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States Held Hostage: Political Hold-Up Problems and the Effects of International Institutions

ALLISON CARNEGIE *Princeton University, University of Chicago*

This paper argues that the benefits of international institutions accrue disproportionately to pairs of states that find cooperation most difficult. It determines which states achieve the greatest gains from these institutions by identifying a central reason that states fail to cooperate in international relations: they fear being "held up" by other states for political concessions. Political hold-up problems occur when one state fails to undertake an otherwise productive investment due to the increased ability it would give another state to extract political concessions. Focusing on the World Trade Organization (WTO), I demonstrate that political hold-up problems are pervasive in international relations due to links between economic and political policies, but that international institutions can solve hold-up problems by helping to enforce agreements. I first formalize this argument and then empirically test the implications derived from the model, finding that the WTO increases trade most for politically dissimilar states by reducing states' abilities to hold up their trading partners for foreign policy concessions. I provide evidence of the causal mechanism by showing that WTO membership increases trade in contract-intensive goods and boosts fixed capital investment. I conclude that by solving political hold-up problems, international institutions can normalize relations between politically asymmetric states that differ in terms of capabilities, regime types, and alliances.

Theories of international institutions typically contend that these institutions support cooperation among all members. Some scholars have criticized this claim, suggesting that benefits accrue most to the powerful states that created the institutions, potentially at the expense of weak states.[1] In this paper, I argue that the distribution of benefits can be most productively understood by examining the effects of institutions on the relationships between certain pairs of states. States have more trouble cooperating with some partners than with others, and pairs that find cooperation difficult gain the most from membership in international institutions.

To analyze how membership in international institutions affects particular types of states, I examine the specific case of the World Trade Organization (WTO) and its predecessor, the General Agreement on Tariffs and Trade (GATT).[2] The distribution of benefits from WTO membership depends on the types of problems that the WTO can solve. Existing theories contend that the WTO can ameliorate time inconsistency problems, which occur when a country's *ex ante* incentives differ from its *ex post* incentives, but these theories offer ambiguous predictions about the differential impact of WTO membership.[3] By contrast, I determine the pairs of states that benefit most from WTO membership by identifying a specific type of time inconsistency problem that is pervasive in international relations: the "political hold-up problem." Political hold-up problems occur when one state fails to undertake an investment due to the increased ability it would provide another state to extract political concessions. For example, states often hesitate to construct oil and natural gas pipelines because once they invest in building the pipelines, their partners can obtain political concessions by threatening to terminate oil or gas exports. I demonstrate that these problems are most acute for politically dissimilar pairs of states, in which one state has the ability and incentive to extract concessions from its potential trading partner. However, I show that the WTO can solve political hold-up problems by helping to enforce dynamic agreements, allowing countries to trade based on their economic incentives, rather than for political reasons. In so doing, the WTO can mitigate the impact of a variety of political asymmetries between countries, providing the largest benefits for politically dissimilar pairs of states. I first formalize this claim and then empirically test the implications derived from the model, finding that the WTO increases trade most between country pairs that differ in terms of capabilities, regime types, and alliances, by preventing states from holding up their trading partners for foreign policy concessions.

To understand how political hold-up problems form, consider the historical trade relations between the United States and Hawaii. In 1876, the U.S. signed a trade agreement with the Kingdom of Hawaii which

Allison Carnegie is Senior Research Fellow, Niehaus Center for Globalization and Governance, Princeton University, Princeton, NJ; Assistant Professor, Department of Political Science, University of Chicago, Chicago, IL.

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[1] The literature on the benefits of institutions was pioneered by Keohane (1984). The view that benefits tend to fall disproportionately to powerful states has been advanced by Krasner (1991) and Mearsheimer (1994), among others.

[2] In 1995, the WTO replaced the GATT. Throughout the paper, I use the term WTO to refer to both the GATT and the WTO unless otherwise specified.

[3] Although see Gowa and Kim (2005) for an argument that predicts that large states are the main beneficiaries.

eliminated high U.S. sugar tariffs. Hawaii responded by ramping up sugar production for export to the United States, such that Hawaiian sugar exports to the U.S. rose from 21 million pounds in 1876 to 114 million pounds in 1883 (La Croix and Grandy 1997). Increasing sugar production required a large investment: sugar producers adopted new sugar processing technology, bought government and private land, undertook large-scale irrigation projects, and invested in fertilizers. The Hawaiian government signed the treaty expecting other markets for its sugar exports to open up by the time of the treaty's renewal (La Croix and Grandy 1997). However, when the treaty expired in 1883, Hawaii had no viable alternative export market (Kuykendall 1953).[4] Thus, during negotiations over the treaty's renewal, the United States demanded exclusive rights to Pearl Harbor; otherwise, the U.S. threatened to reinstate the high sugar tariff. The Hawaiian government conceded.

