nccr trade regulation
swiss national centre of competence in research

Working Paper No 2015/11 | May 2014

Pricing to Market as a Revelator of Policy-Induced Market Power

Alan Asprilla / Nicolas Berman / Olivier Cadot / Melise Jaud

This paper studies the determinants of pricing-to-market at the firm level on a sample of developing-country exporters, focusing on how it interacts with firm heterogeneity and trade policy. We use a large cross-country, firm-level panel with export values and quantities by product and destination for all exporting firms in 12 developing and emerging countries for several years. We find that firms in our sample do price to market, i.e. significantly adjust unit values in home currency to exchange-rate variations. The extent of pricing-to-market is quantitatively small but highly significant and homogenous across origin countries. We also find that large, high performance exporters price more to market than smaller ones. More importantly, we identify significant effects of trade policy instruments on pricing-to-market: Higher import tariffs are associated with less pricing to market, whereas non-tariff measures are associated with more. These results suggest that trade policy has deep effects on market power, the direction of which depends on the type of instrument used.

Research for this paper was funded by the Swiss National Science Foundation under a grant to the National Centre of Competence in Research on Trade Regulation, based at the World Trade Institute of the University of Bern, Switzerland.

1 Introduction

Although the idea that market power plays a strong role in determining pricing-to-market behaviour at the firm level goes back at least to Krugman (1986), it is only recently that research has provided evidence that large, productive firms with high market shares price more to market. This literature is however mostly limited to high-income countries, and there is still much to understand about the way in which market power and market structure affect pricing-to-market. We contribute to the literature in two main ways. First, we use the first large set of firm-level data covering several low- and middle-income countries and show that the literature's key results extend to that setting, with identification based on a powerful array of fixed effects. Second and more importantly, we study how trade policy, through its effect on market power, can affect the extent of pricing-to-market. Our results can be read backward: Assuming that differences in pricing-to-market mostly reflect differences in market power, they suggest that trade policy has deep effects on market power, and that those effects can go in opposite directions, depending on which policy instrument is used.

"Pricing to market" (PTM) by exporters has received much attention in the economics literature over the past twenty years. A primary concern of that literature has been to explain the lack of exchange-rate pass-through observed in aggregate data, what Obstfeld and Rogoff (2001) called the "exchange-rate disconnect". But the literature has generated new questions as well. For instance, as Burstein and Gopinath (2013) recently noted, the response of individual firms to exchange-rate and other shocks can say something about competition and market structure in their destination markets. We pursue this idea and explore how the variation of PTM across destination markets, within firms and products, can inform us about the competitive environment exporters face on those markets and, by implication, about the effects of trade policies on market structure.

What do we know about PTM? The term (Krugman, 1986) refers to a practice whereby firms react to bilateral exchange-rate shocks by adjusting their FOB export price in the home currency, creating wedges between domestic and export prices and between those across different destinations, rather than by passing through shocks to consumer prices. Theoretically, in a standard monopolistic-competition model, markups are constant and "mill pricing" applies, so there can be no PTM. However, several extensions of the standard model can generate PTM, essentially with two additional ingredients: variable markups and trade costs. Variable markups can be obtained through a number of ways.[1] Corsetti and Dedola (2005) show that the introduction of per-unit distribution in an otherwise standard monopolistic competition model is sufficient to generate PTM.[2] This is because distribution costs create a disconnection

[1] See Burstein and Gopinath (2013) for a more general discussion.

[2] Burstein, Neves and Rebelo (2003) and Goldberg and Campa (2010) also discuss the presence of distribution costs in local currency.

between producer and consumer prices, lowering the price elasticity of demand perceived by the firms, which generates PTM. Alternatively, non-CES preferences such as quadratic preferences *à la* Melitz and Ottaviano (2008) also allow for variable markups along a linear demand curve. Atkeson and Burstein (2008) propose another approach, followed by a number of subsequent papers (e.g. Amiti, Itskhoki and Koning, 2013, or Auer and Schoenle, 2013). Their model features a two-level demand structure characterized by a higher elasticity of substitution at the lower level, combined with oligopolistic competition (either Cournot or Bertrand with product differentiation) also at the lower level, i.e. within each sector. In this setting, the price elasticity of demand faced by each firm varies with its market share (crucially, it depends only on the two elasticities of substitution and the firm's own market share), making optimal markups variable.

All these frameworks thus generate PTM, the extent of which depends the firms's market share or productivity. Large firms face or perceive a lower elasticity of demand[3], which make their markups more responsive to exchange rate movements. This linkage between PTM and market share also appears as an empirical regularity.[4] Berman, Martin and Mayer (2012) use a combination of firm-level export and balance-sheet data to show that larger/more efficient exporters do more price pricing to market.[5] Amiti, Istkhoki and Koning (2013) show that large exporters are also large importers; as imported inputs dampen the effect of exchange-rate shocks on costs, large firms refrain from passing through exchange-rate shocks both because of market power and because of real hedging.

We study firm-level pricing-to-market using a very large, multi-country firm-level dataset obtained from customs administrations in 12 countries at widely different stages of development, ranging from low-income (Uganda) to OECD (Mexico). The ability to pool together firm-level data from several countries is a first and lends itself to a systematic exploration of the drivers of pricing to market. We find significant but limited pricing-to-market in all regions of the sample. Interestingly enough, we find that the average degree of PTM - how much export prices react to real exchange rate changes - is very similar across origin countries, even though these feature very different sizes and income per capita. Following a 10 percent exchange rate depreciation, firms increase their price by 0.8 to 1.5% depending on the country. We also find higher pricing-to-market in high and low income destinations markets, compared to middle income ones.[6] Finally, we show that pricing-to-market increases with various indicators of firm performance, and that this remains the case even after controlling for all country-pair-product-specific determinants of

[3]In the model with distribution costs, the reason is that for more efficient firms, the additive distribution cost creates a relatively larger wedge between producer and consumer prices (Berman, Martin and Mayer, 2012). In Atkeson and Burstein (2008) the relationship between market share and pricing-to-market is potentially non-monotonic in certain oligopoly configurations (Auer and Schoenle 2013).

[4]The analysis of the relationship between pass-through and firm size goes back to the work of Feenstra, Gagnon and Knetter (1996). See also Alessandria (2004) and Garetto (2012).

[5]See Chatterjee, Dix-Carneiro and Vichyanon (2013) and Li, Ma, Xu and Xiong (2012) for similar evidence using respectively Brazilian and Chinese data.

[6]High distribution costs in high-income markets may explain why PTM appears empirically strong on those markets (see e.g. Fosse 2012).

pricing-to-market.

