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- Product-level information in industrial censuses, surveys
  - In a few cases (U.S., Colombia, Chile, India ...) including information on physical quantities.
- 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

Data used for this paper: Customs information for almost 30 countries for period 2004-2009.
A View from Trade (cont.)

- New datasets make it possible to address new questions:
  - Multi-product firms:
    - How does greater availability of inputs affect provision of outputs? (Goldberg et al., 2010)
  - Product quality:
    - To what extent do quality differences explain price patterns? (Hallak and Sivadasan, 2009; Kugler and Verhoogen, 2012; Crozet, Head and Mayer, 2012)
    - How does product quality vary with income of destination? (Bastos and Silva, 2010; Manova and Zhang, 2012)
  - Sequencing of market entry:
    - Does entering market A reduce a firm's cost of entering market B? (Albornoz, Calvo-Pardo, Corcos and Ornelas, forthcoming; Morales, Sheu and Zahler, 2011)
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    - 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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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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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?
Some disagreement in literature about role of destination characteristics, especially income/willingness to pay for quality:
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- Common theoretical approach: effects of exporting operate 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 Murákozy (2010): Hungary
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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).
Difficult in investigating second story: quality is unobserved.
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.
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.

Punchline: results support quality story.
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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.
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.

- 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.
Summary of theory

- Ingredients:
Summary of theory

Ingredients:

- Complementarity between firm capability and input quality in generating output quality (Kugler and Verhoogen, 2012).
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Summary of theory

- Ingredients:
  - Complementarity between firm capability and input quality in generating output quality (Kugler and Verhoogen, 2012).
  - 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.)

- Implications:
  - Conditional on destination market, input quality and output quality increasing in plant capability, size.
Summary of theory (cont.)

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  - Conditional on destination market, input quality and output quality increasing in plant capability, size.
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Summary of theory (cont.)

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  - Positive shock to outside sector productivity and hence relative wage in N ⇒ increase in average output prices, input prices in H firms.
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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.
Data

- Two main datasets:
  - Customs data on firm-level international trade transactions.
    - Essentially the universe of 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.
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.
- Baseline estimates are for firm-years appearing in both datasets.
  - Unbalanced panel
  - 3,000-3,500 firms/year in 1997-2001
### Table 1: Summary statistics, firm-level data, 1997-2005

<table>
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<th>est. sample</th>
<th>all exporters</th>
<th>all manufact.</th>
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<td>Exports per firm per year</td>
<td>6.33</td>
<td>1.65</td>
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<tr>
<td></td>
<td>(42.35)</td>
<td>(18.66)</td>
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<tr>
<td>Export share of sales</td>
<td>0.47</td>
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<td>(0.38)</td>
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<td></td>
<td>(10.75)</td>
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<td>(23.15)</td>
<td>(27.5)</td>
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<td>Number of source countries, 2005</td>
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<td>2.84</td>
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<td></td>
<td>(6.49)</td>
<td>(4.34)</td>
<td></td>
</tr>
<tr>
<td>Number of import categories, 2005</td>
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<td>14.02</td>
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<td>(60.54)</td>
<td>(40.08)</td>
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<td>Avg. earnings, 2005</td>
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<td>9.25</td>
<td>5.54</td>
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<td>(4.1)</td>
<td>(28.19)</td>
<td>(22.91)</td>
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<td>Employment, 2005</td>
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<td>(242.42)</td>
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<td>Sales, 2005</td>
<td>27.49</td>
<td>6.3</td>
<td>1.24</td>
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<td></td>
<td>(200.27)</td>
<td>(70.35)</td>
<td>(31.83)</td>
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<td>N (firm-year obs.)</td>
<td>17988</td>
<td>134655</td>
<td>45031</td>
</tr>
<tr>
<td>N (distinct firms)</td>
<td>3896</td>
<td>39865</td>
<td>45031</td>
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<td>Exports</td>
<td>Full data (aggreg.)</td>
<td>Est. sample (aggreg.)</td>
<td>Est. sample (firm-level)</td>
</tr>
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<td>--------------------</td>
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</tr>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>Richer nations</td>
<td>0.922</td>
<td>0.937</td>
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</tr>
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<td>Germany</td>
<td>0.206</td>
<td>0.221</td>
<td>0.109</td>
</tr>
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<td>Spain</td>
<td>0.148</td>
<td>0.146</td>
<td>0.187</td>
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<td>France</td>
<td>0.145</td>
<td>0.147</td>
<td>0.146</td>
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<td>UK</td>
<td>0.124</td>
<td>0.122</td>
<td>0.086</td>
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<td>Netherlands</td>
<td>0.051</td>
<td>0.053</td>
<td>0.04</td>
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<td>Belgium</td>
<td>0.046</td>
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<td>0.027</td>
</tr>
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<td>US</td>
<td>0.042</td>
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<td>0.051</td>
</tr>
<tr>
<td>Italy</td>
<td>0.039</td>
<td>0.039</td>
<td>0.023</td>
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<tr>
<td>Poorer nations</td>
<td>0.078</td>
<td>0.063</td>
<td>0.193</td>
</tr>
<tr>
<td>Angola</td>
<td>0.018</td>
<td>0.006</td>
<td>0.053</td>
</tr>
<tr>
<td>Brazil</td>
<td>0.01</td>
<td>0.009</td>
<td>0.023</td>
</tr>
<tr>
<td>Turkey</td>
<td>0.004</td>
<td>0.004</td>
<td>0.002</td>
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<tr>
<td>Cape Verde</td>
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<td>0.004</td>
<td>0.005</td>
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<td>Russia</td>
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<td>0.003</td>
<td>0.006</td>
</tr>
<tr>
<td>Hungary</td>
<td>0.003</td>
<td>0.003</td>
<td>0.002</td>
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<tr>
<td>South Africa</td>
<td>0.003</td>
<td>0.003</td>
<td>0.006</td>
</tr>
<tr>
<td>Imports</td>
<td>Full data (aggreg.) (4)</td>
<td>Est. sample (aggreg.) (5)</td>
<td>Est. sample (firm-level) (6)</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------------------</td>
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</tr>
<tr>
<td><strong>Richer nations</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Spain</td>
<td>0.252</td>
<td>0.21</td>
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<tr>
<td>Germany</td>
<td>0.16</td>
<td>0.218</td>
<td>0.112</td>
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<td>France</td>
<td>0.115</td>
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<td>0.086</td>
<td>0.061</td>
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<td>0.071</td>
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<td>Belgium</td>
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<td>US</td>
<td>0.032</td>
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<td><strong>Poorer nations</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Brazil</td>
<td>0.018</td>
<td>0.024</td>
<td>0.024</td>
</tr>
<tr>
<td>China</td>
<td>0.007</td>
<td>0.004</td>
<td>0.021</td>
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<td>Russia</td>
<td>0.005</td>
<td>0.007</td>
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<tr>
<td>India</td>
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<td>Thailand</td>
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<td>Turkey</td>
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<tr>
<td>Pakistan</td>
<td>0.003</td>
<td>0.002</td>
<td>0.009</td>
</tr>
</tbody>
</table>
Relative Price Levels, Top Richer Destinations (Non Euro Zone)
Relative Price Levels, Top Poorer Destinations

