

Export Destinations and Input Prices: Evidence from Portugal

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Introduction

- ▶ There is mounting evidence of effects of exporting on firm behavior.
 - ▶ Productivity literature somewhat mixed (Clerides et al., 1998; Bernard and Jensen, 1999; Van Biesebroeck, 2005; De Loecker, 2007).
 - ▶ Evidence of effects on technology investments (Bustos, 2011; Lileeva and Trefler, 2010).
 - ▶ Evidence of effects on wages, ISO 9000 certification (Verhoogen, 2008).

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 - ▶ Evidence of effects on technology investments (Bustos, 2011; Lileeva and Trefler, 2010).
 - ▶ Evidence of effects on wages, ISO 9000 certification (Verhoogen, 2008).
- ▶ Important, not yet fully resolved questions:
 - ▶ Does the destination of exports matter?
 - ▶ If so, why?

Introduction (cont.)

- ▶ A common approach in the literature is to model effects of exporting as operating through scale effects (Yeaple, 2005; Bustos, 2011).
 - ▶ Increase in sales volume with export entry induces firms to pay fixed costs of technology, R&D etc.
 - ▶ Suggests exports *per se*, not destination characteristics, should matter.

Introduction (cont.)

- ▶ A common approach in the literature is to model effects of exporting as operating through scale effects (Yeaple, 2005; Bustos, 2011).
 - ▶ Increase in sales volume with export entry induces firms to pay fixed costs of technology, R&D etc.
 - ▶ Suggests exports *per se*, not destination characteristics, should matter.
- ▶ But there seems to be a robust within-firm-product correlation between prices and destination-market income:
 - ▶ Bastos and Silva (JIE, 2010): Portugal
 - ▶ Manova and Zhang (QJE, 2012): China
 - ▶ Martin (2010): France
 - ▶ Görg, Halpern and Muraközy (2010): Hungary

Introduction (cont.)

- ▶ Possible explanations for within firm-product price patterns:
 - ▶ Endogenous mark-ups: “pricing to market”
 - ▶ Differences in demand for quality: richer consumers more willing to pay for quality, firms raise quality of good sold to them (Linder, 1961; Hallak, 2006; Verhoogen, 2008).

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- ▶ Possible explanations for within firm-product price patterns:
 - ▶ Endogenous mark-ups: “pricing to market”
 - ▶ Differences in demand for quality: richer consumers more willing to pay for quality, firms raise quality of good sold to them (Linder, 1961; Hallak, 2006; Verhoogen, 2008).
- ▶ This paper:
 - ▶ Derives arguably distinctive implications of the quality story
 - ▶ Tests them in combination of customs and firm-level price data from Portugal.

Introduction (cont.)

- ▶ Difficulty: quality is unobserved. Literature has relied on accumulation of indirect evidence:
 - ▶ Some sectors sell large volumes at high prices, suggesting that goods are high-quality (Hummels and Klenow, 2005; Hallak and Schott, 2011; Khandelwal, 2010)
 - ▶ Larger plants in Colombia purchase more expensive material inputs (Kugler and Verhoogen, 2012)
 - ▶ Exporting more to the EU and the US induces Argentinian firms to pay higher average wages and employ more skilled labor (Brambilla et al, 2012)

Introduction (cont.)

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 - ▶ Use real-exchange-rate movements as instrument for export destination.
 - ▶ Look at effects of average destination income on prices of material inputs, within firms.
- ▶ Punchline: avg. destination income $\uparrow \Rightarrow$ input prices \uparrow
 - ▶ We interpret results as supportive of quality story.

Theory

- ▶ Goal: derive comparative-static predictions for how firm-level prices respond to real-exchange rate shocks, to guide empirical work.
- ▶ Draws on ideas from existing models:
 - ▶ Melitz (2003)
 - ▶ Kugler and Verhoogen (2012), variant 1: complementarity between firm capability and input quality in generating output quality.
 - ▶ Linder (1961), Hallak (2006), Verhoogen (2008): richer consumers more willing to pay for quality.

Theory (cont.)

- ▶ Three countries: Home (h), North (n), South (s)
 - ▶ i indexes production location
 - ▶ j indexes destination market

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 - ▶ i indexes production location
 - ▶ j indexes destination market
- ▶ Three sectors:
 - ▶ Homogeneous-good “outside” sector.
 - ▶ Freely traded, produced by all countries. Pins down wages, w_i .
 - ▶ Productivity in sector, hence wages, may vary across countries.
 - ▶ Intermediate-input sector
 - ▶ Perfectly competitive, but with quality differences.
 - ▶ Final-good sector
 - ▶ Monopolistic competition, heterogeneous firms, quality differences.

