Exchanging Tariffs with Rules in Trade Agreements

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Abstract

Standard trade theory implies that trade agreements are most likely to be concluded between countries of similar size. Yet in practice, both the European Union and the United States frequently enter into trade agreements with partners that are substantially smaller. I explain this puzzle by arguing that trade agreements involve not only the exchange of tariff preferences, but also regulatory concessions. In a parsimonious model of deep trade agreement negotiations, I first establish the conventional result that size asymmetry inhibits agreement formation. I then show that greater pre-agreement regulatory differences, by increasing the scope for regulatory concessions, attenuate this effect. Event-study evidence showing post-agreement increases in intellectual property protection and patenting by EU and US firms in partner countries provides further support for the proposed mechanism.

1 Introduction

Following the gridlock in multilateral trade negotiations, recent decades have witnessed a rapid proliferation of regional trade agreements (RTAs). The number of RTAs in force worldwide has increased from just 22 in 1990 to over 380 in 2024. [1] A striking feature of this trend, and one that is difficult to reconcile with standard trade theory, is that many of these agreements are concluded between countries that differ substantially in size.

Standard trade theory implies that RTAs are most likely to form between countries of similar size. In the canonical framework of Bagwell and Staiger (1999), trade agreements solve a prisoners' dilemma created by reciprocally positive optimal tariffs. However, this motive is absent in agreements between a large and a small country: the small country cannot manipulate world prices, so its optimal tariff is already zero and it has no terms-of-trade externality to internalise. More generally, mutual gains from an RTA decline as countries become more unequal in size, making agreements less likely. [2]

Still, many of the world's largest economies conclude RTAs with partners that are much smaller than themselves. The European Union (EU), for example, has signed trade agreements with Ecuador, Peru, Egypt, and Morocco. Likewise, the United States (US) has entered into agreements with Costa Rica, the Dominican Republic, Honduras, and Guatemala. The pattern is too widespread to dismiss as exceptional, and suggests that large economies derive benefits from RTAs that extend beyond the conventional gains from reciprocal tariff liberalisation.

One potential explanation is that RTAs exchange not only tariff preferences but also regulatory concessions. Consistent with this view, there is substantial evidence that the

[1] See the WTO RTA Database.

[2] See Baier and Bergstrand (2004) for a formalisation of this result.

US uses trade agreements to strengthen intellectual property rights (IPR) protection abroad (Rodrik, 2018). The EU may provide an even stronger example. A prominent argument in both policy discourse and the international legal literature, known as the Brussels Effect, holds that the EU leverages access to its large market to shape regulation beyond its borders (Bradford, 2020). Given that the EU has the world's largest network of trade agreements, and that modern trade agreements extend well beyond tariffs to cover areas such as intellectual property rights, competition policy, investment, and capital mobility (see Hofmann et al., 2019), RTAs may constitute a key channel through which the EU projects its regulatory preferences.

This paper studies how regulatory concessions interact with the negative effect of size asymmetry on RTA formation. I begin with a simple model of shallow trade agreements in a profit-shifting framework and establish the benchmark result that greater size asymmetry reduces the likelihood of an agreement. I then introduce negotiable domestic regulations that affect the extensive margin of trade and show that larger pre-agreement regulatory differences, by increasing the scope for regulatory concessions, attenuate this effect. I motivate this modelling approach with suggestive evidence on the salience of provisions addressing regulatory barriers faced by exporters.

To test the theory, I construct separate panels of potential trade agreement partners for the EU and the US and estimate how size asymmetry and regulatory distance jointly shape the probability of agreement formation. I measure regulatory distance using differences in the extent to which countries' regulatory environments are conducive to business activity, consistent with the theory. The results provide strong support for the hypothesis that greater scope for regulatory concessions attenuates the inhibiting effect of size asymmetry on RTA formation.

For complementary evidence on the regulatory concessions mechanism, I focus on IPR, one of the regulatory areas covered by the theoretical model, because both statutory rules and economic outcomes are readily measurable, and because IPR are particularly salient in EU and US trade agreements. [3] I show that partners' statutory IPR strengthen in the years following an RTA with the EU or the US, and that EU and US firms increase their patent filings in these partner countries after the agreements enter into force.

By analysing how the incorporation of domestic regulations into trade negotiations affects incentives to form agreements between countries of asymmetric size, this paper contributes to the literatures on endogenous trade agreement formation (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; Santacreu, 2025), and issue linkage in international negotiations (e.g., Conconi and Perroni, 2002; Limão, 2005, 2007). More broadly, the paper speaks to the re-emerging literature on geoeconomics, which studies how countries use market-derived economic power to pursue strategic and economic objectives abroad (e.g., Clayton et al., 2026; Broner et al., 2025). By showing how access to a large market can be exchanged for regulatory concessions, the paper identifies a mechanism through which economically powerful countries may shape regulatory outcomes beyond their borders through trade agreements.

The paper closest in spirit is Limão (2007), which studies how regulatory concessions in trade agreements affect incentives for multilateral tariff cooperation. In Limão's

[3] See Section 2.

framework, regulations reduce consumer externalities and a trade agreement between a large and a small country is always feasible because the small country can offer a sufficiently large regulatory concession. In contrast, I endogenise trade agreement formation and characterise the conditions under which regulatory concessions make an agreement feasible. This generates testable predictions about when large economies conclude trade agreements with substantially smaller partners and allows the mechanism to be evaluated empirically.

The paper also differs from much of the recent theoretical literature on deep integration, which has primarily focused on regulations motivated by production or consumption externalities (see, e.g., Limão, 2007; Maggi and Ossa, 2023). [4] Instead, I focus on regulations that affect market access by creating barriers to foreign exporters. This perspective is consistent with Rodrik (2018), who argues that trade agreement negotiations are often driven by rent-seeking exporters seeking greater access to foreign markets.

The remainder of the paper is organised as follows. Section 2 motivates the theory with descriptive evidence on regulatory provisions in EU and US trade agreements. Section 3 presents the model and derives its key predictions. Section 4 maps the theory to the data. Section 5 presents the main empirical results. Section 6 provides complementary evidence on the regulatory concessions mechanism in the IPR context. Section 7 concludes.

2 Regulatory Issues in EU and US RTAs

Several anecdotes suggest that RTAs concluded by the EU and the US are to a large extent motivated by efforts to advance the commercial interests of their exporters.

The 2025 Commission Report on EU Trade Agreements lists two non-tariff objectives for EU trade agreements:

1. *Removing regulatory barriers to market entry for EU exporters*
2. *Promoting EU values on sustainability and labour rights*

Among these two objectives, removing regulatory barriers to EU exporters seems to dominate for several reasons. First, Commission reports rely far more heavily on export-oriented terminology (for example, 71 mentions of "exports" versus 31 mentions of "imports" in the 2025 Commission Report). On top of this, there are explicit calculations of losses for EU exporters from technical barriers to trade that amount to 25 billion euros annually (see Figure 1 and the 2025 Commission Report). There is even a dedicated website, Access2Markets, that documents regulatory barriers that EU exporters face abroad. By contrast, sustainability and labour-rights objectives are more often framed in aspirational terms and appear to operate primarily through political dialogue.

