Imports, Innovation and Employment after Crisis: Evidence from a Developing Country

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Objective

- Adoption of embodied know-how - specifically foreign intermediate inputs = **stimulus of innovation activities and jobs**

- >>> **Objective** is to provide evidence on the impacts of firms' importing on product innovation, scope and costs as well as employment effects for those firms

  - Evidence on lower middle income country, Ecuador
  - Explore effects of a substantial national crisis
  - Objective firm-level time-varying measure of product innovation
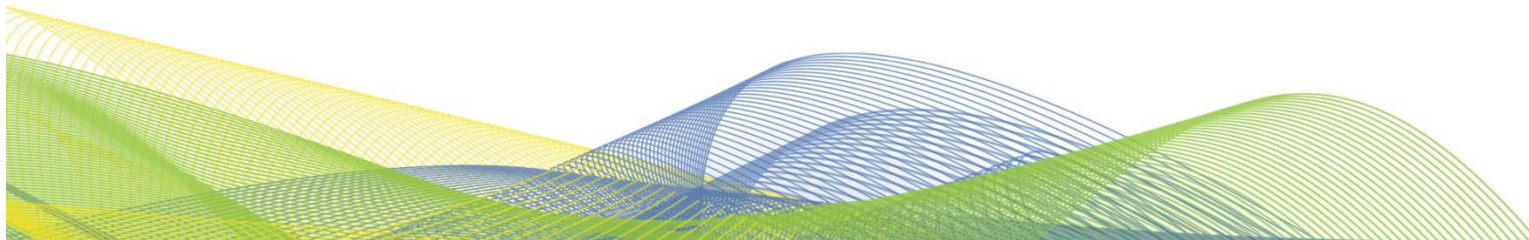
Conceptual Framework

- **Imports & Performance**: Kugler and Verhoogen (2009) model of complementarities input quality and plant productivity.

  - Imported inputs → product innovations (e.g. new and/or better inputs allow producing new goods), product cost reductions (e.g. use of new inputs leads to production efficiency gains) and product scope (e.g. new inputs reduce sunk production costs)

- **Imports & Employment:** Ambiguous impacts depending on:

  - *i)* whether new inputs reduce unit production costs impacting on firms' product demand and consequently their labor needs;

  - *ii)* how foreign inputs alter capital-labor mix of the firm's production; and, more broadly,

  - *iii)* how foreign intermediate inputs affect process innovations and/or product innovations and, thus, importing firms' revenues and employment.

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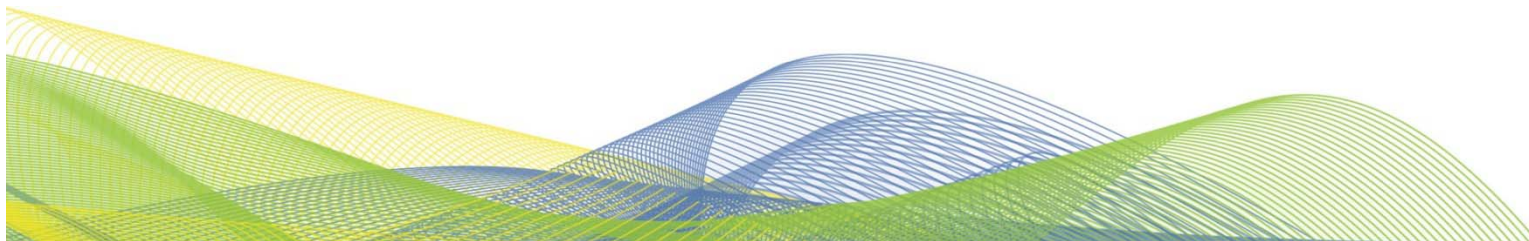
Data

Census panel dataset produced by Ecuadorian Institute of Statistics (INEC) of manufacturing plants with 10+ employees

- Link to two additional datasets which contain information on price and quantity of plants' intermediate inputs and on plants' output products
- Data cleaning procedures and check the quality of our dataset following Bernard et al. (2010), Kugler and Verhoogen (2009b) and Goldberg et al. (2010) .

