Playing by the Rules:

How has the TRIPS Agreement Affected IP Adherence?

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Abstract

In recent years, the industrialization of developing countries has led to a rise in globalization. While positive for economic growth, these increased multinational interactions have also caused a number of trade disputes. One of the most contentious types involves the infringement of international protection of intellectual property rights (IP). This paper examines whether enforcement of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) dispute settlement mechanism spurs a rise in intellectual property rights (IP) reform. Surprisingly, I find this system has a negative effect on IP as perceived by local economic actors. Results are less conclusive regarding improved adherence to IP on an institutional level.

Introduction

In December of 2019, the World Trade Organization's (WTO) Appellate Body (AB) slipped into a quiet retirement when the term for two of the last three remaining members was not renewed.[1] With only one member remaining, the Appellate Body no longer met the minimum quorum to review trade disputes. Until these vacancies are filled, trade disputes interrogated by the WTO will remain pending indefinitely.

Since 1995, the WTO's Dispute Settlement System (DSS) had been the primary multilateral adjudicatory system for settling trade disagreements. This system is far from impotent; over its 25-year tenure, the DSS has lodged nearly 600 complaints between WTO member countries, with a compliance rate well above 80% (Bekhar, 2010). In particular, intellectual property (IP) protection is one of the key areas regulated by the WTO. This is handled by the Agreement on Trade-Related Aspects of Intellectual Property Rights (commonly referred to as TRIPS).

To avoid retaliation, countries can choose to amend laws over the 12-15 month consultation period. If changes are satisfactory, all charges are dropped. Of the forty-two cases of TRIPS disputes, twenty-four were successfully settled without retaliation. Sixteen (largely in the last five years) remain pending indefinitely. In two cases, the respondent country was found guilty and experienced retaliation.

One such example of a case involving retaliation involves a dispute[2] between the European Union (complainant) and the United States (respondent). The European Union

[1] The WTO's appellate body crisis: Implication for trade rules and multilateralism, January 2020 https://www.orfonline.org/expert-speak/the-wtos-appellate-body-crisis-implication-for-trade-rules-and-multilateralism-60198/

[2] A summary of this case can be found here: https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds160_e.htm

contended that the US Copyright Act permitted radio and television music in public spaces, such as bars and restaurants, without paying royalty fees. After the fifteen-month period lapsed in which the U.S. Congress failed to achieve a resolution, the EU was authorized to retaliate. This was achieved through a special fee for U.S. nationals transferring copyrighted goods over the border had to pay, "so as to ensure that the level of affected US benefits will not exceed the level of EU benefits nullified or impaired as a result of the WTO-inconsistent provisions of the US Copyright Act" (WTO, 2001).

As stated in its bylaws, unilateral measures do not align with the goals or spirit of the WTO. Article 23 of the Dispute Resolution Understanding (DSU) explicitly prohibits members from invoking unilateral measures as they can be highly distortive to markets. However, this rule has been consistently ignored, most often by the United States (Ministry of Economy, Trade and Industry, 2019[3]). Nonetheless, countries who wish to file a claim "the right way" have no other choice than to follow the dispute settlement procedures specified by the WTO.

Under threat of future unilateral action, would countries (most notably smaller, developing ones) refrain from filing a TRIPS dispute in fear of angering an aid-granting country? Although the matter has not been closely studied, evidence suggests to the contrary. Reich (2017) finds that although only 25% of WTO member countries qualify as "least-developed countries", they make up 57% of all complaints.[4] Furthermore, the United States and European Union, the top two development aid donors in the world, are the respondents to approximately

[3] The full chapter may be found here: https://www.meti.go.jp/english/report/downloadfiles/2014WTO/02_15.pdf
[4] These countries are: Afghanistan, Angola, Bangladesh, Benin, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Congo, Democratic Republic of the Djibouti, Gambia, Guinea, Guinea Bissau, Haiti, Lao People's Democratic Republic, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Rwanda, Senegal, Sierra Leone, Solomon Islands, Tanzania, Togo, Uganda, Vanuatu, Yemen, and Zambia. Source: wto.org

56% of all complaints. This suggests that countries do not fear negative repercussions to filing a dispute against a larger party enough to refrain from filing a trade dispute.

The retirement of this dispute resolution mechanism motivates the question: is the WTO Appellate Body, particularly relating to that of TRIPS, efficient in resolving international trade disputes? This study attempts to quantify the effect of the mechanism on intellectual property rights adherence on the country-level. Secondly, I investigate if a country accused of a TRIPS violation serves as a positive shock to the property rights adherence in neighboring countries. It follows that a TRIPS violation incurred on a neighbor may incentivise improved intellectual property adherence in countries with similar geography, consumer preferences, and exports. For these reasons, I hypothesize that a TRIPS dispute will serve as a positive shock to IP adherence both for the accused country and for geographic neighbors. Furthermore, the onset of a TRIPS violation could correct information asymmetries between a country and its geographic neighbors, leading to higher trade barriers in the short-run and more relaxed trade barriers after the issue is resolved.

If the analysis reveals a positive effect, this could indicate that the TRIPS agreement was effective in stimulating intellectual property reform in the country accused of a violation. In this case, TRIPS should potentially be renewed. If the analysis reveals negative or insignificant effects, this suggests that the TRIPS agreement was ineffective in its dealings; retiring the AB and shifting to a case-by-case, bilateral resolution process outside of the WTO may be a welcome improvement.

I construct this dataset by scraping dispute data from the WTO website and incorporating the WEF Global Competitiveness Report, CIA World Factbook, and Index of Economic

Freedom to serve as additional indicators and checks. In a straightforward analysis of the effect of a TRIPS violation on the offending country, I find there to be a small, negative effect in IP adherence as perceived by local economic actors. In neighboring countries I find a small, positive increase in absence of trade barriers and IP adherence on the books. Due to the possibility that countries are able to anticipate incurring a violation, findings in this paper should nonetheless be taken as suggestive.

Literature review

A. Intellectual Property, Public Goods and Development

Strong property rights are widely considered to be the backbone of economic growth (Maskus, 2000). Furthermore, intellectual property bears the traits of a public good in two main aspects: first, it is nonrivalrous - one person's use does not diminish another's use. A song may be streamed one billion times without diminishing the piece for any individual, and the knowledge going into making an iPhone could be replicated an infinite number of times. In essence, the marginal cost of producing an additional unit of such a good is functionally zero.

Secondly, intellectual property is nonexcludable. In the case of theft and dissemination, it becomes nearly impossible to exclude others from consuming intellectual property (such as music downloads from an illegal streaming service). Many developing cities in the world have entire blocks squared away for the sale of faux designer handbags and imitation Rolex watches. Intellectual property is functionally a privatized public good, and as a result suffers the market failure of free-riding. Before the installation of the WTO as an arbiter of international trade

agreements, the U.S. Chamber of Commerce estimated that U.S. companies lost a combined 60 billion dollars per annum as a result of IP infringement[5].

Intellectual property rights have also been shown to *shift* the distribution of market power. Previous studies have found that tighter intellectual property rights shift product lines from less developed to more developed countries (Helpman, 1992). Middle-income countries may gain or lose, depending on whether improved terms of IP protection outweigh worsened allocations of production.

