

Exchanging Tariffs With Rules in Trade Agreements

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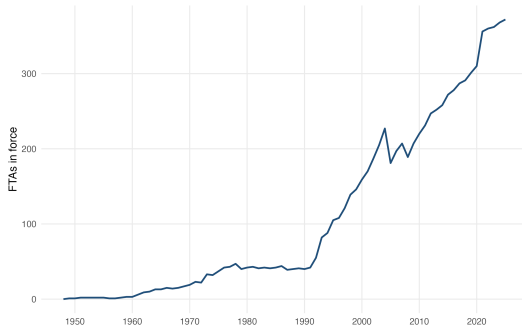
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Motivation I

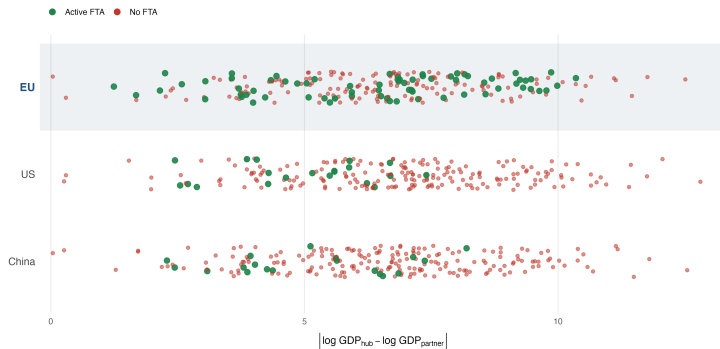
- ▶ Multilateral trade talks have stalled since the Uruguay Round (1994)
- ▶ Free Trade Agreements (FTAs) have become the central instrument of trade policy



Cumulative number of FTAs worldwide. Data: WTO RTA Database.

Motivation II

- *Theory*: trade agreements more likely between countries of similar size (see e.g. Baier and Bergstrand, 2004)
- *In practice*: large economies frequently sign FTAs with much smaller partners



Explanation: Trade Agreements as Rule-Setting Instruments

“America should write the rules. America should call the shots. Other countries should play by the rules that America and our partners set, and not the other way around.”

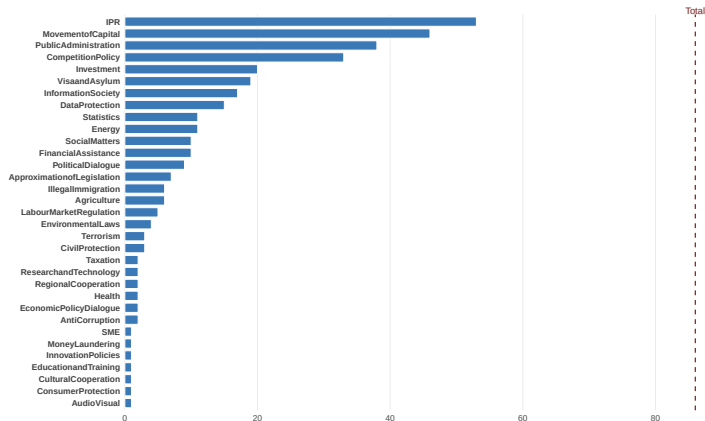
— *Barack Obama on TPP, 2016*

“Power today is economic power. It is actually power through standardization. So if you’re able to shape the standards and export them to the rest of the world, you exert power.”

— *Ursula von der Leyen, 2020*

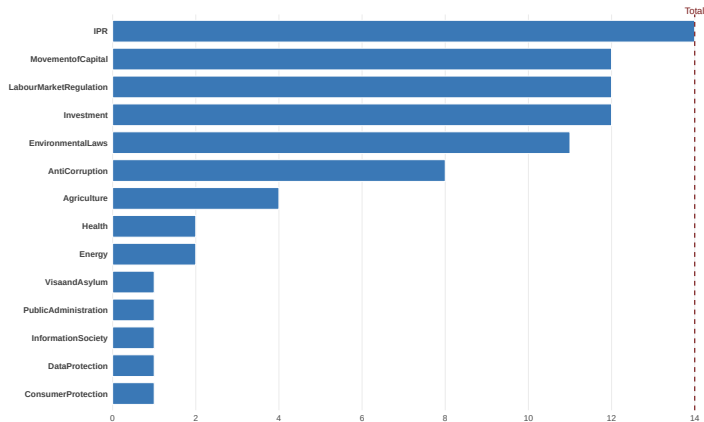
Trade agreements may serve not only to liberalise tariffs, but also to set domestic rules and standards abroad.