If size and market power affects pricing-to-market at the firm-level, we expect changes in market structure to play an important role as well. We focus here on the effects of trade-policy instruments on market structure, using the reaction of firms to exchange-rate shocks as the identification device. One essential difference between tariffs and non-tariff measures is that the former apply only to imports whereas the latter, when in compliance with the WTO's "national treatment" clause (Article III of the GATT and the SPS and TBT agreements), must apply equally to imported and domestically-produced products.[7] This creates sharply different implications for market structure.

A tariff has two effects working at cross-purposes, one on the intensive margin and one on the extensive margin. At the intensive margin, the classic "rent-shifting effect" (Brander and Spencer, 1984) reduces the market share of foreign exporters on the domestic market; this, in the Atkeson-Burstein model, will reduce their incentive to engage in PTM.[8] At the extensive margin, the least efficient exporters exit; each time exit takes place, locally, market shares go up for all remaining competitors, raising their market power.[9] As the market share of exporters tends to zero when tariffs become prohibitive, the negative effect at the intensive margin must dominate the positive effect at the extensive one.

By contrast, nondiscriminatory NTMs in the form of sanitary or technical regulations raise the costs of all producers, including domestic ones, by the same amount (the compliance cost). As costs rise, the equilibrium shifts along the industry demand curve while preserving the market shares of individual firms, which, under CES preferences, leaves the price elasticity facing each firm unchanged. Thus, the intensive-margin effect is neutralized. Only the extensive-margin effect is left, which raises the market power of remaining producers as the least efficient ones exit.

All in all, we expect tariffs to be associated with less PTM and non-tariff measures by more, provided that they are non-discriminatory (if they are not, they act like tariffs). We find strong support for these predictions using data on 6-digit bilateral applied tariffs and non-tariff barriers: controlling for firm-level indicators of performance, we find that firms adjust less their prices following exchange rate movements in markets where tariffs are high or NTMs are

[7] We will leave aside the case of quantitative restrictions, as those have largely been phased out, and focus on regulations, either sanitary or technical, of which there is a plethora in high-income countries.

[8] A similar result is obtained in models with distribution costs or with linear demand: increasing tariffs act exactly as a market-specific reduction in productivity and size, which increases demand elasticity and reduces PTM.

[9] The crucial property of the Atkeson-Burstein model that the perceived price elasticity of demand depends only on a firm's own market share and not on the distribution of other firms' market shares means that intensive and extensive-margin effects play exactly in the same way, as the number of competitors does not matter in itself. If a foreign exporter exits, all other firms will gain market share. Therefore, with a finite number of competitors, in the neighborhood of an exit threshold, the effect of a tariff rise on PTM will be unambiguously positive. By contrast, between two exit thresholds, a tariff rise will raise the domestic producers' market share at the expense of foreign exporters, thus reducing the incentive to engage in PTM for the latter.

low. These results support the idea that market power is an important driver of PTM. More specifically, both the firm-specific component of market power, related to firms' performance, and the market-specific one, related to market structure, importantly affect PTM. Again, these results can be read backward: The fact that PTM greatly differs across markets characterized by different tariff and non-tariff barriers suggests that trade policy has deep effects on market power. While the argument that trade policy affects competition is an old one, there is to this day little firm-level evidence of how it does so and, in particular, how the effects of different trade-policy instruments play out. Our results suggest that useful information can be generated in this regard from the analysis of exporter adjustment to exchange-rate fluctuations.

2 Data and empirical methodology

2.1 Data

Our dataset combines three main types of information: (i) firm-level data on trade flows; (ii) macroeconomic data; (iii) trade policy variables.

Firm-level trade data

Our data was obtained from the Customs administrations of twelve countries : Bangladesh, Chile, Jordan, Kenya, Kuwait, Lebanon, Mexico, Morocco, Rwanda, Tanzania, Uganda and Yemen. It includes all export transactions over a number of years (see Table 1) with, for each transaction, a firm identifier, a date (indicating month and year), the transaction's destination country, the product's HS code (at country-specific HS8-equivalent levels), the transaction value in local currency, and a host of other variables of lesser interest for this paper. We aggregate the data by year. For each firm-destination-product-year, unit values are computed as the ratio of export value to quantity (expressed in kilograms). We clean the data in a number of ways. First, for both unit values and export volumes, we drop the observations belonging to the top and bottom percentiles in terms of levels and growth rate, percentiles being computed by origin country and sector (HS2). Second, we keep only flows over a thousand USD.

Table 1 gives basic information on our final sample size and sample periods, by origin country. The dataset is dominated by four large origins, Bangladesh, Chile, Mexico and Morocco, in terms of transactions (both total and yearly) and number of firms. All origin countries have diversified destination portfolios, and the total number of HS6 products exported in one year or another ranges between 126 (Rwanda) and 5,607 (Mexico), out of a notional total of about nearly 6,000 HS6 lines. Sub-Saharan African firms are less diversified on average in terms of both number of destinations and products.

Table 1: Sample characteristics

Country	Period	# observations	Obs./year	# firms	# dest.	# products	dest./firm	prod./firm
Bangladesh	2006-11	128,600	21914	7487	159	1030	10.7	8.1
Chile	2004-09	205,839	34674	6526	157	3120	15.8	9.7
Jordan	2004-11	22,490	3085	2074	141	1142	9.9	5.1
Kenya	2006-11	42,753	7800	2921	138	2296	9.4	15.2
Kuwait	2009-10	4,602	2311	814	73	941	7.4	22.9
Lebanon	2009-10	30,261	15134	2508	133	1692	11.9	33.3
Mexico	2001-09	587,539	86919	48619	157	5607	8.9	23.7
Morocco	2003-10	125,302	15693	6295	152	2374	8.3	12.4
Rwanda	2006-11	769	149	229	41	126	6.1	3.2
Tanzania	2006-11	7,083	1334	987	99	775	7.8	6.6
Uganda	2005-11	6,294	1005	709	81	635	7.7	6.4
Yemen	2007-10	2,186	737	425	59	285	8.8	15.7

Country-level variables

Exchange rates vis-a-vis the U.S. dollar are from the IMF's International Financial Statistics (IFS) and are deflated by consumer price indices to obtain real exchange rates (RER). They are all expressed in local currency units (LCU) per dollar in the IFS. Let e_o and e_d be respectively the origin and destination countries' exchange rates in LCU per dollar, and p_o and p_d their consumer price indices. Our bilateral exchange-rate variable, in logs, is thus[10]

$$\ln(e_{od}) = \ln\left(\frac{e_o/p_o}{e_d/p_d}\right) = \ln\left(\frac{e_o}{e_d}\right) - \ln\left(\frac{p_o}{p_d}\right) \tag{1}$$

Finally, GDPs are from the World Bank's World Development Indicators (WDI).

