner¶ characteristics, I show that even firms from LICs conduct pricing-to-market: they differentiate the free on board (fob) price of exports across markets. This finding shows that the small open economy assumption has not empirical evidence. Most importantly, in contrast to existing evidence, pricing-to-market is not confined to differentiated goods, and rather also applies to homogeneous goods. The disparate tastes across importing countries seem to be leading pricing-to-market in homogeneous goods exported by LICs, thus highlighting the importance of considering the demand side when studying pricing-to-market.

Keywords: *unit values, pricing-to-market, firm level data, variable demand elasticity of substitution.*

JEL Classification: F1, C33

1. Introduction

The variation of export prices across destinations was first defined by Krugman (1986) as pricing-to-market. This paper relates ɫ µ˛ ª ° ¤± ¶ ³ µɈ ⁓±ª -to-° ¤µ® ⁀ · ·² ·« ¨ « ¨·¨µ²ª ª ±¨ ² ˛ ¶ ©µ° ¶ literature, and more specifically to the strand of research that analyses price adjustments to identify firm level quality or productivity competition - rather than adjustments to exchange rate shocks. The empirical literature suggests that adjustments actually do happen and that more investigation is needed to better explain the patterns observed across different countries.[2] Most studies in this literature (with the exception of a recent background paper by Asprilla *et al*, 2014) try to identify evidence of price differentiation in middle- to high-income countries, with a focus on the manufacturing sector. My paper expands on this literature by focusing on a group of Low Income Countries (LICs), and includes all products, rather than only manufacturing products.

The question of if and how exporting firms in LICs conduct pricing-to-market has so far rece7ETB2948

recently, empirical work on the pricing behavior of LI˝ ¶ ¨»³²µ¨µ¶ By accessing this disaggregated information, This study explores the pricing behavior of firms across destinations and further examines whether the observed patterns are ¨§ ¥¼« ¨·¨µ²ª ¨·±¨¬¼²© ·¤¶¨¨ s ¤¦µ²¶¶ destinations. This analysis

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2. Theoretical underpinnings and previous findings

2.1. Testable hypothesis

The main challenge in studies of price discrimination is the difficulty to discern mark-ups from market specific costs. To this end, I use the free on board (fob) unit value of each shipment in the dataset.[3] '«¶¸±¬¹¤¯¸¨¶«²¸¯§¥¨¶¨±¤¶·«˙˙@µ°ªµ˙³µ╎˙²©«˙˙»³²µ˙§·µ¤±¶¤¦·⁻²± not including the costs for shipping, handling, storage, marketing, or the tariff paid in the final destination. Hence, the analysis is conducted under the assumption that this price should only include the mark-up applied by the firm and its marginal cost. In addition, the nature of the data (in terms of disaggregation) allows me to assume that each product exported by a firm is of a specific variety or quality. Consequently the marginal cost of a product sold by a firm remains unchanged across destinations and I can relate price discrimination to the different demand elasticities across destinations, in the absence of product-quality or production-cost differences.[4]

Profit-maximization[5] for a representative firm implies the

(1)   N   I

which yields the pricing equation:

$$(2) \qquad L_{Ùã×ç} = \frac{à_{ÑÛß}}{5?5W_{ÑÛïß}}$$

where $L_{Ùã×ç}$ is the fob price of firm *f* 27Cice{074ETIat Tmda27Cic

As a consequence the only conclusion to be drawn is that pricing-to-market behavior differs across countries and export industries (Pall *et al* 2013).

The analysis undertaken in my work also relates to the more general literature that focuses on destination specific characteristics that should determine the variation in export prices (at product or firm level) across destinations. These destination characteristics range from distance (Hummels and Skiba, 2004; Baldwin and Harrigan, 2011; Martin, 2012), to income (Hummels and Klenow, 2005; Hallak, 2006; Bastos and Silva, 2010; Khandelwal, 2010; Hallak and Schott, 2011), trade costs (Feenstra, 1989; Kreinin, 1961; Mallick and Marques, 2007; Atkeson and Burstein, 2008; and Yu, 2010) and even income inequality (Fajgelbaum *et al*, 2011; Bekkers *et al*, 2012; Flash and Janeba 2013).

Moreover, the use of firm level data relates this paper to the heterogeneous firms literature, where different models predict constant or variable prices across destinations. Depending on the type of competition that characterizes the market, it is possible to classify the main models explaining firm heterogeneous performance as:

1. price competition models: Melitz (2003) and Melitz and Ottaviano (2008), where better performing firms are characterized by higher productivity and lower marginal costs; and

2. quality competition models: Baldwin and Harrigan (2011), Antoniades (2008), and Fajgelbaum, Grossman, and Helpman (2011), where the quality dimension enters the model to explain why bigger and more productive exporters pay higher wages, use better inputs and have marginal costs increasing in quality.