A look at the enforceability of WTO-X provisions in EU trade agreements, measured by whether they are subject to dispute settlement, further underscores the relative salience of reducing regulatory barriers for EU exporters compared with objectives such as labour rights and environmental protection. [5] Figure 2 reports, by policy area, the

[4] A notable recent exception is Santacreu (2025), who studies trade agreements containing intellectual property rights provisions and examines their implications for growth and welfare.

[5] WTO-X provisions refer to policy areas that lie outside the current mandate of the WTO

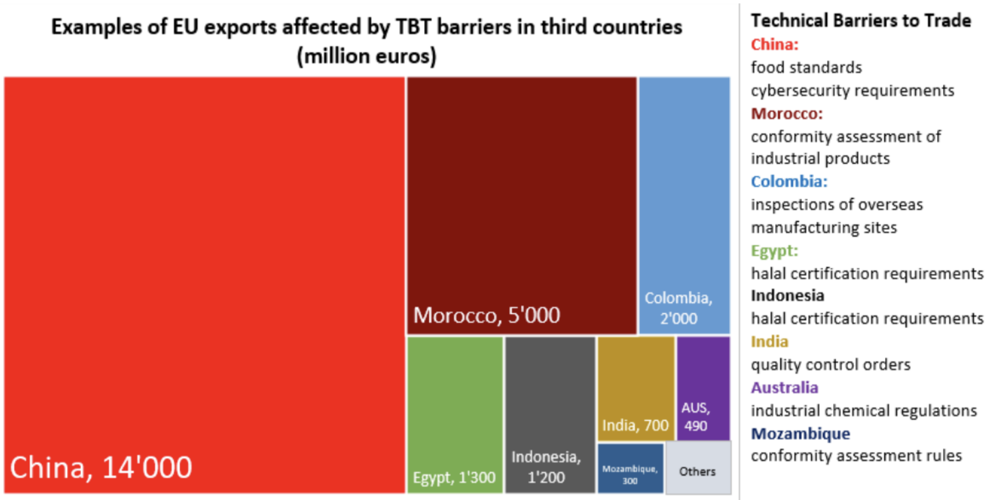

Figure 1: Example barriers faced by EU exporters in 2024. Source: 2025 Commission Report.

number of EU trade agreements in which these provisions are enforceable, using hand-coded data from Hofmann et al. (2019). While provisions on intellectual property rights, competition policy, investment, and capital movements are among the most frequently enforceable areas, labour and environmental standards are subject to dispute settlement in only four of the 44 agreements concluded since 1990. These policy areas can have first-order effects on exporters' market access by protecting intellectual property, ensuring fair competition, and enabling firms to establish affiliates and move capital across borders.

The pattern is similar for the US, as shown in Figure 3. Provisions on intellectual property rights, anti-corruption, capital movements, and investment are among the most frequently enforceable areas. Although labour and environmental provisions are more commonly subject to dispute settlement in US agreements than in EU agreements, provisions affecting exporters' market access remain at least as prominent. Combined with anecdotal evidence that US businesses exert substantial influence over trade negotiations (see Rodrik, 2018) and recent evidence that large US multinationals lobby in favour of trade agreements (see Blanga-Gubbay et al., 2025), this pattern suggests that advancing the commercial interests of domestic firms has been a central motivation for US trade agreements.

Motivated by these facts, I build a model of trade agreement negotiations that centres around size asymmetry, market access, and negotiable regulations that affect the extensive margin of trade.

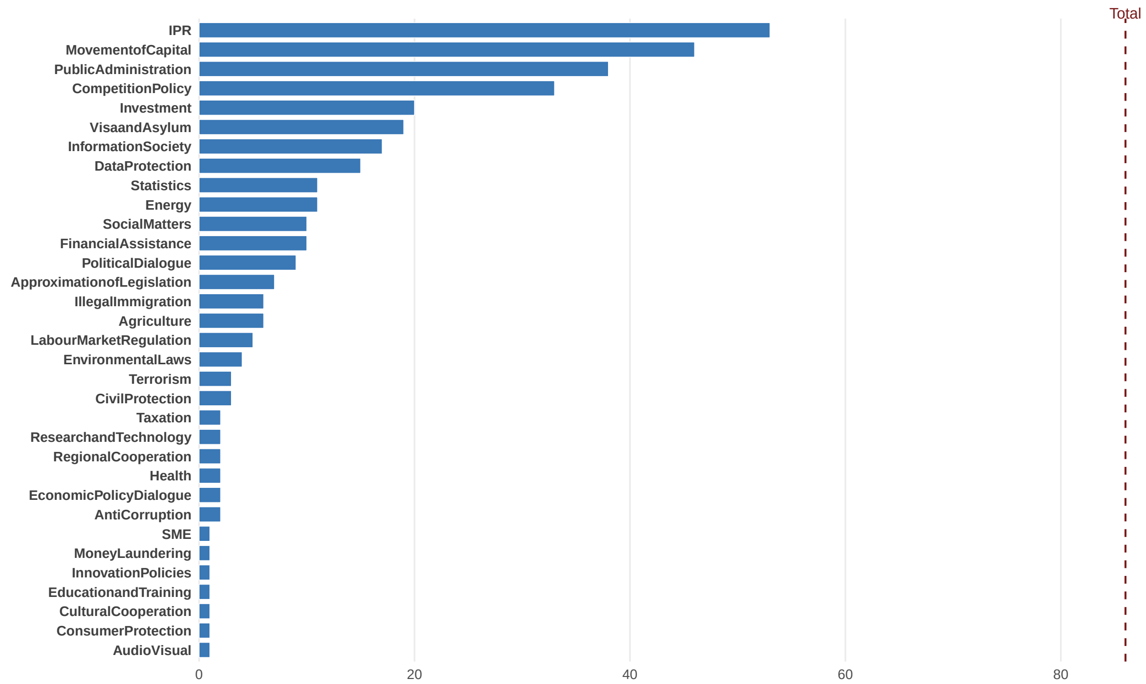

Figure 2: WTO-X Policy Areas Subject to Dispute Settlement in EU Trade Agreements. Source: (Hofmann et al., 2019) data.

