Imports' Quality and Income Inequality

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Research Question

- How income inequality affects the demand for vertically differentiated goods (different quality) from abroad?

Contribution & Finding

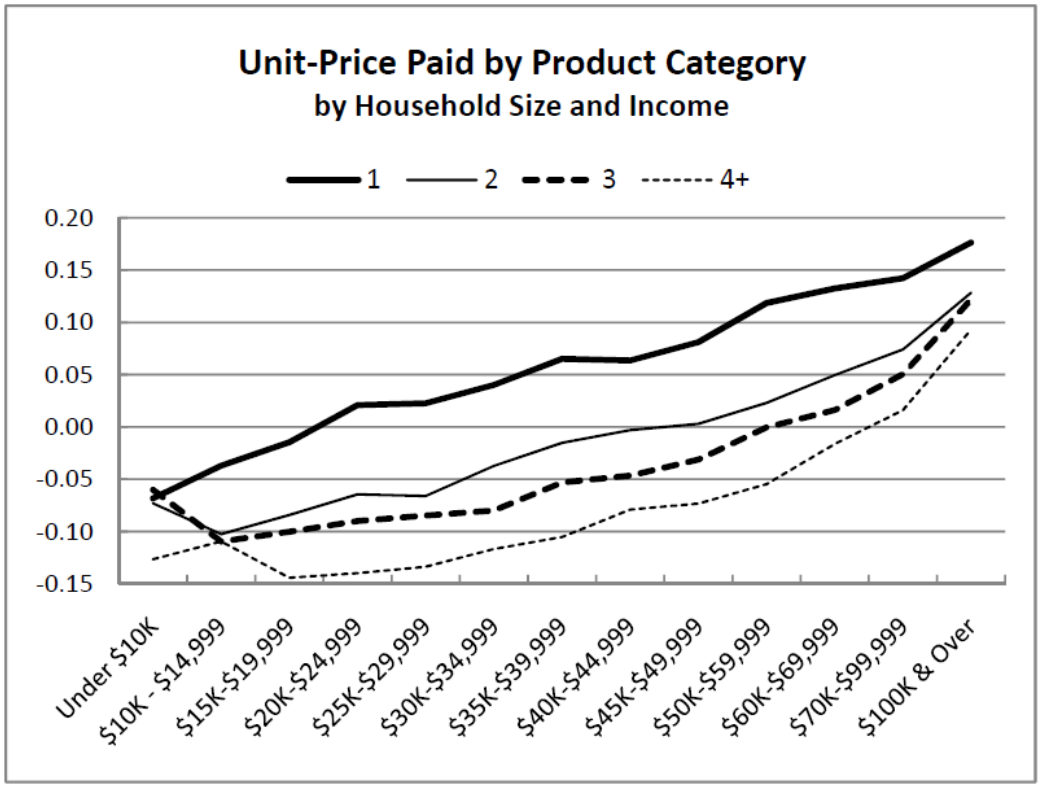
- Study the impact of income inequality in the importing country on exporting firms in a model à la Melitz (with a twist)
- Develop a new dataset
- Main Finding⇒ Negative Correlation btw Income Inequality and Quality of Imported goods
- Income inequality operates through the market size effect
- Results confirmed controlling for selection

Outline

- Motivation
- Fact
- Literature review
- Model
- Empirics
- Results
- Conclusion

Fact

- Wealthier HHs consume goods of higher Unitary Value



Source: Broda-Romalis (2009)

Motivation I

Is the question interesting/important?

- If we allow consumption patterns to differ for individuals in different parts of the income distribution, then inequality should have a role in shaping demand for vertically differentiated goods

Literature Review

- *Quality and Country Characteristics*
  Murphy & Schleifer (1997) Schott (2004) - Fajgelbaum et al. (2009) Khandelwal (2011) Hallak (2006) - Simonovska (2010) Feenstra & Romalis (2011) - Crinò & Epifani (2011) - Baldwin & Harrigan (2011)
- *Quality and Income distribution*
  Latzer & Mayneris (2011) - Fajgelbaum et al. (2009) - Choi et al. (2009)
- *Income Inequality and Trade*
  Mitra & Trindade (2003) - Helpman et al. (2010)

Individual maximizes:

$$U_i = u_i(d_M, d_N) \tag{1}$$

where,

$$d_M = \left(\sum_{j=1}^{n} (q_j c_j)^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}. \tag{2}$$

