Export Destinations and Input Prices: Evidence from Portugal

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Preliminary

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"New Analytical Tools and Datasets": A View from Trade

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  - ▶ Product-level information in industrial censuses, surveys
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  - ▶ Trade transactions data: administrative records on each export sale, import purchase by firms.
    - ▶ World Bank trade group has collected from 30+ countries, including South Africa, Cameroon, Senegal, Nigeria, Niger, Uganda, Kenya, Tanzania, Pakistan, Cambodia, Mexico, Chile, Peru, Colombia, Costa Rica, [Rwanda].

Map from Freund & Pierola Oct. 2011 presentation
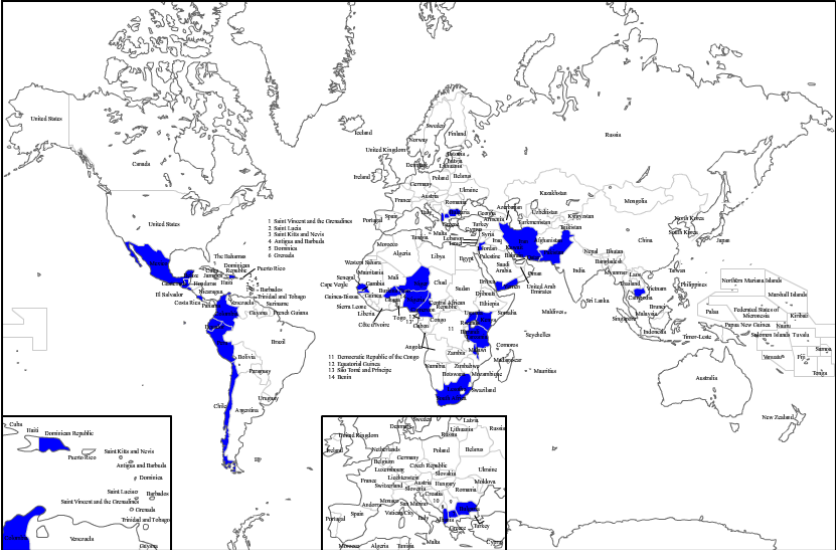
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  - Search and learning in export dynamics
    - Why do new firm-product exports to a market start small and then either exit or grow fast? (Eaton et al., 2009)

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- ▶ They provide a rich source of information for researchers in private enterprise development, even those uninterested in classic trade questions. (See next talk.)

- ▶ Lots of variation in tariffs, non-tariff barriers, exchange rates. Useful for identification, especially given that experiments hard to run in large firms.

A View from Trade (cont.)

- Caveat: analysis using only trade transactions may be misleading.
  - Firms that export and/or import are very different from those that do not.
  - Within firms, transactions that cross borders are different from those that do not.
    - Prices for exported outputs/imported inputs systematically higher than domestic outputs/inputs
  - Can be hard to generalize to domestic sales/purchases.

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    - ▶ Prices for exported outputs/imported inputs systematically higher than domestic outputs/inputs
  - ▶ Can be hard to generalize to domestic sales/purchases.
- ▶ Suggestion: focus on settings where trade-transactions data can be combined with detailed *domestic* firm-product level information.

This paper

- Uses combination of trade-transactions data and firm-level input and output price data from Portugal to provide further evidence on role of product quality.
- Motivating questions: does the destination of exports matter? If so, why?

This paper (cont.)

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    - Common theoretical approach: effects of exporting operate through scale effects (Yeaple, 2005; Bustos, 2011).
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        - Suggests exports *per se*, not destination characteristics, should matter.

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        - 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

This paper (cont.)

- ▶ Latter pattern is suggestive, but there is more than one possible explanation:
  - ▶ 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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- ▶ Difficulty in investigating second story: 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)
  - ▶ Plant-level facts (Kugler and Verhoogen, 2012):
    - ▶ Within product categories, larger plants charge higher prices for outputs. (Also consistent with mark-up story.)
    - ▶ Within product categories, larger plants also pay more for material inputs. (Harder to reconcile with mark-up story.)
    - ▶ Price-plant size correlations greater in sectors with greater scope for quality differentiation, as proxied by standard measure from Sutton (1998): R&D and advertising intensity.

