

The Role of Intellectual Property Rights in Seed Technology Transfer through Trade – Evidence from U.S. Field Crop Seed Exports

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Introduction

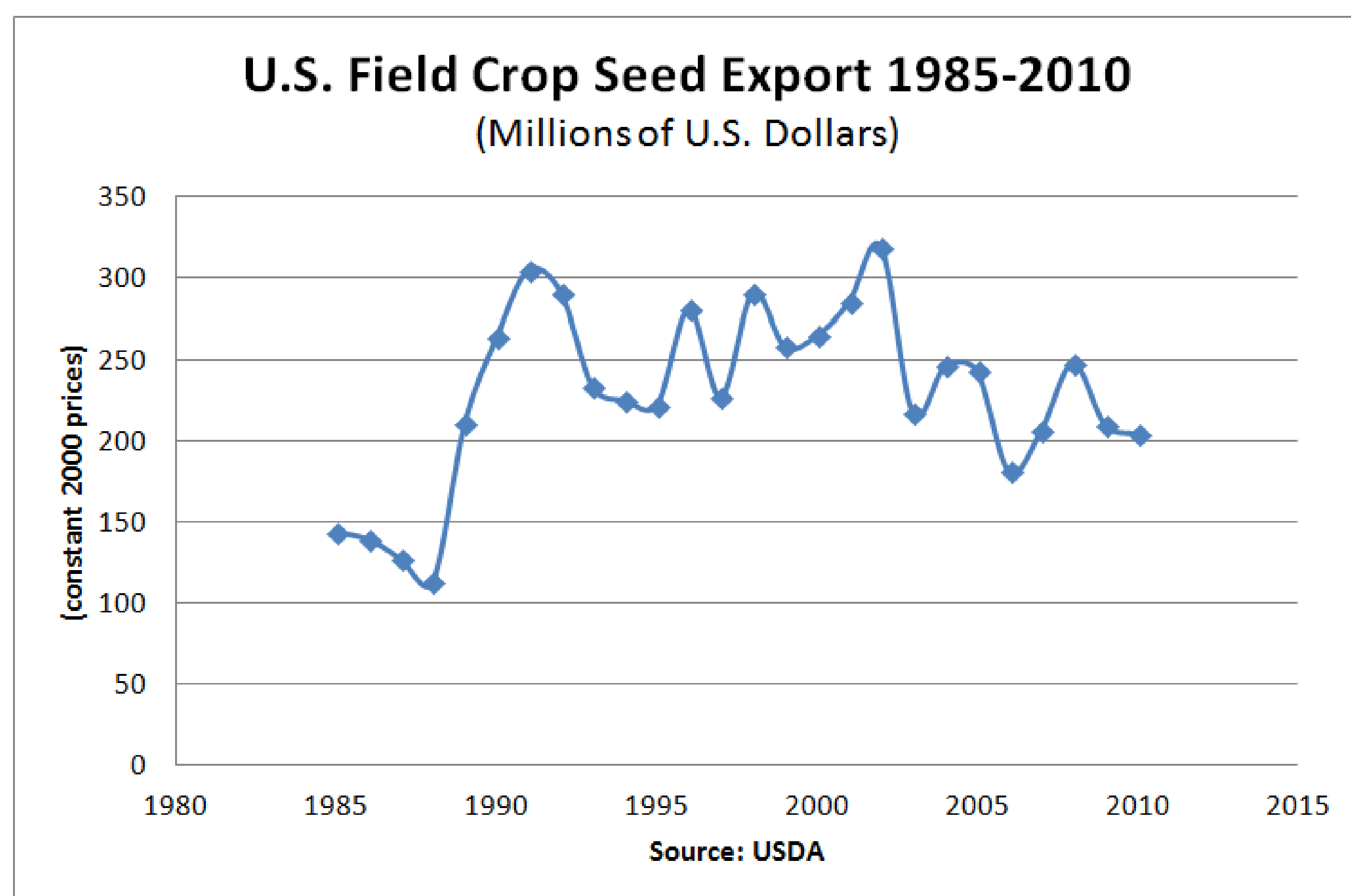
▪ **Research question:** How do country's IPRs affect U.S. (field crop) seed exports to this country?

▪ **Motivation:** Access to improved seed varieties is essential for feeding an increasing global population in a sustainable fashion.

IPRs --- facilitate seed innovation and technology transfer, most valuable asset of the seed industry

U.S. --- global leader in seed production and exporting

Field crop seeds --- account for over 1/3 of planting seed exported, include major GM crops



Top export destinations: Mexico, Canada, Italy, France, Japan, Spain, Saudi Arabia, Greece, Austria, Netherlands.