Why couldn't the United States obtain access to Pearl Harbor when the treaty was initially signed?[5] At that point, the Hawaiian government would have weighed the cost of granting access to Pearl Harbor plus the cost of the sugar investment against the economic gains from increased sugar exports. By the time the treaty was up for renewal, however, the sugar investment had already been made. Thus, the government weighed only the cost of giving up Pearl Harbor against the benefits of trading more sugar. The United States was therefore able to hold up Hawaii for the value of the sugar investment.

In general, I show that states anticipate their partners' opportunistic behavior and therefore underinvest in the production of goods for trade with these partners. While the Hawaiian government was aware that it could be held up when it chose to sign the initial agreement, it hoped that it could open other markets for its sugar by the time the treaty was renewed.[6] A less optimistic country could have refused to undertake the investment in the first place. Because states cannot commit to refrain from holding up other states, their partners under-invest, decreasing the welfare of both parties.[7]

Note that the opportunity to demand political concessions dramatically increases states' incentives to use their trade policies opportunistically. In the aforementioned example, if the U.S. government had no interest in Pearl Harbor, it may have had no reason to hold Hawaii up. Because imports of Hawaiian sugar benefited U.S. consumers, it is not clear that the U.S. government would have wanted to raise its sugar tariffs. The opportunity to link economic and political policies, however, meant that the U.S. government had a large incentive to hold Hawaii up to gain access to Pearl Harbor.

Political hold-up problems create the need for enforceable long-term trade agreements, which allow countries to credibly promise not to raise tariffs to extract political concessions. However, long-term agreements are often unenforceable in a bilateral setting. Luckily, international institutions can help to enforce these agreements, permitting countries to commit to not use their trade policies for political leverage. Countries benefit from tying their hands through the resulting increases in trade and investment. International institutions enable countries to abide by dynamic agreements through a variety of mechanisms; as argued by Axelrod and Keohane (1985, 235), members "(1) can identify defectors; (2) they are able to focus retaliation on defectors; and (3) they have sufficient long-run incentives to punish defectors."

The WTO in particular provides transparency and a loss of reputation for violators through its Dispute Settlement Body (DSB), which adjudicates disputes between WTO members. The DSB provides WTO participants with "a guarantee for the right to negotiate, a common standard for evaluating outcomes, the option for several countries to join a dispute, and incentives for states to change a policy found to violate trade rules" (Davis 2006). By developing norms and behaviors that states are expected to follow and by specifying which states are noncompliant, the DSB influences members' reputations, which serves as an effective restraint in many settings (Tomz 2007). The WTO publicizes which countries cooperate with agreements, which allows members to establish reputations for cooperation and encourages continued cooperation in the future. Conversely, if countries are known to violate agreements frequently, their partners may reduce cooperation with them by withdrawing trade concessions, becoming more reluctant to enter agreements, or becoming less cooperative in related areas (Maggi 1999). WTO rulings can also provide countries with domestic political cover for adhering to agreements (Allee and Huth 2006; Staiger and Tabellini 1999) and the ability to develop domestic reputations for compliance (Mansfield, Milner, and Rosendorff 2002). Additionally, if a country frequently breaches WTO law, what is to prevent its trading partners from recurrent violations? This could lead to a

[4] For example, Australia had become a sugar exporter, and the Canadian population was too small to serve as a substitute (La Croix and Grandy 1997). Additionally, continental Europe had begun producing large quantities of beet sugar as a substitute for imported cane sugar (Rolph 1917).

[5] See La Croix and Grandy (1997, 175–179) for evidence that the United States did not initially have enough bargaining power to extract this concession, but its bargaining power had increased by the time of the renewal due to Hawaii's extensive investment in its sugar industry.

[6] La Croix and Grandy (1997, 177) quote Charles de Varigny, the Foreign Minister of the Kingdom of Hawaii, explaining, "Seven years [the length of time before the treaty's renewal] would give us time to establish our sugar production on a solid basis. After all, we would have an opportunity through similar negotiations to open up other markets."

[7] The argument presented here differs from ordinary issue linkage, or the "simultaneous discussion of two or more issues for joint settlement" (Poast 2012, 2). Unlike issue linkage (or the closely related concept of conditionality), wherein both countries can be made better off through the bargain (Davis 2004 2009; Dreher, Sturm, and Vreeland 2009; Koremenos, Lipson, and Snidal 2001), hold-up problems can result in both countries being made worse off due to underinvestment.

breakdown of the system as a whole, an outcome which many states have strong incentives to avoid.