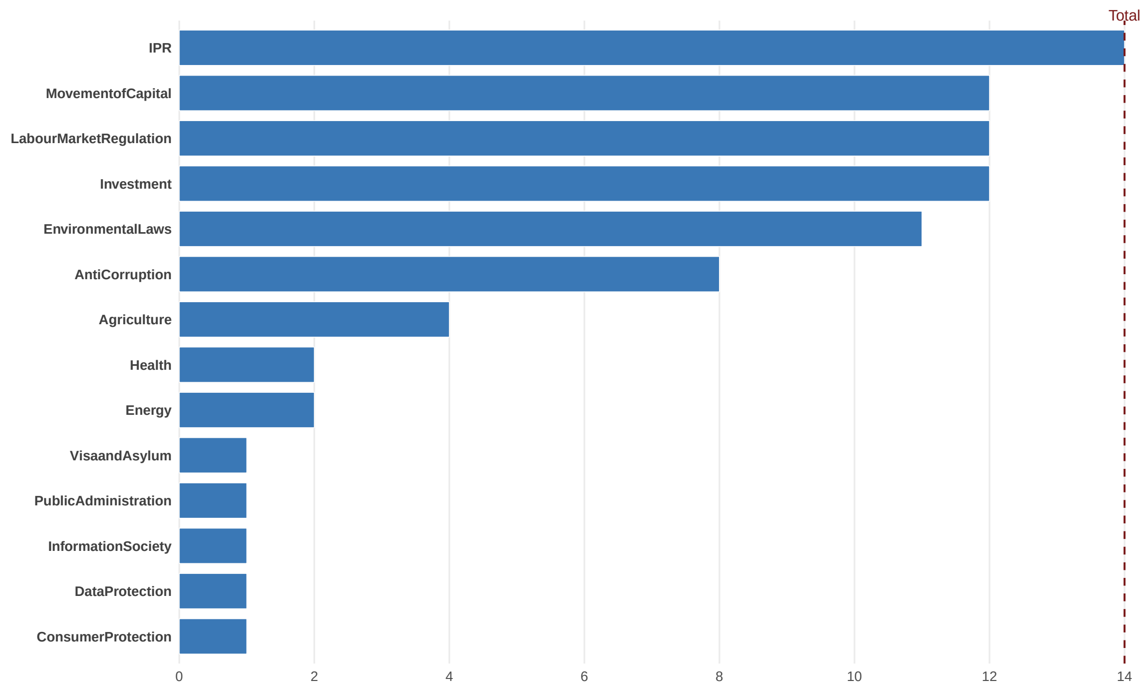

Figure 3: WTO-X Policy Areas Subject to Dispute Settlement in US Trade Agreements. Source: (Hofmann et al., 2019) data.

3 Theory

I consider two countries, Home (H) and Foreign (F), where Foreign is smaller in population size ($L_H > L_F$). I begin with a simple model in which tariffs are the only policy instrument and the motive for trade policy is profit shifting in the spirit of Brander and Spencer (1985). Governments do not internalise the effect of their tariffs on foreign firms' profits, and a trade agreement eliminates this inefficiency. I then introduce pro-market regulation as a second policy instrument. These regulations affect the probability that foreign firms can access a country's market through exports. I use this framework to study how regulatory concessions alter the effect of size asymmetry on the incentives to form an RTA.

3.1 Benchmark

In each country, a perfectly competitive sector produces a freely traded homogeneous good. Production in this sector exhibits constant returns to scale and uses labour as the only factor of production. Normalising the price of the homogeneous good to one and assuming positive production in both countries equalises wages at $w_H = w_F = 1$. As a result, the model resembles a partial equilibrium setting that shuts down terms-of-trade (TOT) motives for trade policy and isolates profit shifting as the sole motive for protection.

In addition, each country hosts a firm in an imperfectly competitive sector. These firms compete under Cournot competition in international markets, facing specific tariffs. Profits and tariff revenues are rebated lump-sum to consumers in each country. Governments are welfare maximizers.

Consumer Preferences. Consumers in all countries have identical quasi-linear preferences, characterised by linear utility over the numeraire good and quadratic utility over the differentiated good:

$$U_j = q_{0j} + \alpha Q_j - \frac{1}{2}\eta Q_j^2, \qquad Q_j \equiv q_{jj} + q_{ij},$$

where q_{jj} denotes per-capita consumption in country j of the domestic firm's output, and q_{ij} denotes per-capita consumption in country j of imports from country i, with $i \neq j$. The parameters $\alpha > 0$ and $\eta > 0$ govern demand for the differentiated good. Consumers are atomistic and therefore take aggregate income as given. The implied inverse demand function in country j is

$$p_j = \alpha - \eta Q_j.$$

With residual income spent on the numeraire good, indirect utility is given by

$$V_j = 1 + \pi_j + t_j q_{ij}^* + \frac{1}{2}\eta (Q_j^*)^2,$$

where π_j denotes per-capita profits of the domestic firm, and starred variables denote equilibrium quantities.

Supply. Let t_j denote the tariff imposed by country j on imports from country i, where $i \neq j$. Equilibrium quantities in market j are

$$q_{jj} = \frac{\alpha + t_j}{3\eta}, \qquad q_{ij} = \frac{\alpha - 2t_j}{3\eta}.$$

The corresponding profits earned in country j are

$$\Pi_{jj} = L_j \eta q_{jj}^2, \qquad \Pi_{ij} = L_j \eta q_{ij}^2.$$

Since tariffs act as a unit cost, they reduce the output of the foreign firm and increase the output of the domestic firm. As a result, tariffs raise domestic profits and reduce foreign profits, giving rise to the classic profit-shifting motive for trade policy.

Optimal Tariff. The optimal tariff is symmetric across countries and non-prohibitive for international trade, with a value lower than the choke tariff:

$$t_j^* = \arg\max_{t_j} V_j = \frac{\alpha}{3} \; < \; \frac{\alpha}{2} = t^{\text{choke}}.$$

A symmetric optimal tariff may appear surprising from the perspective of the TOT motive for trade policy a là Johnson (1953). However, here the motive for trade policy is profit-shifting. A larger market increases the total profits that can be shifted, but those gains are distributed across a larger population. These effects exactly offset in per-capita welfare terms, implying that the optimal tariff does not depend on country size. This symmetry simplifies the analysis, but it is not central to the model's predictions. If Home were to set a relatively higher optimal tariff, the asymmetry in conventional gains from a trade agreement, which is the key force driving the results that follow, would be even stronger. [6]

Trade Agreement. I now consider a shallow trade agreement that cooperatively sets preferential tariffs. For simplicity, I assume that the agreement eliminates tariffs completely, so that $t_H = t_F = 0$. This assumption is consistent with the institutional constraints governing tariff negotiations under Article XXIV of the GATT/WTO, which requires trade agreements to liberalise substantially all trade. Such an agreement is feasible if and only if it is mutually beneficial.

Formally, an RTA is feasible if, for each country $j \in \{H, F\}$,

$$\Omega_j^{RTA} \equiv V_j(0,0) - V_j\left(\frac{\alpha}{3}, \frac{\alpha}{3}\right) \geq 0.$$

This condition can be written as

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

where $j \neq i$. The first term captures the loss from unilaterally eliminating the optimal tariff, while the second term captures the additional profits, thus income, from improved market access abroad. The participation constraint for a country j is satisfied if and only if

$$\frac{L_i}{L_j} \geq \frac{9}{16} \equiv \bar{\lambda}.$$

Since $L_H \geq L_F$, F is always willing to participate in the RTA. However, the agreement will be mutually beneficial, thus feasible, if and only if

$$\frac{L_F}{L_H} \geq \bar{\lambda}.$$

[6] See also Ossa (2011) for optimal tariffs independent of size in a firm relocation model.

This result establishes the conventional prediction of trade theory that incentives to form an RTA are strongest between countries of similar size. As countries become more asymmetric, improved access to the small country cannot compensate the larger country for the loss of its optimal tariff. I now introduce negotiable domestic regulations that affect the extensive margin of trade and examine how the possibility of regulatory concessions alters the size-asymmetry threshold derived above.

3.2 Introducing Regulation

I now introduce pro-market regulation as a second policy instrument. In particular, suppose that access to a foreign market depends not only on tariffs, but also on the level of pro-market regulation. Let pro-market regulation, such as competition policy, IPR enforcement, or efficient certification procedures, determine the probability that a foreign firm can successfully enter a market. Denote this probability by

$$G(r) \equiv \Pr(\text{partner entry} \mid r),$$

where higher levels of pro-market regulation increase the likelihood of entry. I assume that

$$G(0) = 0, \qquad G'(r) > 0, \qquad G''(r) < 0 \text{ for } r \in (0, \tilde{r}),$$

and

$$G(r) = 1 \qquad \text{for } r \geq \tilde{r}.$$

Thus, stricter pro-market regulation increases market access, although at a diminishing rate, and sufficiently high levels of pro-market regulation guarantee entry.