Regulatory Issues in Trade Agreements: the EU



Number of EU Agreements by Legally Enforceable WTO-X Policy Area. Source: Hofmann et al. (2019)

Regulatory Issues in Trade Agreements: the US



Number of US Agreements by Legally Enforceable WTO-X Policy Area. Source: Hofmann et al. (2019)

This Paper

1. **Build a model** of trade agreement negotiations with
 - ▶ country size differences
 - ▶ regulatory differences
2. **Show both theoretically and empirically** that
 - ▶ size asymmetry inhibits agreement formation
 - ▶ this effect weakens when regulatory differences create scope for concessions
3. **Validate the mechanism**
 - ▶ event studies showing smaller partners' regulations converge to the larger partner's around the RTA

Related Literature

- ▶ **Endogenous trade agreements** (e.g., Baier and Bergstrand, 2004; Aghion et al., 2007; Chen and Joshi, 2010)
- ▶ **Deep integration** (e.g., Grossman et al., 2021; Maggi and Ossa, 2023; Parenti and Vannoorenberghe, 2024)
- ▶ **Issue linkage** (e.g., Conconi and Perroni, 2002; Limão, 2005, 2007)
- ▶ **Geoeconomics** (e.g., Clayton et al., 2026; Broner et al., 2025)
- ▶ **The Brussels effect** (e.g., Bradford, 2012, 2020; Maggi and Mrázová, 2024)

Theory Roadmap

1. **Benchmark:** shallow trade agreements with tariffs only
 - ▶ size asymmetry inhibits agreement formation
2. **Extension:** negotiable domestic regulations
 - ▶ regulatory differences create scope for concessions
 - ▶ attenuate the effect of size asymmetry

Benchmark Model

- ▶ Two countries (H, F), two sectors (numeraire, differentiated); $L_H > L_F$
- ▶ Numeraire sector: perfect competition, labour as the only input, CRS $\Rightarrow w = 1$
- ▶ Differentiated sector: one firm per country (Cournot duopoly)
- ▶ Specific tariffs on the differentiated sector: t_H, t_F

Consumer Preferences

- ▶ Quasilinear preferences with quadratic utility

$$U_H = q_{0H} + \alpha Q_H - \frac{1}{2}\eta Q_H^2, \quad Q_H \equiv q_{HH} + q_{HF}, \quad \alpha > 0, \eta > 0$$

- ▶ Profits and tariff revenues distributed back to atomistic consumers
- ▶ Indirect utility absent regulation costs is

$$V_H = \underbrace{1}_{\text{labor income}} + \underbrace{\pi_H}_{\text{profits per capita}} + \underbrace{t_H q_{HF}^*}_{\text{tariff revenue per capita}} + \underbrace{\frac{1}{2}\eta(Q_H^*)^2}_{\text{consumer surplus}}$$

Noncooperative Tariffs

Governments choose tariffs to maximise welfare:

$$t^* = \arg \max_t V = \frac{\alpha}{3} > 0$$

- ▶ $t \uparrow \Rightarrow \pi \uparrow$, tariff revenue $\uparrow$
- ▶ $t \uparrow \Rightarrow p \uparrow$
- ▶ Optimal tariff is non-prohibitive:

$$t^* = \frac{\alpha}{3} < \frac{\alpha}{2}$$

- ▶ Profit-shifting motive of trade policy (Brander and Spencer, 1985)

Trade Agreement

Consider a trade agreement with

$$t_H = t_F = 0$$

The agreement is mutually beneficial iff for $i \in \{H, F\}$

$$\Omega_i^{FTA} = V_i(0, 0) - V_i\left(\frac{\alpha}{3}, \frac{\alpha}{3}\right) \geq 0$$

$$\iff \underbrace{V_i\left(0, \frac{\alpha}{3}\right) - V_i\left(\frac{\alpha}{3}, \frac{\alpha}{3}\right)}_{<0} + \frac{L_j}{L_i} \cdot \eta \cdot \Delta(q_{ji}^2) \geq 0$$