The loss of reputation before the large audience of WTO members appears to be a strong deterrent, as there are many examples of the WTO helping to uphold agreements between powerful and weak states. Powerful states have high rates of compliance with WTO rulings on cases brought by weak states (Busch and Reinhardt 2003 2004; Davis 2006; Wilson 2007). Additionally, Busch, Raciborski, and Reinhardt (2009) show that large WTO members reduce protectionist practices against small WTO members in particular. By improving members' abilities to commit to agreements, the WTO can thus help countries to limit political hold-up problems, thereby decoupling trade and politics.

Yet previous work on hold-up problems in the context of the WTO is rare and focuses largely on the determinants of institutional design, rather than on state behavior. For example, Yarbrough and Yarbrough (1992) and Goldstein and Gowa (2002) use the logic of economic hold-up problems to explain the selection of trade institutions.[8] Prior examinations of the role of the WTO point to other types of inefficiencies the WTO can help alleviate. For example, the WTO can also resolve a terms-of-trade prisoner's dilemma, where governments of large countries have an incentive to set tariffs at inefficiently high levels due to their ability to pass some of the cost onto their trading partners through the impact of their tariffs on world prices (Bagwell and Staiger 1999). Further, the WTO can allow countries to avoid succumbing to domestic political pressures (Büthe and Milner 2008; Maggi and Rodriguez-Clare 1998; Mansfield and Pevehouse 2008). Although solving hold-up problems is an important function of the WTO, it is by no means the only time inconsistency problem that the WTO can remedy. But while other theories often offer ambiguous empirical predictions, the logic of political hold-up problems generates clear, testable hypotheses.

In the next section, I present a formal model which shows that hold-up problems occur most frequently when one country has the ability and the incentive to hold up a partner country. The model demonstrates that powerful countries have a greater ability to hold up weaker countries, since weaker countries are less able to retaliate. If a weak country tries to hold up the United States, for example, the United States can threaten it with military, financial, economic, or political penalties, while a weak country would find it more difficult to punish the U.S. The model also implies that countries have greater incentives to hold up nonallies and countries with dissimilar regime types, since these countries have more disparate policy goals. Because politically dissimilar countries are most susceptible to hold-up problems, trade and investment should be inefficiently low between these countries in the absence of the WTO. The main benefit of WTO membership, increased trade, should therefore accrue most heavily to these country pairs. In what follows, I formally derive these predictions and then substantiate the claims empirically, finding that the WTO increases trade most for politically dissimilar pairs of countries, which are most vulnerable to hold-up problems. Finally, I provide evidence of the causal mechanism driving the results, demonstrating that WTO membership increases fixed capital investment and that WTO members are more likely to trade goods which rely on contract enforceability.

A MODEL OF POLITICAL HOLD-UP PROBLEMS

Overview

I present a model which shows that the WTO most benefits politically dissimilar country pairs by improving contract enforcement. The model demonstrates that long-term agreements solve political hold-up problems, but are difficult to abide by in a bilateral setting, particularly for dissimilar pairs of states. By contrast, WTO membership allows countries to commit to long-term agreements, resulting in greater levels of investment and trade.

The model features two countries that bargain over the terms of a trade agreement. A two-player model permits a focus on political hold-up problems, since these problems occur when one party makes a relationship-specific investment, or an investment whose returns depend on the continuation of the relationship with a particular partner (Crawford 1990).[9] A viable alternative trading partner may not exist for several reasons: First, the country's investment may only physically permit trade with a specific market, such as roads that connect the country of origin to the destination. Second, investment may produce a good that is demanded by a unique market, such as a factory designed to build automobiles that meet a partner's especially stringent emissions standards. Third, investment may promote trade in goods for which switching partners is too costly, either because a state's market size is so large that a suitable substitute does not exist (as in the Hawaii example discussed previously), or because the good is supplied at such a favorable price that a feasible alternative is not available.

In the model, one state may choose to make a relationship-specific investment in order to produce a good for export to a partner state. The exporter may

[8] Other work on hold-up problems between governments tends to remain outside of the context of the WTO. See Davis and Meunier (2011) for an application to trade and conflict, Lake (1999) for an application to alliances, Wallander (2000) for hold-up problems in the context of NATO, Cooley and Spruyt (2009) for hold-up problems in sovereign transfers, and Rector (2009) for an application to federations. Additionally, McLaren (1997) argues that the potential for hold-up problems can have perverse effects on the design of agreements. However, I focus on the effect of long-term agreements on investment behavior, arguing that these agreements can remedy political hold-up problems.