Pro-market regulation is costly to implement. Let the cost of regulation in country $i \in \{H, F\}$ be given by

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

where c_i captures heterogeneous costs of enforcing pro-market regulation that may reflect institutional capacity, administrative efficiency, or experience with rule-based systems. These enforcement costs are financed through lump-sum taxation, with the tax burden distributed equally across individuals in the economy. I assume throughout that Home has a weakly lower enforcement cost parameter than Foreign,

$$c_H \leq c_F.$$

This assumption captures the idea that large developed economies are often better able to implement and monitor sophisticated regulatory regimes.

The New Noncooperative Government Problem. Assuming that governments are now expected-welfare maximisers, they solve the following problem:

$$\max_{t_j, r_j} G(r_j) \cdot V_j^{duopoly}(t_j) + [1 - G(r_j)] \cdot V_j^{monopoly} - c_j r_j$$

Expected welfare depends on the probability $G(r_j)$ with which country j allows imports of the differentiated good. Conditional on entry, equilibrium consumption quantities are identical to those in the benchmark case. If entry does not occur, the domestic firm becomes the sole supplier in the market. This corresponds to the benchmark equilibrium under the choke tariff, $t^{\text{choke}} = \frac{\alpha}{2}$.

Since tariffs are only relevant when both firms serve the market, the optimal tariff maximises indirect utility in the duopoly region. As a result, the optimal tariff is identical to the benchmark case:

$$t_j^* = \frac{\alpha}{3} \qquad \text{for } j \in \{H, F\}.$$

The implicit solution for optimal noncooperative pro-market regulation is characterised by the first-order condition,

$$G'(r_j^*)[V_j^{trade}(\frac{\alpha}{3}) - V_j^{autarky}] - c_j = 0.$$

A direct implication of this is that a higher c_j implies a lower r_j for country j. Since the difference in indirect utility in the duopoly and the monopoly region is identical across countries, $c_H \leq c_F$ implies $r_H \geq r_F$ in the non-cooperative equilibrium. Intuitively, asymmetric gains from trade in this model arise entirely through the export side. Because the domestic gains from allowing imports are identical across countries, differences in equilibrium regulation are driven solely by differences in enforcement costs.

3.3 Agreement Feasibility under Negotiable Regulation

I now characterise agreement feasibility when countries can negotiate pro-market regulation. As before, an RTA reciprocally eliminates tariffs. In addition, the agreement sets a minimum level of pro-market regulation with which both countries must comply.

To keep the analysis as close as possible to the benchmark case, and without loss of generality for the results that follow, I assume that Home's enforcement costs are sufficiently low such that

$$G(r_H^n) = G(\tilde{r}) = 1,$$

where the superscript n denotes the noncooperative equilibrium. Thus, entry into the Home market is always guaranteed in the noncooperative equilibrium. Since $r_H^n \geq r_F^n$,

$$G(r_F^n) \leq 1,$$

so that entry into the Foreign market is not guaranteed in the noncooperative equilibrium unless $r_H^n = r_F^n$. Furthermore, I restrict attention to agreements in which Home's level of pro-market regulation is fixed and determined outside the model. This captures the idea that large developed economies are unlikely to adjust core regulatory frameworks in response to agreements with smaller partners.

An important implication of these primitives is that there exists a region of Foreign enforcement costs for which full regulatory harmonisation is feasible. In particular, there exists a corresponding interval of noncooperative regulation levels below r_H^n such that Foreign is willing to fully harmonise its regulation to Home's level.

Lemma 1. *There exists a non-empty interval of enforcement costs and corresponding non-cooperative regulation levels*

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

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

$$r_F^c = r_H^n.$$

Proof. See Appendix A.1. ■

Within the full harmonisation region, agreement feasibility is straightforward to characterise. By definition of the full harmonisation region,

$$\Omega_F(r_F^c = r_H^n) \geq 0,$$

so Foreign's participation constraint does not bind under full harmonisation. Moreover, Home's gains from the agreement are strictly increasing in

$$r_F^c - r_F^n,$$

since higher Foreign pro-market regulation increases the probability that Home firms can export and earn profits abroad. It therefore follows that full harmonisation maximises Home's gains while satisfying Foreign's participation constraint in the full harmonisation region. Hence, there exists an agreement if and only if Home's participation constraint is satisfied under full harmonisation.

Home's gains from an RTA under full harmonisation are given by

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

The first term captures the strict welfare loss from giving up the optimal tariff, as in the benchmark model. The second term captures the export gains from the agreement. As in the benchmark model, tariff liberalisation increases Home firms' export profits, but these gains now also depend on the increase in Foreign pro-market regulation induced by the agreement.

Rearranging yields

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

Thus, relative to the benchmark model, full harmonisation generates an additional source of gains from trade agreements by increasing the probability that Home firms can access the Foreign market. These gains are larger the lower is the non-cooperative level of Foreign pro-market regulation, that is, the greater is the pre-agreement regulatory distance.

Solving Home's participation constraint under full harmonisation yields the size-asymmetry threshold

$$\frac{L_F}{L_H} \geq \frac{9}{18 - 2G(r_F^n)}. \tag{1}$$

Since the right-hand side is decreasing in r_F^n, greater pre-agreement regulatory differences attenuate the inhibiting effect of size asymmetry on agreement formation within the full harmonisation region.

Proposition 1. *In the full harmonisation region, pre-agreement distance in regulation, $r_H^n - r_F^n$ relaxes the size asymmetry threshold for RTA feasibility by creating scope for concessions.*

Proof. Follows from above. ∎

Importantly, this result does not imply that size asymmetry becomes irrelevant once regulatory concessions are introduced. Scope for concessions simply expands the size-asymmetry threshold under which an agreement is feasible. Under the maximum possible regulatory concession, which occurs when $G(r_F^n) = 0$, the threshold becomes $\frac{L_F}{L_H} \geq \frac{9}{18} = \frac{1}{2}$. Hence, sufficiently asymmetric country pairs still cannot sustain an agreement, even under full harmonisation.

The reason is that the value of regulatory concessions scales with the size of the Foreign market, just as conventional gains from trade liberalisation do in the benchmark model. When a country is small, the additional export profits generated by regulatory concessions are also limited. Still, regulatory concessions expand the range of size asymmetries under which an agreement is feasible.

The implications of the model within the full harmonisation region are illustrated in Figure 4. When Home and Foreign have identical non-cooperative levels of pro-market regulation, the model collapses to the benchmark case, in which no agreement is feasible once size asymmetry exceeds $1/\bar{\lambda}$. However, as pre-agreement regulation levels diverge, gains from regulatory concessions expand the range of size asymmetries under which an agreement is feasible, although not without bound.

