Global Value Chains and Intellectual Property Right in Agricultural Trade

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2023 AAEA Annual Meeting
July 25, D.C.

Backgroud

Intellectual property rights (IPR) and trade agreement

- IPR is a domain of domestic policy.
- Many efforts have been made to harmonize and standardize the rules on IPR through international trade agreements.
  - Multilateral agreement: The Agreement on Trade-Related Aspects of Intellectual Property Rights (WTO TRIPs)
    $\rightarrow$ A Norm, minimum standard since 1995
  - Reciprocal agreements between countries: Regional Trade Agreements (RTAs)
    $\rightarrow$ Beyond TRIPs

Background

- The impact of stronger IPR protection on trade is ambiguous due to its multiple channels. Market expansion effect (+), market power effect (-), firm's decision on foreign market entry mode (-/+), enhancing export capacity (+).
- Empirical evidence is mixed and asymmetric depending on development status, but many studies for select sectors (mostly manufacturing goods) suggest that stronger and more uniform global levels of IPR protection increase trade flows of technology or knowledge-intensive goods.

Motivation

- Any studies in the agriculture and food sector?
  - Most of the studies find an insignificant impact of IPR protection on seed trade in the U.S. (Yang and Woo, 2006; Galushko, 2012), or on seed trade in EU countries (Eaton, 2013).
  - Zhou et al. (2018) show a positive impact of IPR protection on U.S. seed exports to high-income countries but a negative impact on its exports to low-income countries.
  - Campi and Dueñas (2016) show the negative effects of stronger IPR on bilateral trade by utilizing gross agricultural and food export data from 60 countries.

We focus on...

- GVC-related trade
  - Intellectual property has been recognized as a critical source of competitiveness for economies engaged in the global value chain (GVC) [1]. GVC share
  - More generally, we still have a limited understanding of the impact of trade policy on GVCs (Antràs and Staiger 2012a, 2012b; Laget et al. 2020; Balié et al. 2019).
- IPR provisions in RTAs and their type
  - RTAs have been a key fixture in international trade relations.
  - IPR provision varies across RTAs.

[1] A global value chain (GVC) is the series of stages in the production of a product or service being produced in different countries for sale to consumers (WDR, 2020)

Dataset

- Countries: 189 countries
- Number of trade agreements covered: 224
- Year: 1990-2015 (Annual data)
- Sector: Agriculture and Food (EORA26 sector 1 and 4)
- Variables of interest: Dummies indicating RTA including IPR provisions (independent var), GVC-related trade (dependent var)

Data

Type of IPR provisions in RTA

- WTO-plus and WTO-extra provisions (Source: Hofman et al. 2017)
  - WTO+ (plus): strengthen the WTO TRIPs rules (including reaffirmation of WTO TRIPs rules and additional procedural rules to promote cooperation and improve transparency, technology transfer, and legal enforceability.)
  - WTO-X (extra): IPR provisions require accession to international treaties not referenced in the WTO TRIPs.

Data

GVC-related trade (Source: WITS GVC database)

- The data is computed following the methodology discussed in Borin, Mancini and Taglioni (2021) using EORA26 MRIO.
- GVC-related trade,
  $GVC_{sr} = GrossTrade_{sr} - TraditionalTrade_{sr}$
  (s: exporter, r: importer)
  - $TraditionalTrade_{sr}$ =directly absorbed value-added in exports from s to r. In plain words, the value of goods and services that crosses just one border.
- It could be decomposed into Forward, Backward, and two-sided GVC-related trade

GVC decomposition

Outline for the empirical analysis

- What would be the impact of having IPR provisions in RTAs on GVC-related flow?
  - 1) Overall effect of IPR provision, 2) Effects of WTO plus and WTO extra provision, and 3) Heterogeneity across income pair groups
- Following the reduced form standard gravity model.

1) Overall effect of IPR provision

Identifying the overall effects of IPR provision

$$X_{ij,t}^{c,p} = exp[\beta_1 RTA_{ij,t} + \beta_2 IPR_{ij,t} + \delta_{i,t} + \eta_{j,t} + \phi_{ij}] \times \varepsilon_{ij,t} \quad (1)$$

- X_{ijt}^{c} = GVC-related trade that exports from i to j at t where c denotes three dependent variables Total GVC trade, GVC forward and backward trade.
- p = refers to three samples by sector: Agri-Food, Agriculture and Food
- $RTA_{ij,t}$ is 1 if country i and j has membership in any RTA at time t.
- $IPR_{ij,t}$ is 1 if the RTA between country i and j includes IPR provisions. This is identical to express $RTA_{ij,t} \cdot IPR_{ij,t}$
- δ_{it} = exporter-time dummies, η_{jt} = importer-time dummies, ϕ_{ij} = bilateral dummies.