[9] The key feature of such an investment is described by McLaren (1997) as "*irreversibility*, or costly reversibility, of investment decisions. Thus, after reorienting production towards a particular trading partner, it would be very costly to return to the status quo."

desire a lower tariff than the importer wishes to set, so in exchange for a lower tariff, the exporter may offer foreign policy concessions such as human rights improvements, democratization, technology sharing, access to military bases, etc. States could, of course, bargain over tariffs and other economic concessions instead. However, the model's purpose is to demonstrate the conditions under which hold-up problems occur, and economic hold-up problems are typically much less prevalent between countries than political hold-up problems. The model indicates that hold-up problems arise when a state has the ability to hold up its partner; that is, when one state is much more powerful than another. In these cases, the economic concessions that a large state may receive from a small state are often much less valuable than the political concessions the large state can obtain. While trade with a small state tends to represent a minor share of a large state's market, the political importance of small states can be extremely high. For this reason, large states commonly use their trade policies to attempt to obtain political concessions from their partners, both today and historically. Consider a few examples: the renewals of India and Nepal's short-term trade treaties of 1991 and 1996 were contentious due to Indian opposition to Nepal's acquisition of Chinese weapons (Heitzman and Worden 1996); trade agreements concluded by the EU with Mongolia, Sri Lanka, Vietnam, and Nepal make respect for human rights a key condition for yearly renewal; China often ties the renewal of short-term agreements to its partner's support for Taiwan (Dumbaugh 2008); the United States frequently linked the renewal of trade agreements with China, Vietnam, and Cambodia to human rights and other political concessions before these states joined the WTO; Russia would only renew the 1797 Anglo-Russian Treaty of Commerce if Britain provided a military diversion (Roach 1983).

While the aforementioned examples all occurred in the context of short-term trade agreements, the model indicates that political hold-up problems can be solved with perfectly enforceable, long-term agreements, which allow states to commit not to behave opportunistically. However, long-term agreements can be difficult to abide by in the absence of the WTO, as discussed previously. Indeed, the empirical pattern of agreements seems to match the theoretical expectation. For example, while all agreements signed within the WTO are long-term agreements, short-term agreements remain common outside of the WTO.[10] Further, I coded the duration of all current United States trade agreements as well as all current Australian trade agreements and found that 116 out of 236 of the United States' trade agreements and 32 out of 73 of Australia's agreements have limited durations. Additionally, most of these short-term agreements were signed before the advent of the GATT, with a non-WTO member, or between large countries for whom hold-up problems are rare.[11] The model demonstrates that these short-term agreements cause political hold-up problems, but that the WTO alleviates such problems by helping to enforce long-term agreements.[12]

Setup

Consider a world that consists of one period and two countries, H and F, to be indicated by superscripts. Country F is able to produce good g. Good g is demanded solely by H, but F may export g to H. F may only produce g if F makes an investment $i \in \{0, 1\}$, such as the development of new technology or infrastructure. If $i = 0$, g is not produced. If $i = 1$, F incurs cost i, so that i represents both the investment decision and the cost of the investment.

If $i = 1$, the amount of g produced depends on H's import tariff $\tau \in [0, \bar{\tau}]$ where $\bar{\tau}$ is the prohibitive tariff beyond which no g is traded.[13] H receives utility from the consumption of g and F receives utility from the export of g. Since the amount of g available for export and consumption depends on τ, it is convenient to denote utility over g as a function of τ, or $\Omega^k(\tau)$ where $k = \{H, F\}$. $\Omega^k(\cdot)$ is a general functional form that allows for the possibility that states may have utility over both government investment and investment by private agents. Governments may care about the welfare of domestic actors either because governments are benevolent, or because of political economy concerns such as the desire to remain in power or interest in collecting rents (Grossman and Helpman 1994).[14] In either case, H's welfare depends on the tariff, as the tariff will determine the profitability of the investment. $\Omega^H(\tau)$ is assumed to have an interior maximum of τ^N and $\Omega^F(\tau)$ is assumed to be concave in τ and monotonically decreasing in τ.

H's utility function is

$$u^H(\tau, f, i) = i\Omega^H(\tau) + f,$$

[10] Note that for my purposes, long-term, bilateral agreements are considered multilateral if they use the WTO's dispute settlement body for adjudication. By contrast, bilateral short-term agreements do not rely on this type of multilateral adjudication, and are therefore not considered multilateral.