Trade protection

We use data on both tariff and non tariff barriers. For tariffs, we use data on MFN and preferential tariffs at the HS6 level from TRAINS, from which we deduce the applied tariff. For each country-pair and product, we use the average tariffs over the period. This is because the tariff data contains many missing values, but also because we are interested in how PTM varies across markets with different tariffs, rather than on the effect of tariffs by themselves.

For non-tariff barriers, we use ad-valorem equivalents (AVEs) estimated in Cadot and Gourdon (2014), to which we refer the reader for details. The source data was collected as part of an ongoing joint project of UNCTAD and the World Bank which currently covers 37 countries (counting the EU as one). The raw data consists of binary indicators by product (at the six-digit level of the Harmonized System) and by type of measure. Measures are coded according to the

[10]In our baseline estimations, we have dropped country-pairs for which bilateral real exchange rates display extreme variations (generally countries with hyperinflation). This limits measurement errors but only drops 0.07 percent of total trade value.

MAST classification revised in 2012. As our regressor for NTMs is constructed, our results may be affected by attenuation bias.

Table 2 shows descriptive statistics for the variables used in the regressions. Unsurprisingly, trade-policy variables have the largest proportion of missing values. Our final sample contains around 82,000 firms, exporting a median of 14 (8-digits) products to 7 destinations.

Table 2: Descriptive statistics

	Obs.	Mean	S.D.	Q1	Median	Q3
Volume (weigth in kg)	1163718	172544	3.00	626	4942	37950
ln volume	1163718	8.41	3.00	6.44	8.51	10.54
Unit value (domestic currency)	1163718	100636.30	241E+05	45.54	282.20	1307.06
ln unit value	1163718	5.58	2.52	3.82	5.64	7.18
Number of products (firm, t0)	1163718	90.98	263.65	5.00	14.00	40.00
ln number of products	1163718	2.78	1.67	1.61	2.639057	3.69
Number of destinations (firm, t0)	1163718	17.22	28.21	2.00	7.00	19.00
ln number of destinations	1163718	1.92	1.39	.69	1.95	2.94
Real exchange rate	1132614	104.81	398.73	4.25	10.90	34.70
ln real exchange rate	1132614	2.09	2.78	1.45	2.39	3.55
GDP constant (2000)	1151479	4.45E+12	5.44E+12	8.55E+10	1.17E+12	1.18E+13
ln GDP	1151479	27.27	2.61	25.17	27.78	30.10
Bilateral distance	1163718	4788.91	3852.04	2060.27	3369.05	6621.32
ln distance	1163718	8.17	0.81	7.63	8.12	8.80
Foreign Import tariff	753925	5.14	13.73	0.00	0.27	6.00
ln (tariff/100+1)	753925	0.05	0.08	0.00	0.00	0.06
Non Tariff measure (AVE)	205232	0.07	0.29	0.00	0.00	0.07

2.2 Empirical methodology

We have three main objectives: (i) to estimate the extent of pricing-to-market at the firm-level across origin countries; (ii) to study the heterogeneity of this pricing-to-market across firms; and (iii) to assess the impact of different trade policy instruments on the degree of pricing-to-market. We now describe our methodology in details.

Baseline specification

Let us define the following indices: o is origin country, d is destination country, f is firm, p is product, and t is year. Let e_{odt} be the average real exchange rate between the origin and destination countries in year t and p_{fdpt} the producer price of product p exported by firm f to destination d at t, in country o's currency (proxied by unit value).[11] Let $\mathbf{x_{dt}}$ be a set of time-varying destination specific controls, including the destination's GDP. Finally, let δ_{ot} and δ_{fdp} be respectively origin-year and firm-product-destination fixed effects respectively. The baseline

[11] Origin subscripts can be omitted in the presence of firm subscripts given that firms in the sample are treated as if all country-level subsidiaries were independent entities.

estimation equation is:

$$\ln(p_{fpdt}) = \alpha \ln(e_{odt}) + \gamma \mathbf{x_{dt}} + \delta_{ot} + \delta_{fpd} + \varepsilon_{fdpt}. \quad (2)$$

The parameter estimate for α is expected to be positive in the presence of pricing-to-market: firms increase their export prices following a depreciation of the exchange rate. Equation (2) is estimated by OLS with robust standard errors clustered at the product-origin-destination-year level.[12] We will also estimate the equivalent of (2) on export volumes, i.e. replacing the left-hand side variable by the log of the quantity exported by firm f to country d in product p in year t. In this case we also expect the coefficient on $\ln(e_{odt})$ to be positive.

Firm heterogeneity

We expect firm size and productivity to affect positively pricing-to-market (Berman , Martin and Mayer, 2012, Amiti, Istkhoki and Koning, 2013). Unfortunately, while our database is very large, it is relatively poor in covariates as it contains no firm characteristics. Thus, the identification of the effects of firm productivity/size must rely on proxies. In the literature, product scope is the firm-level observable that correlates most closely, across firms, with productivity. However, within firms, both the theoretical literature (Bernard, Redding and Schott, 2011, Eckel and Neary 2010) and the empirical one (Chatterjee, Dix-Carneiro and Vichyanon, 2013) suggest that product scope is endogenous to the firm's environment. For instance, Bernard, Redding and Schott (2006) and Eckel and Neary (2010) show that firms optimally reduce product scope (focus on their core competencies) after a trade liberalization as a result of pro-competitive effects. The same pro-competitive effects can be expected from an appreciation of the exporter's currency. Other proxies for firm performance, such as total exports or the number of destinations served, are even more clearly endogenous to exchange-rate variations. Thus, we have a problem of collinearity between firm-size proxies and exchange rates, both on the right-hand side. We treat the problem in two ways: first, we use product scope, destinations served and total export values at the firm-level rather than the firm-destination or firm-product levels. Second and more importantly, we systematically use beginning-of-period values for each of those variables. Denoting by φ_{f0} the performance of a firm in $t = 0$, i.e. the first year it enters the dataset, we therefore estimate:

$$\ln(p_{fdpt}) = \alpha_0 \ln(e_{odt}) + \alpha_1 \ln(e_{odt})\varphi_{f0} + \gamma \mathbf{x_{dt}} + \delta_{ot} + \delta_{fdp} + \varepsilon_{fdpt} \quad (3)$$

where the non-interacted term φ_{f0} is absorbed by the fixed effects δ_{fdp}. Both α_1 are expected to be positive: high performance firms price more to market.

[12] Our main results are robust to clustering the standard errors at the firm or at the origin-destination-year levels.

