Intellectual Property Rights and International Trade of Agricultural Products. Evidence for Latin America

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Motivation

- Global progressive tightening and harmonization of IP protection systems, especially since the signing of the Trade Related Aspects of Intellectual Property Rights (TRIPS) Agreement in 1995

- In particular, developing countries are adopting stronger systems of IPRs and the TRIPS demanded protection of plant varieties and other sectors which were usually excluded from IP protection

- Empirical study of the effect of strengthening IP protection generated by the TRIPS

How are IPRs and Trade Related?

- Net effect on trade of increasing IPRs not clear
- Theoretically, Maskus and Penubarti (1995) have argued that there are different and contradictory effects
- If IP protection increases in country A:
  - *Market Expansion Effect*: Should encourage firms to export more since this reduces the risk of imitation
  - *Market Power Effect*: The market power that the importing firm earns, may induce her to behave in a monopolistic way, increasing prices and reducing sales
- Necessity of empirical analysis

Objectives

- Using data of agricultural trade exports and an index of IP protection for plant varieties, we explore the effect of the strengthening of IP on:
  - Trade Volumes
  - Bilateral Trade Links

- For 60 countries (29 DCs, 31 LDCs, and 14 LA) for the post-TRIPS period: 1995-2011

IPRs and Total Trade

- Data
  - Total Trade of Agricultural Products: HS Commodity Classification, sectors a to 24, excluding fishery (3 and 16): agricultural products and animal products and food that use vegetable products as inputs
  - Control Variables
    - Index of IP Protection
    - GDP per capita
    - Remoteness: weighted by the GDP
    - Openness to Trade
    - Human Capital: years of schooling for population over 15 years old
- Model

$$\log(\text{texpa}_i(t)) = x_i(t) \cdot \beta + \mu_i(t) \; ; \tag{1}$$

$$x_i = \{1, \text{inda}_i, \log(\text{gdppc}_i), \text{hc}_i, \log(\text{remot}_i), \log(\text{open}_i)\} \tag{2}$$

Total Agricultural Exports. Fixed Effects Estimations

Model	(1)	(2)	(3)	(4)
Sample	FS	DC	LDC	LA
IP Index	0.015	-0.031	0.001	0.015
	(0.015)	(0.025)	(0.020)	(0.027)
log GDP per capita	0.228***	0.784***	-0.012	-0.366**
	(0.074)	(0.119)	(0.095)	(0.154)
human capital	0.505***	-0.034	1.111***	1.153***
	(0.126)	(0.161)	(0.186)	(0.245)
log remotness	1.421***	2.311***	0.593	4.324***
	(0.332)	(0.481)	(0.447)	(1.091)
log openness	1.062***	1.061***	1.015***	0.705***
	(0.034)	(0.047)	(0.047)	(0.072)
constant	-7.717***	-19.180***	0.466	-28.650***
	(2.895)	(4.183)	(3.924)	(8.818)
Observations	1,020	493	527	238
R-squared	0.837	0.871	0.825	0.867
Number of countries	60	29	31	14

Notes: Dependent variable: log of total exports of the agricultural sector. Standard errors in parenthesis. Significance level: *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

IP Index Coefficients. Sub-sectors. Fixed Effects Estimations

Model	(1)	(2)	(3)	(4)
Sample	FS	DC	LDC	LA
1 Live Animals	0.080	0.009	0.151	0.153
	(0.067)	(0.0611)	(0.105)	(0.208)
2 Meat and Edible Meat Offal	0.156***	-0.136**	0.244***	-0.047
	(0.057)	(0.053)	(0.091)	(0.168)
4 Dairy, Eggs, Honey, and Edible Products	0.282***	0.096***	0.344***	0.213*
	(0.041)	(0.036)	(0.064)	(0.120)
5 Products of Animal Origin	-0.004	0.012	0.033	0.034
	(0.042)	(0.038)	(0.068)	(0.118)
6 Live Trees and Other Plants	0.075**	-0.050	0.116**	0.246***
	(0.037)	(0.057)	(0.051)	(0.089)
7 Edible Vegetables	0.010	-0.104***	0.064	0.178***
	(0.029)	(0.038)	(0.042)	(0.065)
8 Edible Fruits and Nuts, Peel of Citrus/Melons	-0.038	-0.007	-0.069*	-0.050
	(0.028)	(0.045)	(0.038)	(0.059)
9 Coffee, Tea, Mate and Spices	-0.085**	-0.153***	-0.080*	-0.142**
	(0.036)	(0.052)	(0.048)	(0.061)
10 Cereals	0.142*	0.059	0.086	0.127
	(0.074)	(0.094)	(0.111)	(0.177)
11 Milling Industry Products	0.044	0.066	-0.016	-0.016
	(0.052)	(0.064)	(0.078)	(0.109)