Helpman (1992) examines a dynamic general equilibrium framework in which the "global North" innovates new technology and the "global South" imitates them. He identifies four areas of intellectual property enforcement: 1) terms of trade; 2) interregional allocation of manufacturing, 3) product availability; and 4) R&D investment patterns. Using these four metrics, Helpman finds evidence to suggest that tighter IP laws are detrimental to innovation in both developing and developed nations. When intellectual property rights standards are tightened, there is an initial rise followed by a longer, steeper decline to the rate of innovation in the North. Similarly, the rate of imitation (in which developing countries imitate new technologies) falls. This decreases welfare in the global South.

When IP is not upheld, however, other market failures may follow. Wade (2003) finds that governments in developing countries may choose not to enforce intellectual property protection if it aids in the pursuit of economic growth. On a microeconomic scale, Long and Wang (2015) find that in cases between a local business and international entity, provincial courts in China are likely to side with the local business after controlling for plaintiff and

[5] Unadjusted for inflation; pg. 4 of "Innovation, Imitation and intellectual Property Rights", Helpman, 1992

defendant characteristics. A shift in market dynamics decreases welfare for the global South, causing local actors to resort to crime as a method of self-preservation.

One of the points of contention surrounding TRIPS involves the optimal level of intellectual property protection promised by the South. Liao and Wong (2009) use a three-stage repeated game to compare the effect of the TRIPS agreement and intellectual property protection on the North-South divide. They show that tightening IP protection through TRIPS without putting similar pressures on the North to provide R&D subsidies negatively affects the South. The only way to avoid a decrease in overall welfare, Liao and Wong suggest, is by reviewing and recalibrating IP protection and R&D subsidies hand-in-hand when formulating such policies.

B. 'Freer' Trade Agreements

As already discussed, intellectual property rights may lead to negative externalities, shifting market dynamics in favor of developed countries and against imitators. Next, I question the effectiveness of "free" trade agreements in general.

The superiority of free trade and comparative advantage is not controversial. Proponents defend TRIPS as a deal in which developing countries receive freer access to markets in exchange for their agreement to protect the IP of foreign stakeholders (Helfer, 2004). Even if a country in the global south temporarily suffers short-run welfare losses, relationships with other WTO countries offset this drawback with lucrative long-run trade. Furthermore, intellectual property rights encourage R&D investment in developing countries through the provision of exclusionary selling rights for a period of time (Chadha, 2005).

TRIPS is not without naysayers. As early as 2003, the United Nations Development Programme (UNDP) released a report remarkably critical of TRIPS (Helfer, 2004). This report

asserted that 'the relevance of TRIPs is highly questionable for large parts of the developing world' and urges developing countries to begin dialogues to eventually replace TRIPS. Since its inception, NGOs and governing bodies alike have often spoken out against the inherent unfairness of the TRIPS agreement against the interests of the global South.

Trade agreements could result in mutually beneficial trade through increased market access - but they could also produce purely redistributive outcomes under the guise of 'freer' trade. Rodrik (2018) questions the true value of international free trade agreements at all. As he states, "*Rather than neutralizing the protectionists, trade agreements may empower a different set of rent-seeking interests and politically well-connected firms—international banks, pharmaceutical companies, and multinational firms."* Rodrik further questions the almost unanimous agreement by economists over the merits of the North American Free Trade Agreement - a nearly 2,000 page volume negotiated by governments under pressures of lobbyists and special interest groups.

This politicization of "free trade" is furthered with recent U.S. election statistics. Conconi et al. (2017) employ a linear probability model to show that electoral incentives affect the initiation of trade disputes in the U.S. They find that U.S. Presidents (both Democratic and Republican) are more likely to initiate a dispute through the WTO in the year preceding re-election. Moreover, trade disputes are more likely to involve industries important to crucial swing states in a given election. As a result, there should be a clearer and more obvious distinction between the merits of "free trade" with that of "free trade agreements" from that of the current literature.

C. A Case Study of the Rare Earth Elements (REE) Market

Proelss et al. (2018) investigate whether the WTO dispute resolution mechanism has the power to fundamentally change market dynamics in rare earth elements (REEs). REEs are a crucial component to many emerging technologies such as electric cars, wind turbines, mobile phones, hard drives, and solar panels. Furthermore, REEs are almost exclusively mined in China, a country that has often been the epicenter to many intellectual property disputes. It was strict restrictions placed by China on REE exports that led to the U.S., Japan, and the EU to formally file a complaint through TRIPS in 2012. Proelss et al. (2018) employ a differences-in-differences approach, treating a WTO dispute violation as an exogenous event expected to have an effect on REE investment (the treatment) but not other companies (the control). They conclude this event did have an effect on investment in the Chinese rare earth elements market.

Proelss et al. (2018) suffer from possible endogeneity in the same sense that this paper does. Nonetheless, they believe their findings relevant; as stated on page 21, "*There may have been some foreshadowing, or anticipation, of the launch of a WTO dispute resolution case about REEs from prior WTO rulings against China....nevertheless, if investors had foreseen the start of the WTO resolution case against China, logically, we would have expected them to rationally adjust their expectations.*" I take a similar approach in my main specification, and supplement these findings by studying a WTO TRIPS dispute as a truly exogenous shock to neighboring countries in my secondary specification.

D. Regarding the Implementation of TRIPS & Conclusion

Chadha (2005) studies 65 pharmaceutical firms in India 1991-2004 and finds a strong and positive increase in patenting activity among firms post-TRIPS. He also finds a two-year lag

between R&D spending and patent applications for these pharmaceutical firms. Similarly, Bouet (2015) finds the installment of TRIPS favored innovation in the Indian pharmaceutical industry. Di Vita (2013) partially echoes this sentiment by finding that participation in the TRIPS agreement not only prompts innovation, but also reduces CO2 and PM10 emissions in developed countries. This is likely because stronger IP protection stimulates foreign direct investment, which reduces pollution emissions through the invention of newer, more sustainable technologies.

In addition to imitation, FDI is an important component to endogenous growth in the global South and has been growing substantially in recent years. FDI geared towards developing countries increased from 10 billion in 1993 (two years before TRIPS) to 232.6 billion by 1999[6]. Zhang and Yang (2016) examine the relationship between TRIPS compliance and foreign direct investment (FDI) in 23 developing countries via Ordinary Least Square (OLS), Fixed Effects (FE) and System Generalized Method of Moments (GMM) techniques. They find that compliance with TRIPS in fact constituted a driving force of FDI in developing countries.

As discussed, previous studies have centered around the effect of TRIPS on markets such as pharmaceuticals, rare earth elements, and foreign direct investment. This study is unique from existing literature in that it studies the effect of the TRIPS agreement on institutional change itself. This paper will be the first to show this effect explicitly.

Dataset and variables

I use data from three sources, all of which are publicly available online and summarized below. Data was collected between January and March of 2020, by then of which the minimum

[6] *United Nations Conference on Trade and Development, 1999*

quorum for the WTO Appellate Body failed to be reached and no new trade disputes could be processed. All data gathered begins in the first quarter of 2006. This sample period is chosen as it comes just after the ten-year period developing nations were appropriated to implement IP reform in accordance with TRIPS. In this sense, the period 2006-2019 is the most consistent to measure the effect of TRIPS exogenous to transitions and other events.