[11] Future work might examine this pattern more systematically. The texts of these agreements were obtained from a variety of sources including the U.S. Trade Compliance Center website and the Australia Government Department of Foreign Affairs and Trade website. This pool of agreements includes bilateral preferential trade agreements, bilateral investment treaties, trade relations agreements, intellectual property rights agreements, agreements covering specific goods, and friendship, commerce, and navigation treaties.

[12] Note that a short-term agreement is usually much easier to enforce, since states may simply wait until the agreement's expiration to alter its terms or extract concessions. By contrast, states typically must terminate a long-term agreement in order to change its provisions.

[13] An export tax or subsidy could be modeled equivalently, but I focus on tariffs for simplicity.

[14] In the Hawaii example discussed previously, sugar planters invested heavily once the government signed the trade agreement. The Hawaiian king was then held up for access to harbors because, to order to maintain power, he needed to satisfy the demands of the planters by renewing the trade agreement (La Croix and Grandy 1997).

where $f \in [0, \bar{f}]$ represents F's foreign policy concessions to H, as described above.[15] F's utility function is

$$u^F(\tau, f, i) = i\Omega^F(\tau) - i - \gamma f,$$

where the parameter γ represents H and F's foreign policy preference dissimilarity, such that a large γ indicates that F strongly dislikes making concessions f.

Short-term and long-term trade agreements are available to governments, in which governments select policies f^j and τ^j, where $j \in \{st, lt\}$, through Nash bargaining. H's bargaining power is denoted by α. If a long-term agreement is chosen, H and F bargain over f^{lt} and τ^{lt}, after which F decides whether to invest.[16] If a short-term agreement is selected, F first chooses whether to invest, and then countries bargain over f^{st} and τ^{st}. Thus the timing is as follows:

1. Countries choose whether to sign a long-term agreement specifying τ^{lt} and f^{lt}.
2. F chooses whether to invest.
3. Countries choose whether to sign a short-term agreement specifying τ^{st} and f^{st} if they did not previously sign a long-term agreement.[17]

I make two key assumptions: First, I assume that in the first-best solution, which maximizes the joint surplus, countries trade g; otherwise, investment would be inefficient and hold-up problems would not occur. Second, I assume that parties cannot contract over F's investment decision, as is standard in models of hold-up problems, because investment cannot be verified. For example, suppose F agrees to invest in its agricultural sector. If F fails to invest, H may observe that agricultural output is low, but cannot tell if low output is the result of a lack of investment or, say, adverse weather conditions.

Short-term Trade Agreements

Suppose first that in the absence of the WTO, only short-term agreements are available. Short-term agreements allow countries to bargain over specific policy levels once the investment is undertaken. The threat point, or the outcome if bargaining breaks down, is the noncooperative equilibrium in which countries play their preferred policies, such that if $i = 1$, H selects τ^N and F selects $f = 0$.[18] I show that in this case, hold-up problems arise for sufficiently dissimilar pairs of countries.

Proposition 1. *When only short-term agreements are available, hold-up problems occur when H's bargaining power (α) is sufficiently large.*

Proposition 1 implies that if the other parameters are such that $i = 1$ under a short-term contract, then a sufficient increase in α changes the investment decision to $i = 0$ under a short-term contract. However, if the parameters are such that $i = 0$ under a short-term contract, then increasing α does not affect the investment decision.[19] Proposition 1 is proven in the Appendix, but the intuition is straightforward. As α increases, H is able to drive a harder bargain against F, so that H obtains a higher tariff. However, if the expected tariff increases enough, F does not receive a large enough share of the surplus to make an investment worthwhile, and so F decides not to invest. H should lower its tariff to induce F to invest, but because H cannot commit to maintain a low tariff once the investment has been undertaken, there is no way to entice an investment when only short-term agreements are available.

Proposition 2. *When only short-term agreements are available, hold-up problems occur when H and F's foreign policy preference dissimilarity (γ) is sufficiently large.*

Proposition 2 implies that if the parameters are such that $i = 1$ under a short-term contract, then a sufficient increase in γ changes the investment decision to $i = 0$ under a short-term contract.[20] Proposition 2 is proven in the Appendix. Intuitively, the more dissimilar the countries' foreign policy preferences, the less F is willing to make the concessions that H desires. Since a higher value of γ means that F's concessions are more costly, H must lower τ^{st} to induce F to invest, but cannot commit to do so. Thus, a sufficiently high γ causes hold-up problems.