Note that in principle, the coefficient α_1 could capture the effect of unobserved product, destination or origin specific characteristics correlated with firm size and affecting pricing to market. It might be the case, for instance, that high performance firms export on average to more remote markets or with higher distribution costs. To ensure that we indeed capture the role of firm's performance, and given the various dimensions of the dataset's dimension, we can go further than the existing literature and include in (3) origin-destination-product-year fixed effects:

$$\ln(p_{fdpt}) = \alpha_1 \ln(e_{odt}) \ln(\varphi_{f0}) + \gamma \mathbf{x_{dt}} + \delta_{odpt} + \delta_{fdp} + \varepsilon_{fdpt} \tag{4}$$

In this extremely demanding specification, α_1 unambiguously identifies the effect of firm characteristics on PTM, as all heterogeneity in PTM across products or destinations is controlled for by δ_{odpt}. The drawback of this specification is that we cannot identify the average effect of bilateral exchange-rate changes on changes in unit values anymore, as e_{odt} non-interacted is absorbed by the fixed effects δ_{odpt}.

Trade policy

As mentioned earlier, one of the main contributions of the our paper is to study how trade policy affect on pricing-to-market behavior. We have constructed proxies for both non-tariff and tariff barriers which are country-pair-product specific and time-invariant. We further include in (2) an interaction term between our trade policy measures and the exchange rate:

$$\ln(p_{fdpt}) = \alpha_0 \ln(e_{odt}) + \beta_1 \ln(e_{odt}) \ln(1 + t_{odp}) + \beta_2 \ln(e_{odt}) NTM_{dp} + \gamma \mathbf{x_{dt}} + \delta_{ot} + \delta_{fdp} + \varepsilon_{fdpt} \tag{5}$$

where t_{odp} is the average tariff imposed by destination country d on product p imported from origin o over the period, and NTM_{dp} the ad-valorem equivalent of non-tariff measures imposed by destination d on product p (NTMs are recorded in the raw data as "MFN", i.e. applying to all origin countries). We expect β_1 to be negative: an increase in import tariffs acts as an aggregate decrease in productivity, decreases the market share of all exporters of country o, and dampens PTM. Non-discriminatory non-tariff measures are expected to have the opposite effect: they decrease competition for incumbents, raise market power, and should therefore increase PTM ($\beta_2 > 0$).

3 Results

3.1 Pricing-to-market across countries

Table 3 presents baseline regression results for the whole sample (column (1)) and split by country or country groups (columns (2) to (7)). The dependent variable is the log of export unit values, and all regressions are estimated by OLS with firm-product-destination and origin-year fixed effects. The pricing-to-market coefficient is the coefficient on the log of the real bilateral exchange rate.

Table 3: Exchange rates and unit values

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep. var: ln(unit value)							
Exporting countries	All	Excl. Mexico	EAC	MENA	Bangladesh	Chile	Mexico
ln(RER)	0.136^a	0.128^a	0.124^c	0.088^a	0.126^a	0.129^a	0.144^a
	(0.011)	(0.012)	(0.067)	(0.030)	(0.028)	(0.014)	(0.022)
ln(dest. GDP)	0.053^a	-0.014	-0.193^b	-0.069^c	0.021	0.064^b	0.420^a
	(0.020)	(0.022)	(0.085)	(0.039)	(0.059)	(0.028)	(0.056)
Observations	1122970	562194	54686	181975	127600	197933	560776
Adj. R^2	0.042	0.090	0.088	0.072	0.216	0.054	0.006

^{c} significant at 10%; ^{b} significant at 5%; ^{a} significant at 1%. Robust standard errors, clustered by product-origin-destination-year in parentheses. All estimations include origin-year dummies and firm-product-destination fixed effects.

On the whole sample, the coefficient on the log of the bilateral RER is positive, significant, and quantitatively close to the estimates found by the literature on industrial and emerging countries, which typically lie between 0.05 and 0.2.[13] Therefore, despite the fact that we are considering less developed countries, we still find a degree of pricing to market which is very consistent with the results found on richer countries. Note however that our estimates, as the ones found by the literature, reflect limited pricing to market on average, and very high levels of pass-through into import price (around 85% to 90%). But these firm-level estimates might hide a great deal of heterogeneity, and aggregate pricing-to-market might be much higher if large firms adjust more their prices to exchange rate variations. We will indeed find strong evidence of this in the next subsection.

The second, perhaps surprising result is that the degree of pricing-to-market is very homogenous across origin countries: in all cases, the coefficient on exchange rate lies between 0.08 and 0.15. This might be an indication that the deep determinants of pricing-to-market are similar across countries. In particular, if exports are systematically concentrated in a few very large firms, and if firms react heterogeneously to exchange rates, we would mechanically expect to find low levels of pricing to market (small firms, which adjust less their prices, represent the majority of observations in our sample, which drives down the exchange rate coefficients).

The results are very similar when we further include product-year fixed effects, as shown in Table 10 in the appendix. Tables 9 and 11 in the appendix replicates the same estimations using export volumes as the dependent variable. We find positive and significant effects of exchange

[13] Around 0.1 in France (Berman et al., 2012); 0.2 in Belgium (Amiti et al., 2013) and Brazil (Chatterjee et al., 2013); 0.06 in China (Li et al., 2012); 0.05 in Italy (Bernard et al., 2013).

rate variations, although the coefficients are quantitatively limited. Differences across origin countries are slightly larger, but the coefficients are also less precisely estimated.

3.2 Firm heterogeneity and pricing-to-market

Tables 4 and 5 estimate specifications (3) and (4), which assess the heterogeneity of reactions to exchange rate variations across firms of different performance levels. Columns (1) to (3) focus on unit values, columns (4) to (6) on export volumes. We use three alternative measures of size: the number of products sold by the firm, the number of destinations it reaches and its total export value. All are taken at the beginning of the period (i.e. the first year we observe the firm in our data).

Table 4: Firm heterogeneity and pricing to market

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. var.		ln unit value			ln export volume	
ln(RER)	0.030^c	0.053^b	-0.229^a	0.567^a	0.865^a	1.668^a
	(0.018)	(0.027)	(0.073)	(0.044)	(0.059)	(0.148)
ln(dest. GDP)	0.061^a	0.055^a	0.054^a	1.356^a	1.367^a	1.380^a
	(0.020)	(0.020)	(0.020)	(0.051)	(0.052)	(0.051)
ln(RER) × ln(# product_{t0})	0.039^a			-0.148^a		
	(0.006)			(0.011)		
ln(RER) × ln(# dest_{t0})		0.031^a			-0.260^a	
		(0.009)			(0.019)	
ln (RER) × ln(export val_{t0})			0.023^a			-0.094^a
			(0.005)			(0.009)
Observations	1122970	1122970	1122968	1122970	1122970	1122968
Adj. R^2	0.042	0.042	0.042	0.077	0.077	0.077

[c] significant at 10%; [b] significant at 5%; [a] significant at 1%. Robust standard errors, clustered by product-origin-destination-year in parentheses. All estimations include origin-year dummies and firm-product-destination fixed effects.