A. WTO Dispute Filings Data

I construct a cumulative list of WTO disputes hosted by the World Trade Organization.[7] Over the 2006-2019 time period I record 17 disputes filed through TRIPS, with a handful of countries incurring multiple charges within that time period.[8] For purposes of analysis, the WTO treats the European Union (EU) as one unit instead of as individual nations.[9]

The independent variable in my regressions is *TRIPS_Dispute,* a dummy equal to one if a member country initiates a dispute against country *i* in year *t* and remains one thereafter. In some robustness checks, I include the additional independent variable, *non_TRIPS_sum*, a cumulative variable of non-TRIPS WTO disputes filed contemporaneously against country *i* in year *t.* Because agreements are meant to be mutually-exclusive, I treat all non-TRIPS disputes with equal weight. When analyzing neighboring countries, I employ the *TRIPS_Neighbor* dummy variable. Similar to the first variable, *TRIPS_ Neighbor* is a binary variable equal to one if a neighbor within 1000 kilometers of country *i* in year *t* is accused of a TRIPS violation (also remaining one thereafter).

[7]For more information, refer to table 1 of the appendix or WTO, Disputes by Agreement: https://www.wto.org/english/tratop_e/dispu_e/dispu_agreements_index_e.html
[8]Countries that incurred the most violations were Australia (5), China (4) and the EU and Saudi Arabia (2 each).
[9]As a result, in cases against the EU it may or may not be stated what country within the EU is the violator; therefore I must treat all EU countries as a single unit.

Lastly, I design a false experiment, or placebo test, to demonstrate that the effect is non-existent when countries were not in fact treated. I do this by shifting all TRIPS disputes back by five years and repeating the regressions from the primary specification. This additional variable I name *TRIPS_Dispute_Placebo.*

B. Economic Freedom Index

Economic freedom is defined as the fundamental right of every human to control his or her own labor and property. With this goal in mind, the *Economic Freedom Index* was created jointly by the Wall Street Journal and The Heritage Foundation to measure the extent to which institutions globally uphold individual liberties[10]. Scores in each category range from 0 - 100, based on 12 quantitative and qualitative factors and representing 13 categories overall.[11] I include the three most relevant metrics in my analysis as dependent variables: *1) Property_Right_Laws[12], 2) Trade_Freedom, and 3) Laws_Overall.* I also standardize these scores to a mean of zero and standard deviation of one.

Trade_Freedom is a composite measure of the absence of tariff and non-tariff barriers that affect imports and exports of goods and services. *Property_Rights* is an assessment of the ability of individuals to accumulate private property, secured by clear laws that are fully enforced by the state. It also assesses the likelihood that private property will be expropriated and analyzes the independence of the judiciary, the existence of corruption within the judiciary, and the ability of individuals and businesses to enforce contracts. Lastly, *Laws_Overall* is a

[10] Website for the EF Index found at *https://www.heritage.org/index/explore*

[11] These 12 categories are divided into 4 pillars: 1. Rule of Law (property rights, government integrity, judicial effectiveness), 2. Government Size (government spending, tax burden, fiscal health), 3. Regulatory Efficiency (business freedom, labor freedom, monetary freedom), and 4. Open Markets (trade freedom, investment freedom, financial freedom).

[12] In some of the following tables, I label results regarding the *Property_Rights_Law* variables as that of "PR Laws". This is simply out of spatial constraints.

composite measure of the previous two assessments in addition to other measures such as *judicial effectiveness*, *tax burden, fiscal health, government integrity,* and *business freedom.* I include this metric to capture the effect of changes to government overall as a result of a TRIPS dispute.

C. Property Rights in Practice

To measure the level of intellectual property adherence and reform in practice, I include data from the Global Competitiveness Report (GCR) administered by the World Economic Forum. The GCR is an index comprising survey data from over 11,000 local business owners. Economic actors are anonymously surveyed regarding their personal perception of a country's current intellectual property system, but the survey also takes into account quantitative information regarding the effectiveness of IP enforcement by country and year. The GCR is a popular metric used in the literature to measure intellectual property administered in practice (Papageorgiadis et al., 2014). This variable I label *Business_Perception*[13]

In total, I then have four encompassing indicators to measure the effect of TRIPS. How these variables perform by country and year is summarized in figures 1-3 below. Figures 1 and 2 show that the distribution of values takes a distribution approaching standard normal; figure 3 exemplifies the changes to each score over time. The dotted line signifies the year a dispute occurred. In the case of China, the red dotted line signifies the onset of the U.S. - China trade war. Simply viewing the graphs alone, no conclusive evidence is found regarding the effect of a TRIPS violation on IP adherence.

[13] Due to space constraints this variable is referred to simply as *Perception* in later tables.