In terms of price heterogeneity across destinations, in both price (Melitz, 2008) and quality (Baldwin and Harrigan, 2011) competition models that assume constant elasticity of substitution (CES) demand, all firms charge a constant mark-up over variable cost in every market. As a consequence, the fob price charged by a firm is determined only by marginal costs and not by the characteristics of the destination market. Melitz and Ottaviano (2008) modify the assumption of CES demand by including a linear demand and variable mark-ups. Therefore the fob price depends on the degree of competition and other characteristics of a destination

market: a firm might set different prices across destinations (pricing-to-market). The same linear demand is also included in Antoniades (2008), and Fajgelbaum *et al* (2011).[6]

Manova and Zhang (2012) is the main empirical reference for this paper. The authors analyze a custom database on Chinese firms and establish six stylized facts on the variation in export prices and imported-input prices across firms, products and trade-partner countries. The finding of relevance to this paper is the fifth stylized fact: across firms within a product, firms that serve more destinations set a wider range of export prices. Predominantly, this pattern is more pronounced for products with greater scope for quality differentiation. In my paper I confirm that the fifth stylized fact from Manova and Zhang (2012) holds in a larger group of countries. However, differently from these authors, I find that pricing-to-market is not different in homogeneous and differentiated goods. Pricing-to-market in homogeneous goods was already found in Rollo (2012) in a single-country study on Tanzania.

The distinction between differentiated and homogeneous goods is commonly used as a way to infer that pricing-to-market is led by quality attributes of exported goods. For this reason my paper also relates to the group of papers that look for evidence of quality differentiation, both across firms and across destinations. Looking at quality differentiation across firms, Hallak and Sivadasan (2008), and Iacovone and Javorcik (2008) find that exporting status and output prices are positively related. Crozet, Head, and Mayer (2009) find evidence that high-quality producers export to more markets, charge higher prices, and sell more in each market. Recent

3. Data and descriptive statistics

destination level. This proxy for price has been largely used in previous literature, as actual prices are typically not observed.[11]

With regard to the firm, value, quantity and prices are the only information available. The dataset is then merged with destination and product specific characteristics such as the Rauch classification[12] (to classify products as homogeneous and differentiated goods), and the import demand elasticity estimated by Kee, Nicita and Olarreaga (2008) - for 149 countries at the HS88 6-digit level averaged across the years 1988 2002.[13] Finally, I also merge the data with the World Bank classification of countries into Upper Middle Income Countries (UMICs), Lower Middle Income Countries (LMICs) and Low Income Countries (LICs).[14]

3.1. Features of the data

Before starting the econometric analysis, it is useful to look at the descriptive statistics

indicated by the fact that approximately one third of all firms export more than seventy per cent of exports.

Secondly, it is important to look at the variation in export prices across different dimensions. The first column of

classification, a dummy variable for product differentiation is built: it is one if the product falls into category (2) and zero otherwise. As per Table 4, in terms of share of total observations (first two columns), except for Yemen, the majority of shipments from all countries correspond to trade in differentiated goods. Nevertheless, a look at the number of exported products indicates that all countries (excluding Albania) export more homogeneous than differentiated goods. This confirms that homogeneous goods are an important component of exports in this group of countries. Moreover we have seen from Table 3 that price varies across destinations also in homogeneous goods, even though to a lower extent compared to differentiated goods. This justifies the fact that I do not drop homogeneous goods from the sample, as done in most of the literature dealing with pricing-to-market.

4. Empirical framework and testable hypothesis

4.1. Pricing-to-market

The testable hypothesis derived in Section 2.1 is that firms from LICs exporting a product p to multiple destinations d are expected to be price takers: not to charge different prices in different destinations, in respect of the law of one price. Since my variable of interest is the variation of prices across destinations, I focus on the standard deviation of price, rather than

observables and to have a stricter definition of within firm-product variation in prices.

$Q(\mathrm{sd}_p(H_{pd}))$

5.2. Heterogeneity of demand

Pricing-to-market can be led by

be sold at different prices. This can be due to the fact that exporters exploit the difference in tastes across countries, at least in the products where the country has a comparative advantage and in products where exporters can brand their products by (perceived) quality or market niches. Several other reasons might lead to this behavior (from market power arguments to destination specific characteristics), but the result of relevance is the further confirmation that the small open economy assumption has no empirical evidence.