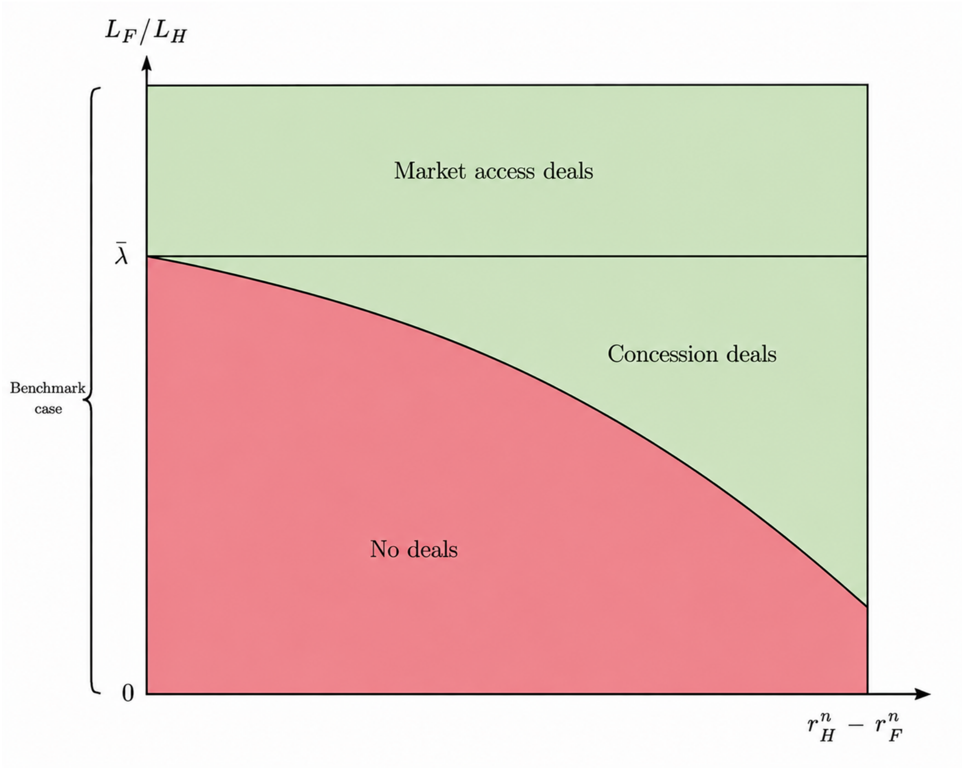

Figure 4: Agreement feasibility under full harmonisation.

To map the theory to data, it is useful to characterise the region outside full harmonisation as well. A key result is that the maximum cooperative level of Foreign pro-market regulation consistent with Foreign's participation constraint is weakly decreasing in c_F, and therefore in the pre-agreement regulatory distance $r_H^n - r_F^n$.

Lemma 2. *Outside the full harmonisation region, the maximum cooperative level of Foreign pro-market regulation that satisfies Foreign's participation constraint is weakly decreasing in c_F.*

Proof. See Appendix A.2. ∎

Together with Lemma 2, the general version of Equation 1,

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

implies a *level effect* of regulatory distance on agreement formation. Although greater pre-agreement regulatory distance initially expands the scope for regulatory concessions, sufficiently high enforcement costs reduce the maximum cooperative regulation Foreign can sustain.

In particular, for sufficiently high c_F and corresponding $r_H^n - r_F^n$, an agreement becomes infeasible regardless of size asymmetry. This occurs whenever the maximum cooperative regulation consistent with Foreign's participation constraint satisfies

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

because in that case agreement feasibility requires $L_F > L_H$, which contradicts the maintained assumption that $L_H \geq L_F$.

4 From Theory to Data

Theory implies three testable predictions:

1. Probability of RTA formation between a country pair decreases with size asymmetry
2. Probability of RTA formation between a country pair decreases with regulatory distance
3. *The inhibiting effect of size asymmetry on RTA formation is attenuated by regulatory distance*

4.1 Empirical Specification

To bring the testable predictions to the data, I estimate a discrete-time logit hazard model of trade agreement formation using right-censored annual panel data on potential trade agreement partners of the EU and the US. All explanatory variables are lagged by five years to mitigate concerns of reverse causality.

The estimating equation is

$$\begin{aligned}\Pr(\text{FTA}_{h,p,t}) = \Lambda\Big(&\beta_1 + \beta_2 \text{Asymmetry}_{h,p,t-5} + \beta_3 \text{RegDist}_{h,p,t-5} \\ &+ \beta_4 \text{Asymmetry}_{h,p,t-5} \times \text{RegDist}_{h,p,t-5} + X'_{h,p,t-5}\Gamma + \gamma_{ht}\Big),\end{aligned}$$

where $\Lambda(\cdot)$ denotes the logistic cumulative distribution function, h indexes the hub economy (EU or US), p denotes the prospective partner country, and γ_{ht} are hub-year fixed effects. Size asymmetry is measured as

$$\text{Asymmetry}_{h,p,t-5} = \log(GDP_{h,t-5}) - \log(GDP_{p,t-5}),$$

while $\text{RegDist}_{h,p,t-5}$ is measured by the difference in an off-the-shelf measure of how conducive regulatory frameworks are to businesses, as I will elaborate in Section 4.2.

The model predicts

$$\beta_2 < 0, \qquad \beta_3 < 0, \qquad \beta_4 > 0.$$

Greater size asymmetry and regulatory distance reduce the probability of RTA formation. However, regulatory distance also expands the scope for regulatory concessions, thereby attenuating the negative effect of size asymmetry on agreement formation.

Given the nature of the data used to construct regulatory distance, which is noisy over time and more informative in the cross section, and since the question of how large economies select RTA partners is inherently cross-sectional, I do not include partner fixed effects. Instead, I rely on a rich set of controls.

In the baseline specification, in addition to the three structural covariates implied by the theory, I include time fixed effects and the controls proposed by Baier and Bergstrand (2004), which capture canonical determinants of RTA formation. In Specification (2), I additionally control for common language and colonial ties. In Specification (3), I include partner-region fixed effects. Finally, in Specification (4), I add institutional controls to mitigate concerns that the regulatory distance measure captures broader institutional characteristics rather than the mechanism proposed in the theory. The exact controls as well as the data sources are detailed in Appendix A.3.

The sample consists of annual observations over the period 2001–2025 and excludes partner countries with prior reciprocal or non-reciprocal trade agreements with the hub economy in order to mitigate potential endogeneity arising from earlier negotiation processes.

4.2 Measuring Regulatory Distance

The data for pro-market regulation comes from the Regulatory Quality indicator of the Worldwide Governance Indicators. Although perception-based and therefore potentially noisy, this indicator corresponds closely to the broad notion of pro-market regulation in the theory. The official definition is as follows:

> Regulatory Quality (RQ) captures perceptions of the government's ability to design and implement policies and regulations that promote private sector development.