The results shown in Table 4 clearly show that larger exporters react more than smaller ones in terms of prices, and less in terms of volumes, a result consistent with Berman, Martin and Mayer (2012) and Amiti, Istkhoki and Konings (2013). This result is robust to changes in the size proxy used. Quantitatively, the heterogeneity in adjustment is non-negligible: following a 10% depreciation of its home currency, a firm exporting only one product will raise its price on average by 0.4% only and its volume by 5.2% ; by contrast, a firm selling ten products will raise its price by 1.2%, three times more, and its volume by only 2%.

The main issue with Table 4 is that large firms might export specific products to specific destinations, which might be – for unobserved reasons – characterized by higher degrees of pricing-to-market. Given the structure and size of our dataset, we can go further than the existing literature and include origin-destination-product-year fixed effects. These will control for any heterogeneity in adjustment to exchange-rate variations across products or destinations.[14] Our interaction terms now capture differences in PTM between firms of different sizes, located in the same country and selling the same product to the same market in the same year. The results, shown in Table 5, are very robust. If anything, they are reinforced quantitatively.

Table 5: Firm heterogeneity and pricing to market: robustness

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. var.		ln unit value			ln export volume	
ln(RER) × ln(# product$_{t0}$)	0.056^a			-0.241^a		
	(0.013)			(0.025)		
ln(RER) × ln(# dest$_{t0}$)		0.084^a			-0.353^a	
		(0.019)			(0.041)	
ln(RER) × ln(export val$_{t0}$)			0.039^a			-0.130^a
			(0.009)			(0.020)
Observations	1132520	1132520	1132518	1132520	1132520	1132518
Origin-destination-product-year FE	Yes	Yes	Yes	Yes	Yes	Yes

^{c} significant at 10%; ^{b} significant at 5%; ^{a} significant at 1%. Robust standard errors, clustered by product-origin-destination-year in parentheses. All estimations include origin-year dummies and firm-product-destination fixed effects.

3.3 Pricing to market across destinations

Does pricing-to-market differ across destination countries? On one hand, if competition is tougher in high-income countries, we expect to observe less pricing-to-market. On the other hand, high-income countries might be characterized by larger distribution margins, which have been shown to be important determinants of pricing-to-market (Campa and Golberg, 2010, Corsetti and Dedola, 2005). We would also expect more pricing-to-market in high-income countries if PTM were increasing with quality and high-income markets demanded higher-quality products (Chen and Juvenal, 2014). Given these opposite forces, whether there should be more or less PTM in high-income countries is an empirical question, which we now test.

In Table 6, we interact the exchange-rate variable with dummies by destination-country income group: low income, lower-middle income, and upper-middle income, high income being the omitted category. The dimensions of our dataset allow us to include controls capturing adjustment heterogeneity across firms, destinations and products to ensure the we are indeed capturing destination-specific effects. We control for these sources of heterogeneity by including interactions between the exchange rate and exporter size in columns (2) to (4), between the

[14] Alternatively, we have included a set of interaction terms between the exchange rate variable and destination dummies, and between the exchange rate and product dummies. The results were similar.

Table 6: Pricing to market across destinations

Dep. var: ln unit value	(1)	(2)	(3)	(4)
ln(RER)	0.220[a]	0.116[a]		
	(0.017)	(0.022)		
ln(RER) × Upper middle income dest.	-0.104[a]	-0.114[a]	-0.131[a]	-0.142[a]
	(0.022)	(0.022)	(0.023)	(0.024)
ln(RER) × Lower middle income dest.	-0.313[a]	-0.316[a]	-0.327[a]	-0.334[a]
	(0.036)	(0.036)	(0.038)	(0.039)
ln(RER) × Low income dest.	-0.101	-0.107	-0.092	-0.107
	(0.067)	(0.067)	(0.078)	(0.075)
ln(dest. GDP)	0.052[a]	0.060[a]	0.062[a]	0.061[a]
	(0.020)	(0.020)	(0.020)	(0.020)
Additional interactions				
ln RER × firm size	No	Yes	Yes	Yes
ln RER × origin	No	No	Yes	Yes
ln RER × HS2	No	No	No	Yes
Observations	1122970	1122970	1122970	1122970
Adj. R^2	0.042	0.042	0.042	0.044

[c] significant at 10%; [b] significant at 5%; [a] significant at 1%. Robust standard errors, clustered by product-origin-destination-year in parentheses. All estimations include origin-year dummies and firm-product-destination fixed effects.

exchange rate and origin-country dummies in columns (3) and (4), and between the exchange rate and product dummies in column (4).

The results are stable across specifications: PTM is found to be non-monotonically related to income, with the lowest degree of PTM found in middle-income destinations. The high PTM found on high-income countries is consistent with the existing literature (e.g. Gaulier et al., 2008) and suggests that the forces of high distribution margins and/or higher-quality products seem to dominate the force of (presumably) stronger competition on high-income markets.

3.4 Trade policy and pricing to market

In this section, we test our predictions on the effect of trade policy on PTM. We interact the exchange rate variable with the applied tariff imposed by destination d on (HS6) product p imported from origin o in year t, and with the ad-valorem equivalent of non-tariff measures imposed by destination d on product p.[15] Table 7 displays the results. Columns (1) to (4) focus on tariffs, while columns (5) to (8) deal with NTMs. We control for various measures

[15] Whereas applied tariffs are specific to origin-destination dyads, most non-tariff measures, in particular SPS and TBT regulations, are imposed on an "MFN" basis, i.e. specific to a destination and not a dyad. For instance, a maximum residual level of pesticides in horticulture products applies to *all* imports, not just to imports from a particular country, and, unlike a tariff, will not be relaxed in the presence of a preferential trade agreement.

of firm performance in columns (2)-(4) and (6)-(8). Table 13 in the appendix includes both trade policy measures simultaneously (this decreases importantly the number of observations compared to tariff regressions, which is why we take Table 7 as our baseline) and also considers export volumes as an alternative dependent variable.