Theory (cont.)

- ▶ Representative consumer:

$$U_j = \left\{ \left[\int_{\omega \in \Omega_j} (q(\omega)^{\mu_j} x(\omega))^{\frac{\sigma-1}{\sigma}} d\omega \right]^{\frac{\sigma}{\sigma-1}} \right\}^{\beta} Z^{1-\beta} \quad (1)$$

- ▶ Z is consumption of homogeneous good.
- ▶ q is quality of variety ω , chosen by firms.
- ▶ μ_j is valuation of quality, differs across countries.
 - ▶ Assume $\mu_n > \mu_h > \mu_s > \frac{1}{2}$

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- ▶ Yields demand for each variety:

$$x_j(\omega) = \beta w_j L_j P_j^{\sigma-1} q(\omega)^{\mu_j(\sigma-1)} p(\omega)^{-\sigma}$$

- ▶ where $P_j := \left[\int_{\omega \in \Omega_j} \left(\frac{p(\omega)}{q(\omega)^{\mu_j}} \right)^{1-\sigma} d\omega \right]^{\frac{1}{1-\sigma}}$
- ▶ L_j is endowment of effective units of labor.

Theory (cont.)

- ▶ Intermediate-input sector:
 - ▶ Transforms unskilled labor into inputs of different qualities.
 - ▶ Can also be thought of as education sector, bundling labor units into skilled workers.
 - ▶ Production function:

$$F_I(\ell, c) = \frac{\ell}{c}$$

- ▶ ℓ is units of effective labor.
- ▶ c units of labor required to produce input of quality c .
- ▶ In equilibrium, $p_I(c) = w_I c$.

Theory (cont.)

- ▶ Final-good sector:
 - ▶ Firms pay investment $w_i f_e$ to get “capability” draw, λ
 - ▶ Pareto distribution: $G(\lambda) = 1 - \left(\frac{\lambda_m}{\lambda}\right)^k$, $0 < \lambda_m \leq \lambda$
 - ▶ Fixed cost: $w_i f_{ij} = w_i f$ for $i = j$, $= w_i f_x > w_i f$ for $i \neq j$.
 - ▶ Iceberg trade cost: $\tau_{ij} = \tau$ for $i \neq j$, $= 1$ for $i = j$.
 - ▶ Capability λ affects production costs: producing one unit of output requires $\frac{1}{\lambda^a}$ units of input.
 - ▶ Capability λ also affects quality of output:

$$q = \left[\frac{1}{2} (\lambda^b)^\theta + \frac{1}{2} (c^2)^\theta \right]^{\frac{1}{\theta}}$$

$\theta < 0 \Rightarrow$ complementarity between firm capability and input quality.

Theory (cont.)

- ▶ Solve first-order conditions for firm to obtain optimal output and input quality (and prices) for each market
- ▶ Key point: conditional on λ and entry, q , p_O , c , and p_I higher for goods sold to richer markets.

Theory (cont.)

- ▶ Solve first-order conditions for firm to obtain optimal output and input quality (and prices) for each market
- ▶ Key point: conditional on λ and entry, q , p_O , c , and p_I higher for goods sold to richer markets.
- ▶ Entry cut-offs pinned down by:
 - ▶ Zero-profit conditions for marginal firms
 - ▶ Free-entry condition (zero ex ante expected profit)

Theory (cont.)

- ▶ These can be solved explicitly for λ_{jj}^* , and λ_{ij}^* for $i \neq j$ can be inferred from them.
- ▶ Model “real-exchange-rate shock” as a shock to productivity in outside sector, which determines wage rate.
- ▶ Consider effect of changes in w_n around equilibrium with $w_n = w_h = w_s = 1$:

$$\begin{array}{ll} \frac{\partial \lambda_{nh}^*}{\partial w_n} > 0 & \frac{\partial \lambda_{ns}^*}{\partial w_n} > 0 \\ \frac{\partial \lambda_{hn}^*}{\partial w_n} < 0 & \frac{\partial \lambda_{sn}^*}{\partial w_n} < 0 \end{array}$$

Theory (cont.)