This holds if and only if

$$\frac{L_F}{L_H} \geq \frac{9}{16} \equiv \bar{\lambda}$$

Size asymmetry inhibits trade agreement formation

Introducing Regulation

- ▶ Pro-market regulation (competition policy, IPR enforcement, efficient certification) determines entry probability

$$G(r) \equiv \Pr(\text{partner entry} \mid r), \quad G(0) = 0, \quad G' > 0, \quad G'' < 0 \text{ on } (0, \tilde{r}), \quad G = 1 \text{ for } r \geq \tilde{r}$$

- ▶ Regulation is costly, with country-specific enforcement costs reflecting state capacity or experience with rule-based systems:

$$C_i(r_i) = L_i c_i r_i$$

- ▶ *Home has lower enforcement costs, i.e., $c_H < c_F \implies r_H^n > r_F^n$*

Trade Agreement With Negotiable Regulations

- ▶ Consider a trade agreement with $t_H = t_F = 0$ and a common minimum regulation level r^c
- ▶ Let c_H be sufficiently low such that $r_H^n = \tilde{r}$, hence $G(r_H^n) = 1$
- ▶ Suppose c_F is sufficiently high such that $G(r_F^n) < 1$
- ▶ When is the agreement mutually beneficial?

The Full Harmonisation Region

Lemma 1

There exists a non-empty interval of enforcement costs and corresponding noncooperative regulation

$$c_F \in (c_H, \bar{c}], \quad r_F^n \in [\underline{r}, r_H)$$

such that Foreign's participation constraint is satisfied under full harmonisation

$$r^c = r_H$$

Agreement Feasibility Under Full Harmonisation

Home gains under full harmonisation are

$$\Omega_H(r_F^c = r_H^n) = V_H(0, 0) - V_H(0, \frac{\alpha}{3}) + \frac{L_F}{L_H} \eta \left[1 \cdot q_{FH}^2(t_F = 0) - G(r_F^n) \cdot q_{FH}^2(t_F = \frac{\alpha}{3}) \right]$$

Decomposing profits per capita abroad gives

$$\Omega_H(r_F^c = r_H^n) = \Omega_H^{\text{benchmark}} + \left[1 - G(r_F^n) \right] \frac{L_F}{L_H} \eta q_{FH}^2(t_F = \frac{\alpha}{3})$$

Additional gains from concessions, increasing in $r_H^n - r_F^n$

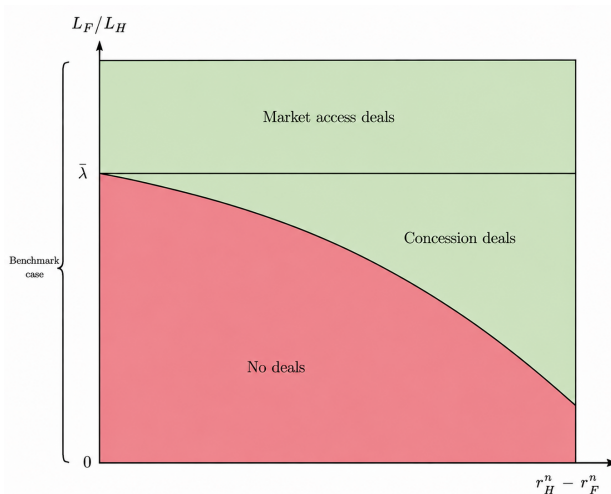
Agreement Feasibility Under Full Harmonisation

The size asymmetry threshold under full harmonisation is

$$\frac{L_F}{L_H} \geq \frac{9}{18 - 2G(r_F^n)}$$

Pre-agreement regulatory distance attenuates the inhibiting effect of size asymmetry

Agreement Feasibility Under Full Harmonisation



The Level Effect of Regulatory Distance

The minimum size of the small economy required for an agreement is

$$\frac{L_F}{L_H} \geq \frac{9}{18G(r_F^c) - 2G(r_F^n)}$$

For sufficiently high regulatory adjustment costs c_F , even the maximum feasible concession satisfies

$$G(r_F^c) \leq \frac{1}{2}$$

In this case, no agreement is feasible for any $L_H > L_F$

Testable Predictions

The model predicts that

1. Size asymmetry inhibits trade agreement formation
2. Regulatory distance inhibits trade agreement formation
3. **The inhibiting effect of size asymmetry is attenuated by regulatory distance**