Moreover,

$$I_{i,tot} = \Phi_M(I_i, P) I_i + (1 - \Phi_M(I_i, P)) I_i. \tag{3}$$

As in Mitra & Trindade (2003),

- $\Phi_M(I_i, P)$= share of income devoted to manufactured goods
- $[1 - \Phi_M(I_i, P)]$ = share of income devoted to necessities
- $P^{1-\sigma} = \int_{\epsilon\Omega} \left(\frac{p_j}{q_j}\right)^{1-\sigma} di$
- Assumption: $\frac{\partial \Phi_M(I_i,P)}{\partial I_i} > 0 \Longrightarrow$ **Non Homothetic Preferences** (i.e. convex income exp. paths)

Model

Demand in Country D and X

- $c_j = \frac{(p_j)^{-\sigma}\left(\frac{1}{q_j}\right)^{1-\sigma} S_{tot}}{P^{1-\sigma}}$ in country D and X
- $\frac{\partial\left(\frac{d_M}{d_N}\right)}{\partial I_i} > 0$
- Rich and Poor i, $S_{tot} = \Phi_{MR}(I_R, P)I_R + \Phi_{MP}(I_P, P)I_P$
- $I_R = \eta I_{tot}$ and $I_P = (1-\eta)I_{tot}$
- $\eta^{d,x}$ = Income Inequality
- $\frac{\partial S_{tot}}{\partial \eta^{d,x}} > 0$
- $\frac{\partial S_{tot}}{\partial I_{tot}} > 0$

- Quality production function in D:

$$q_j = \left(a_j^{1+\theta}\right) \tag{4}$$

with $\theta > -1$ and $a_j \sim G(a) = 1 - \left(\frac{a_M}{a}\right)^k$, $a > a_M = 1$ and $k > 1$.

- Exporting Firm's Total Operating Profits:

$$\frac{R}{\sigma} + \frac{R^x}{\sigma} = \Pi \tag{5}$$

Use:

1. Π
2. Individual Demand
3. $\frac{a_d}{\tau_{dx}} \equiv a_x$ with $\tau_{dx} > 1$
4. $f_x = \left(\frac{\sigma-1}{\sigma}\right)^{1-\sigma} \sigma(F + F_x)$
5. $P{=}P^x$

To Get

$\Downarrow$

$$a_d^{trade} = \left[\frac{f_x P^{1-\sigma}}{\left[S_{d,tot} + S_{x,tot} \tau_{dx}^{\theta(1-\sigma)} \right]} \right]^{\frac{1}{\theta(\sigma-1)}} \tag{6}$$

Implications:

$\frac{\partial a_d^{trade}}{\partial S_{tot}^x} < 0$

$\frac{\partial a_d^{trade}}{\partial \tau_{dx}} > 0$

- Since: $\frac{\partial S_{tot}^x}{\partial \eta^x} > 0 \Rightarrow$

$$\frac{\partial a_d^{trade}}{\partial \eta^x} < 0$$

$\uparrow c_x$ *(Market Size)* , $\uparrow$ *Firms,* $\downarrow \ a_d^{trade} \Rightarrow \downarrow q_j$

- **Income Inequality increases market size and reduces quality of imported products**

- However, for all OBSERVED prices it must be the case that $\left(\frac{p_j}{q_j}\right)^{trade} < \left(\frac{p_j}{q_j}\right)^{domestic}$
- $\left[Prob(\left(\frac{p_j}{q_j}\right)^{trade} < \left(\frac{p_j}{q_j}\right)^{domestic})\right] = \left[Prob(\left[a_j^{trade}\right]^{-\theta} < \left[a_j^{domestic}\right]^{-\theta})\right]$
- $\frac{\partial\left[Prob(\left(\frac{p_j}{q_j}\right)^{trade} < \left(\frac{p_j}{q_j}\right)^{domestic})\right]}{\partial S_{x,tot}} > 0$ and $\frac{\partial\left[Prob(\left(\frac{p_j}{q_j}\right)^{trade} < \left(\frac{p_j}{q_j}\right)^{domestic})\right]}{\partial \eta_x} > 0$
- **If high quality, more likely to sell in unequal markets**

Dataset Description

- Build a Dataset on "World Bank" poor/medium income countries
- F.O.B. Prices and Quantities: BACI (CEPII)
- HS-6(1996) level data in US dollars
- 173 reporters, 255 partners and 5000+ product categories/year
- Data on income, income inequality and education World Bank
- Data on distance and other barriers to trade, from CEPII.