- ▶ Output on each production line varies inversely with cut-offs.

$$x_{ij}^*(\lambda) = \frac{r_{ij}^*(\lambda)}{p_{Oij}^*(\lambda)} = \frac{(\sigma - 1)f_{ij}}{w_i \tau_{ij} (2\mu_j - 1)^{-\frac{1}{2\theta}}} \frac{\lambda \zeta_j^{a - \frac{b}{2}}}{\lambda_{ij}^* \zeta_j}$$

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- ▶ The key observable is average input prices at the plant level:

$$\bar{p}_{l_h}^*(\lambda) = \sum_{j \in h, n, s} \left[\frac{x_{hj}^*(\lambda)}{x_{hh}^*(\lambda) + x_{hn}^*(\lambda) + x_{hs}^*(\lambda)} \right] p_{l_{hj}}^*(\lambda)$$

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- ▶ The comparative-static results on entry cutoffs imply:

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- ▶ Similarly for average output prices.

Data

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 - ▶ *Inquérito Anual à Produção Industrial (IAPI)* [Annual Survey of Industrial Production]: survey of prices of outputs and inputs of manufacturing firms.
 - ▶ In selected sectors, includes largest firms until 90% of sales are covered.
 - ▶ Available 1997-2005. Sample coverage reduced 2002-2005.

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 - ▶ In selected sectors, includes largest firms until 90% of sales are covered.
 - ▶ Available 1997-2005. Sample coverage reduced 2002-2005.
- ▶ Baseline estimates are for unbalanced panel composed of
 - ▶ 6,800-8,300 firms/year in 1997-2001
 - ▶ 2,300-3,900 firms/year in 2002-2005.

Estimation sample vs. all trading firms, 1997

	all exporters (1)	all importers (2)	estimation sample (3)
Exports per firm (millions 2000 euros)	1.75 (0.17)		4.97 (0.71)
Share of exports to richer nations	0.61 (0.00)		0.79 (0.01)
Number of export destinations	3.72 (0.05)		7.48 (0.14)
Number of export categories	8.42 (0.19)		9.78 (0.27)
Imports per firm (millions 2000 euros)		1.51 (0.07)	3.39 (0.37)
Share of imports from richer nations		0.88 (0.00)	0.89 (0.00)
Number of import source countries		3.65 (0.02)	5.57 (0.08)
Number of import categories		16.94 (0.23)	21.53 (0.64)
Fraction exporter			0.48
Fraction importer			0.49
Fraction exporter and importer			0.37
N (firms)	12557	20195	6816

Notes: Table reports averages across firms, weighting firms equally. First four rows are conditional on being an exporter (i.e. having positive exports), and second four rows are conditional on being an importer (i.e. having positive imports). Values of exports and imports in millions of 2000 euros. Standard errors of means in parentheses.

Estimation sample vs. all manufacturing, 2005

	all mfg. (1)	estimation sample (2)
Revenues (millions 2000 euros)	1.36 (0.15)	15.21 (2.63)
Employment	17.27 (0.94)	90.67 (6.04)
Avg. annual earnings (thous. 2000 euros)	7.06 (0.14)	9.99 (0.09)
Age of firm	15.74 (0.32)	21.51 (0.68)
Number of establishments in Portugal	1.17 (0.00)	1.53 (0.09)
Fraction exporter	0.15	0.59
Fraction importer	0.14	0.58
N (firms)	45031	2720

Notes: Table reports averages across firms, weighting firms equally. Values of sales and revenues (which are sales plus income from provision of subcontracting and other services) are in thousands of euros. Standard errors of means in parentheses. Estimation sample contains 2867 firms in 2005; a small number of firms could not be linked to the manufacturing census.

Main export destinations, 1997

	export rank (1)	export share (all exports) (2)	export share (estimation sample) (3)
A. Richer countries			
Germany	1	0.208	0.212
Spain	2	0.150	0.151
France	3	0.146	0.152
United Kingdom	4	0.125	0.131
Netherlands	5	0.051	0.055
Belgium-Luxemburg	6	0.046	0.052
United States	7	0.042	0.039
Italy	8	0.040	0.039
Sweden	9	0.022	0.019
Denmark	11	0.018	0.018
B. Poorer countries			
Angola	10	0.018	0.007
Brazil	14	0.010	0.009
Turkey	21	0.004	0.005
Cape Verde	24	0.004	0.002
Morocco	25	0.004	0.004
Russia	26	0.003	0.004
Hungary	27	0.003	0.003
South Africa	28	0.003	0.003
Chile	30	0.002	0.003
China	31	0.002	0.002