Figure 1: Standardized Distribution of Variables of Interest, Balanced Panel

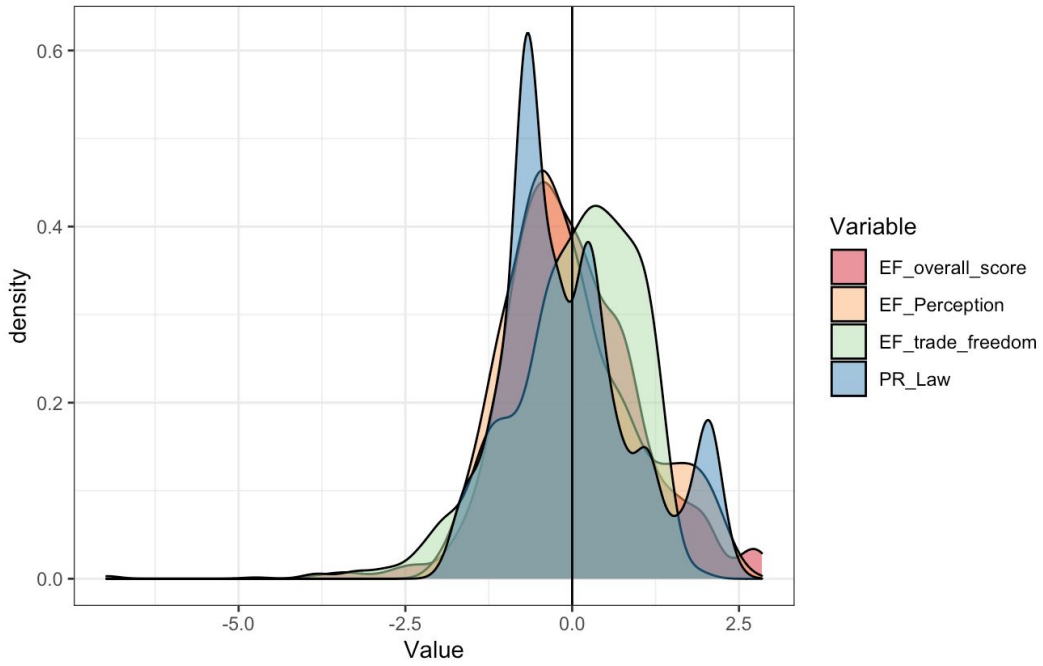


Figure 2: Standardized Distribution of Variables of Interest, Unbalanced Panel

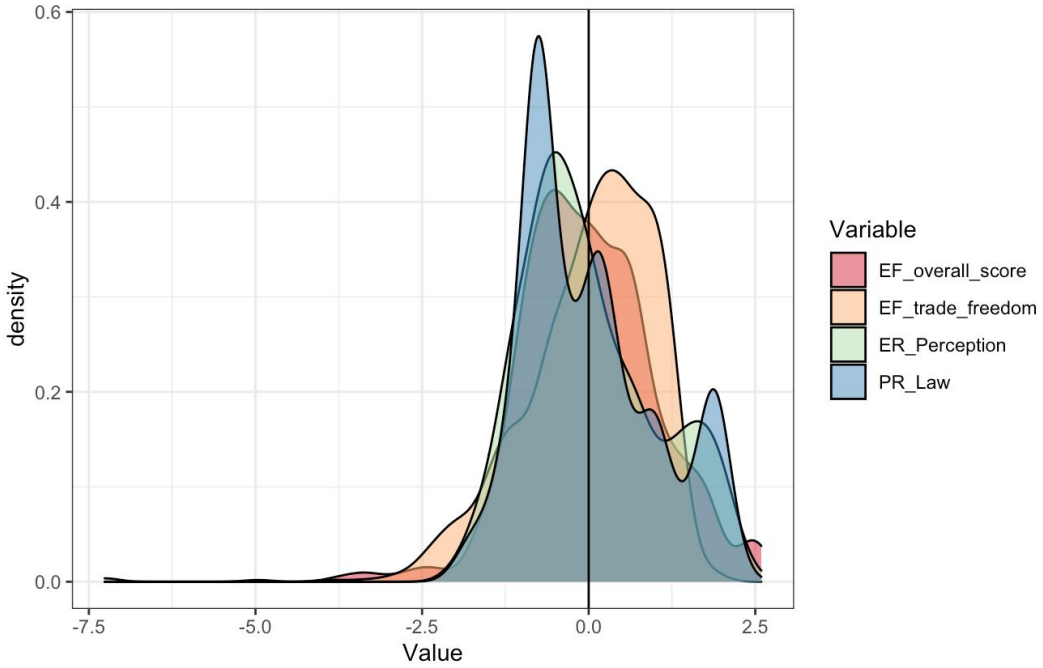
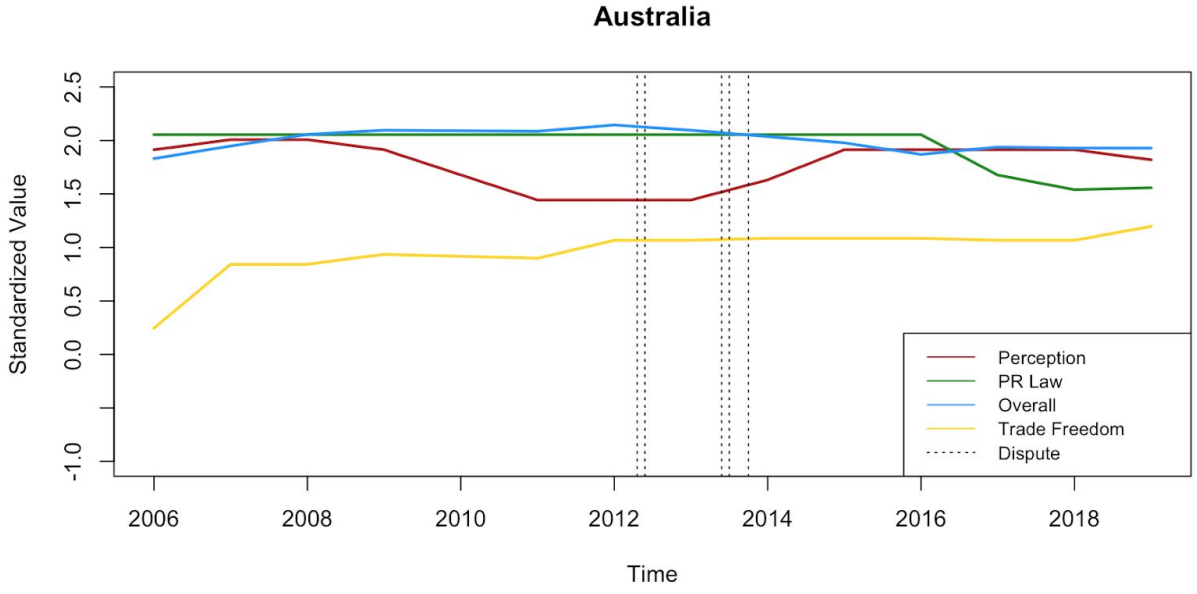
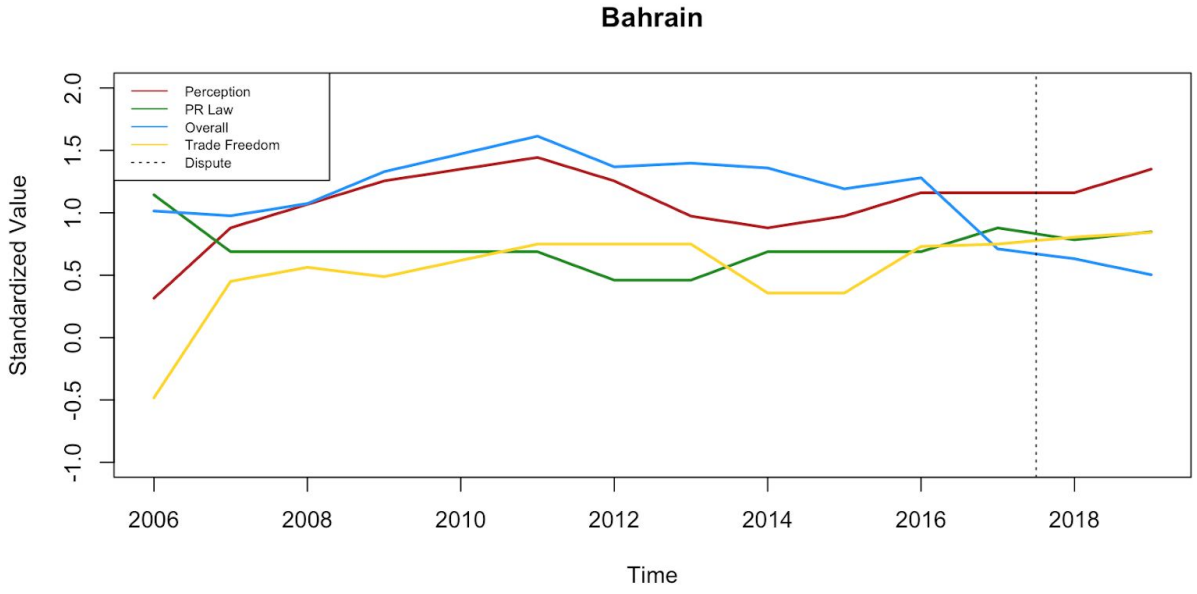
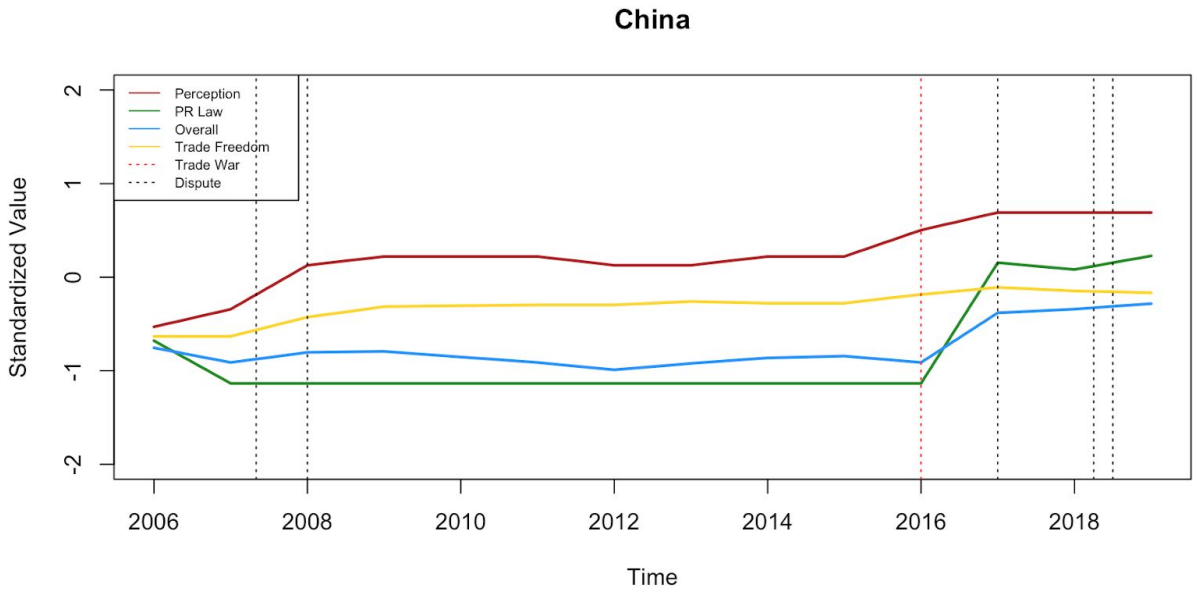
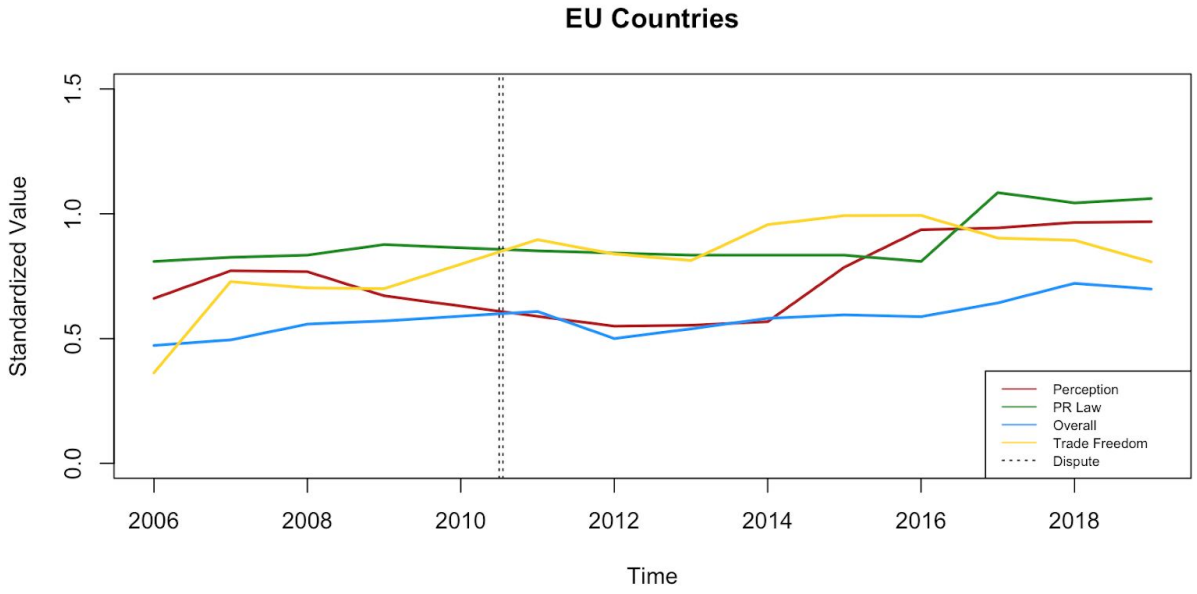