Table 7: Trade policy and pricing-to-market

Dep. var. ln unit values	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ln RER	0.171^a	0.005	0.007	-0.371^a	0.091^a	0.047	-0.217^a	-0.298^b
	(0.015)	(0.027)	(0.037)	(0.100)	(0.017)	(0.031)	(0.048)	(0.118)
ln(dest. GDP)	0.142^a	0.148^a	0.147^a	0.141^a	0.115^a	0.117^a	0.117^a	0.114^a
	(0.024)	(0.024)	(0.024)	(0.024)	(0.035)	(0.035)	(0.035)	(0.035)
ln RER × ln(tariff+1)	-0.727^a	-0.709^a	-0.752^a	-0.721^a				
	(0.111)	(0.112)	(0.112)	(0.112)				
ln RER × NTM AVE					0.239^a	0.239^a	0.265^a	0.238^a
					(0.041)	(0.041)	(0.041)	(0.040)
ln RER × ln(# product_{t0})		0.068^a				0.018		
		(0.010)				(0.012)		
ln RER × ln(# dest_{t0})			0.063^a				0.116^a	
			(0.013)				(0.016)	
ln RER × ln(export val_{t0})				0.034^a				0.024^a
				(0.006)				(0.007)
Observations	728841	728841	728841	728840	192390	192390	192390	192390
Adj. R^2	0.039	0.039	0.039	0.039	0.054	0.054	0.055	0.054

^{c} significant at 10%; ^{b} significant at 5%; ^{a} significant at 1%. Robust standard errors, clustered by product-origin-destination-year in parentheses. All estimations include origin-year dummies and firm-product-destination fixed effects.

We find strong support for our predictions: tariffs decrease the elasticity of prices to exchange rates (columns (1) to (4)), while non-tariff measures magnify pricing-to-market (columns (5) to (8)). These results are robust to controlling for firm size, and to the simultaneous inclusion of both policy measures (Table 13 in the appendix, columns (1) to (4)). Importantly, as shown in Table 12, they are also robust to the inclusion of additional interaction terms between the exchange rate and (i) destination group dummies (as in Table 6); (ii) origin country dummies; (iii) product dummies. This clearly suggests that we are identifying the effect of market-specific trade policy, rather than the role of other country- or product-specific determinants of pricing-to-market. Finally, turning to export volumes, they react in a symmetric way, being more elastic to exchange-rate changes when tariffs are high, and less elastic when NTMs are high; but the coefficient on our interaction terms is significant only in the case of tariffs.

Are these effects quantitative large? Faced with a 10% depreciation of his home currency, an exporter selling a product tariff-free in a given destination would raise his home-currency price by 1.7%. Faced with the same depreciation on a destination where he sold the same product with a 10% tariff, he would raise it by only 1.02%. When the tariff reaches 20-25%, there is no significant PTM left anymore. The effects are also significant, albeit smaller, in the case of NTMs: moving from zero to a 10% ad valorem equivalent raises the PTM elasticity by half, from 9% to 14%. Taking PTM as an indication of market power, these results suggest strong effects of trade policy on market structure.

We can go further and try to directly estimate the effect of trade policy instruments on PTM *through* variations in the firms' market share. We include in our baseline estimation (equation (4)) an interaction terms between the firm average market share in destination d, product p and the real exchange rate. Market shares are computed over total imports of destination d in product p, obtained from UN-COMTRADE. Ideally, we would like to include the entire market sales, including the sales of destination d itself, but we do not observe these. We further instrument this interaction term using interaction terms between the exchange rate and our two trade policy measures. We expect the firms with higher market shares (due to lower tariffs or higher non-tariff barriers) to adjust more their prices when exchange rate varies. Table 14 in the appendix shows that indeed, firm-destination-product specific market shares are positively correlated with NTMs and negatively with applied tariffs. Note that this exercise has a number of drawbacks. First, we cannot directly instrument the firm market share with trade policy instruments due to the inclusion of firm-destination-product fixed effects - only the interaction can be instrumented. Second, it is not clear how exactly market power should be measured, and in particular what is the relevant "market" to compute market share. Third, it is possible that our firm-level custom data and UN-COMTRADE data do not perfectly match, making the computation of market shares problematic. For all these reasons, we consider this exercise as a complement to our baseline results shown in Table 7.

Table 8 contains the results. In column (1), we simply include an interaction term between market share and the real exchange rate. The coefficient on this variable is positive as expected, but statistically significant at the 10 percent level only. Column (2) uses interaction terms between trade policy instruments and the real exchange rate as instrumental variables. We indeed find a positive and significant effect of market share on firm-market specific degree of pricing-to-market, when instrumented by trade policy. Column (3) uses product-destination rather than firm-product-destination specific market shares. The coefficients are more precisely estimated in this case, which was to be expected as trade policy instruments affect all exporters from a given origin country in a symmetric way. Note that in the first stage, only the interaction with tariffs is statistically significant. This might be due to the fact that tariffs vary more, as they are *de facto* bilateral, contrary to NTMs.

Table 8: Market share, trade policy and pricing to market

Dep. var: ln unit value	(1)	(2)	(3)
ln RER	-0.162^a	-0.559^a	-0.432^a
	(0.049)	(0.212)	(0.128)
ln(dest. GDP)	0.149^a	0.209^a	0.173^b
	(0.037)	(0.073)	(0.070)
ln RER × ln(# dest$_{t0}$)	0.101^a	0.109^a	0.070^c
	(0.016)	(0.030)	(0.040)
ln RER × market share$_{fdp}$	0.211^c	8.247^b	
	(0.122)	(4.042)	
ln RER × market share$_{odp}$			1.503^a
			(0.443)
First stage (dep. var.: ln RER × market share)			
ln RER × ln(tariff+1)		-0.078^a	-0.618^a
		(0.022)	(0.146)
ln RER × NTM AVE		0.001	0.091
		(0.010)	(0.097)
ln RER × ln(# dest$_{t0}$)		-0.001	0.024^c
		(0.002)	(0.013)
ln RER		0.052^a	0.197^a
		(0.004)	(0.016)
ln(dest. GDP)		-0.007^a	-0.012
		(0.002)	(0.008)
Observations	181540	127592	127053
Adj. R^2	0.052	-0.029	-0.007
F-stat excl. instruments	-	6.2	9.9

^{c} significant at 10%; ^{b} significant at 5%; ^{a} significant at 1%. Robust standard errors, clustered by product-origin-destination-year in parentheses. All estimations include origin-year dummies and firm-product-destination fixed effects. Similar results are obtained when including interactions with other firm-specific performance indicators or when excluding these controls.

4 Concluding remarks

Our objective in this paper was double. First, we set out to explore in some depth the determinants of pricing to market for a sample of developing-country exporters. Second, we proposed to put the PTM literature "on its head", starting from the assumption that PTM reflects market power and, based on that assumption, exploring how different trade-policy instruments affect market power using exporter adjustment to exchange-rate fluctuations as the identification mechanism. The size and dimensionality of our multi-country, firm-level dataset allowed us to filter out many confounding influences with a powerful array of fixed effects.