Empirical Specification

Discrete-time logit on the EU and US, right-censored data, lagged covariates

$$\Pr(\text{FTA}_{h,p,t}) = \Lambda \left(\beta_1 + \beta_2 \text{Asymmetry}_{h,p,t-6} + \beta_3 \text{RegDist}_{h,p,t-6} + \beta_4 \text{Asymmetry}_{h,p,t-6} \times \text{RegDist}_{h,p,t-6} + X'_{h,p,t-6} \Gamma + \gamma_{ht} \right)$$

$$\text{Asymmetry}_{h,p,t-6} = \log(GDP_{h,t-6}) - \log(GDP_{p,t-6})$$

Predicted Signs

- ▶ $\beta_2 < 0, \beta_3 < 0, \beta_4 > 0$

Sample

- ▶ Annual data, 2002–2025
- ▶ Partners with no prior trade agreements

Data: Measuring Regulation

Regulatory Quality (RQ)

World Bank Governance Indicators

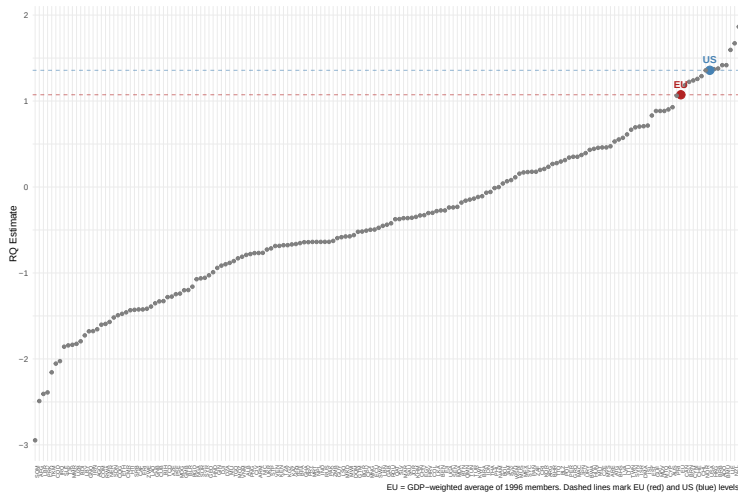
“Regulatory Quality captures perceptions of the government’s ability to design and implement policies that promote private sector development.”

- ▶ Broad measure of **pro-market regulation**
- ▶ Captures non-tariff barriers, IPR protection, competition policy, and broader regulatory quality

Regulatory Distance:

$$\text{RegDist}_{h,p,t} = \text{RQ}_{ht,t} - \text{RQ}_{p,t}$$

Regulatory Quality Distribution



Controls

1. Controls following Baier and Bergstrand (2004)
 - ▶ GDP sum (CEPII)
 - ▶ distance, distance ROW (CEPII)
 - ▶ K/L ratio (and its difference to the ROW) PWT 11.0
2. Gravity controls
 - ▶ colonial links (CEPII)
 - ▶ common language (CEPII)
3. Institutional controls
 - ▶ rule of law, control of corruption (WGI)
 - ▶ government effectiveness, voice and accountability (WGI)
4. Year and region (UNSD) fixed effects

Baseline Results

	EU				US			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Asymmetry _{<i>t-6</i>}	-0.927*** (0.317)	-0.906*** (0.340)	-0.948** (0.455)	-1.06** (0.537)	-1.97*** (0.765)	-2.39*** (0.799)	-2.58*** (0.697)	-3.08** (1.35)
RegDist _{<i>t-6</i>}	-5.17*** (1.56)	-5.14*** (1.69)	-5.82*** (2.20)	-7.88** (3.08)	-5.60*** (2.10)	-6.34*** (2.06)	-7.17*** (1.84)	-9.43*** (2.30)
Asymmetry _{<i>t-6</i>} × RegDist _{<i>t-6</i>}	0.613*** (0.193)	0.609*** (0.202)	0.681** (0.274)	0.867** (0.391)	0.744*** (0.288)	0.860*** (0.278)	0.965*** (0.258)	1.13*** (0.394)
B&B (2004)	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Colonial/language		✓	✓	✓		✓	✓	✓
Region FE			✓	✓			✓	✓
Institutional controls				✓				✓
Obs.	758	758	714	714	1,583	1,583	1,511	1,511
Pseudo <i>R</i> ²	0.259	0.267	0.309	0.340	0.316	0.371	0.385	0.435
AUC	0.875	0.874	0.892	0.900	0.928	0.937	0.953	0.964