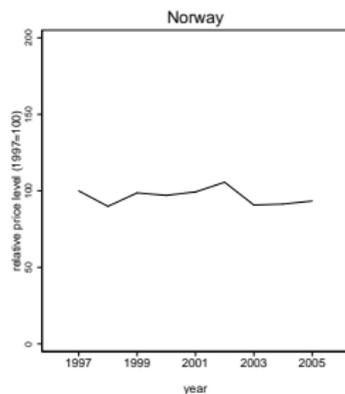
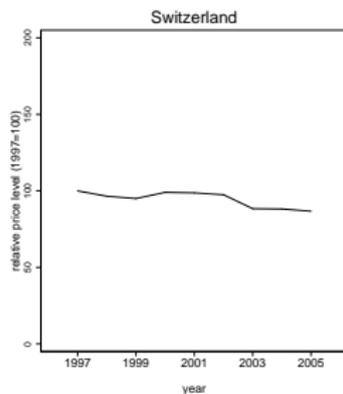
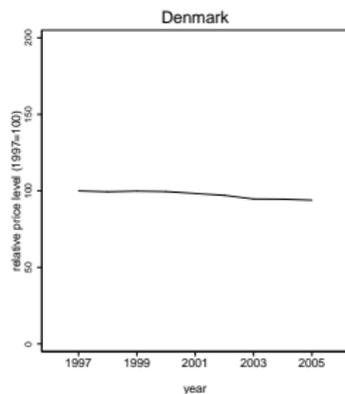
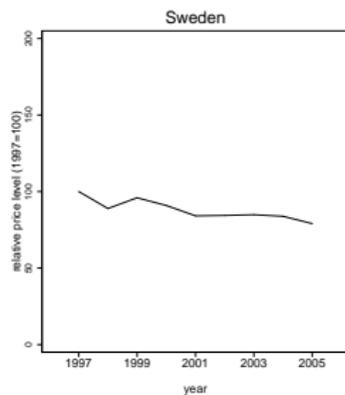
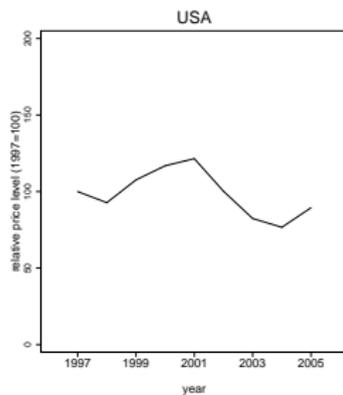
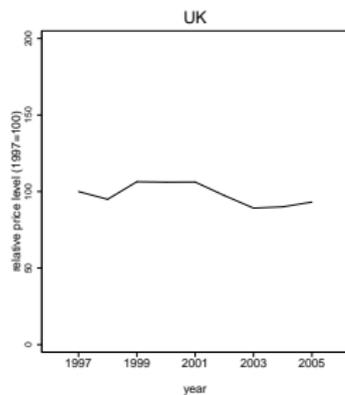
Notes: Poorer/richer based on 1996 GDP/capita. Export ranks based on all exports (not the estimation sample).