6. Robustness

6.1. Controlling for compositional effects

A potential concern to my analysis arises from the use of data at HS 6-digit level, which precludes the possibility to control for measurement errors. More specifically, each HS 6-digit product may consist of many HS 8 digit products. Consequently, a change (for instance increase) in the unit value of a HS 6-digit code could be due to (i) a change in the composition of one underlying HS 8-digit product, or (ii) it could genuinely be a change (increase) in prices across all underlying products. To establish pricing-to-market, it is essential to focus on the second channel. Consequently, I reproduce the results from Table 5 and Table 7 for the Tanzanian dataset at the HS 8-digit level.[20] This explains the concerns expressed in Lavoie and Liu (2007), who examine the potential bias in pricing-to-market results when using unit values aggregating differentiated products. The authors argue that mo444.55 Tm1 0 0 1ncfenti9(e)-9( )-30 1 e pre di13

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A further concern relates to the possibility that my results on homogeneous goods depend on the way I ¦²±¶µ¸¦··«¨ %¤¸¦« §¸°°¼°«⊣« ¶¶²±¨ ©ª²²§¶¤µ¨¦¯¤¶¶©¨§ ¥¼%¤¸¦« ¤¶ differentiated, and zero otherwise. Accordingly, homogeneous goods include, by construction, both differentiated and reference goods. This is consistent with Manova and Zhang (2012). In order to be more specific about homogeneous goods, I could re-build the dummy by simply ignoring reference goods, so as to assign zero to strictly defined homogeneous goods. In other words, based on the Rauch classification (as per Section 3.1), a dummy variable for product differentiation is one if the product falls into category (2) and zero if it falls into category (1) - Category (3) is left out. Once again, as per Table 9, the main results hold. Within each country-firm-product triplet, if firms increase the number of destinations to which they export, their price dispersion across destinations increases. LMICs and LICs conduct pricing-to-market in homogeneous goods only when the taste dispersion across destinations is high.

7. Concluding remarks

The analysis presented in this paper contributes to the literature on pricing-to-market by testing the small open economy assumption: exporters from LICs are price takers and cannot conduct pricing-to-market. The

exploit market niches in countries where consumers are willing to pay more for products that satisfy specific quality characteristics.

Even though the results in this paper cannot provide a conclusive answer to the question of what is leading price dispersion for multiple-destinations exporters, they do provide evidence that even exporters in small LICs, which are normally viewed as price-takers, charge different prices for the same product across destinations. Several factors may contribute to this behavior, ranging from market power arguments to destination specific characteristics, but what is confirmed is that there is no empirical evidence backing up the small open economy assumption.

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Table 3: Variation in Export Prices

Across:	Firms, products, destinations, and years	Firms and destinations

Table 4: Proportion of differentiated and homogeneous products exported

Share of 85

Country

	Hom	Diff	Hom	Diff
Albania	17.39	82.61	29.69	70.31
Burkina Faso	41.36	58.64	54.07	45.93
Bulgaria	24.09	75.91	55.38	44.63
Jordan	37.46	62.5	86.11	13.89
Malawi	27.60	72.40	0.00	0.00
Peru	22.58	.42	5.28	24.72
Senegal	37.	2.49	5.00	25.00
Tanzania	36.9	3.01	5.29	14.71
Yemen	59.	4.85	3.33	1.67

Table 5: Pricing-to-market in homogeneous and differentiated goods

Panel A: All Countries

	firms (or time)				time			
Dependent variable: sd(log(price)) across destinations within a country firm product triplet								
Variation Across:	firms (or time)				time			
Within:	country-product				country-firm-product			
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ALL	ALL	Hom	Diff	ALL	ALL	Hom	Diff
log(nr dest by cfp)	0.046***	0.047***	0.047***	0.041***	0.081***	0.081***	0.080***	0.078***
	(0.002)	(0.003)	(0.003)	(0.003)	(0.005)	(0.007)	(0.007)	(0.007)
log(nr dest by cfp)*Diff		-0.006				-0.004		
		(0.005)				(0.010)		
FE	c-p	c-p	c-p	c-p	c-f-p	c-f-p	c-f-p	c-f-p
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	213605	204530	58076	146454	213605	204530	58076	146454
R-squared	0.266	0.253	0.283	0.227	0.747	0.743	0.716	0.746
f-p cluster	102628	97846	25072	72774	102628	97846	25072	72774

Panel B: Upper Middle Income Countries

	firms (or time)				time			
Dependent variable: sd(log(price)) across destinations within a country firm product triplet								
Variation Across:	firms (or time)				time			
Within:	country-product				country-firm-product			
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ALL	ALL	Hom	Diff	ALL	ALL	Hom	Diff
log(nr dest by cfp)	0.043***	0.045***	0.045***	0.041***	0.076***	0.074***	0.072***	0.075***
	(0.002)	(0.003)	(0.003)	(0.003)	(0.005)	(0.008)	(0.007)	(0.007)
log(nr dest by cfp)*Diff		-0.004				0.000		
		(0.005)				(0.010)		
FE	c-p	c-p	c-p	c-p	c-f-p	c-f-p	c-f-p	c-f-p
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	186,738	179,394	47,327	132,067	186,738	179,394	47,327	132,067
R-squared	0.221	0.220	0.268	0.190	0.737	0.736	0.708	0.739
f-p cluster	64707	64707	64707	64707	64707	64707	64707	64707