Sensitivity: Lag Length

	EU				US			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Asymmetry _{<i>t-L</i>}	-1.20*** (0.369)	-0.906*** (0.340)	-0.685** (0.306)	-0.580* (0.299)	-2.26*** (0.768)	-2.45*** (0.876)	-2.43*** (0.835)	-2.27*** (0.781)
RegDist _{<i>t-L</i>}	-6.18*** (1.84)	-5.14*** (1.69)	-3.91*** (1.47)	-3.36** (1.40)	-5.97*** (2.13)	-6.66*** (2.37)	-6.61*** (2.13)	-6.27*** (2.02)
Asymmetry _{<i>t-L</i>} × RegDist _{<i>t-L</i>}	0.746*** (0.214)	0.609*** (0.202)	0.458** (0.185)	0.404** (0.185)	0.807*** (0.277)	0.887*** (0.310)	0.893*** (0.288)	0.848*** (0.273)
Lag <i>L</i>	4	5	7	8	4	5	7	8
B&B (2004)	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Colonial/language	✓	✓	✓	✓	✓	✓	✓	✓
Obs.	758	758	758	758	1,583	1,583	1,583	1,583
Pseudo <i>R</i> ²	0.277	0.267	0.251	0.237	0.366	0.379	0.372	0.366
AUC	0.882	0.874	0.872	0.870	0.933	0.930	0.936	0.935

Sensitivity: Alternative Estimators

	EU			US		
	Probit	Cloglog	OLS	Probit	Cloglog	OLS
Asymmetry _{<i>t</i>-6}	-0.389*** (0.133)	-0.892*** (0.331)	-0.006* (0.004)	-0.963*** (0.302)	-2.33*** (0.743)	-0.006*** (0.002)
RegDist _{<i>t</i>-6}	-2.05*** (0.670)	-5.13*** (1.61)	-0.036*** (0.012)	-2.58*** (0.761)	-6.14*** (1.91)	-0.017*** (0.006)
Asymmetry _{<i>t</i>-6} × RegDist _{<i>t</i>-6}	0.247*** (0.080)	0.604*** (0.194)	0.004** (0.002)	0.343*** (0.105)	0.837*** (0.258)	0.002*** (0.0008)
B&B (2004)	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Colonial/language	✓	✓	✓	✓	✓	✓
Obs.	758	758	1,550	1,583	1,583	5,593
Pseudo <i>R</i> ²	0.260	0.269	-0.046	0.372	0.370	-0.008
AUC	0.887	0.870	0.767	0.956	0.930	0.783

Validating the Mechanism

- ▶ Do we observe these regulatory concessions in practice?
- ▶ Focus on **intellectual property rights**:
 - ▶ Most-prevalent regulatory chapter in EU & US RTAs ([Hofmann et al., 2019](#))
 - ▶ Both statutory rules and economic activity are measurable
- ▶ **Approach:** [Sun and Abraham \(2021\)](#) staggered DiD event studies with TWFE on statutory IPR strength and cross-border patenting around EU/US trade agreements

Data

- ▶ **IPR Stringency:** Ginarte-Park Index ([Ginarte and Park, 1997](#); [Park, 2008](#))
 - ▶ 120 countries, 1960-2015
- ▶ **Patents:** INPACT-S ([Labelle et al., 2023](#))
 - ▶ 213 countries, 31 industries, 1980-2019, patents by origin-destination-industry-year

IPR Stringency: Ginarte-Park Index

(1) Coverage	Available	Not available
Patentability of pharmaceuticals	1/8	0
Patentability of chemicals	1/8	0
Patentability of food	1/8	0
Patentability of surgical products	1/8	0
Patentability of microorganisms	1/8	0
Patentability of utility models	1/8	0
Patentability of software	1/8	0
Patentability of plant and animal varieties	1/8	0
(2) Membership in international treaties	Signatory	Not signatory
Paris convention and revisions	1/5	0
Patent cooperation treaty	1/5	0
Protection of new varieties (UPOV)	1/5	0
Budapest treaty (microorganism deposits)	1/5	0
Trade-related intellectual property rights (TRIPS)	1/5	0