IP Index Coefficients. Sub-sectors. Fixed Effects Estimations

Model	(1)	(2)	(3)	(4)
Sample	FS	DC	LDC	LA
12 Oil Seeds/Misc. Grains/Med. Plants/Straw	0.113***	0.074	0.073	0.272**
	(0.038)	(0.052)	(0.055)	(0.113)
13 Lac, Gums, Resins, etc.	-0.047	-0.173**	0.031	-0.095
	(0.049)	(0.073)	(0.068)	(0.120)
14 Vegetable Planting Materials	-0.190***	-0.217**	-0.214***	0.119
	(0.062)	(0.103)	(0.082)	(0.148)
15 Animal or Vegetable Fats, Oils and Waxes	0.035	0.007	0.049	0.339***
	(0.040)	(0.044)	(0.063)	(0.069)
17 Sugars and Sugar Confectionery	0.122***	0.112**	0.046	-0.060
	(0.040)	(0.051)	(0.058)	(0.079)
18 Cocoa and Cocoa Preparations	0.087**	0.172***	0.074	-0.172**
	(0.044)	(0.045)	(0.069)	(0.083)
19 Preps. of Cereals, Flour, Starch or Milk	0.137***	0.041	0.190***	0.098
	(0.038)	(0.047)	(0.056)	(0.089)
20 Preps. of Vegetables, Fruits, Nuts, etc.	-0.085***	-0.151***	-0.028	0.038
	(0.022)	(0.036)	(0.029)	(0.038)
21 Misc. Edible Preparations	0.082**	0.008	0.117**	0.219***
	(0.033)	(0.037)	(0.051)	(0.068)
22 Beverages, Spirits and Vinegar	0.025	-0.033	0.046	0.018
	(0.036)	(0.050)	(0.052)	(0.078)
23 Residues from Food Industries, Animal Feed	0.031	-0.005	0.002	0.196**
	(0.039)	(0.037)	(0.062)	(0.088)
24 Tobacco and Manuf. Tobacco Substitutes	0.037	0.143	-0.038	0.027
	(0.060)	(0.094)	(0.080)	(0.102)

Bilateral Trade Links and IPRs

Intensive Margin

Extensive Margin

We use a Gravity Model:

$$W_{ij,k} = \exp\{x_{ij} \cdot \beta_k\}\eta_{ij,k}, \tag{3}$$

$$x_{ij} = \{\log(Y_i), \log(Y_j), \log(X_i), \log(X_j), Z_i, Z_j, d_{ij}, D_{ij}\};$$

- $W_{ij,k}$ is the export from country i to country j, in sector k
- Y_i is the annual GDP
- d_{ij} the geographical distance

- $X_i = \{\text{AREA}_i, \text{POP}_i\}$
- $D_{ij} = \{\text{contig,comlang\_off, comcol, colony}\}$ barriers to trade
- $Z_i = \{\text{landl}, \textbf{IP Index}\}$

Variable Details

Gravity Model Estimation

Sample		FS			LA	
Model	FE	PPML	Logit	FE	PPML	Logit
IP Index_e	0.002	-0.001	-0.032*	-0.048**	-0.388***	-0.301***
	(0.010)	(0.019)	(0.018)	(0.021)	(0.056)	(0.060)
IP Index_i	-0.081***	0.020	0.307***	-0.076***	0.259***	0.246***
	(0.010)	(0.021)	(0.019)	(0.022)	(0.045)	(0.043)
log GDP_e	1.146***	0.807***	1.391***	0.388***	0.680***	-0.935***
	(0.038)	(0.023)	(0.020)	(0.100)	(0.080)	(0.124)
log GDP_i	1.642***	1.002***	1.023***	2.217***	0.780***	1.583***
	(0.036)	(0.022)	(0.018)	(0.092)	(0.039)	(0.044)
log POP_e	-0.576***	-0.261***	-0.622***	1.133***	-0.862***	0.506***
	(0.097)	(0.023)	(0.021)	(0.320)	(0.102)	(0.138)
log POP_i	-0.300***	-0.175***	-0.607***	-0.025	0.150***	-1.191***
	(0.095)	(0.025)	(0.022)	(0.225)	(0.049)	(0.055)
log AREA_e		0.062***	0.203***		0.851***	1.052***
		(0.011)	(0.012)		(0.040)	(0.052)
log AREA_i		-0.150***	-0.018		-0.125***	0.027
		(0.010)	(0.012)		(0.025)	(0.035)
Land-locked_e		-0.819***	-0.619***		-1.036***	-4.068***
		(0.035)	(0.032)		(0.121)	(0.165)
Land-locked_i		-0.516***	-0.149***		-0.398***	-0.792***
		(0.036)	(0.036)		(0.057)	(0.076)
log Distance		-0.561***	-0.857***		-0.654***	-1.364***
		(0.017)	(0.019)		(0.053)	(0.090)
Contiguity		0.931***	1.143***		0.805***	
		(0.046)	(0.236)		(0.090)	
Common Language		0.187***	1.515***		0.080	0.508***
		(0.041)	(0.094)		(0.076)	(0.140)
Common Colonizer		0.271***	2.075***		-2.949***	0.878
		(0.085)	(0.120)		(0.344)	(0.611)
Colony		-0.025	0.375		0.376***	
		(0.036)	(0.276)		(0.101)	
Time-dummies		yes	yes		yes	yes
Constant	yes			yes		
Observations	61,129	70,720	70,720	13,241	15,232	14,331

Significance level: *** p<0.01, ** p<0.05, * p<0.10.