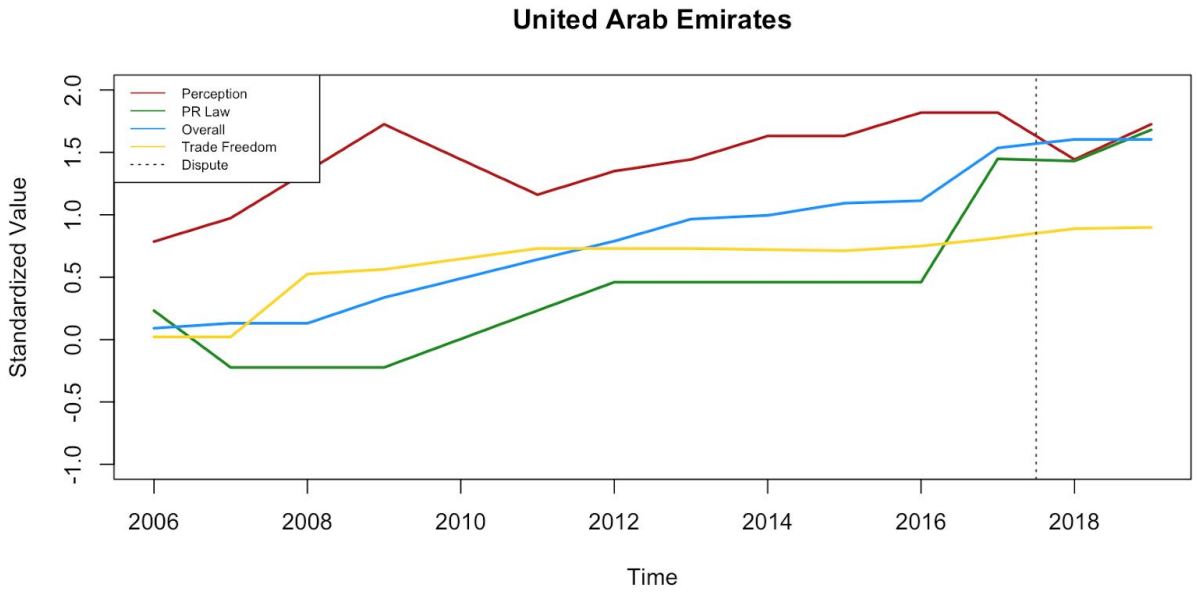
Figure 3: Countries Accused of a TRIPS Violation Over Time






China
Perception
PR Law
Overall
Trade Freedom
Trade War
Dispute
Standardized Value
2
1
0
-1
-2
2006
2008
2010
2012
2014
2016
2018
Time


EU Countries
Standardized Value
1.5
1.0
0.5
0.0
Perception
PR Law
Overall
Trade Freedom
Dispute
2006
2008
2010
2012
2014
2016
2018
Time



D. Geospatial Data

Lastly, I include geospatial data that gives the latitude and longitude of each country's centroid. This is for the purpose of employing cluster-robust inference using spatial HAC standard errors in my secondary analysis (table 3), which accounts for spatial correlation between a country accused of a TRIPS violation and neighbor states. I obtain this data from the Central Intelligence Agency World Factbook, assuming that borders (and therefore centroids) have not drastically changed between the years of 2006-2019 for countries in my sample.