Main Empirical Specification

$$\ln(uv)_{p,e,i,t} = \alpha_{p,e,t} + \beta_1 \ln(X_{i,t}) + \beta_2 \ln(B_{i,e}) + \beta_3(\eta_{i,t}) + \varepsilon_{p,e,i,t}$$

- $\ln(uv)_{p,e,i,t}$ = unit value of imported product, p, in i from e in t.
- $X_{i,t}$ = Variables, importing country level
- $B_{i,e}$ = Bilateral controls
- $\eta_{i,t}$ = Income Inequality
- $\alpha_{p,e,t}$ = Time, Exporter and Product Fixed Effect

WB Countries

	Country	Years
1	Albania	2002; 2004
2	Argentina	2002; 2004; 2006
3	Armenia	2002; 2004; 2006
4	Burundi	2006
5	Belarus	2002; 2004; 2006
6	Brazil	2002; 2004
7	Chile	2006
8	China	2002
9	Colombia	2006
10	Costa rica	2004
11	Estonia	2002; 2004
12	Georgia	2002; 2004
13	Ghana	2006
14	Honduras	2002; 2004
15	Hungary	2004
16	Indonesia	2002
17	Jamaica	2002
18	Jordan	2006
19	Kazakhstan	2002; 2004; 2006
20	Kyrgyzstan	2006
21	Cambodia	2004
22	Lithuania	2002; 2004
23	Moldova, republic of	2002; 2004; 2006
24	Maldives	2004
25	Mexico	2002; 2004; 2006
26	Macedonia, the former yugoslav republic of	2002; 2006
27	Mauritania	2004
28	Malawi	2004
29	Malaysia	2004
30	Pakistan	2006
31	Panama	2006
32	Peru	2006
33	Philippines	2006
34	Poland	2004; 2006
35	Romania	2006
36	Russian federation	2002; 2004
37	Rwanda	2006
38	Slovakia (slovak republic)	2004; 2006
39	Slovenia	2002; 2004
40	Thailand	2002; 2006
41	Turkey	2002; 2004; 2006
42	Uganda	2002; 2006
43	Ukraine	2004; 2006
44	Uruguay	2006
45	Venezuela	2004
46	Viet nam	2006

Interdecile Ratio

Table 1: Bilateral export prices and Importer charateristics WB countries - Differentiated Products, 2002-04-06

	(1) Unit Value	(2) Unit Value	(3) Unit Value
GDP		-0.010	-0.044***
		(0.014)	(0.013)
Avg GDP			0.175***
			(0.019)
Interdecile Ratio	-0.062**	-0.061**	-0.034*
	(0.028)	(0.028)	(0.019)
Competitive disadvantage	-0.079***	-0.078***	-0.095***
	(0.010)	(0.009)	(0.008)
Distance	0.144***	0.149***	0.158***
	(0.014)	(0.014)	(0.012)
Common official language	-0.203***	-0.208***	-0.182***
	(0.038)	(0.037)	(0.037)
Common legal origin	-0.033	-0.037	-0.051
	(0.035)	(0.036)	(0.032)
Observations	337815	337815	337815
R^2	0.043	0.043	0.065

(1) (2) (3) with product(p)/exporter(x)/year(t) fixed effects and importer/year clustered standard errors

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Interquintile Ratio

Table 2: Bilateral export prices and Importer charateristics WB countries - Differentiated Products, 2002-04-06

	(1) Unit Value	(2) Unit Value	(3) Unit Value
GDP		-0.009	-0.044***
		(0.014)	(0.013)
Avg GDP			0.175***
			(0.019)
Interquintile Ratio	-0.086**	-0.083**	-0.044
	(0.040)	(0.040)	(0.027)
Competitive disadvantage	-0.079***	-0.078***	-0.095***
	(0.010)	(0.009)	(0.008)
Distance	0.145***	0.150***	0.158***
	(0.014)	(0.014)	(0.012)
Common official language	-0.201***	-0.206***	-0.182***
	(0.038)	(0.037)	(0.037)
Common legal origin	-0.034	-0.038	-0.051
	(0.035)	(0.036)	(0.032)
Observations	337815	337815	337815
R^2	0.043	0.044	0.065

(1) (2) (3) with product(p)/exporter(x)/year(t) fixed effects and importer/year clustered standard errors

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Gini Coefficient

Table 3: Bilateral export prices and Importer charateristics WB countries - Differentiated Products, 2002-04-06