2) WTO-plus and WTO-extra

Identifying the "WTO-plus" and "WTO-extra" effects

$$X_{ij,t}^{c,p} = exp[\alpha RTA_{ij,t} + \beta_1 iprPlus_{ij,t} + \beta_2 iprExtra_{ij,t} + \beta_3 iprPlus * iprExtra_{ij,t}] \times exp[\delta_{i,t} + \eta_{j,t} + \phi_{ij}] \times \varepsilon_{ij,t} \quad (2)$$

- *iprPlus* and *iprExtra* are binary variable. 1 if the provision of IPR in RTA between country i and j has each characteristic and 0 otherwise.

Result: Overall

Table: Effects of IPR provision on agriculture and food GVC trade (Total GVC)

	Agri-Food	Agri	Food	Agri-Food	Agri	Food
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Total GVC trade						
RTA(t)	0.025*	0.045*	0.012	0.021	0.082**	-0.004
	(0.011)	(0.018)	(0.009)	(0.016)	(0.025)	(0.017)
IPR(t)				0.005	**-0.050**$^{+}$	0.020
				(0.016)	(0.026)	(0.016)
Obs.	748,457	748,298	748,539	748,457	748,298	748,539
Pseudo-R2	0.999	0.999	0.999	0.999	0.999	0.999

Note: Standard errors are clustered by country pair and reported in parentheses. We adjust for the (asymptotic) bias in the coefficient estimates as well as the standard errors by using the bias correction method suggested by Weidner and Zylkin(2021). The p-values read as follows: $+p < .10$,* $p < .05$,** $p < .01$.

Result: WTO-plus and WTO-extra

Agriculture Food

Table: Effects of WTO plus and WTO extra type of IPR provisions on GVC trade in Agriculture sector

	Total GVC		GVC Forward		GVC Backward	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel B: Agriculture						
RTA(t)	0.082**	0.062*	0.119**	0.104**	0.063*	0.044
	(0.025)	(0.026)	(0.030)	(0.028)	(0.029)	(0.027)
IPR(t)	-0.050+		-0.066*		-0.047	
	(0.026)		(0.028)		(0.031)	
iprPlus(t)		-0.149**		-0.181**		-0.154**
		(0.033)		(0.038)		(0.034)
iprExtra(t)		-0.166+		-0.130+		-0.136*
		(0.086)		(0.068)		(0.058)
iprPlus(t)*iprExtra(t)		0.344**		0.313**		0.319**
		(0.094)		(0.081)		(0.064)
Obs.	748,298	748,298	745,774	745,774	748,800	748,800
Pseudo-R2	0.999	0.999	0.999	0.999	0.999	0.999

Note: Standard errors are clustered by country pair and reported in parentheses. We adjust for the (asymptotic) bias in the coefficient estimates as well as the standard errors by using the bias correction method suggested by Weidner and Zylkin(2021). The p-values read as follows: $+p < .10,^{*}\ p < .05,^{**}\ p < .01$.