Literature Review

Theoretical work is ambiguous due to IPRs two countervailing effects on market access: market expansion vs. market power

Empirical work:

- *Yang and Woo (2006)*: apply linear dynamic model and find no significant effect of IPRs on U.S. aggregate seed exports;
- *Eaton (2009)*: uses quantile regression model but fails to detect significant effect of IPRs on U.S. and EU aggregate seed exports;
- *Galushko (2012)*: employs Heckman selection model and finds the effect of IPRs varies across different types of crops using U.S. seed export data.

Data

▪ **Dataset:** 134 countries over 26 years (1985-2010), but about half of the export values are zeros

Relevant international IPR treaties:

UPOV --- International Convention for the Protection of New Varieties of Plants

TRIPs --- (WTO's) Trade Related Aspects of Intellectual Property Rights

Variables of interest:

UPOV10 =1 if country has signed up to 1978 Act, but not 1991 Act yet
=0 otherwise

UPOV01 =1 if country has signed up to 1991 Act, but did not previously sign up to 1978 Act
=0 otherwise

UPOV11 =1 if country has signed up to 1991 Act, and previously signed up to 1978 Act
=0 otherwise

WTO_TRIPs =1 if WTO member has implemented TRIPs
=0 otherwise

WTO_trans =1 if WTO member is given TRIPs transition period
=0 otherwise

Control variables:

logGDP Represents economic size

logCropProd Combined output of cereals, coarse grain, and oilseed crops; indicates market size

FTA =1 if country has free trade agreement in force with U.S.
=0 otherwise

growGM =1 if country grows genetically modified crops
=0 otherwise

Methodology

Two-way fixed-effects models:

$$\text{Linear model: } \log(y_{i,t}) = \mathbf{x}'_{i,t}\beta + \alpha_i + \gamma_t + \varepsilon_{i,t}$$

$$\text{Poisson model: } y_{i,t} = \exp(\mathbf{x}'_{i,t}\beta + \alpha_i + \gamma_t) + \varepsilon_{i,t}$$

Results

VARIABLES	Linear Fixed Effects				Poisson Fixed Effects			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>logGDP</i>	1.231** (0.548)	1.387** (0.538)	1.170** (0.549)	1.316** (0.539)	2.259*** (0.690)	2.513*** (0.662)	2.058*** (0.749)	2.324*** (0.748)
<i>logCropProd</i>	0.316 (0.291)	0.280 (0.290)	0.310 (0.284)	0.271 (0.280)	0.365 (0.597)	0.340 (0.588)	0.197 (0.491)	0.180 (0.484)
<i>FTA</i>	0.196 (0.329)	0.280 (0.300)	0.168 (0.335)	0.270 (0.303)	-0.150 (0.253)	-0.253 (0.200)	-0.118 (0.250)	-0.221 (0.202)
<i>growGM</i>	0.174 (0.260)	0.0916 (0.265)	0.125 (0.258)	0.0484 (0.261)	0.473 (0.320)	0.483 (0.310)	0.446 (0.310)	0.452 (0.302)
<i>UPOV10</i>		0.244 (0.233)		0.173 (0.234)		0.275 (0.287)		0.278 (0.306)
<i>UPOV01</i>		-0.663** (0.286)		-0.759** (0.296)		-0.210 (0.354)		-0.102 (0.421)
<i>UPOV11</i>		0.369 (0.481)		0.241 (0.485)		0.946 (0.607)		0.890 (0.622)
<i>WTO_TRIPs</i>			0.881** (0.401)	0.924** (0.425)			1.152** (0.530)	1.046* (0.552)
<i>WTO_trans</i>			0.433 (0.404)	0.470 (0.412)			0.863 (0.589)	0.741 (0.607)
Observations	1,643	1,643	1,643	1,643	3,214	3,214	3,214	3,214
Countries	134	134	134	134	134	134	134	134

Notes: Time fixed effects (year dummies) are included for all specifications but not reported here. Cluster-robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Discussion

- ***WTO_TRIPs*** is found to have significantly positive impact on seed exports in both types of models, with its magnitude larger in Poisson models.
- Membership dummies have drawbacks.
- Results also complicated by firm's FDI and licensing efforts, as exports are not only way to sell products and technology.
- For future research, we would also consider estimating both linear and nonlinear dynamic models, and
- How IPRs influence the mode of serving foreign markets.

References

- Eaton, D. "Trade and intellectual property rights in the agricultural seed sector," paper presented at the International Association of Agricultural Economists Conference, Beijing, China, 16-22 August (2009).
- Yang, C. H., and R. J. Woo. "Do stronger intellectual property rights induce more agricultural trade? A dynamic panel data model applied to seed trade," *Agricultural Economics* 35 (2006): 91-101.
- Galushko, V. "Do stronger intellectual property rights promote seed exchange: evidence from U.S. seed exports?" *Agricultural Economics* 43 (2012) supplement 59-71.