	(1) Unit Value	(2) Unit Value	(3) Unit Value
GDP		-0.009	-0.043***
		(0.014)	(0.013)
Avg GDP			0.173***
			(0.019)
Gini Index	-0.199*	-0.191*	-0.088
	(0.108)	(0.107)	(0.075)
Competitive disadvantage	-0.079***	-0.078***	-0.094***
	(0.009)	(0.009)	(0.008)
Distance	0.148***	0.152***	0.159***
	(0.014)	(0.014)	(0.012)
Common official language	-0.199***	-0.204***	-0.180***
	(0.040)	(0.039)	(0.038)
Common legal origin	-0.034	-0.038	-0.049
	(0.035)	(0.036)	(0.032)
Observations	345052	345052	345052
R^2	0.043	0.043	0.064

(1) (2) (3) with product(p)/exporter(x)/year(t) fixed effects and importer/year clustered standard errors

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Robustness I

Selection Mechanism

Use a two-step Heckman estimator as in Harrigan-Ma-Shlychkov ('11):

1. $\Pr(q_{p,e,i,t} > 0) = \Phi(\alpha_{p,e,t} + \delta W_i)$
2. $\ln(q_{p,e,i,t}) = \alpha_{p,e,t} + \theta W_i + \theta \widehat{\lambda}_{p,e,i,t} + u_{p,e,i,t}$
3. $\ln(uv)_{p,e,i,t} = \alpha_{p,e,t} + \theta W_i + \beta \widehat{u}_{p,e,i,t} + \varepsilon_{p,e,i,t}$

- Check if main results change when using specification (3)

Robustness I

Table 4: Unit Values and Imp. charact. with selection - WB Countries

	(1) Unit Value
Avg GDP	0.175***
	(0.017)
GDP	-0.044***
	(0.012)
Interdecile Ratio	-0.034*
	(0.018)
Competitive disadvantage	-0.095***
	(0.006)
Distance	0.158***
	(0.009)
Common official language	-0.182***
	(0.025)
Common legal origin	-0.051**
	(0.025)
Selection Parameter	-0.157***
	(0.004)
Observations	337581
R^2	0.185

(1) (2) (3) with product(p)/exporter(x)/year(t) fixed effects and importer/year clustered standard errors
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Robustness I

Table 5: Unit Values and Imp. charact. with selection - WB Countries

	(1) Unit Value
Avg GDP	0.174***
	(0.017)
GDP	-0.044***
	(0.012)
Interquintile Ratio	-0.044*
	(0.025)
Competitive disadvantage	-0.095***
	(0.006)
Distance	0.158***
	(0.009)
Common official language	-0.182***
	(0.025)
Common legal origin	-0.052**
	(0.025)
Selection Parameter	-0.157***
	(0.004)
Observations	337581
R^2	0.185

(1) (2) (3) with product(p)/exporter(x)/year(t) fixed effects and importer/year clustered standard errors
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Robustness II

Khandelwal Procedure

- $\ln(s_{i,p,t}) - \ln(s_{0i,p,t}) =$

$$\lambda_p + \lambda_t + \beta_1 \ln p_{i,p,t} + \beta_2 (ns_{i,p,t}) + \beta_3 \ln pop_{i,p,t} + \lambda_{i,p,t}$$

- Estimate the equation above for each industry in each importing country, i
- Quality: $q_{i,p,t} \equiv \widetilde{\lambda}_p + \widetilde{\lambda}_t + \widetilde{\lambda}_{i,p,t}$

Robustness II

Table 6: Quality and Importer charateristics - WB countries

	(1) Quality	(2) Quality	(3) Quality
Avg GDP		-0.493***	0.243
		(0.181)	(0.171)
GDP			-0.718***
			(0.111)
Interquintile Ratio	-0.325	-0.574*	-0.066
	(0.333)	(0.330)	(0.275)
Competitive disadvantage	0.074	0.131*	0.102
	(0.085)	(0.077)	(0.069)
Distance	-0.572***	-0.517***	-0.171
	(0.177)	(0.168)	(0.133)
Common official language	0.127	-0.074	-0.426
	(0.469)	(0.442)	(0.316)
Common legal origin	-0.913***	-0.878**	-0.960***
	(0.332)	(0.336)	(0.277)
Observations	136492	136492	136492
R^2	0.013	0.019	0.062

(1) (2) (3) with product(p)/exporter(x)/year(t) fixed effects and importer/year clustered standard errors

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Conclusion & To DOs

- Theory: income inequality in importing countries influences imports of quality goods from trading partners
- Emprics (1): More unequal countries import goods of lower quality
- Emprics (2): The market size story is supported
- Results are confirmed when controlling for a *selection mechanism* and using *Khandelwal's* definition of quality