Result: WTO-plus and WTO-extra

Marginal effect

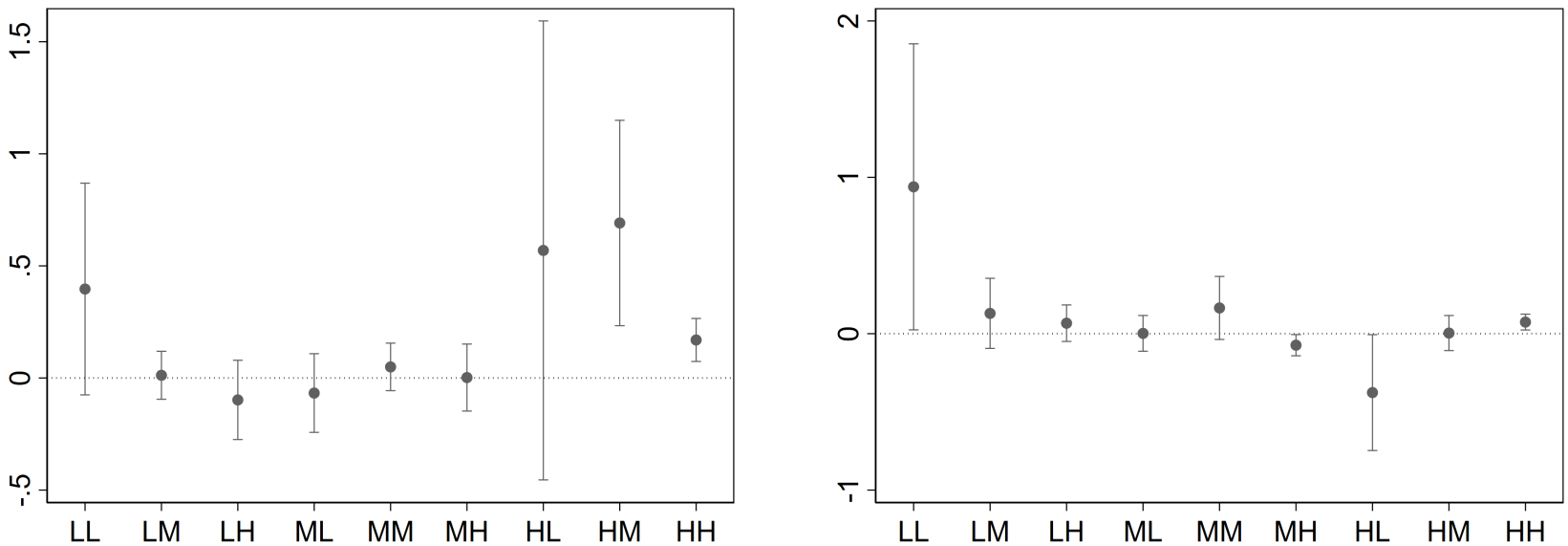
Table: Marginal effect of "WTO plus" and "WTO extra" IPR provisions on GVC trade

	Agriculture			Food		
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Total	Forward	Backward	Total	Forward	Backward
Proportional change in average dependent variable when $\Delta x = 1$						
$x = iprExtra \mid iprPlus = 1$	0.195^{**}	0.201^{**}	0.201^{**}	0.031^{+}	0.019	0.059^{**}
	(0.037)	(0.043)	(0.033)	(0.016)	(0.013)	(0.015)
$x = iprExtra \mid iprPlus = 0$	-0.153^{*}	-0.121^{*}	-0.127^{*}	-0.017	0.021	-0.029
	(0.073)	(0.060)	(0.051)	(0.041)	(0.071)	(0.054)
$x = iprPlus \mid iprExtra = 1$	0.216^{+}	0.141^{+}	0.179^{**}	0.051	0.003	0.060
	(0.115)	(0.086)	(0.066)	(0.043)	(0.066)	(0.062)
$x = iprPlus \mid iprExtra = 0$	-0.138^{**}	-0.165^{**}	-0.143^{**}	0.002	0.005	-0.028
	(0.029)	(0.031)	(0.029)	(0.021)	(0.024)	(0.018)

Note: Specifically, $x = iprExtra \mid iprPlus = 1$ can read as the proportional change in average dependent variable when iprExtra changes from 0 to 1 when iprPlus = 1 (and RTA = 1). This implies the incremental effect of having both type of provisions compared to having plus type of provision. The rest of estimates are also calculated and interpreted in similar way. Standard errors are in parentheses and the p-values read as follows: $+p < .10,^{*} p < .05,^{**} p < .01$.