Main import sources, 1997

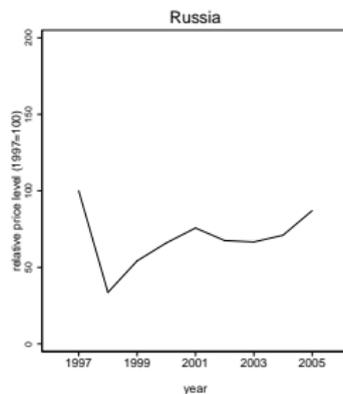
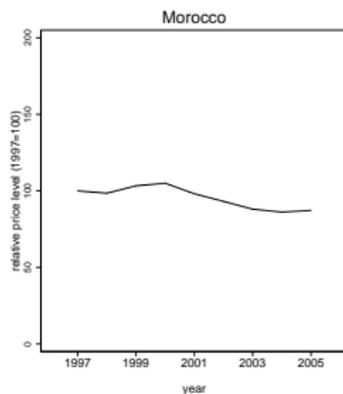
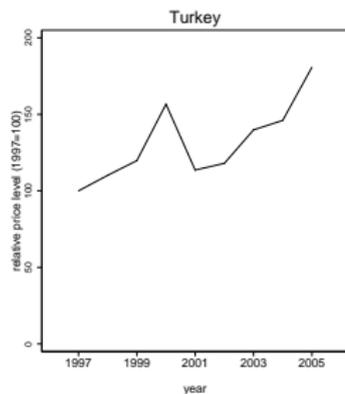
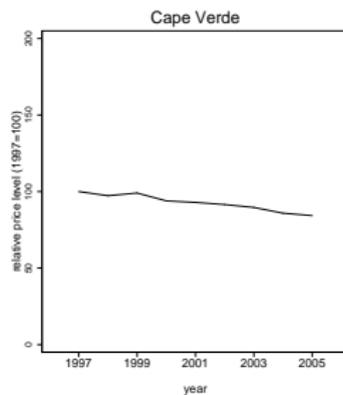
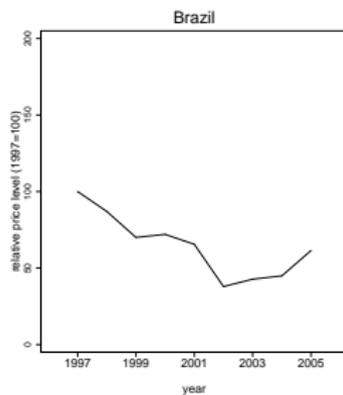
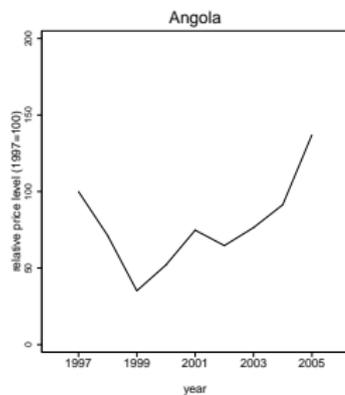
	import rank (1)	import share (all imports) (2)	import share (estimation sample) (3)
A. Richer countries			
Spain	1	0.252	0.229
Germany	2	0.162	0.211
France	3	0.116	0.122
Italy	4	0.087	0.064
United Kingdom	5	0.071	0.074
Netherlands	6	0.051	0.040
Belgium-Luxemburg	7	0.034	0.029
United States	8	0.032	0.025
Japan	9	0.026	0.029
Switzerland	11	0.013	0.008
B. Poorer countries			
Brazil	10	0.018	0.026
China	14	0.008	0.003
Russia	19	0.005	0.009
India	20	0.004	0.006
Thailand	21	0.004	0.002
South Africa	22	0.004	0.004
Turkey	23	0.003	0.003
Pakistan	25	0.003	0.004
Colombia	26	0.003	0.001
Malaysia	27	0.003	0.003

Notes: Countries poorer than Portugal (in 1996 GDP/capita) appear in italics. Import ranks based on all imports (not the estimation sample).

Relative Price Levels, Richer Non-Euro-Zone



Relative Price Levels, Poorer Non-Euro-Zone



Export prices and destination income, 1997

	dep. var.: firm-product log export price			
	(1)	(2)	(3)	(4)
richer than Portugal	0.11*** (0.03)	0.10*** (0.03)		
log GDP/cap.			0.03*** (0.01)	0.04*** (0.01)
log GDP	0.01 (0.00)	0.00 (0.00)	0.00 (0.01)	-0.00 (0.01)
European Union	0.04 (0.03)	0.01 (0.02)	0.06** (0.03)	0.02 (0.02)
landlocked	0.02 (0.03)	0.03 (0.02)	0.01 (0.03)	0.02 (0.02)
log distance	0.05*** (0.01)	0.05*** (0.01)	0.05*** (0.01)	0.05*** (0.01)
product effects	Y	N	Y	N
firm-product effects	N	Y	N	Y
R2	0.74	0.93	0.74	0.93
N	62814	62814	62814	62814

Import prices and source income, 1997

	dep. var.: firm-product log import price			
	(1)	(2)	(3)	(4)
richer than Portugal	0.60*** (0.11)	0.34*** (0.10)		
log GDP/cap.			0.23*** (0.03)	0.12*** (0.03)
log GDP	0.05*** (0.02)	0.01 (0.02)	0.05** (0.02)	0.01 (0.02)
European Union	-0.41*** (0.10)	-0.24** (0.10)	-0.34*** (0.08)	-0.21** (0.08)
landlocked	0.18*** (0.05)	-0.00 (0.07)	0.13*** (0.04)	-0.01 (0.06)
log distance	-0.06 (0.06)	-0.01 (0.07)	-0.04 (0.04)	-0.00 (0.06)
product effects	Y	N	Y	N
firm-product effects	N	Y	N	Y
R2	0.67	0.94	0.67	0.94
N	77430	77430	77430	77430

Empirical Approach

- ▶ Estimate firm-level average prices:

$$\ln p_{ikt} = \theta_{it} + \psi_{kt} + u_{ikt}$$

- ▶ firm i , product k , time t
- ▶ Recover coefficients on firm-year effects, $\hat{\theta}_{it}$. These represent firm-year-level average prices, deviating from product-year means.