This paper (cont.)

- ▶ Strategy of this paper:
    - ▶ Derive (arguably distinctive) within-firm prediction of the quality story: average destination income $\uparrow \Rightarrow$ input prices $\uparrow$
    - ▶ Use real-exchange-rate movements as instrument for export destination.

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  - ▶ Use real-exchange-rate movements as instrument for export destination.
- ▶ Punchline: results support quality story.

Related paper

- Brambilla, Lederman and Porto (forthcoming):
  - Brazilian devaluation generates exogenous variation in destination of exports for Argentinian firms.
  - Exports to rich countries lead to higher *wages*; exports per se do not.

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  - Brazilian devaluation generates exogenous variation in destination of exports for Argentinian firms.
  - Exports to rich countries lead to higher *wages*; exports per se do not.
- Value-added of current paper:
  - Have information on material inputs. Arguably less affected by institutional factors (e.g. collective bargaining).
  - For Argentina, income of destination is highly correlated with distance. For Portugal, correlation is reversed. Can better separate demand-for-quality and "shipping the good apples out" stories.

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  - Complementarity between firm capability and input quality in generating output quality (Kugler and Verhoogen, 2012).
  - Three countries, H, N, S, ranked by income. Consumers in richer countries more willing to pay for quality (Linder, 1961; Hallak, 2006; Verhoogen, 2008).
  - Three sectors:
    - Homogeneous-good "outside" sector to pin down wages.
    - Intermediate-input sector: perfectly competitive, but with quality differences.
    - Final-good sector: monopolistic competition, heterogeneous firms, quality differences.

Summary of theory (cont.)

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  - ▸ Conditional on plant capability, input quality, output quality, input price, output price increasing in income of destination market.
  - ▸ Positive shock to outside sector productivity and hence relative wage in N $\Rightarrow$ increase in average output prices, input prices in H firms.
  - ▸ Opposite for increase in relative wage in S.

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- Two main datasets:
  - Customs data on firm-level international trade transactions.
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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.
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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 firm-years appearing in both datasets.
  - ▶ Unbalanced panel
  - ▶ 3,000-3,500 firms/year in 1997-2001
  - ▶ 750-1,350 firms/year in 2002-2005.

Table 1: Summary statistics, firm-level data, 1997-2005

|	est. sample	all exporters	all manufact.
Exports per firm per year	6.33	1.65	
	(42.35)	(18.66)	
Export share of sales	0.47		
	(0.38)		
Number of export destinations, 2005	10.21	3.35	
	(10.75)	(5.29)	
Number of export categories, 2005	15.2	9.85	
	(23.15)	(27.5)	
Number of source countries, 2005	7.38	2.84	
	(6.49)	(4.34)	
Number of import categories, 2005	35.46	14.02	
	(60.54)	(40.08)	
Avg. earnings, 2005	9.44	9.25	5.54
	(4.1)	(28.19)	(22.91)
Employment, 2005	172.89	49.37	17.38
	(468.05)	(242.42)	(62.47)
Sales, 2005	27.49	6.3	1.24
	(200.27)	(70.35)	(31.83)
N (firm-year obs.)	17988	134655	45031
N (distinct firms)	3896	39865	45031

Table 2: Main export destinations, 1997

Exports	Full data (aggreg.) (1)	Est. sample (aggreg.) (2)	Est. sample (firm-level) (3)
Richer nations	**0.922**	**0.937**	**0.807**
Germany	0.206	0.221	0.109
Spain	0.148	0.146	0.187
France	0.145	0.147	0.146
UK	0.124	0.122	0.086
Netherlands	0.051	0.053	0.04
Belgium	0.046	0.051	0.027
US	0.042	0.045	0.051
Italy	0.039	0.039	0.023
Poorer nations	**0.078**	**0.063**	**0.193**
Angola	0.018	0.006	0.053
Brazil	0.01	0.009	0.023
Turkey	0.004	0.004	0.002
Cape Verde	0.004	0.002	0.025
Morroco	0.004	0.004	0.005
Russia	0.003	0.003	0.006
Hungary	0.003	0.003	0.002
South Africa	0.003	0.003	0.006