Long-Term Trade Agreements

Suppose that when only short-term agreements are available, $i = 0$, but now H and F are able to sign a long-term agreement prior to F's investment decision. Since investment is efficient but does not take place without a long-term agreement, if bargaining breaks down, g is not produced. Therefore, both countries' reservation

[15] $\bar{f}$ represents the maximum amount of concessions that F can make. For example, a transition to a full democracy would constitute the most concessions possible in the area of democratization.

[16] The timing represents in reduced form the intuition of a dynamic model in which investment is made periodically, such that the countries' commitments to future policies influence current investment levels. In a more dynamic model, investment would need to be made periodically to sustain the industry. The timing is meant to capture the idea that without periodic investment, the industry would collapse. The interpretation should not literally be that countries bargain over tariffs before any good is produced.

[17] In this model, there is no scope for the renegotiation of a long-term agreement, as a renegotiation would have to make both parties better off. This could not occur since parties can correctly anticipate the size of the surplus, which they divide when the original agreement is signed. Since the size of the surplus is identical before and after the investment decision, renegotiation would require one country to benefit at the expense of the other.

[18] In the noncooperative equilibrium, if $i = 0$, τ is irrelevant since no good is produced, and F plays $f = 0$.

[19] Note that investment always occurs in the first-best solution. See the proof for details.

[20] Again, if the parameters are such that $i = 0$ under a short-term contract, then increasing γ does not affect the investment decision.

utilities are zero. The hold-up problems that arise under short-term agreements can be remedied by long-term agreements, if these agreements are enforceable.

Proposition 3. *Perfectly enforceable long-term agreements solve hold-up problems.*

Proposition 3 is satisfied by construction because in order to ensure that F undertakes the investment after the agreement is signed, the bargaining problem is subject to the constraint that F's utility from investing must be greater than its utility from not investing, or $\Omega^F(\tau^{lt}) - 1 \geq 0$.[21] Since the outcome is guaranteed to satisfy F's investment constraint, F undertakes the investment.

If long-term trade agreements solve hold-up problems and increase the welfare of both parties, why don't countries always sign them? The problem is that agreements between sovereign nations can be difficult to enforce, as states often receive high payoffs with small penalties from reneging. Many states find it difficult to detect cheating, and have few resources to punish their partners. Thus, I now consider the more realistic case of imperfect enforceability.

Proposition 4. *The WTO can enforce long-term agreements when these agreements are otherwise unenforceable.*

Suppose that hold-up problems occur under a short-term agreement, such that no investment takes place. A long-term agreement could solve the underinvestment problem, but is often tough to enforce. To see this, suppose countries incur costs from deviating from trade agreements, where H's cost is denoted C^H and F's cost is denoted C^F. These costs are determined outside of the model and represent the ability and credibility of one country to punish the other.[22] Countries can penalize their partners by using military force, raising tariffs on other goods, cutting off foreign aid, etc. The cost of deviating from an agreement is higher the more effectively the violator can be punished. Hold-up problems occur when H is large, in which case H faces a relatively low cost of reneging on the agreement, since a weak F can do little to punish a powerful H. By contrast, a powerful H is often easily able to retaliate against a small F. Thus, I focus on H's incentives to breach the agreement. If H reneges, it deviates to τ^N. H does not renege when the utility from deviating is less than the utility from abiding by the agreement, or $\Omega^H(\tau^j) \geq \Omega^H(\tau^N) - C^H$.[23] However, as discussed, C^H is often low for a powerful H.

Luckily, the WTO can help to enforce long-term agreements. The WTO raises the penalty for violating an agreement, increasing C^H to $\hat{C}^H$. H does not deviate when $\hat{C}^H \geq \Omega^H(\tau^N) - \Omega^H(\tau^j)$. There are many channels through which the WTO raises the cost of breaking agreements, such as fostering the development of norms for compliance (Johnston 2002), increasing domestic pressures to adhere to agreements (Gaubatz 1996), and creating incentives to maintain rules that are obeyed by others (Hudec 2002; Jackson 1997; Kovenock and Thursby 1992). Importantly, the WTO also allows H to develop a reputation for compliance by providing transparent, impartial adjudication of disputes. Panels of three judges are selected from other member states, rendering the panelists much more impartial than the parties to the dispute. Third parties may also participate in the dispute, and the verdict is publicly available. Further, the WTO publishes trade policy reviews, collecting and disseminating information regarding states' adherence to their agreements. Reviews are published every two years for the major traders (such as the United States and the European Union), every four years for the second largest traders, and every six years for the smallest traders.[24]