Intensive Margin: PPML & FE

Using total bilateral exports

Extensive Margin: Logit

Using bilateral trade relationships

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Full Sample Evidence
- ▶ Trade volumes are unaffected by IPRs
- ▶ The extensive margin is positively affected by IPRs

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Intensive Margin: PPML & FE
Using total bilateral exports

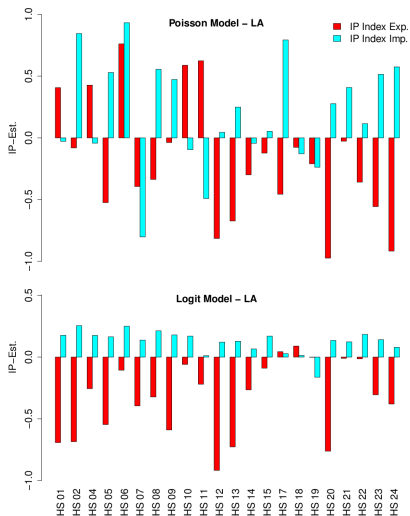## Extensive Margin: Logit
Using bilateral trade relationships

Full Sample Evidence
- ▶ Trade volumes are unaffected by IPRs
- ▶ The extensive margin is positively affected by IPRs

Latin American Evidence
- ▶ Exporters' and importers' IPRs lead to opposite effects on both trade margins

IPR-Effects on Sub-sectors' Trade: LA exports

Sector Intensive Margin

- ▶ The net-effect on trade volumes due to the exporters' and the importers' IPRs is quite sector specific.
- ▶ In just one sector (HS=6) the net effect of strong IPRs is expected to promote LA exports

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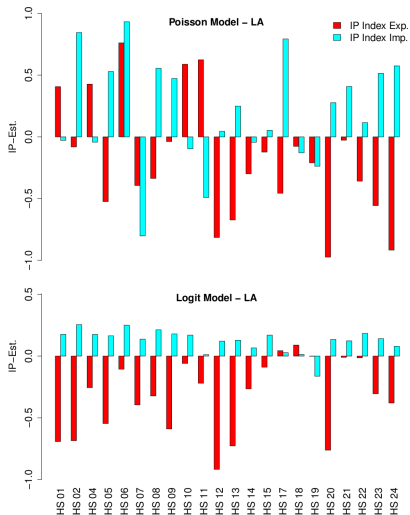
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Sector Extensive Margin

- ▶ Stronger IPRs in LA countries are expected to limit their possibilities of opening new markets

General Conclusions

- Trade Volume and IPRs
  - The increase in IPRs after the signing of the TRIPS does not have a significant effect on trade volumes of agricultural products
  - The results are robust when considering samples restricted to different development levels and Latin American countries
  - For more disaggregated level of products, we found different correlations between trade volumes and the index of IP protection
- Bilateral Trade Links and IPRs
  - Stronger IPRs in the LA countries limit have a negative effect on the creation of trade links
  - LA countries may benefit from stronger IPRs systems in other countries
- The fact that the exporter's level of IP protection has a negative effect, especially in developing countries may be due to the fact that IPRs are affecting negatively productivity, innovation activities and competitiveness of these countries
- This provides evidence against the idea that there is a unique system of IP protection that fit equally all countries

Thank you!

List of Variables. Gravity Model

Label	Description	Source
W	Imports in U.S. Dollars by sectors	BACI-CEPII
open	Openness to Trade	Penn World Table
GDP	Gross-domestic product	Penn World Table
area	Country area in Km^2	
pop	Country population	CEPII
IP Index	Index of IP protection for Plant Varieties	Campi and Nuvolari (2013)
hc	Index of human capital per person	Penn World Table
remot	Remoteness	Melitz (2007)
d	Distance between two countries, based on bilateral distances between the largest cities of those two countries, weighted by the share of the city in the overall country's population	CEPII
landl	Dummy variable equal to 1 for landlocked Countries	CEPII
contig	Contiguity dummy equal to 1 if two countries share a common border	CEPII
comlang_off	Dummy equal to 1 if both countries share a common official language	CEPII
comcol	Dummy equal to 1 if both countries have had a common colonizer	CEPII
colony	Dummy equal to 1 if both countries have ever had a colonial link	CEPII

back to GM