Table 2 (cont.): Main import source countries, 1997

Imports	Full data (aggreg.) (4)	Est. sample (aggreg.) (5)	Est. sample (firm-level) (6)
Richer nations	**0.907**	**0.888**	**0.891**
Spain	0.252	0.21	0.28
Germany	0.16	0.218	0.112
France	0.115	0.112	0.106
Italy	0.086	0.061	0.146
UK	0.073	0.071	0.058
Netherlands	0.05	0.036	0.000
Belgium	0.034	0.029	0.033
US	0.032	0.030	0.031
Poorer nations	**0.093**	**0.112**	**0.109**
Brazil	0.018	0.024	0.024
China	0.007	0.004	0.021
Russia	0.005	0.007	0.004
India	0.004	0.006	0.011
Thailand	0.004	0.002	0.002
South Africa	0.004	0.004	0.004
Turkey	0.003	0.003	0.004
Pakistan	0.003	0.002	0.009

Relative Price Levels, Top Richer Destinations (Non Euro Zone)
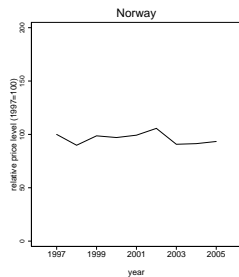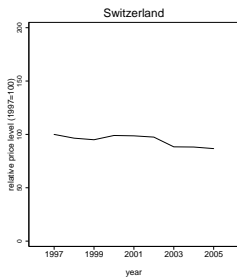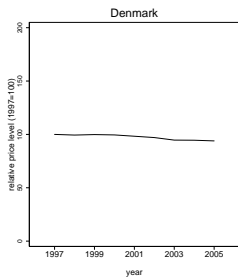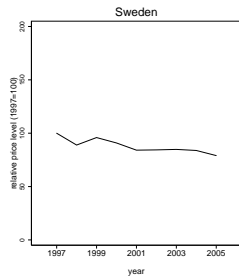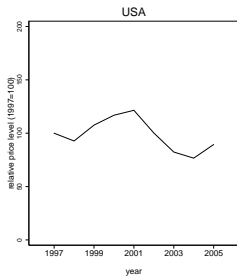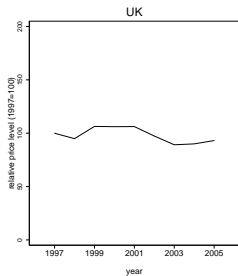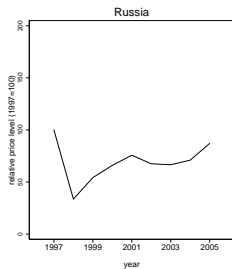
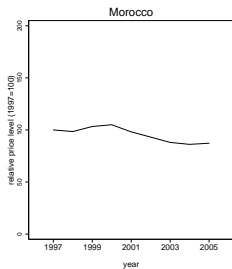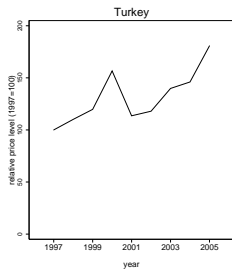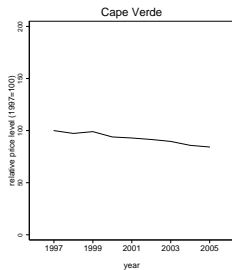# Relative Price Levels, Top Poorer Destinations
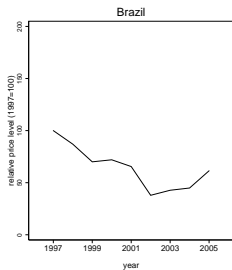
Table 3: Gravity and export prices, 1997

| | dep. var.: firm-product log export price | | | |
	(1)	(2)	(3)	(4)
richer than Portugal	0.09***	0.08***		
	(0.03)	(0.02)		
ln gdp per capita			0.03***	0.03***
			(0.01)	(0.01)
ln gdp	0.01	0.00	0.01	0.00
	(0.00)	(0.01)	(0.00)	(0.01)
European Union	0.07***	0.03	0.07***	0.04*
	(0.02)	(0.02)	(0.02)	(0.02)
landlocked	0.05**	0.03*	0.03	0.02
	(0.02)	(0.02)	(0.02)	(0.02)
ln distance	0.09***	0.07***	0.08***	0.07***
	(0.01)	(0.01)	(0.01)	(0.01)
product effects	Y	N	Y	N
firm-product effects	N	Y	N	Y
R2	0.75	0.93	0.75	0.93
N	71687	71687	71687	71687