The indicator combines multiple underlying sources covering perceptions of non-tariff barriers, intellectual property rights, competition policy, and other regulatory features relevant for market access and business activity. Its broad cross-country coverage, spanning more than 200 economies, together with annual availability from 1996 onward, makes it a plausible empirical proxy for the theoretical object of interest. Figure 5 shows that the

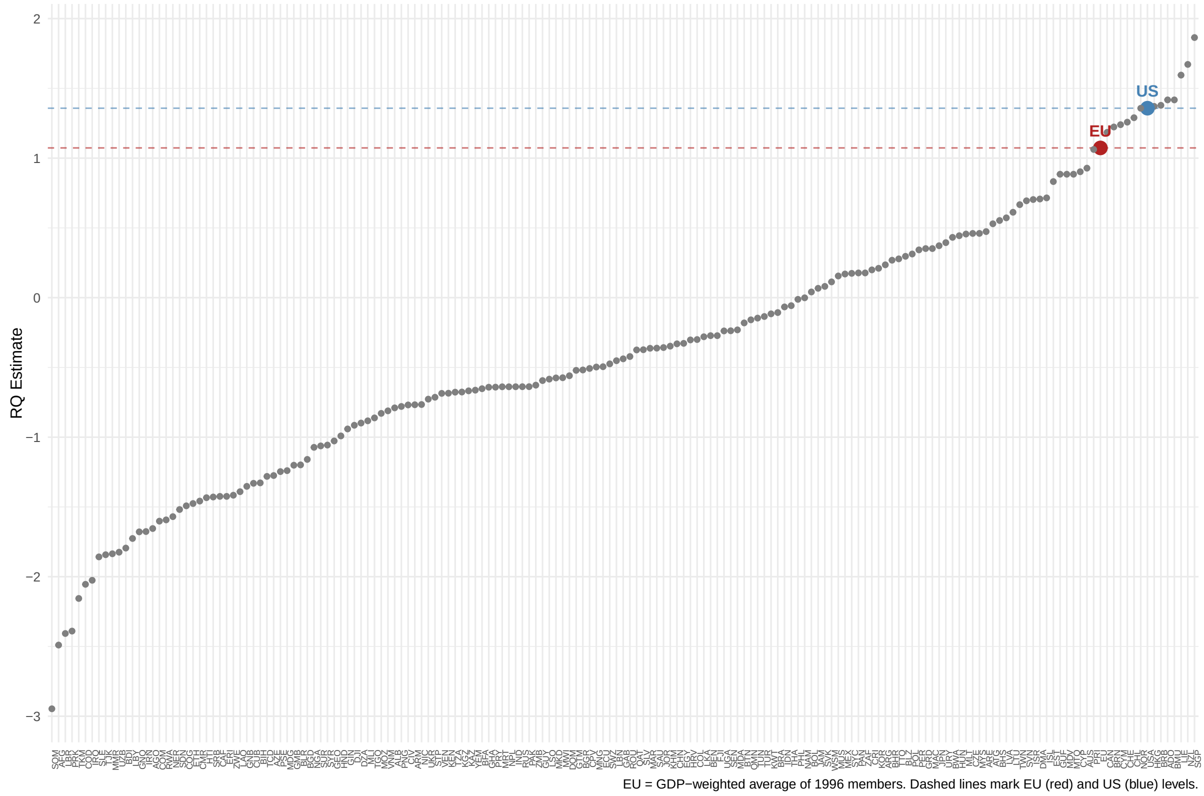

Figure 5: Distribution of Countries by Regulatory Quality (1996).

EU and US lie near the top of the global regulatory quality distribution, making the theory's predicted exchange of tariff preferences for pro-market regulation highly plausible in practice.

In line with the theory, I construct the bilateral regulatory distance as follows:

$$\mathrm{RegDist}_{\mathrm{h,p,t}} = \mathrm{Regulatory\ Quality}_{\mathrm{h,t}} - \mathrm{Regulatory\ Quality}_{\mathrm{p,t}}.$$

5 Results

The main results are presented in Table 1. Consistent with the theory, size asymmetry and regulatory distance have negative coefficients, while their interaction has a positive coefficient, confirming the central prediction of the model. The sign and statistical significance of these coefficients are robust to a wide set of controls, including the canonical controls of Baier and Bergstrand (2004), year fixed effects, gravity controls, region fixed effects, and institutional controls.

A natural concern is that, due to the positive correlation between Asymmetry and RegDist, the interaction term might spuriously capture a quadratic effect of either main variable. To address this, I include the squared terms of both Asymmetry and RegDist as additional controls (see Appendix A.4). The interaction coefficient remains positive, statistically significant, and even larger in magnitude than in the linear baseline, indicating that the interaction is not picking up a missing curvature. There is also no statistical evidence for an (inverted) U-shaped relationship in either variable at conventional levels.

Table 1: Baseline Results for EU and US RTA Formation

	EU				US			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Asym_{t-5}	-0.869***	-0.835***	-0.742**	-0.850**	-1.77***	-2.04***	-2.36***	-2.65**
	(0.288)	(0.307)	(0.355)	(0.391)	(0.670)	(0.637)	(0.598)	(1.07)
RegDist_{t-5}	-4.98***	-4.89***	-5.11***	-7.18***	-5.43***	-5.68***	-7.02***	-9.64***
	(1.39)	(1.49)	(1.67)	(2.43)	(1.91)	(1.71)	(1.65)	(1.97)
Asym × RegDist	**0.600***	**0.589***	**0.592***	**0.794***	**0.699***	**0.762***	**0.936***	**1.09***
	(0.180)	**(0.186)**	**(0.212)**	**(0.290)**	**(0.259)**	**(0.228)**	**(0.234)**	**(0.337)**
B&B (2004)	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Colonial/language		✓	✓	✓		✓	✓	✓
Region FE			✓	✓			✓	✓
Institutional controls				✓				✓
Obs.	919	919	867	867	1,854	1,854	1,770	1,770
Pseudo R^2	0.262	0.269	0.301	0.337	0.290	0.343	0.365	0.412
AUC	0.883	0.883	0.896	0.904	0.912	0.932	0.947	0.955

The results are also robust to alternative estimators and lag structures. The sign, magnitude, and statistical significance of the main coefficients remain broadly stable across logit, probit, complementary log-log, and linear probability model specifications, and across alternative lag lengths around the baseline five-year window (see Appendix A.4).

6 Mechanism

The main results in Section 5 are consistent with the central prediction of the theory: regulatory distance attenuates the negative effect of size asymmetry on RTA formation. While supportive of the regulatory-concessions channel posited by the theory, these results do not directly establish that such concessions take place in practice. This section provides such evidence by examining whether partner countries' regulatory standards change following an RTA with the EU or the US. I focus on IPR, one of the regulatory areas covered by the model, since both statutory rules and economic outcomes are readily measurable and IPR provisions are particularly salient in EU and US trade agreements, as illustrated in Section 2.

Empirical strategy. I estimate dynamic effects of EU and US RTAs on partner statutory IPR and patent inflows using Sun and Abraham (2021) event studies with partner and year fixed effects, which correct the bias that two-way fixed effects exhibit under heterogeneous treatment effects (see de Chaisemartin and D'Haultfœuille, 2020; Callaway and Sant'Anna, 2021; Goodman-Bacon, 2021; Sun and Abraham, 2021). Treatment is defined at the partner level by the year in which the partner's first RTA with either the EU or the United States enters into force. Combining the two programs is necessary because seventeen of the twenty US RTA partners also signed with the EU within a few years, leaving too little variation to separately identify EU- and US-specific dynamics.

Data. To measure statutory IPR, I use the widely adopted Ginarte–Park index (Ginarte and Park, 1997; Park, 2008), which captures the strength of patent protection across 120 countries from 1960 to 2015 at five-year intervals. The index is based on five dimensions: patent coverage across sectors, membership in international treaties, duration of protection, enforcement mechanisms, and the absence of restrictions on patent rights. For patenting activity, I use the dataset constructed by Labelle et al. (2023), which provides cross-border patent filings at the origin–destination–industry–year level for 213 countries over 1980–2019, covering 31 industries. I aggregate the industry-level patent data to the country level for the empirical analysis.