Product innovation: dummy equal to one for plant in year t selling 11-digit ISIC product it never sold prior to t

Labor productivity: real sales over total employment with real sales obtained using firm-price index

Examples of Products and Inputs

Product description	ISIC Code	Unit
A. Outputs		
Sausages and similar products made of meat	15112113210	Kilograms
Woven fabrics of combed wool or of combed fine hair	17112654001	Metres
Ties, bow-ties and cravats	18102822903	Units
Footwear with uppers of leather or composition leather	19202933001	Pairs
Statuettes and other ornamental wooden articles	20293191302	Units
Gummed or adhesive paper and paperboard	21013214913	Kilograms
Exercise books	22213260001	Units
Preparations for use on the hair	24243532302	Litres
Brakes and servo-brakes and parts thereof	34304912901	Units
B. Inputs		
Tobacco extracts and essences	16002509002	Litres
Bovine leather and equine leather, without hair	19112912012	Units
Paper or paperboard lables of all kinds	21093219700	Units
Paraffin wax, crude or refined	23203350001	Kilograms
Prepared glues and other prepared adhesives	24293542005	Litres
Ceramic tableware, kitchenware and other ceramic household and toilet articles	26913722102	Units
Electrical plugs and sockets	31204621206	Units
Pressure regulators and controllers (manostats)	33134827001	Units
Spectacle lenses of glass	33204831102	Pairs

Baseline Estimation Set-Up

Starting point is the following:

$$performance_{it} = \alpha^1 + \beta_M^1 M_{it} + \delta_{ind}^1 * ind + \delta_{reg}^1 * reg + \delta_{year}^1 * year + \varepsilon_{it}^1$$

$$employment_{it} = \alpha^2 + \beta_M^2 M_{it} + \delta_{ind}^2 * ind + \delta_{reg}^2 * reg + \delta_{year}^2 * year + \varepsilon_{it}^2$$

Firm fixed effects to eliminate systematic fixed differences across firms, *but no account of performance improvements over time with possible impact on firms' importing decisions*

Identification Strategy

fixed effects instrumental variable estimation using three uments:

-specific input real exchange rates:
- Widely used and recently at firm level (Park et al., 2010)
- 3 steps: *i)* obtain log real exchange rate of Ecuador vis-à-vis trading partners in pre-analysis period, *ii)* compute product specific real exchange rate, and *iii)* obtain firm specific measure weighted by products in pre-period

-specific variations in input tariffs:
- Broadly employed as in Fernandes (2007)
- 2 steps, *i)* obtain product specific tariff rate, *ii)* obtain firm specific tariff
- Use of 2-period lag tariff changes

cator of the availability of national producers of firm inputs:
- Dummy if there are no local suppliers of input at 6-digit level

Descriptive Results - OLS

	Product innovation	Product scope	Labor productivity	Total employment	Skilled employment	Unskilled employment
	(1)	(2)	(3)	(4)	(5)	(6)
er	0.057**	0.163**	0.018	0.088***	0.114***	0.093***
	(0.022)	(0.078)	(0.039)	(0.025)	(0.033)	(0.029)
xed effects	Yes	Yes	Yes	Yes	Yes	Yes
xed effects	Yes	Yes	Yes	Yes	Yes	Yes
fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
y 6-digit fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
vations	11,786	11,786	11,786	11,786	11,786	11,786
	0.33	0.86	0.83	0.93	0.91	0.90

t standard errors clustered at the firm level in parentheses. ***, ** and * indicate
cance at 1%, 5% and 10% confidence levels, respectively.

First Stage IV Results

	Importer
Exchange rate$_{t-1}$	0.096**
	(0.040)
Tariff changes$_{t-2}$	-0.002
	(0.002)
Availability of national producers$_t$	-0.681***
	(0.042)
First-stage F Statistic of excluded instruments	91.6
Observations	6399

Main Results – IV

	Product innovation (1)	Product scope (2)	Labor productivity (3)	Total employment (4)	Unskilled employment (5)	Skilled employment (6)
A						
	0.540*	1.480	-0.069	0.447**	0.722**	0.241
	(0.293)	(0.904)	(0.425)	(0.226)	(0.312)	(0.249)
	6399	6399	6399	6399	6399	6399
B						
	0.689**	1.857*	0.245	0.294	0.579**	0.031
	(0.344)	(1.063)	(0.495)	(0.221)	(0.295)	(0.290)
tition	2.404**	4.531	4.711***	-1.957*	-1.318	-4.049**
	(1.019)	(3.102)	(1.768)	(1.168)	(1.571)	(1.819)
	6313	6313	6313	6313	6313	6313
C						
	0.530*	1.499	-0.123	0.474**	0.733**	0.335
	(0.287)	(0.918)	(0.402)	(0.230)	(0.317)	(0.243)
variation in the firm's product market	0.318***	0.519	0.544***	-0.188	-0.082	-0.485**
	(0.118)	(0.370)	(0.207)	(0.152)	(0.202)	(0.237)
	6313	6313	6313	6313	6313	6313

Robustness (1)