(3) Duration of protection	Full	Partial
	1	$0 < f < 1$
(4) Enforcement mechanisms	Available	Not available
Preliminary (pre-trial) injunctions	1/3	0
Contributory infringement	1/3	0
Burden of proof reversal	1/3	0
(5) Restrictions on patent rights	Does not exist	Exists
Working requirements	1/3	0
Compulsory licensing	1/3	0
Revocation of patents	1/3	0

where f is the duration of protection as a *fraction* of 20 years from the date of application or 17 years from the date of grant (for grant-based patent systems). Overall score for patent rights index: sum of points under (1)–(5).

Figure: Composition of the Ginarte-Park Index in Park (2008).

IPR Stringency: Ginarte–Park Index

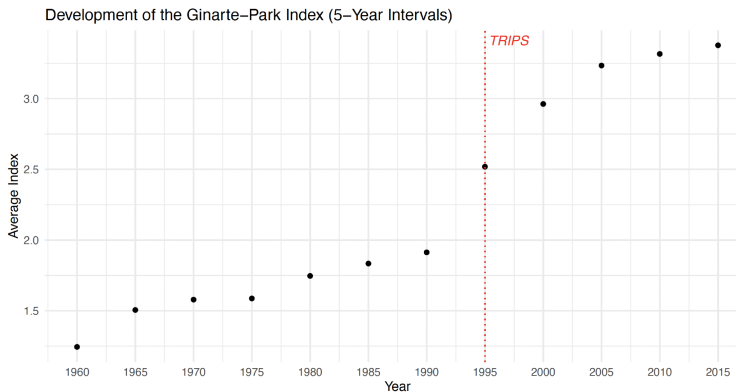


Figure: Evolution of the Ginarte–Park Index Over Time

Effect of EU/US RTAs on Statutory IPR

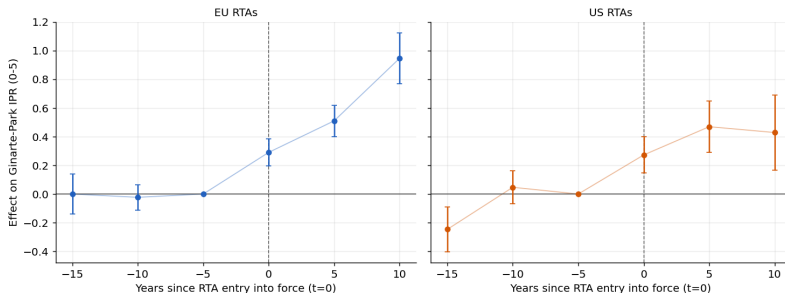


Figure: Ginarte–Park IPR index. [Sun and Abraham \(2021\)](#) event study with TWFE; 90% CIs.

Effect of EU/US RTAs on Cross-Border Patenting

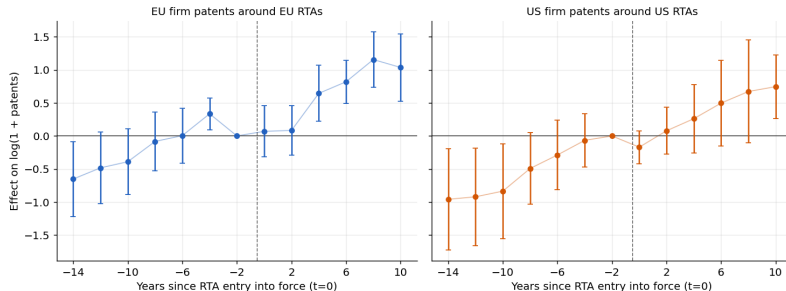


Figure: $\log(1+\text{patents})$ from EU/US firms in partner countries. Sun and Abraham (2021) event study with TWFE; 90% CIs.

Conclusion

- ▶ Gains from tariff liberalisation favours RTAs between similarly sized countries
- ▶ Regulatory concessions help explain why large economies form FTAs with much smaller partners
- ▶ Regulatory differences attenuate the negative effect of size asymmetry on agreement formation
- ▶ This prediction is supported in EU and US data

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