Identification strategy

A. Main Specification

I study the ceteris paribus effect of a dispute filing on the intellectual property reform in the respondent country. The treatment group is the respondent country that was accused of a violation through TRIPS. For the control group, I include all other non-treated available countries in the sample. There are 17 instances of a TRIPS dispute being filed between 2006 - 2019 and 145 countries in my sample. The regression specification is as follows:

Model 1

$$Y_{it} = \alpha + \beta T_{it} + \theta_i + \delta_t + \varepsilon_{it}$$

The outcome variable Y_{it} measures total country score, which uses 4 measures to capture numerous aspects of intellectual property enforcement. T_{it} is a binary treatment variable that becomes 1 in the year a country is accused of a TRIPS violation and remains 1 thereafter. θ_i is country fixed-effects and δ_t is time fixed-effects[14]. I cluster standard errors by country.

Additionally, I construct a balanced panel that controls for other non-TRIPS WTO disputes filed. The regression equation is as follows:

Model 2

$$Y_{it} = \alpha + \beta T_{it} + \theta_i + \delta_t + \gamma \sum_{0}^{t} X_{it} + \varepsilon_{it}$$

$\sum_{0}^{t} X_{it}$ is the number of non-TRIPS WTO disputes filed, beginning at 0 in the base year and cumulative thereafter. For example, if Turkey is accused of five non-TRIPS violations in 2014 and six in 2015, then the value for Turkey is eleven for 2015 onwards and zero before. I

[14] To see the importance of time fixed-effects, please refer to *figure 4* of the appendix.

include the original seventy-nine countries from 2006 so that the cumulative measure is equally applied to each country. Similar to the first specification, I cluster standard errors by country and include time and country fixed-effects.

If more time allowed, I would only include non-TRIPS disputes filed contemporaneously, that is as a number that expires two years after being incurred. I believe this would better capture the effect of a "violation dump" on countries to improve their law systems in place, as dispute violations likely do not matter after some years have passed. Due to time constraints I leave this aspect to future research.

B. Secondary Specification; Bad Neighbor Effect

I measure the effect of a TRIPS dispute violation on neighboring countries of the respondent. While countries accused of a TRIPS violation may anticipate a dispute, it is likely that neighboring states in this case experience the shock exogenously. Therefore I treat the effect of a TRIPS violation as an exogenous shock to neighboring countries. Similar to the primary specification, I model this with a modified difference-in-differences analysis (model 1). T_{it} is a binary treatment variable that becomes 1 in the year a *neighbor* country[15] is accused of a TRIPS violation and remains 1 thereafter.

When estimating regression models with geospatial characteristics, two forms of auto-correlation become relevant: serial and spatial correlation. I account for some correlation by my inclusion of time and country fixed-effects. In order to accurately account for spatial correlation among geographic regions, I employ Spatial HAC standard errors per Conley (1999, 2008). The method developed by Conley controls for spatial correlation when estimating

[15] As mentioned previously, a country is considered a "neighbor" if it is within 1,000 feet of another country's centroid coordinates. This equates to approximately the distance between Paris and Barcelona.

regression models with longitudinal data. Furthermore, this is a common method employed to confront data with standard errors independent across clusters but correlated within clusters.

Results

In this section I analyze three hypotheses motivated by intuition and rationalized through my identification strategy (1) Countries accused of a TRIPS violation will make changes to improve their own IP adherence, (2) Countries will internalize the effect of a TRIPS dispute incurred by a geographic neighbor, which they will perceive as an exogenous shock to their IP systems and improve their adherence as well, and (3) these interactions may affect the absence or presence of trade barriers as information asymmetries are corrected.

I test these hypotheses using balanced and unbalanced panel data for the 2006-2019 time period and including 79 and 145 countries in my sample period, respectively. I approach all following the methodology of difference-in-differences analysis, then verify robustness by employing a false experiment. All analysis is performed in R, however results could be easily replicable in Stata with minor adjustments.

A. Main Findings

It should be noted that 2010 data is only partially available, therefore I only include data from thirteen years within this timeframe. There are ninety countries beginning in 2006, which drops briefly before surging to 145 countries in 2019 (seventy-nine in the balanced panel for all years). I analyze the four specified IP indicators, *Business_Perception, Property_Rights, Trade_Freedom,* and *Laws_Overall,* to find the average difference-in-differences estimates between treated and untreated countries.

As a note, it is unlikely this analysis suffers from reverse causality. A country flagged for a TRIPS violation should not affect the values of these indicators as they do not take into account perceptions abroad, whereas negative perception from an external party is the entire basis for a trade dispute. At the same time, this analysis *may* suffer from issues relating to endogeneity. Although qualitative research suggests these events are effectively perceived as exogenous (Proelss et al., 2018), it is possible that a country could anticipate incurring a violation via TRIPS before such an event takes place. This effect would serve to bias the results toward zero, as finally incurring a TRIPS violation would not be a truly exogenous shock. This dampening effect suggests that the coefficients may be larger than what is found in the tables below.

Table 1:
In Law and Perception

	PR Law	*PR Law No F.E.*	*PR Law w.controls*	*Perception*	*Perception No F.E.*	*Perception w.controls*
Balanced Panel						
Treatment	-0.008	-0.008	0.027	-0.21**	-0.023	-0.208**
	(0.48)	(0.032)	(0.08)	(0.08)	(0.03)	(0.08)
Observations	1028	1028	1028	1028	1028	1028
R-Squared	0.93	0.01	0.93	0.93	0.03	0.93
Unbalanced Panel						
Treatment	0.023	-0.029		-0.22**	-0.041	
	(0.07)	(0.03)		(0.08)	(0.03)	
Observations	1367	1367		1367	1367	
R-Squared	0.93	0.01		0.92	0.03	
Country Fixed Effects	Yes	No	Yes	Yes	No	Yes
Time Fixed Effects	Yes	No	Yes	Yes	No	Yes

p <.1* p<.05** p<.01***
(Standard errors clustered by country)

Table 2:
Change to Laws in Place

	PR Laws	*PR Laws Controls*	*Economic Freedom*	*Economic Freedom Controls*	*Laws Overall*	*Laws Overall Controls*
Balanced Panel						
Treatment	-0.008	0.027	-0.09	-0.08	-0.003	0.025
	(-0.48)	(0.08)	(0.13)	(0.14)	(0.07)	(0.07)
Observations	1028	1028	1028	1028	1028	1028
R-Squared	0.93	0.93	0.78	0.80	0.94	0.94
Unbalanced Panel						
Treatment	0.023		-0.098		-0.022	
	(0.07)		(0.13)		(0.07)	
Observations	1367		1367		1367	
R-Squared	0.93		0.78		0.937	
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

p <.1* p<.05** p<.01***
(Standard errors clustered by country)

I find being in violation of TRIPS leads a country to have a standardized *perception* score .208 points lower than a country without a violation, *ceteris paribus*. This finding is significant after controlling for time and country fixed-effects and clustering standard errors by country (column 1 of Table 1). This result is also significant with controls. When I remove fixed effects, the results only differ nontrivially but the error bands become much greater.

These numbers are standardized with a mean of zero and a standard deviation of one; therefore a decrease of .208 suggests a fall of one-fifth of one standard deviation from the mean. Surprisingly, no other measure was strong or significant regarding changes to property rights law (table 2), leaving some ambiguity. This may be in part due to the fact that they are measures of property rights, not specifically *intellectual* property rights - therefore changes may not be strong enough to pick up effects. Secondly, it may be that governments are slower to respond on an institutional level, whereas local economic actors are affected almost instantaneously. If this

measure is only picking up short-term effects, it is understandable that local economic actors may suffer negative externalities in the immediate aftermath of a TRIPS violation being incurred.