	Product innovation (1)	Product scope (2)	Labor productivity (3)	Total employment (4)	Unskilled employment (5)	Skilled employment (6)
input sector exchange rates						
	0.532*	1.480*	-0.153	0.456**	0.700**	0.355
	(0.283)	(0.900)	(0.399)	(0.229)	(0.310)	(0.247)
	6254	6254	6254	6254	6254	6254
dditional firm controls						
	0.583*	1.701	-0.136	0.311**	0.434***	0.390*
	(0.321)	(1.039)	(0.336)	(0.132)	(0.144)	(0.200)
	6312	6312	6312	6312	6312	6312
2-digit industry-year fixed effects						
	0.495***	1.342*	-0.186	0.170	0.435*	0.072
	(0.183)	(0.700)	(0.418)	(0.199)	(0.249)	(0.235)
	6313	6313	6313	6313	6313	6313
port spending						
port expenditure	0.050*	0.137	-0.013	0.048**	0.074**	0.034
	(0.028)	(0.087)	(0.038)	(0.024)	(0.034)	(0.024)
	6313	6313	6313	6313	6313	6313

Robustness (2)

	Product innovation (1)	Product scope (2)	Labor productivity (3)	Total employment (4)	Unskilled employment (5)	Skilled employment (6)
alternative set of instruments						
	0.446*	1.139*	0.286	0.374**	0.447*	0.494**
	(0.236)	(0.599)	(0.354)	(0.179)	(0.230)	(0.236)
	7110	7110	7110	7110	7110	7110
all sample years						
	0.344	1.349**	-0.0857	0.345*	0.408*	0.465*
	(0.210)	(0.616)	(0.349)	(0.199)	(0.248)	(0.245)
	9447	9447	9447	9447	9447	9447
n-level exchange rates						
	0.114**	0.031	0.142	0.118*	0.142*	0.169*
	(0.056)	(0.162)	(0.104)	(0.064)	(0.077)	(0.089)
	7290	7290	7290	7290	7290	7290
the top 10 performers						
	0.485*	1.636*	-0.142	0.272	0.524**	0.090
	(0.250)	(0.911)	(0.368)	(0.186)	(0.241)	(0.255)
	5329	5329	5329	5329	5329	5329

Product Production Cost Effects

que information for each product on overall production costs and
ntities manufactured

ain average firm-level product production costs following the two-
 procedure proposed in Kugler and Verhoogen (2009):

Regressions of product-level firm production costs on firm-year and product-
ear fixed effects → estimated coefficients on firm-year fixed effects are
verage production costs at the firm level purged of effects due to the
omposition of products used for regression below

	Product production cost
Importer	-3.807***
	(1.412)
Observations	6183

Differences across Industries?

	Product innovation (1)	Product scope (2)	Labor productivity (3)	Total employment (4)	Unskilled employment (5)	Skilled employment (6)
ng producers of chemical products and machinery						
	0.534*	1.496	-0.068	0.312*	0.553**	0.219
	(0.294)	(0.915)	(0.390)	(0.174)	(0.224)	(0.218)
s	5701	5701	5701	5701	5701	5701
resource-based producers						
	1.140	2.389	1.053	1.390*	2.074*	1.117
	(0.776)	(2.025)	(1.022)	(0.824)	(1.183)	(0.907)
s	2196	2196	2196	2196	2196	2196

Impacts in the Aftermath of the Crisis

	Product innovation (1)	Product scope (2)	Labor productivity (3)	Total employment (4)	Unskilled employment (5)	Skilled employment (6)
imation results						
Post-crisis years	0.017	0.040	0.083	0.017	0.027	0.039
	(0.032)	(0.117)	(0.053)	(0.036)	(0.042)	(0.044)
Beyond the post-crisis years	0.059*	0.157	0.004	0.105***	0.102**	0.150***
	(0.031)	(0.110)	(0.052)	(0.035)	(0.040)	(0.041)
F-Test of difference in coefficients across	0.07	0.08	0.05	0.00	0.03	0.00
ns	6406	6406	6406	6406	6406	6406
ation results						
Post-crisis years	0.452	1.648	-0.243	-0.067	0.023	0.030
	(0.307)	(1.052)	(0.421)	(0.277)	(0.329)	(0.285)
Beyond the post-crisis years	0.572**	1.614*	-0.135	0.407	0.628*	0.357
	(0.276)	(0.953)	(0.426)	(0.269)	(0.334)	(0.283)
F-Test of difference in coefficients across	0.47	0.95	0.72	0.02	0.02	0.12
ns	6254	6254	6254	6254	6254	6254

Conclusion

Importing leads to ↑**product adoption**, ↑ **product scope** and ↓**product production costs**

>>> Importing generates **2 types of benefits** for importers shared with consumers(?) **:** ↑ **variety and** ↓ **price**

+ employment impacts for importers, however, not

necessarily in the aggregate: **-** of product market competition

Benefits **not** restricted to high-tech producers only

Weaker employment effects in the immediate post-crisis

Importing not an option for all firms →simplistic industrial policies might not succeed as **badly performing downstream industries can significantly constrain upstream producers**