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- ▶ firm i , product k , time t
 - ▶ Recover coefficients on firm-year effects, $\hat{\theta}_{it}$. These represent firm-year-level average prices, deviating from product-year means.
- ▶ Regress average prices on exporting variables:

$$\hat{\theta}_{it} = inc_{it}\beta_1 + X_{it}\beta_2 + a_i + b_t + \varepsilon_{it}$$

- ▶ inc_{it} is average destination income, including home market, using 1996 GDP/cap and current revenue shares.
- ▶ X_{it} includes export share and log total sales.
- ▶ a_i and b_t are firm and year effects.

Empirical Approach (cont.)

- ▶ Instrument for destination income (and possibly export share and log sales):

- ▶ For export destination j , define relative price level as:

$$e_{jt} = \log \left[\left(\frac{CPI_{jt}}{CPI_{Ht}} \right) / (\text{nominal exch. rate}) \right]$$

- ▶ This is the log of the reciprocal of the real exchange rate as usually defined.
 - ▶ Interact relative price level with 1997 revenue share for each destination:

$$e_{jt} * \left(\frac{R_{j,1997}}{\sum_{j' \in J} R_{j',1997}} \right)$$

- ▶ $R_{j,1997}$ is revenues from destination j in 1997.
 - ▶ Set of destinations, J , includes domestic market.
 - ▶ Limit to 100 destinations. Exclude interaction terms for euro-zone countries.

First stage

Instrument	log avg. dest. income				export share		log sales
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
United Kingdom	-0.07	-0.04	-0.06	-0.04	-0.07	-0.05	-0.94***
United States	0.02	0.03	0.02	0.03	-0.03	-0.04	0.14
Sweden	1.09***	0.87***	1.09***	0.87***	0.64**	0.62**	0.66
Angola	-0.11*	-0.12**	-0.11*	-0.12**	0.04*	0.04	0.09
Denmark	7.08***	4.71***	7.03***	4.71***	6.78***	6.64***	5.05
Switzerland	0.51	0.34	0.53	0.34	0.49	0.54	-1.77
Brazil	-0.54***	-0.58***	-0.54***	-0.58***	0.11	0.11	-0.18
Canada	0.41**	0.38**	0.41**	0.38**	0.09	0.08	0.46
Japan	0.42	0.36	0.41	0.36	0.18	0.17	0.62
Israel	0.63*	0.63**	0.65*	0.63**	0.00	0.05	-1.89*
Turkey	1.08	1.34*	1.08	1.34*	-0.74	-0.72	-0.45
Singapore	0.76	0.66	0.77	0.66	0.29	0.34	-1.51
Australia	-0.11	-0.15	-0.09	-0.15	0.12	0.17	-1.76
Cape Verde	0.13	0.17	0.15	0.17	-0.12	-0.08	-1.46
Morocco	2.47	2.04	2.41	2.04	1.21	1.05	5.69
Russia	-0.63***	-0.68***	-0.63***	-0.68***	0.15	0.14	0.48**
Hungary	7.91***	5.37***	7.83***	5.37***	7.24***	7.02***	7.72
South Africa	-0.21	-0.25*	-0.22	-0.25*	0.11	0.08	1.02
Hong Kong	1.16***	0.26	1.12***	0.26	2.58***	2.47***	3.95*
Chile	-0.04	-0.13	-0.04	-0.13	0.26	0.27	-0.05
export share of sales		0.35***		0.35***			
log sales			0.01***	0.00		0.03***	
firm effects	Y	Y	Y	Y	Y	Y	Y
year effects	Y	Y	Y	Y	Y	Y	Y
N	48002	48002	48002	48002	48002	48002	48002

Notes: Coefficient in first row is (1997 export revenues from UK/1997 total export + domestic revenues)*(relative price level in UK, current year). Robust standard errors in parentheses. *10% level, **5% level, ***1% level.