As to the first objective, we were able to confirm results obtained so far largely on industrial-country data in a more general setting and with a powerful identification. We found that developing-country exporters in our sample typically absorb about ten to fifteen percent of the effect of currency fluctuations, passing through the remaining 85-90%. There was surprisingly little variation in this split, even though our sample spanned several continents and included countries at different levels of development and integration in global value chains . Also in accordance with the literature, we found that, on the basis of various proxies for firm size (and hence performance), PTM clearly rises with exporter size. Quantitatively, the effect is sizable; for instance, in reaction to a given home-currency depreciation, a firm that exports ten products (overall) would raise its home-currency price three times more than one that exports a single product.

As to the second objective, we found that tariffs in a destination market reduce the extent of PTM by exporters selling on that destination market. This is in accordance with the rent-shifting effect of tariffs in traditional oligopoly theory. We found that non-tariff measures have the opposite effect, being associated with more PTM. This is again consistent with theory if non-tariff measures raise costs for all firms alike (domestic and foreign), inducing the exit of the smaller ones and consequently larger market shares (and market power) for those that stay.

While the argument that trade policy affects competition is an old one, there is to this day little firm-level evidence of how it does so and, in particular, how the effects of different trade-policy instruments play out. Our results suggest that useful information can be generated in this regard from the analysis of exporter adjustment to exchange-rate fluctuations.

5 References

Alessandria, George (2004), "International Deviations from the Law of One Price: The Role of Search Frictions and Market Share"; *International Economic Review* 45, 1263-1291.

Amiti, M., Istkhoki. O. and J. Koning (2013), "Importers, Exporters, and the exchange rate disconnect"; *American Economic Review* forthcoming.

Atkeson, Andrew, and A. Burstein (2008), "Trade Costs, Pricing-to-Market, and International Relative Prices"; *American Economic Review* 98, pp.1998-2031.

Auer, Raphael, and R. Schoenle (2013), "Market Structure and Exchange-Rate Pass-Through"; mimeo, Swiss National Bank and Brandeis University.

Berman, N., P. Martin and T. Mayer (2012), "How do Different Firms React to Exchange-rate Changes?"; *Quarterly Journal of Economics* 127, 437-492.

Bernard, A., and J.B. Jensen (1999) "Exceptional exporter performance: cause, effect, or both?"; *Journal of International Economics* 47, 1-25.

Bernard, A., S. Redding and P. Schott (2011), Multi-product Firms and Trade Liberalization", *Quarterly Journal of Economics* 126, 1271-1318.

Bernard, A., M. Grazzi and C. Tomasi (2013), "Intermediaries in International Trade: Margins of Trade and Export Flows", working paper.

Brander, James, and B. Spencer (1984), "Tariff Protection and Imperfect Competition"; in H. Kierzkowski, ed., Monopolistic competition and international trade; Oxford: Oxford University Press.

Burstein, A., and G. Gopinath (2014), "International Prices and Exchange Rates"; in Gita Gopinath, Elhanan Helpman and Kenneth Rogoff, eds., *Handbook of International Economics*, vol. IV; North Holland.

Burstein, A., J. Neves and S. Rebelo (2003), "Distribution costs and real exchange rate dynamics during exchange-rate-based stabilizations"; *Journal of Monetary Economics* 50, 1189-1214.

Cadot, Olivier; C. Carrere and V. Strauss-Kahn (2011), "Export Diversification: What's Behind the Hump?", *Review of Economics & Statistics* 93, 590-605.

Campa, Jose Manuel, and L. Goldberg (2005), "Exchange-Rate Pass Through into Import Prices"; *Review of Economics and Statistics* 87, 679-690.

Chatterjee, Arpita; R. Dix-Carneiro and J. Vichyanond (2013), "Multi-Product Firms and Exchange-Rate Fluctuations"; *American Economic Journal.*

Chen, N. and L. Juvenal, (2014), "Quality, trade and exchange rate pass-through", CEPR Discussion paper 9744.

Corsetti, G. & Dedola, L. (2005) "A macroeconomic model of international price discrimination," *Journal of International Economics* vol. 67(1), pages 129-155, September.

Eckel, Carsten, and J. Peter Neary (2010), "Multi-product Firms and Flexible Manufacturing in the Global Economy"; *Review of Economic Studies* 77, 188-217.

Engel, Charles (2003), "Expenditure Switching and Exchange-Rate Policy"; *NBER Macroeconomics Annual* 2002 17, 231-272.

Feenstra, Robert; J. Gagnon and M. Knetter (1996), "Market Share And Exchange-Rate Pass-Through In World Automobile Trade"; *Journal of International Economics* 40, 187-207.

Garetto, Stefania (2012), "Firms' Heterogeneity and Incomplete Pass-Through"; mimeo, Boston University.

Gaulier, G., A. Lahreche-Revil and I. Mejean (2008), "Exchange-rate pass-through at the product level", *Canadian Journal of Economics*, vol. 41(2), pages 425-449, May.

Goldberg, Linda, and M. Knetter (1997), "Goods Prices and Exchange Rates: What Have We Learned?"; *Journal of Economic Literature* 35, 1243-1272.

Goldberg, Linda and J. M. Campa (2010), "The Sensitivity of the CPI to Exchange Rates: Distribution Margins, Imported Inputs, and Trade Exposure"; *Review of Economics and Statistics* 92, 392-407.

Goldberg, Pinelopi Koujianou, and R. Hellerstein (2008), "A Structural Approach to Explaining Incomplete Exchange-Rate Pass-Through and Pricing-to-Market";*American Economic Review* 98, 423-29.

Gopinath, Gita, and R. Rigobon (2008), "Sticky Borders"; *Quarterly Journal of Economics* 123, 531-575.

Krugman, Paul (1986), "Pricing to Market when the Exchange Rate Changes"; NBER working paper 1926.

Li, H., H. Ma, Y. Xu and Y. Xiong (2012), "How do exchange rate movements affect Chinese exports? A firm-level investigation", mimeo, School of Economics and Management, Tsinghua University.

Obstfeld, Martin, and K. Rogoff (2001), "The Six Major Puzzles in International Macroeconomics: Is There a Common Cause?"; *NBER Macroeconomics Annual* 2000 15, 339-390.

Ottaviano, Gianmarco and M. Melitz (2008), "Market Size, Trade, and Productivity"; *Review of Economic Studies* 75, 295-316.