Result: WTO-plus and WTO-extra; by group

Marginal effects $(x = iprExtra|iprPlus = 1)$



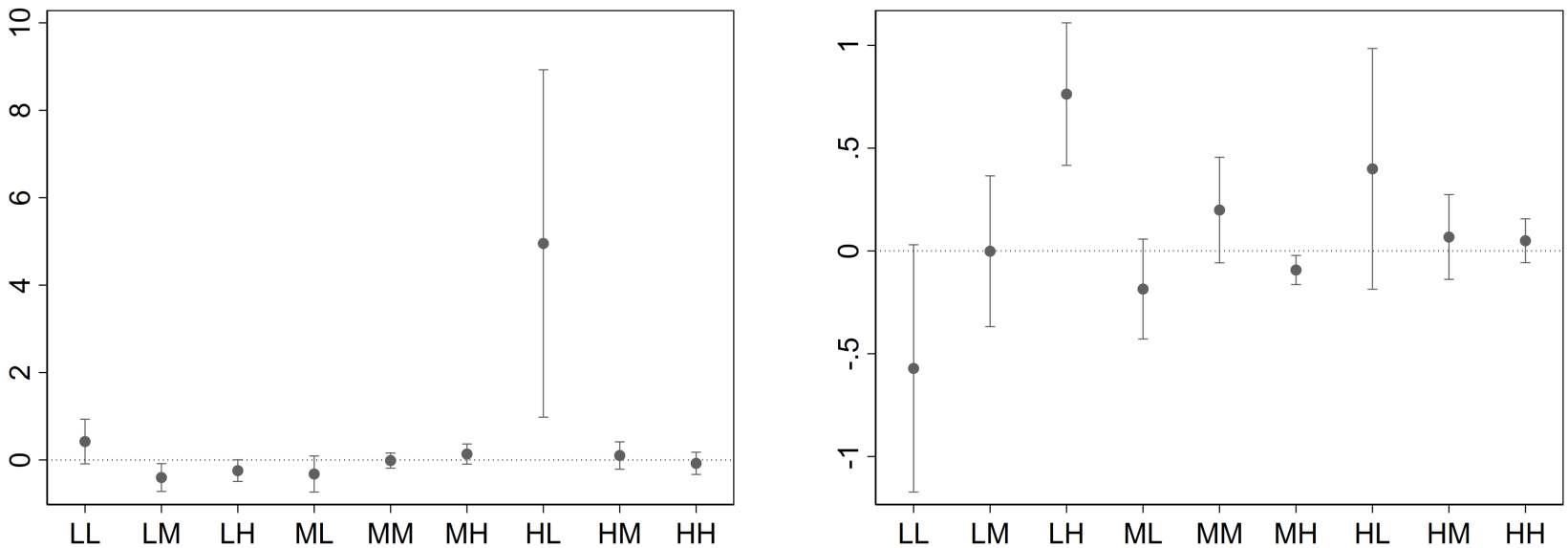
(a) Agriculture

(b) Food

Figure: The incremental effect of having both types of provisions compared to having WTO-plus type of provision on Total GVC trade in Agriculture and Food sector $(x = iprExtra|iprPlus = 1)$

Result: WTO-plus and WTO-extra; by group

Marginal effects ($x = iprPlus|iprExtra = 1$)



(a) Agriculture

(b) Food

Figure: The incremental effect of having both types of provisions compared to having WTO-extra type of provision on Total GVC trade in Agriculture and Food sector ($x = iprPlus|iprExtra = 1$)

Conclusion

- This paper examines the impact of intellectual property rights (IPR) provisions in regional trade agreements (RTAs) on the Agri-Food Global Value Chain (GVC).
- We focus on the difference in IPR provisions within RTAs, specifically *WTO-plus* and *extra* type.
- The key findings are as follows:
  - First, an interactive effect between WTO-plus and WTO-extra IPR provisions is important to enhance agricultural GVC trade.
  - Second, the results indicate that the effects are heterogeneous across income pair groups and the effects could be sensitive to low- and high-income countries.