B. Bad Neighbor Effect

Next, I measure the effect on nearby countries when a neighbor is accused of a TRIPS violation. I estimate these results using model 1 and employing *TRIPS_Neighbor* as the treatment variable. In order to account for spatial correlation in the standard errors, I first compute the longitudinal and latitudinal coordinates for the centroid of each country in my sample (map 1). Following suggestions per Conley (2008), I set the geospatial distance of a "neighbor" to any country with a centroid within 1,000 kilometers of another. Secondly, I only incorporate the balanced panel in this secondary analysis. As a result all seventy-nine countries in the sample are fully representative by year.

Map 1: World map with Centroids, Balanced Panel
(78 countries)

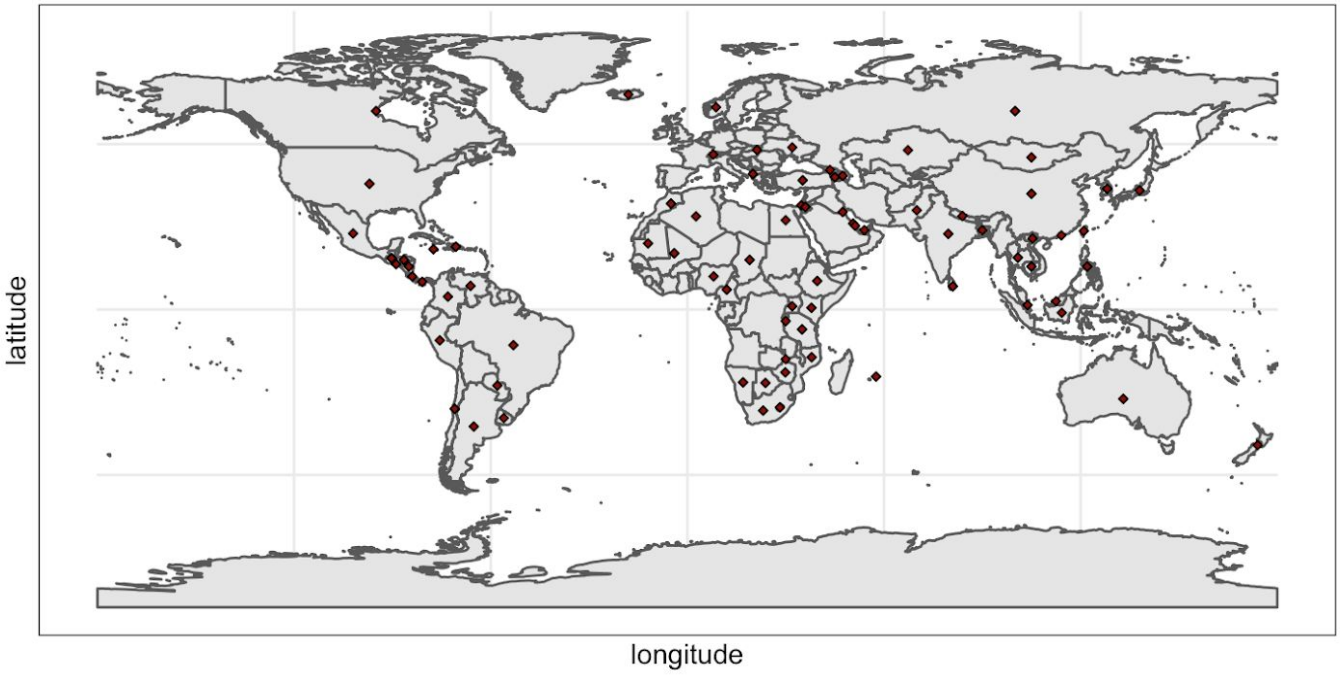


Table 3:
Neighbor Countries After a TRIPS Dispute

	Property Rights Law	*Perception*	*Trade Freedom*	*Trade Overall*
Balanced Panel				
Treatment	0.08*	-.053	0.152***	0.036
	(0.043)	(0.043)	(0.71)	(0.035)
Country Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
Observations	1028	1028	1028	1028
R-Squared	0.93	0.94	0.80	0.95

p <.1* p<.05** p<.01***
(Spatial HAC standard errors)

My findings weakly suggest that perception by local business owners may change negatively after a TRIPS dispute, however what is more puzzling is why the *Trade_Freedom* and *Property_Rights_Law* variables obtain positive significance. It seems that institutions may "take the hint" to improve their laws when a neighboring country is accused of a violation, although it should be noted that this change is small at one-seventh of a standard deviation increase. Furthermore, trade barriers are marginally relaxed (about one-tenth of a standard deviation increase) after a TRIPS dispute on a neighbor occurs. As my dummy variable "turns on" and remains so for every year following a dispute violation, and most disputes are resolved within 12-15 months, this may be picking up the after-effects on relaxed trade barriers after laws are successfully amended.

C. False Experiment

Finally, I design a false experiment to demonstrate that the effect is nonexistent in the absence of treatment. I achieve this by randomly reassigning each of the seventeen TRIPS disputes to a previously unaccused country and repeating my initial regressions (refer to table 1 and 2). This random assignment covers five of the six continents in my sample and includes a

balanced mix of developed and developing countries. I do not test the false experiment on neighbor countries, so the false experiment results are most comparable to tables 1 & 2.

Table 4:
False Experiment

	Property Rights Law	*Perception*	*Trade Freedom*	*Trade Overall*
Balanced Panel				
Treatment	-0.002	0.046	0.15	0.055
	(0.08)	(0.08)	(0.13)	(0.07)
Observations	1028	1028	1028	1028
R-Squared	0.93	0.93	0.80	0.94
Unbalanced Panel				
Treatment	-0.065	0.08	0.086	0.028
	(0.07)	(0.08)	(0.13)	(0.07)
Observations	1367	1367	1367	1367
R-Squared	0.93	0.92	0.78	0.94
Country Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes

p <.1* p<.05** p<.01***
(Standard errors clustered by country)

I find that the single variable significant in my initial regression, that of intellectual property rights as perceived by economic actors (*Business_Perception)*, is insignificant. Furthermore, all variables insignificant in the initial regressions remain so in the false experiment. This strongly suggests that a TRIPS dispute does have some amount of ripple effect on local economic actors, marginal or otherwise. Unfortunately, it appears that they fare worse after the introduction of a violation (at least at the onset).

Conclusions

This paper provides results of the first study that evaluates reform both via institutional change and as perceived by local economic actors after the introduction of a TRIPS dispute. To find these results I drew on WTO, WEF, CIA and EF reports from 2006-2019 to construct a

novel dataset that captures the impact of a TRIPS dispute violation. In regards to if the AB should be taken out of retirement, I find the evidence conflicting.

In opposition to the previous work centered on the effect of TRIPS ranging from foreign direct investment to pharmaceuticals and innovation, my analysis reveals that local economic actors perceive their situation worsened in regards to IP protection after a violation is aired. It may be understandable that local actors perceive an immediately worsened situation after a TRIPS dispute is incurred in their country; perhaps it makes national news, foreign investment diminishes, or they find it harder to trade overseas. This particular set of regressions is open to potential concerns regarding parallel trends and endogeneity and should be taken as suggestive.

I do not find a strong effect on overall institutional change, relaxed trade barriers, or property rights law strengthening in a country accused of a violation. However, the WTO states that over half (24 of 42) of TRIPS violations were peaceably resolved without need for retaliation. This evidence, seemingly contradictory, may allude to issues in this paper to divorce short from long term effects. In future work I would suggest relying less on cumulative measures and more on those better equipped to handle changes contemporaneously.