By contrast, in a bilateral context, the cost to deviating from an agreement can be extremely low. The international community has a difficult time both learning about a potential violation and adjudicating between parties. If one country claims a breach has occurred, while another asserts it has not, third parties may have no way to discern the truth. Without an impartial dispute settlement body, it may be unclear which party's claims are correct. In such a case, the only punishment available for a possible infraction may be the penalty one party to the agreement can apply to the other. Bilateral punishments are often minimal, particularly if a large state breaks the terms of an agreement with a small state, as a small state may have great difficulty punishing a large state. Additionally, anticipating that it will not be able to sanction its partner, a small state may fail to accuse a large state of a breach in the first place, such that the international community may not have the opportunity to learn of the possible violation. A multilateral setting is therefore necessary to allow states to develop reputations for compliance with their agreements.

Interviews with United States trade representatives support the contention that reputation plays a key role in the enforcement of WTO agreements. An official with extensive experience in U.S. trade policy explained, "WTO partners think they have a legally secure agreement. If a country disrupts [an agreement], who knows how many the country will disrupt." He

[21] f^{lt} does not enter the constraint because once F signs the agreement, it must play f^{lt} regardless of its investment decision.

[22] One way to think of C^H and C^F is that they capture in reduced form the maximum credible punishments that the countries could enact in a larger, repeated game that is not modeled here.

[23] Similarly, since F receives the same tariff level regardless and deviates to $f = 0$, F does not deviate when $C^F \geq \gamma f^j$.

[24] Many scholars have proposed bilateral solutions to problems of agreement enforceability. However, these solutions are often inadequate to prevent hold-up problems or are unavailable, particularly because the agreements take place between sovereign nations. For example, one state may offer an economic "hostage," or an item of value to serve as collateral in case of an agreement violation. Yet, states may disagree about whether a violation has occurred, and thus whether the hostage can be seized. Additionally, the state offering the hostage may refuse to relinquish it, or a suitable hostage may not exist (Yarbrough and Yarbrough 1986). Although bilateral solutions may help to prevent hold-up problems in some cases, the WTO adds a great deal of additional enforceability.

stated that WTO members' positive reputations are crucial for maintaining open trading relations because members "must have clear rules and expectations or it all falls apart."[25] States fear that if they violate their WTO agreements frequently, others will do the same, which provides strong incentives to abide by their commitments.

The concern for reputation is also evidenced by the United States' push to strengthen the dispute settlement body prior to the creation of the WTO. In the 1980s, the U.S. took many unilateral actions which violated trade agreements, causing partner countries to reduce trade with the U.S. (Elliott and Bayard 1994; Goldstein and Gowa 2002). In response, the U.S. sought to increase the cost of deviating from agreements, leading to the creation of an institution with stronger enforcement capabilities. Unlike the GATT, the WTO disallows states to veto the adoption of a panel or a panel ruling, features an Appellate Body, and imposes strict timetables for adjudication of disputes. The establishment of the WTO was thus a reaction, in part, to the United States' desire to expand trade by shedding its reputation for opportunism (Goldstein and Gowa 2002).

Deriving Testable Hypotheses

The model generates several empirical predictions. The model indicates that when long-term agreements are not enforceable, political hold-up problems occur. However, WTO membership permits the enforcement of long-term agreements, boosting trade and investment for pairs of states that otherwise would suffer from political hold-up problems. The theory therefore suggests the following hypotheses:

Hypothesis 1. *Membership in the WTO increases trade more for pairs of countries with dissimilar capabilities, relative to pairs with similar capabilities*.

The model shows that, in the absence of the WTO, powerful countries have the greatest ability to hold up weak countries. When countries have dissimilar capabilities, two dynamics come into play: First, H can extract more from F in a short-term agreement due to H's large bargaining power, α, providing H with the incentive to hold F up.[26] Second, H's cost of reneging on an agreement, C^H, is low since weak countries experience difficulty retaliating. Therefore, large power disparities create hold-up problems.

Since weak states anticipate large states' attempts to hold them up, they fail to undertake investments that would promote trade with their more powerful partners. Once countries join the WTO, H's cost of deviating from a long-term agreement increases, permitting H to commit to uphold its agreements. In response, weak states invest in the production of goods for trade with H. Thus, WTO membership should increase trade most between powerful and weak states.

Hypothesis 2. *Membership in the WTO increases trade more for nonallied pairs of countries, relative to allied pairs*.