Panel C: Lower Middle Income & Low Income Countries

	Dependent variable: sd(log(price)) across destinations within a country firm product triplet							
Variation Across:	firms (or time)				time			
Within:	country-product				country-firm-product			
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All	All	Hom	Diff	All	All	Hom	Diff
log(nr dest by fp)	0.077***	0.059***	0.059***	0.042***	0.126***	0.125***	0.125***	0.105***
	(0.010)	(0.013)	(0.013)	(0.014)	(0.020)	(0.025)	(0.024)	(0.029)
log(nr dest by fp)*Diff		-0.016				-0.019		
		(0.019)				(0.038)		
FE	c-p	c-p	c-p	c-p	c-f-p	c-f-p	c-f-p	c-f-p
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	26,867	25,136	10,749	14,387	26,867	25,136	10,749	14,387
R-squared	0.404	0.374	0.322	0.365	0.776	0.768	0.738	0.769
f-p cluster	8067	8067	8067	8067	8067	8067	8067	8067

Robust se in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 6: Economic significance of correlations by country

Table 8: Tanzania data at 8 digits

Panel A: Pricing-to-market

	Dependent variable: sd(log(price)) across destinations within a country firm product triplet							
Variation Across:	firms (or time)				time			
Within:	country-product				country-firm-product			
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ALL	ALL	Hom	Diff	ALL	ALL	Hom	Diff
log(nr dest by cfp)	0.145***	0.066**	0.068***	0.088***	0.199***	0.153***	0.158***	0.139**
	(0.020)	(0.026)	(0.026)	(0.027)	(0.042)	(0.049)	(0.047)	(0.063)
log(nr dest by cfp)*Diff		0.023				-0.007		
		(0.037)				(0.076)		
FE	p	p	p	p	f-p	f-p	f-p	f-p
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	10,148	8,963	3,790	5,173	10,148	8,963	3,790	5,173
R-squared	0.359	0.324	0.304	0.306	0.744	0.737	0.723	0.734
f-p cluster	3067	3067	3067	3067	3067	3067	3067	3067

Panel B: Heterogeneity in taste across destinations

	Dependent variable: sd(log(price)) across destinations within a country firm product triplet							
Variation Across:	time							
Within:	country-firm-product							
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					Hom		Diff	
	Hom	Diff	Hom	Diff	Low sd	High sd	Low sd	High sd
log(nr dest by cfp)	0.048	0.274**	0.101	0.179**	0.119	0.172***	0.188**	0.078
	(0.102)	(0.108)	(0.065)	(0.073)	(0.074)	(0.061)	(0.074)	(0.094)
log(nr dest by cfp)*Q sd$_p$($\bar{}_{pd}$)	0.016	-0.027						
	(0.017)	(0.020)						
log(nr dest by cfp)*High sd$_p$($\bar{}_{pd}$)			0.080	-0.099				
			(0.085)	(0.113)				
FE	f-p	f-p	f-p	f-p	f-p	f-p	f-p	f-p
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	3,518	4,757	3,518	4,757	1,215	2,303	2,781	1,976
R-squared	0.709	0.728	0.709	0.728	0.694	0.719	0.744	0.697
f cluster	666	666	666	666	666	666	666	666

Robust se in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 9

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Appendix: Cleaning procedure

Appendix Table 1: Description of Variables Used

Name	Description		Mean	Std. Dev.
Dependent Variable				
$sd_{fpt} \log(price_{fpdt})$	Standard deviation of logarithm of fob price across destinations within a country firm product triplet		0.51	0.53
Correlated variable				
$\log(\text{nr of destinations}_{fpt})$	Logarithm of number of destinations served by a country-firm-product-year quartet	ALL	0.72	0.94
		UMICs	0.74	0.95
		LMICs & LICs	0.57	0.82
Interaction Variables				
Diff	Dummy variable indicating whether the good is differentiated or homogeneous (according to the Rauch classification)			
$Q\,sd_p(\bar{\tau}_{pd})$	Variable taking values between 1 and 10, indicating the decile of the $sd_p(\bar{\tau}_{pd})$ across product			
$HSDE_p$	Dummy variable indicating if a product' standard deviation of demand elasticity of substitution - across destinations - is above/below the median standard deviation			