Avg destination income and output prices

	OLS			dep. var.: firm average log real output price					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log avg. destination gdp/cap	0.15*** (0.05)	0.12** (0.05)	0.12** (0.05)	0.67*** (0.23)	0.50** (0.22)	0.58*** (0.22)	0.51** (0.22)	0.59*** (0.22)	0.58** (0.23)
export share of sales		0.06 (0.04)	0.03 (0.04)		-0.07 (0.08)	0.83*** (0.27)	-0.10 (0.08)	0.81*** (0.28)	0.86*** (0.31)
log sales			0.06*** (0.01)				0.06*** (0.01)	0.04*** (0.01)	-0.04 (0.19)
firm effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
year effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	48002	48002	48002	48002	48002	48002	48002	48002	48002

Notes: Euro-zone countries excluded from instrument set. Export share treated as exogenous in Columns 5, 7; log sales as exogenous in Columns 7, 8. Robust standard errors in parentheses. *10% level, **5% level, ***1% level.

Avg dest income and input prices

	OLS			IV					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log avg. destination gdp/cap	0.08*** (0.02)	0.09*** (0.03)	0.09*** (0.03)	0.28* (0.15)	0.26** (0.13)	0.27** (0.14)	0.26** (0.13)	0.28** (0.14)	0.29** (0.14)
export share of sales		-0.02 (0.03)	-0.03 (0.03)		-0.08 (0.05)	0.09 (0.28)	-0.09* (0.05)	0.05 (0.28)	-0.05 (0.26)
log sales			0.03*** (0.01)				0.03*** (0.01)	0.02** (0.01)	0.18 (0.11)
firm effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
year effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	48002	48002	48002	48002	48002	48002	48002	48002	48002

Notes: Euro-zone countries excluded from instrument set. Export share treated as exogenous in Columns 5, 7; log sales as exogenous in Columns 7, 8. Robust standard errors in parentheses. *10% level, **5% level, ***1% level.

Robustness: input prices

	OLS			dep. var.: firm average log real input price					
	(1)	(2)	(3)	IV					
log avg. destination gdp/cap	0.08*** (0.02)	0.08*** (0.03)	0.08*** (0.03)	0.33** (0.15)	0.28** (0.14)	0.30** (0.15)	0.28** (0.14)	0.30** (0.14)	0.31** (0.15)
log avg. source gdp/cap	0.05** (0.02)	0.05** (0.02)	0.05** (0.02)	0.27*** (0.08)	0.27*** (0.08)	0.28*** (0.09)	0.27*** (0.09)	0.28*** (0.09)	0.30*** (0.09)
export share of sales		-0.02 (0.03)	-0.03 (0.03)		-0.09* (0.05)	0.17 (0.23)	-0.10* (0.05)	0.13 (0.23)	0.08 (0.23)
log sales			0.03*** (0.01)				0.03*** (0.01)	0.02** (0.01)	0.11 (0.07)
firm effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
year effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	48002	48002	48002	48002	48002	48002	48002	48002	48002

Notes: Euro-zone countries excluded from instrument set. Export share treated as exogenous in Columns 5, 7; log sales as exogenous in Columns 7, 8. Robust standard errors in parentheses. *10% level, **5% level, ***1% level.

Avg destination income and output prices, incl. eurozone insts

	dep. var.: firm average log real output price								
	OLS			IV					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log avg. destination gdp/cap	0.15*** (0.05)	0.12** (0.05)	0.12** (0.05)	1.39*** (0.24)	1.14*** (0.26)	0.93*** (0.21)	1.16*** (0.26)	0.93*** (0.21)	0.89*** (0.23)
export share of sales		0.06 (0.04)	0.03 (0.04)		-0.29*** (0.10)	1.41*** (0.28)	-0.33*** (0.10)	1.42*** (0.29)	1.51*** (0.31)
log sales			0.06*** (0.01)				0.06*** (0.01)	0.02 (0.01)	-0.16 (0.17)
firm effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
year effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	48002	48002	48002	48002	48002	48002	48002	48002	48002

Notes: Euro-zone countries excluded from instrument set. Export share treated as exogenous in Columns 5, 7; log sales as exogenous in Columns 7, 8. Robust standard errors in parentheses. *10% level, **5% level, ***1% level.