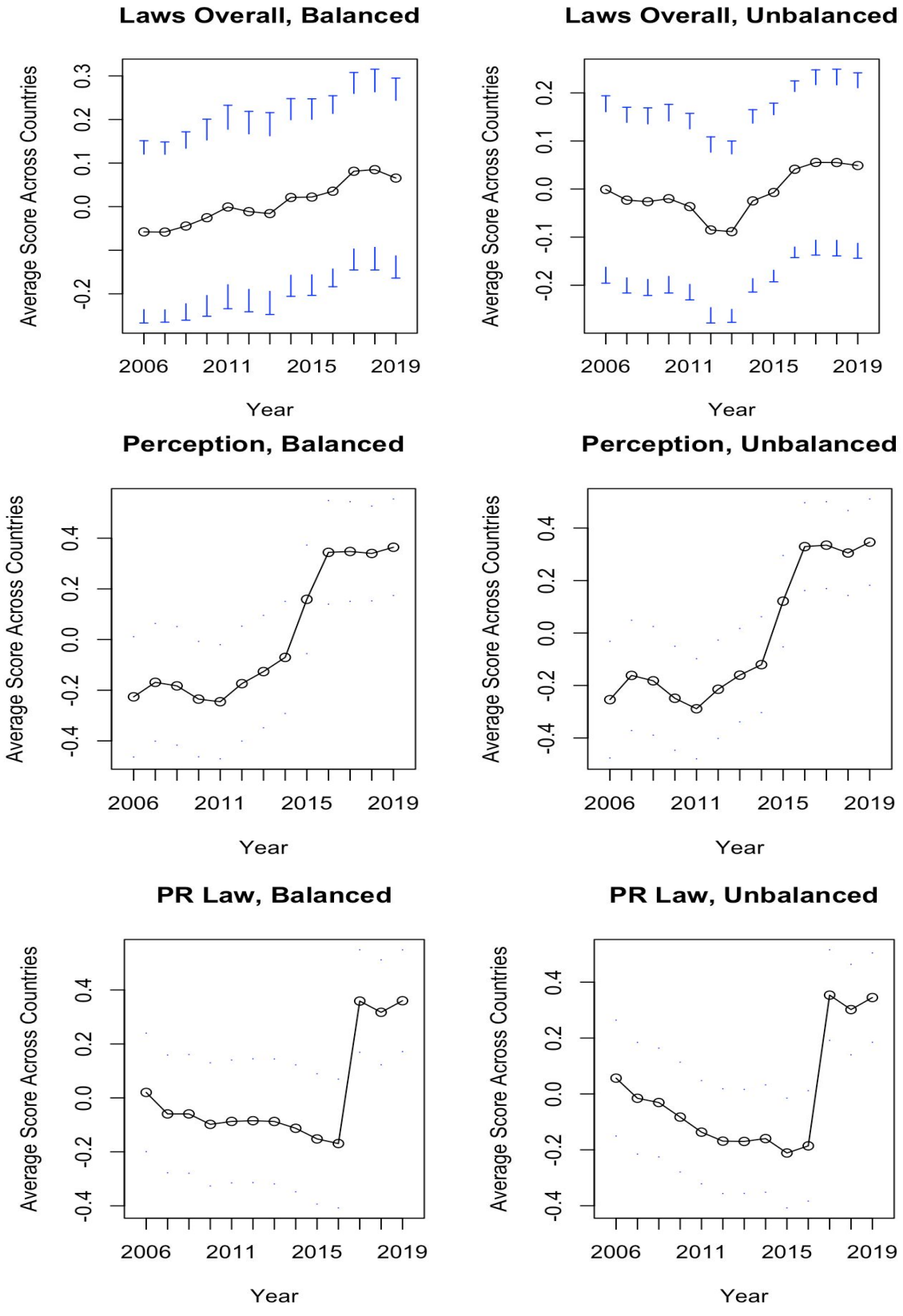
Finally, in neighboring countries I find a small, positive increase in the absence of barriers to trade and property rights law strength. This implies that when a nearby country is accused of a TRIPS violation, neighboring countries relax trade barriers. In this case, I believe this may not be immediately after but a long-run effect being seen; given that the panel lasts 12-15 months on average and most cases are resolved within that time, this variable could be picking up effects occurring *after* the respondent made a satisfactory number of changes, allowing neighbor countries to relax their borders. Furthermore, countries may "take the hint"

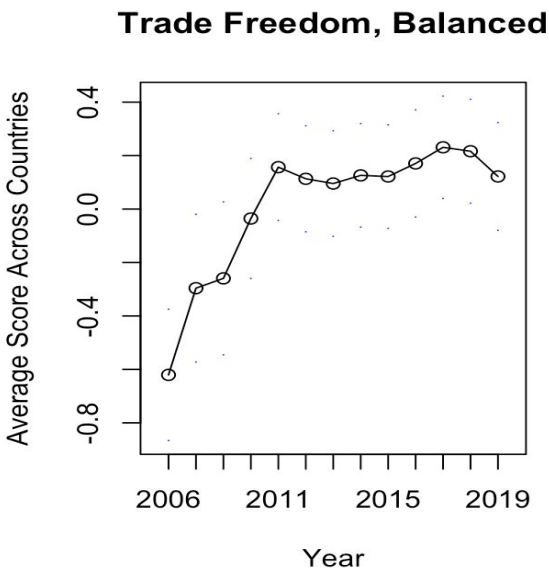
when a neighbor is accused of a violation, leading to a strengthening of their own property rights laws over time (as shown in table 3).

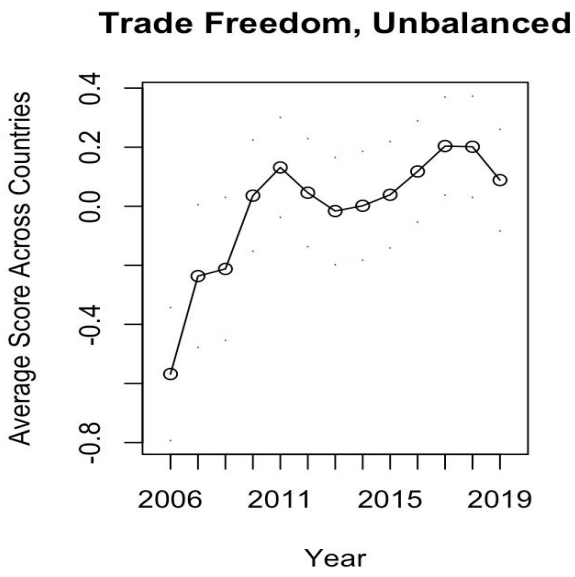
This paper is a first step in taking a closer look at the effectiveness of the WTO in preventing property rights theft worldwide. With the retirement of the Appellate Body, we can now begin to witness the contrapositive - a world with the absence of a global arbiter to free trade. It will be interesting to see the alternatives posed by governments in wake of the AB's retirement and surely provide a rich comparison tool for economists in years to come.

Appendix

Figure 4: Time Effects On Variables of Interest




Trade Freedom, Balanced
Average Score Across Countries
-0.8
-0.4
0.0
0.4
2006
2011
2015
2019
Year


Trade Freedom, Unbalanced
Average Score Across Countries
-0.8
-0.4
0.0
0.2
0.4
2006
2011
2015
2019
Year

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