6 Appendix

Table 9: Exchange rates and export volume

Dep. var.: ln(export volume)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Exporting countries	All	Excl. Mexico	EAC	MENA	Bangladesh	Chile	Mexico
ln(RER)	0.161^a	0.192^a	-0.018	0.401^a	0.183^c	0.179^a	0.089^b
	(0.027)	(0.035)	(0.129)	(0.082)	(0.098)	(0.044)	(0.041)
ln(GDP)	1.387^a	1.216^a	1.479^a	1.320^a	1.143^a	1.086^a	2.250^a
	(0.052)	(0.058)	(0.200)	(0.098)	(0.179)	(0.080)	(0.105)
Observations	1122970	562194	54686	181975	127600	197933	560776
Adj R^2	0.076	0.027	0.017	0.045	0.028	0.007	0.142

^{c} significant at 10%; ^{b} significant at 5%; ^{a} significant at 1%. Robust standard errors, clustered by product-origin-destination-year in parentheses. All estimations include origin-year dummies and firm-product-destination fixed effects.

Table 10: Exchange rates and unit values, robustness

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep. var.: ln(unit value)							
Exporting countries	All	Excl. Mexico	EAC	MENA	Bangladesh	Chile	Mexico
ln(RER)	0.116^a	0.116^a	0.070	0.109^a	0.058^c	0.137^a	0.116^a
	(0.014)	(0.014)	(0.112)	(0.042)	(0.030)	(0.015)	(0.033)
ln(GDP dest.)	0.110^a	0.066^a	0.143	0.074	0.086	0.044	0.310^a
	(0.027)	(0.025)	(0.156)	(0.059)	(0.060)	(0.028)	(0.093)
Observations	1122982	562206	54698	181975	127600	197933	560776

^{c} significant at 10%; ^{b} significant at 5%; ^{a} significant at 1%. Robust standard errors, clustered by product-origin-destination-year in parentheses. All estimations include *origin-product-year* dummies and firm-product-destination fixed effects.

Table 11: Exchange rates and export volume, robustness

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep. var.: ln(export volume)							
Exporting countries	All	Excl. Mexico	EAC	MENA	Bangladesh	Chile	Mexico
ln(RER)	0.168^a	0.235^a	-0.061	0.429^a	0.262^c	0.181^a	0.046
	(0.040)	(0.049)	(0.196)	(0.117)	(0.141)	(0.059)	(0.064)
ln(GDP dest.)	1.322^a	1.146^a	0.185	0.824^a	1.861^a	1.222^a	2.035^a
	(0.083)	(0.086)	(0.308)	(0.150)	(0.276)	(0.111)	(0.186)
Observations	1122970	562194	54686	181975	127600	197933	560776

^{c} significant at 10%; ^{b} significant at 5%; ^{a} significant at 1%. Robust standard errors, clustered by product-origin-destination-year in parentheses. All estimations include *origin-product-year* dummies and firm-product-destination fixed effects.

Table 12: Pricing-to-market and trade policy: additional controls

Dep. var: ln unit value	(1)	(2)	(3)	(4)	(5)	(6)
ln(RER)	0.238^a			0.086		
	(0.039)			(0.053)		
ln(RER)×ln(1 + tariff)	-0.600^a	-0.586^a	-0.571^a			
	(0.170)	(0.177)	(0.182)			
ln(RER) × NTM AVE				0.215^a	0.211^a	0.145^b
				(0.058)	(0.058)	(0.072)
ln(dest. GDP)	0.136^a	0.145^a	0.135^a	0.131^b	0.133^b	0.131^b
	(0.038)	(0.038)	(0.038)	(0.052)	(0.052)	(0.052)
Additional interactions						
ln rer × destination group	Yes	Yes	Yes	Yes	Yes	Yes
ln rer × origin	No	Yes	Yes	No	Yes	Yes
ln rer × HS2	No	No	Yes	No	No	Yes
Observations	728853	728853	728853	192390	192390	192390
Adj. R^2	0.039	0.039	0.041	0.055	0.057	0.060

^{c} significant at 10%; ^{b} significant at 5%; ^{a} significant at 1%. Robust standard errors, clustered by product-origin-destination-year in parentheses. All estimations include origin-year dummies and firm-product-destination fixed effects.

Table 13: Trade policy and pricing to market: more robustness

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. var.		ln unit value				ln export volume		
ln(RER)	0.114^a	0.073^b	-0.184^a	-0.274^b	0.150^a	0.423^a	0.400^a	0.244
	(0.019)	(0.033)	(0.048)	(0.120)	(0.051)	(0.090)	(0.103)	(0.264)
ln(GDP dest.)	0.153^a	0.155^a	0.156^a	0.152^a	1.334^a	1.322^a	1.332^a	1.334^a
	(0.037)	(0.037)	(0.037)	(0.037)	(0.106)	(0.106)	(0.106)	(0.106)
ln(RER)×ln(1 + tariff)	-0.540^a	-0.529^a	-0.580^a	-0.526^a	0.879^b	0.809^b	0.913^b	0.875^b
	(0.156)	(0.156)	(0.157)	(0.155)	(0.409)	(0.410)	(0.410)	(0.408)
ln(RER) × NTM AVE	0.263^a	0.263^a	0.287^a	0.261^a	-0.165	-0.162	-0.185	-0.164
	(0.041)	(0.041)	(0.042)	(0.041)	(0.119)	(0.120)	(0.118)	(0.119)
ln(RER) × ln(# product_{t0})		0.017				-0.113^a		
		(0.013)				(0.028)		
ln rer × ln(# dest_{t0})			0.113^a				-0.094^a	
			(0.016)				(0.036)	
ln(RER) × ln(export val_{t0})				0.024^a				-0.006
				(0.007)				(0.017)
Observations	183478	183478	183478	183478	183478	183478	183478	183478
Adj. R^2	0.053	0.053	0.054	0.054	0.012	0.012	0.012	0.012

[c] significant at 10%; [b] significant at 5%; [a] significant at 1%. Robust standard errors, clustered by product-origin-destination-year in parentheses. All estimations include origin-year dummies and firm-product-destination fixed effects.

Table 14: Market share, trade policy and pricing to market

Dep. var: market share$_{fdpt}$	(1)	(2)	(3)
ln(1 + tariff)	-0.016^a	-0.017^a	-0.020^a
	(0.005)	(0.005)	(0.006)
NTM AVE	0.002	0.006^a	0.006^a
	(0.002)	(0.002)	(0.002)
Observations	189358	189358	189358
R^2	0.334	0.367	0.376
Product FE	Yes	Yes	Yes
Destination FE	No	Yes	No
Origin destination FE	No	No	Yes

^{c} significant at 10%; ^{b} significant at 5%; ^{a} significant at 1%. Robust standard errors, clustered by product-origin-destination-year in parentheses. All estimations include origin-year dummies and firm-product-destination fixed effects. Similar results are obtained when including interactions with other firm-specific performance indicators or when excluding these controls.