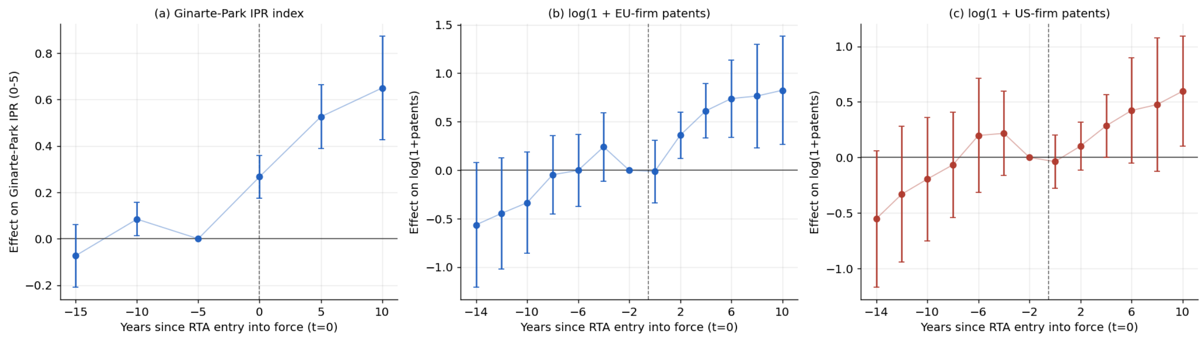

Figure 6: Sun and Abraham (2021) event-study estimates of the dynamic effect of a partner's first RTA entry into force with either the EU or the US (combined treatment). Panel (a): Ginarte-Park IPR index. Panel (b): $\log(1 + \text{EU patents})$. Panel (c): $\log(1 + \text{US patents})$. Partner and year fixed effects; standard errors clustered at the partner level; 90% confidence intervals.

Figure 6 shows that partner countries upgrade their statutory IPR following an RTA with the EU or the US, with no evidence of anticipation effects. By year 10 after a partner's first major-economy RTA, EU-firm patenting into that partner is approximately 2.3 times its pre-treatment level, while US-firm patenting is approximately 1.8 times its pre-treatment level. Some pre-trends are visible in the patent series, though none are significant at the 10% level, and they invite caution in interpreting the magnitude of the patent response. Appendix A.4 reports separate event studies for EU and US RTAs. Patterns are qualitatively similar and quantitatively larger for both outcomes: in each separate event study, partners already treated by the other large economy enter the comparison group while responding to a treatment of the same channel, biasing the estimated effects upward.

These results provide direct empirical support for the regulatory-concession mechanism underlying the theory: consistent with the model's predictions, small countries upgrade their statutory IPR rules and remove barriers to foreign firms from the large economy following the conclusion of an RTA.

7 Concluding Remarks

This paper proposes the exchange of tariff preferences for regulatory concessions as an explanation for the prevalence of trade agreements between countries of asymmetric size. Using a simple profit-shifting model of trade policy, it shows that the negative effect of size asymmetry on agreement formation is attenuated when there is greater scope for regulatory concessions. The paper then maps this mechanism to the data by providing an empirical characterisation of the scope for concessions and finds strong support for the theory using cross-country data on regulatory quality and trade agreement formation. Complementary evidence on regulatory and economic outcomes following trade agreements further supports the proposed mechanism.

Several extensions offer promising directions for future research. One important step is to embed the model in a more general framework that incorporates general equilibrium effects. Strengthening causal identification in the analysis of regulatory and economic outcomes would also help sharpen the empirical claims. Finally, exploring policy areas beyond intellectual property rights could help assess the broader relevance of the mechanism.

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A Appendix

A.1 Proof of Lemma 1

Proof. First note that when $c_F = c_H$, symmetry implies

$$r_F^n = r_H^n = \tilde{r},$$

so that

$$G(r_H^n) = G(r_F^n) = 1.$$

In this case, the model collapses to the benchmark environment without regulatory frictions. Since

$$\frac{L_H}{L_F} > \frac{9}{16},$$

Foreign strictly gains from a deal. Next, by the envelope theorem,

$$\frac{\partial \Omega_F(r^c = r_H^n)}{\partial c_F} = -\left(r_H^n - r_F^n(c_F)\right) < 0.$$

Thus, an increase in Foreign's enforcement costs reduces its gains from an RTA under full harmonisation because it widens the gap between its preferred non-cooperative regulation and the harmonised level imposed by the agreement. Since enforcement costs are

unbounded while the gains from trade are bounded, there exists a sufficiently high level of c_F above which Foreign's participation constraint is violated under full harmonisation. By continuity, there therefore exists a non-empty interval

$$c_F \in (c_H, \bar{c}]$$

for which Foreign's participation constraint is satisfied under full harmonisation. ■

A.2 Proof of Lemma 2

Proof. Let $\bar{r}_F^c(c_F)$ denote the maximum cooperative regulation level that Foreign can accept, implicitly defined by

$$\Omega_F(\bar{r}_F^c(c_F), c_F) = 0.$$

For any $r_F^c > r_F^n$, increasing r_F^c raises the regulatory adjustment required from Foreign and therefore lowers Foreign's payoff, so

$$\frac{\partial \Omega_F}{\partial r_F^c} < 0.$$

Moreover, by the envelope theorem,

$$\frac{\partial \Omega_F}{\partial c_F} = -\left(r_F^c - r_F^n(c_F)\right) \leq 0.$$

Hence, by the implicit function theorem,

$$\frac{d\bar{r}_F^c}{dc_F} = -\frac{\partial \Omega_F / \partial c_F}{\partial \Omega_F / \partial r_F^c} \leq 0.$$

Therefore, the maximum cooperative regulation level that Foreign can afford is weakly decreasing in c_F. ■

A.3 Control Variables

Variable	Description	Source
Baier and Bergstrand (2004) controls		
$\ln(GDP_{\text{EU}} + GDP_p)$	Log sum of GDPs	CEPII Gravity
$\ln GDP_{\text{EU}} - \ln GDP_p$	Log GDP difference	CEPII Gravity
$\ln d_{hp}$	GDP-weighted bilateral distance	CEPII Gravity
$\overline{\ln d}_{\text{ROW}}$	Symmetric average distance to ROW	CEPII Gravity
$\lvert DKL\rvert_{hp}$	Absolute log K/L ratio gap	PWT 11.0 (Feenstra et al. (2015))
DKL^2_{hp}	Squared log K/L ratio gap	PWT 11.0 (Feenstra et al. (2015))
$\overline{DKL}_{\text{ROW}}$	Symmetric average K/L distance to ROW	PWT 11.0 (Feenstra et al. (2015))
Additional gravity controls		
Colonial ties	Colonial relationship indicator	CEPII Gravity
Common language	Shared ethnic language indicator	CEPII Gravity
Partner-region fixed effects		
Africa	Partner located in Africa	UNSD M49
Americas	Partner located in the Americas	UNSD M49
Asia	Partner located in Asia	UNSD M49
Europe	Partner located in Europe	UNSD M49
Oceania	Partner located in Oceania	UNSD M49
Partner institutional controls		
CC_p	Control of corruption	WGI (World Bank)
GE_p	Government effectiveness	WGI (World Bank)
PV_p	Political stability & absence of violence	WGI (World Bank)
RL_p	Rule of law	WGI (World Bank)
VA_p	Voice & accountability	WGI (World Bank)

A.4 Robustness

Table 2: Robustness: Alternative Estimators

	EU			US		
	(1) Probit	(2) Cloglog	(3) OLS	(4) Probit	(5) Cloglog	(6) OLS
Asym_{t-5}	-0.354***	-0.835***	-0.005	-0.845***	-1.99***	-0.005***
	(0.118)	(0.306)	(0.003)	(0.237)	(0.616)	(0.002)
RegDist_{t-5}	-1.95***	-4.91***	-0.034***	-2.38***	-5.53***	-0.016***
	(0.580)	(1.46)	(0.011)	(0.622)	(1.68)	(0.005)
Asym × RegDist	**0.237*****	**0.591*****	**0.004****	**0.314*****	**0.745*****	**0.002*****
	(0.073)	**(0.183)**	**(0.002)**	**(0.085)**	**(0.222)**	**(0.0007)**
B&B (2004)	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Colonial/language	✓	✓	✓	✓	✓	✓
Obs.	919	919	1,711	1,854	1,854	6,134
Pseudo R^2	0.268	0.269	-0.045	0.347	0.342	-0.008
AUC	0.896	0.878	0.867	0.951	0.925	0.556

Notes: $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$. Partner-clustered standard errors.