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, $\widehat{\theta}_{it}$. These represent firm-year-level average prices, deviating from product-year means.

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- Regress average prices on exporting variables:

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

  - 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 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 50 destinations. Exclude interaction terms for euro-zone countries.

First stage

	avg. dest. income	export share	log sales
	(1)	(2)	(3)
$e_{uk,t} * \text{revshare}_{uk,1997}$	0.05***	0.03**	0.11**
	(0.01)	(0.01)	(0.04)
$e_{usa,t} * \text{revshare}_{usa,1997}$	0.15***	0.04***	0.13*
	(0.02)	(0.02)	(0.07)
$e_{denmark,t} * \text{revshare}_{denmark,1997}$	0.16***	0.09***	0.37*
	(0.04)	(0.03)	(0.21)
$e_{angola,t} * \text{revshare}_{angola,1997}$	-0.20***	0.03*	-0.59***
	(0.04)	(0.02)	(0.22)
$e_{brazil,t} * \text{revshare}_{brazil,1997}$	-0.16***	0.04	0.27**
	(0.04)	(0.04)	(0.13)
$e_{turkey,t} * \text{revshare}_{turkey,1997}$	0.05	0.19***	0.15
	(0.09)	(0.04)	(0.10)
(other countries)			
firm effects	Y	Y	Y
year effects	Y	Y	Y
N	17988	17988	17988

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			IV	
dep. var.: firm average log real output price						
	(1)	(2)	(3)	(4)	(5)	(6)
log avg. destination gdp/cap	0.13***	0.08	0.09	0.40**	0.35**	0.34*
	(0.05)	(0.05)	(0.05)	(0.18)	(0.17)	(0.20)
export share of sales		0.09**	0.06		-0.04	0.05
		(0.04)	(0.04)		(0.07)	(0.58)
log sales			0.06		0.06	0.07
			(0.02)		(0.01)	(0.17)
firm effects	Y	Y	Y	Y	Y	Y
year effects	Y	Y	Y	Y	Y	Y
N	17988	17988	17988	17988	17988	17988

Notes: Export share, log sales treated as exogenous in Column 5, instrumented in Column 6. Robust standard errors in parentheses. *10% level, **5% level, ***1% level.

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	(0.03)	(0.03)	(0.03)	(0.10)	(0.10)	(0.10)
export share of sales		0.02	-0.01		-0.11**	0.31
		(0.03)	(0.03)		(0.04)	(0.28)
log sales			0.05*			0.06	-0.00
			(0.01)		(0.01)	(0.08)
firm effects	Y	Y	Y	Y	Y	Y
year effects	Y	Y	Y	Y	Y	Y
N	17988	17988	17988	17988	17988	17988

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Robustness: input prices, no euro-zone insts

	dep. var.: firm average log real input price					
	OLS			IV		
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log avg. destination gdp/cap	0.11***	0.12***	0.13***	0.29**	0.30***	0.30**
	(0.03)	(0.04)	(0.04)	(0.11)	(0.11)	(0.12)
export share of sales		-0.02	-0.05		-0.11**	-0.12
		(0.04)	(0.04)		(0.05)	(0.23)
log sales			0.04		0.04	0.04
			(0.01)		(0.01)	(0.10)
(import share interactions)						
firm effects		Y	Y	Y	Y	Y	Y
year effects		Y	Y	Y	Y	Y	Y
N		13029	13029	13029	13029	13029	13029

Notes: Export share, log sales treated as exogenous in Column 5, instrumented in Column 6. 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 scale effects are unimportant.

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