- Angola
- Brazil
- Cape Verde
- Turkey
- Morocco
- Russia
Table 3: Gravity and export prices, 1997

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
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<tr>
<td>richer than Portugal</td>
<td>0.09***</td>
<td>0.08***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.03)</td>
<td>(0.02)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ln gdp per capita</td>
<td></td>
<td></td>
<td>0.03***</td>
<td>0.03***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.01)</td>
<td>(0.01)</td>
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<tr>
<td>ln gdp</td>
<td>0.01</td>
<td>0.00</td>
<td>0.01</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.01)</td>
<td>(0.00)</td>
<td>(0.01)</td>
</tr>
<tr>
<td>European Union</td>
<td>0.07***</td>
<td>0.03</td>
<td>0.07***</td>
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<td></td>
<td>(0.02)</td>
<td>(0.02)</td>
<td>(0.02)</td>
<td>(0.02)</td>
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<tr>
<td>landlocked</td>
<td>0.05**</td>
<td>0.03*</td>
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<td>0.02</td>
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<td></td>
<td>(0.02)</td>
<td>(0.02)</td>
<td>(0.02)</td>
<td>(0.02)</td>
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<tr>
<td>ln distance</td>
<td>0.09***</td>
<td>0.07***</td>
<td>0.08***</td>
<td>0.07***</td>
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<tr>
<td></td>
<td>(0.01)</td>
<td>(0.01)</td>
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<td>product effects</td>
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<td>N</td>
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<td>N</td>
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<td>firm-product effects</td>
<td>N</td>
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<td>R2</td>
<td>0.75</td>
<td>0.93</td>
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<tr>
<td>N</td>
<td>71687</td>
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<td>71687</td>
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</tr>
</tbody>
</table>
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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\[ \ln p_{ikt} = \theta_{it} + \psi_{kt} + u_{ikt} \]

- 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.

- 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 with 1997 revenue share for each destination:
    \[
    e_{jt} \times \left( \frac{R_{j,1997}}{\sum_{j' \in J} R_{j',1997}} \right)
    \]
    ▶ $R_{j,1997}$ 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

\[
\begin{array}{l}
\text{avg. dest. income} & \text{export share} & \text{log sales} \\
(1) & (2) & (3) \\
\end{array}
\]

\[
e_{uk,t} \ast \text{revshare}_{uk,1997}
\]

0.05*** 0.03** 0.11**
(0.01) (0.01) (0.04)

\[
e_{usa,t} \ast \text{revshare}_{usa,1997}
\]

0.15*** 0.04*** 0.13*
(0.02) (0.02) (0.07)

\[
e_{denmark,t} \ast \text{revshare}_{denmark,1997}
\]

0.16*** 0.09*** 0.37*
(0.04) (0.03) (0.21)

\[
e_{angola,t} \ast \text{revshare}_{angola,1997}
\]

-0.20*** 0.03* -0.59***
(0.04) (0.02) (0.22)

\[
e_{brazil,t} \ast \text{revshare}_{brazil,1997}
\]

-0.16*** 0.04 0.27**
(0.04) (0.04) (0.13)

\[
e_{turkey,t} \ast \text{revshare}_{turkey,1997}
\]

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**

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<td></td>
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<td>firm effects</td>
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<td>Y</td>
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<tr>
<td>year effects</td>
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<tr>
<td>N</td>
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</table>

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.
## Avg dest income and input prices

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<td>N</td>
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</table>

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.
Robustness: input prices, no euro-zone insts

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<td>log sales</td>
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<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.10)</td>
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(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.


___ and Jagadeesh Sivadasan, “Productivity, Quality and Exporting Behavior under Minimum Quality Requirements,” April 2009. NBER working paper no. 14928.
References II


Martin, Julien, “Mark-Ups, Quality and Transport Costs,” 2010. Unpub. paper, CREST-INSEE.