Avg dest income and input prices, incl. eurozone insts

	OLS			dep. var.: firm average log real input price					
	(1)	(2)	(3)	IV					
log avg. destination gdp/cap	0.08*** (0.02)	0.09*** (0.03)	0.09*** (0.03)	0.35*** (0.12)	0.37*** (0.12)	0.36*** (0.12)	0.38*** (0.12)	0.36*** (0.12)	0.40*** (0.13)
export share of sales		-0.02 (0.03)	-0.03 (0.03)		-0.12** (0.05)	-0.01 (0.21)	-0.13*** (0.05)	-0.04 (0.21)	-0.11 (0.20)
log sales			0.03*** (0.01)				0.03*** (0.01)	0.02*** (0.01)	0.17* (0.10)
firm effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
year effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	48002	48002	48002	48002	48002	48002	48002	48002	48002

Notes: Euro-zone countries excluded from instrument set. Export share treated as exogenous in Columns 5, 7; log sales as exogenous in Columns 7, 8. Robust standard errors in parentheses. *10% level, **5% level, ***1% level.

Robustness: input prices, incl. eurozone insts

	OLS			dep. var.: firm average log real input price IV					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log avg. destination gdp/cap	0.08*** (0.02)	0.08*** (0.03)	0.08*** (0.03)	0.28** (0.12)	0.31** (0.12)	0.30** (0.12)	0.31** (0.12)	0.31** (0.12)	0.33** (0.13)
log avg. source gdp/cap	0.05** (0.02)	0.05** (0.02)	0.05** (0.02)	0.32*** (0.08)	0.31*** (0.08)	0.32*** (0.09)	0.32*** (0.08)	0.32*** (0.09)	0.35*** (0.09)
export share of sales		-0.02 (0.03)	-0.03 (0.03)		-0.10** (0.05)	-0.04 (0.16)	-0.12** (0.05)	-0.08 (0.16)	-0.15 (0.17)
log sales			0.03*** (0.01)				0.03*** (0.01)	0.03*** (0.01)	0.12* (0.07)
firm effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
year effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	48002	48002	48002	48002	48002	48002	48002	48002	48002

Notes: Euro-zone countries excluded from instrument set. Export share treated as exogenous in Columns 5, 7; log sales as exogenous in Columns 7, 8. Robust standard errors in parentheses. *10% level, **5% level, ***1% level.

Falsification test: Avg dest income and energy input prices

	OLS			IV					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log avg. destination gdp/cap	-0.02 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.04 (0.12)	-0.08 (0.06)	-0.06 (0.09)	-0.08 (0.06)	-0.06 (0.08)	-0.05 (0.10)
export share of sales		-0.02 (0.02)	-0.01 (0.02)		0.01 (0.02)	0.20 (0.38)	0.01 (0.02)	0.21 (0.38)	0.17 (0.34)
log sales			-0.01** (0.00)				-0.01** (0.00)	-0.01 (0.01)	0.04 (0.08)
firm effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
year effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	44060	44060	44060	44060	44060	44060	44060	44060	44060

Notes: Euro-zone countries excluded from instrument set. Export share treated as exogenous in Columns 5, 7; log sales as exogenous in Columns 7, 8. Robust standard errors in parentheses. *10% level, **5% level, ***1% level.

Avg dest income and energy input prices, incl. source income

	OLS			dep. var.: firm average log real energy input price					
	(1)	(2)	(3)	IV					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log avg. destination gdp/cap	-0.02 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.03 (0.12)	-0.07 (0.06)	-0.06 (0.08)	-0.08 (0.06)	-0.06 (0.08)	-0.06 (0.08)
log avg. source gdp/cap	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.02 (0.04)	-0.02 (0.04)	-0.01 (0.05)	-0.02 (0.04)	-0.02 (0.05)	-0.02 (0.05)
export share of sales		-0.02 (0.02)	-0.01 (0.02)		0.01 (0.02)	0.18 (0.29)	0.01 (0.02)	0.19 (0.29)	0.19 (0.26)
log sales			-0.01** (0.00)				-0.01** (0.00)	-0.01 (0.01)	-0.00 (0.04)
firm effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
year effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	44060	44060	44060	44060	44060	44060	44060	44060	44060

Notes: Euro-zone countries excluded from instrument set. Export share treated as exogenous in Columns 5, 7; log sales as exogenous in Columns 7, 8. Robust standard errors in parentheses. *10% level, **5% level, ***1% level.

Conclusion

- ▶ Robust evidence that exogenous increases in average income of destination markets has positive effect on input prices paid by Portuguese firms.
- ▶ Paper is more evidence, admittedly still circumstantial, for quality story.
- ▶ N.B.: argument is that quality appears to be playing a role, not that pricing-to-market or scale effects are unimportant.

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