Thank You

GVC share

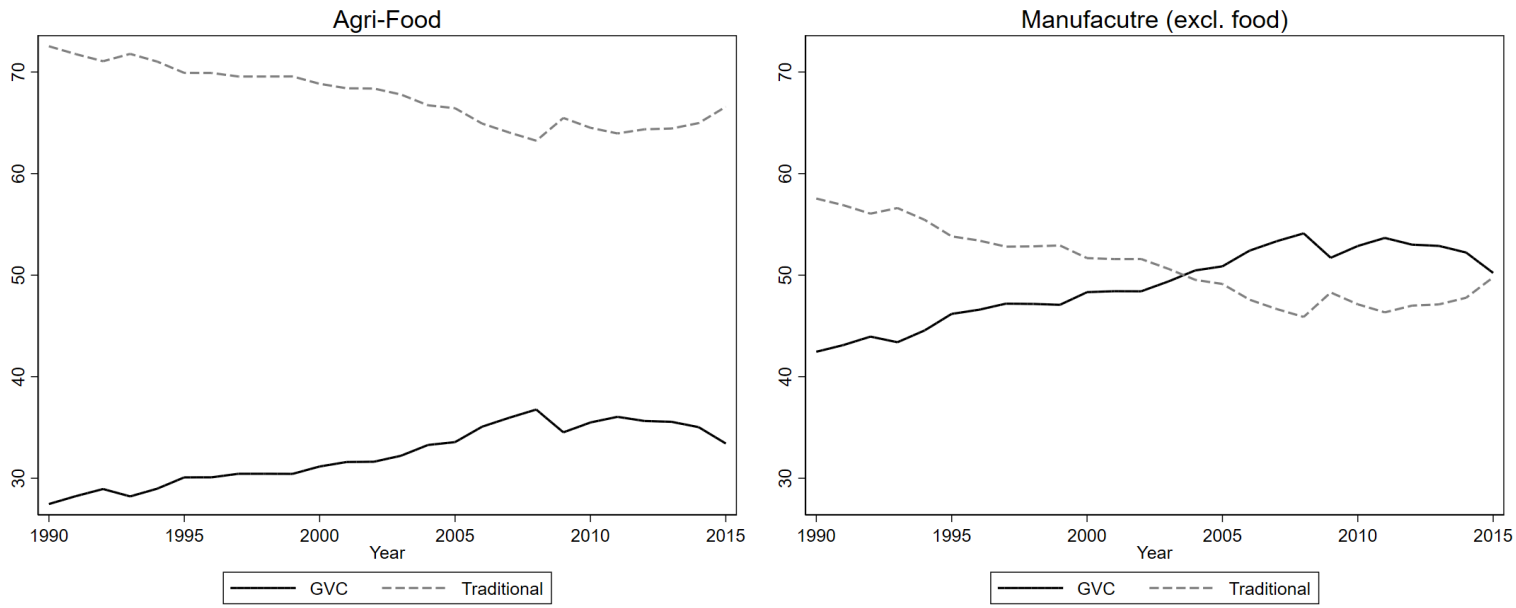


Figure: GVC-related % share of gross export at the global level, 1990-2015

Note: The Y-axis represents % share of gross export. We follow the sector classification of EORA MRIO26. Agri-Food is sum of Agriculture and Food (including Beverage) sector and manufacture includes 8 manufacturing sectors.

motivation

$$GVC_{sr} = GrossTrade_{sr} - TraditionalTrade_{sr}$$
$$GVC_{sr} = Forward_{sr} + Backward_{sr} + twosided_{sr}$$

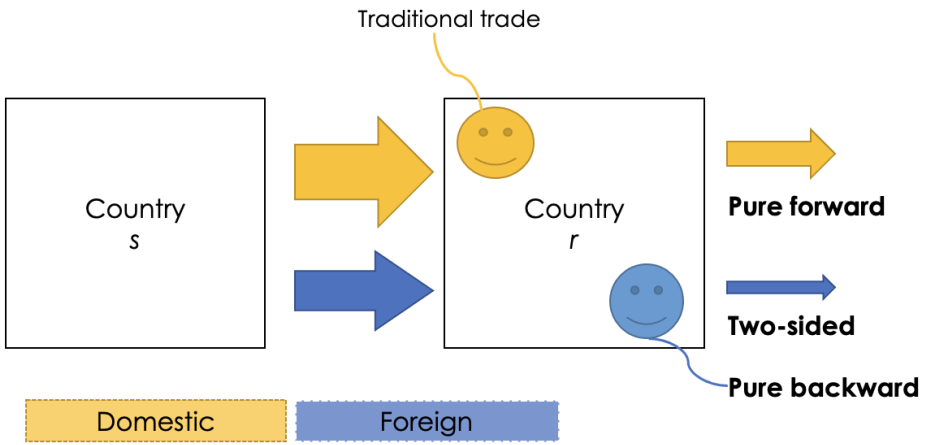


Figure: Illustration of GVC trade decomposition in Borin, Mancini and Taglioni (2021)

- $Forward_{sr}$: the difference between the entire domestic value-added that is exported to r and the one that is directly absorbed by r
- $Backward_{sr}$: the import content of country s's exports absorbed by the importing country r
- $twosided_{sr}$: the import content of country s' exports re-exported by r

DataGVC

Result: WTO-plus and WTO-extra

Food Ag

Table: Effects of WTO plus and WTO extra type of IPR provisions on GVC trade in Food sector

	Total GVC		GVC Forward		GVC Backward	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel C: Food						
RTA(t)	-0.004	-0.006	-0.006	-0.007	0.015	0.013
	(0.017)	(0.018)	(0.022)	(0.022)	(0.015)	(0.015)
IPR(t)	0.020		0.020		0.009	
	(0.016)		(0.021)		(0.015)	
iprPlus(t)		0.002		0.005		-0.029
		(0.021)		(0.024)		(0.019)
iprExtra(t)		-0.017		0.021		-0.030
		(0.041)		(0.070)		(0.056)
iprPlus(t)*iprExtra(t)		0.048		-0.002		0.087
		(0.046)		(0.071)		(0.058)
Obs.	748,539	748,539	745,163	745,163	748,799	748,799
Pseudo-R2	0.999	0.999	1.000	1.000	0.999	0.999

Note: Standard errors are clustered by country pair and reported in parentheses. We adjust for the (asymptotic) bias in the coefficient estimates as well as the standard errors by using the bias correction method suggested by Weidner and Zylkin(2021). The p-values read as follows: $+p < .10$,* $p < .05$,** $p < .01$.