Table 3: Robustness: Lag-Length Variation

	EU					US				
	(1) $L = 4$	(2) $L = 5$	(3) $L = 6$	(4) $L = 7$	(5) $L = 8$	(6) $L = 4$	(7) $L = 5$	(8) $L = 6$	(9) $L = 7$	(10) $L = 8$
Asym_{t-L}	-1.03***	-0.835***	-0.711**	-0.659**	-0.561**	-1.93***	-2.04***	-1.98***	-2.01***	-1.93***
	(0.352)	(0.307)	(0.288)	(0.285)	(0.280)	(0.587)	(0.637)	(0.594)	(0.628)	(0.602)
RegDist_{t-L}	-5.73***	-4.89***	-4.47***	-4.05***	-3.58***	-5.28***	-5.68***	-5.37***	-5.60***	-5.44***
	(1.65)	(1.49)	(1.39)	(1.38)	(1.34)	(1.61)	(1.71)	(1.56)	(1.65)	(1.62)
Asym × RegDist	**0.686***	**0.589***	**0.515***	**0.473***	**0.417**	**0.711***	**0.762***	**0.733***	**0.762***	**0.739***
	(0.203)	**(0.186)**	**(0.175)**	**(0.176)**	**(0.179)**	**(0.214)**	**(0.228)**	**(0.212)**	**(0.223)**	**(0.217)**
B&B (2004)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Colonial/language	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Obs.	919	919	839	760	760	1,854	1,854	1,854	1,854	1,584
Pseudo R^2	0.283	0.269	0.263	0.260	0.247	0.334	0.343	0.336	0.339	0.337
AUC	0.892	0.883	0.881	0.878	0.875	0.934	0.932	0.935	0.934	0.934

Notes: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Logit with partner-clustered standard errors.

Table 4: Robustness to Quadratic Level Effects

	EU Baseline	EU Quadratic	US Baseline	US Quadratic
Asym_{t-5}	-0.850**	0.989	-2.65**	3.04
	(0.391)	(1.08)	(1.07)	(2.39)
Asym^2_{t-5}		-0.221*		-0.646**
		(0.130)		(0.267)
RegDist_{t-5}	-7.18***	-6.16	-9.64***	-11.8***
	(2.43)	(4.85)	(1.97)	(3.13)
RegDist^2_{t-5}		-1.58		-2.14***
		(0.986)		(0.758)
Asym × RegDist	**0.794***	**1.40***	**1.09***	**2.74***
	(0.290)	**(0.499)**	**(0.337)**	**(0.903)**
B&B (2004)	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Colonial/language	✓	✓	✓	✓
Region FE	✓	✓	✓	✓
Institutional controls	✓	✓	✓	✓
Obs.	867	867	1,770	1,770
Pseudo R^2	0.337	0.378	0.412	0.480
AUC	0.904	0.911	0.955	0.975

Notes: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Standard errors clustered at the partner level.

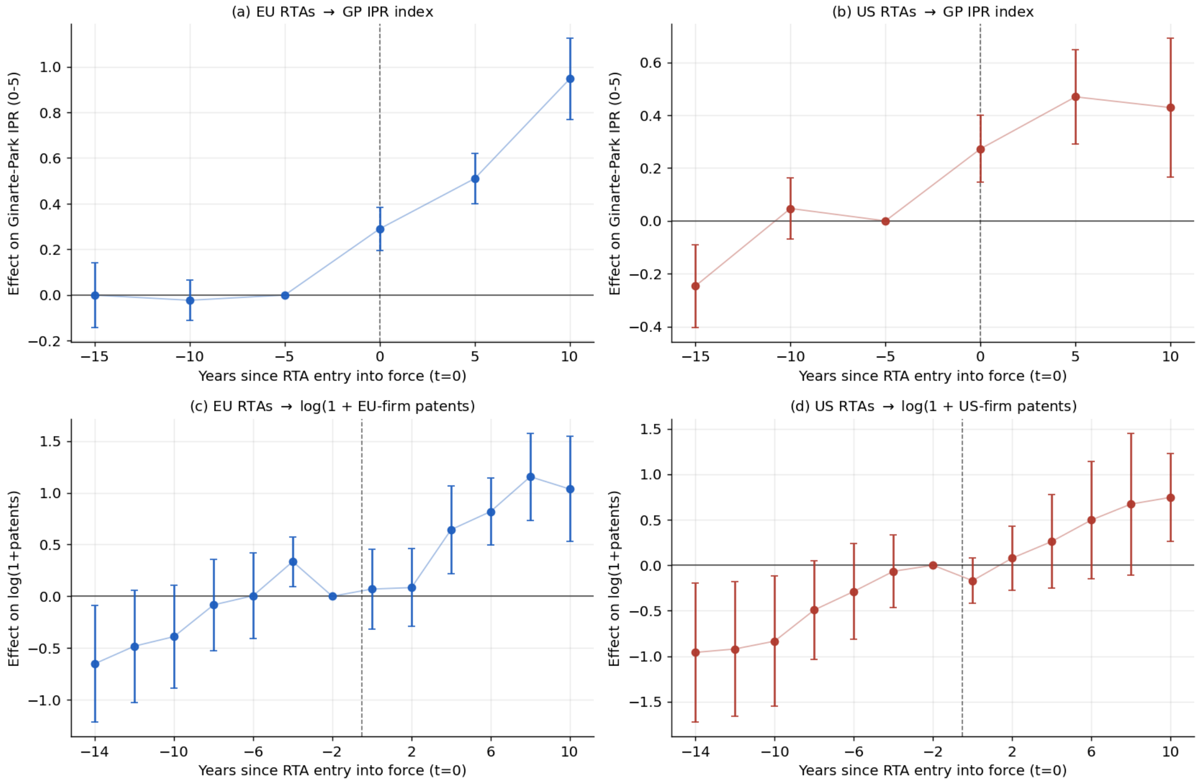

Figure 7: Sun and Abraham (2021) event studies with EU and US RTAs treated separately. Panels (a) and (c): EU RTA entry into force on the Ginarte-Park IPR index and log(1 + EU patents) respectively. Panels (b) and (d): US RTA entry into force on the Ginarte-Park IPR index and log(1 + US patents) respectively. Partner and year fixed effects; standard errors clustered at the partner level; 90% confidence intervals.