The model also predicts that hold-up problems are more common when H and F's foreign policy interests are more dissimilar. A large γ indicates that F dislikes making the concessions desired by H. F then underinvests in relationship-specific goods, and trade between H and F remains low.[27] Since nonallies have more dissimilar policy preferences, they should underinvest in the absence of the WTO to a greater extent than allies should because nonallies fear being held up by their partners for policy concessions. Since the WTO enforces agreements between nonallies by raising C^H, WTO membership should increase trade more for nonallies than for allies.

Hypothesis 3. *Membership in the WTO increases trade more for pairs of countries with dissimilar regime types, relative to pairs with similar regime types*.

Pairs of states with similar regime types tend to have more similar policy interests, or lower γ, than pairs with dissimilar regime types. Countries worry that partners with dissimilar regimes will hold them up for policy concessions and therefore underinvest in goods for trade with these states. For example, members of the Organization for Economic Cooperation and Development (OECD) have expressed strong ideological commitments to "market economies backed by democratic institutions" (*OECD* 2011), and have used a variety of carrots and sticks to promote similar regime types in partner countries. Withholding or extending trade privileges to encourage policy reforms, such as human rights improvements or democratization, is common and firmly entrenched in many OECD countries' policies, so trading partners with dissimilar regimes may underinvest due to the risk of being held up for these concessions. Since the WTO allows countries to commit not to hold up their partners, I expect WTO membership to boost trade between countries with dissimilar regime types in particular.

An Example: U.S. MFN Designation

The insights generated by the theoretical model can be observed in practice in the trade relations between many pairs of states. Examples of countries holding up asymmetric, nonmember trading partners for political concessions abound. For example, the United States often threatens to raise its tariff levels in order to extract political concessions from non-WTO members. When

[25] Interview by author. February 22, 2012.

[26] The game theoretic literature shows that a key determinant of bargaining power is a party's reputation for toughness (Fudenberg and Tirole 1991). We might expect that countries with greater material capabilities possess such a reputation since they are able to make more credible threats.

[27] This hypothesis comports with Gowa and Mansfield (2004), who argue that allies experience hold-up problems less often than nonallies do, which promotes trade between allies.

the U.S. Congress disapproves of policies enacted by these trading partners, it often offers the renewal of most favored nation (MFN) status in exchange for policy concessions. MFN status entitles countries to nondiscriminatory trade policies such that a country cannot lower tariffs for a partner with MFN status without lowering tariffs for all partners with MFN status.[28] While all WTO members must grant each other MFN status, extending MFN status to non-WTO members is optional. Members of the U.S. Congress have explicitly acknowledged that the renewal of MFN status is a valuable tool to obtain political concessions from non-WTO members. For example, Rep. Loretta Sanchez advocated threatening to revoke MFN status from Vietnam in order to extract human rights concessions, stating, "If we insist that Vietnam improve its human rights record as a condition to trading with America, we would gain human rights advances in Vietnam, so I think it is a tragic mistake for the United States to decline to use this tool that is available to us" (*The Congressional Record* 2001, 14673). As predicted by the model, the U.S. typically has relied on these short-term MFN agreements to govern trade with former Communist countries, which, at the time, were nonallies with dissimilar regime types.[29] Also in line with the theory, there is considerable evidence that the repeated renewal of the agreements discouraged investment (Devereaux, Lawrence, and Watkins 2006) since the U.S. could not commit to refrain from using its MFN policies to hold up its nonmember partners.

As a more detailed illustration, consider the case of U.S.-China trade relations. In 1979, China signed a bilateral trade agreement with the United States, granting China short-term MFN status, which was renewed yearly by the U.S. The fall of the USSR created a unique point in U.S.-Chinese history when the U.S. had considerable leverage over China (Kissinger 2011), such that U.S. bargaining power, α, was large due to several factors: First, the potential impact of raising U.S. tariffs on the Chinese economy was severe, as the U.S. was China's most important export market. No other market was large enough to absorb such a high volume of Chinese goods. Second, China had acquired a diminished strategic importance due to the end of the Cold War (Lilley and Willkie 1994, 127). Policy preference dissimilarity, γ, was also high because the Tiananmen Square incident increased the salience of differences in human rights policy preferences.

Due to this dip in China's power relative to that of the U.S., the U.S. Congress repeatedly threatened China with tariff increases unless China addressed the United States' concerns regarding human rights, weapons proliferation, and trade (Lilley and Willkie 1994, 24). China made many policy concessions in exchange for low U.S. tariffs. Between 1990 and 1993, China released 881 Tiananmen prisoners, lifted martial law, disclosed information on high profile political prisoners, agreed not to export products made with prison labor, allowed the Red Cross to visit prisoners, sent two human rights delegations to the U.S., and gave passports to many families of political exiles (Lilley and Willkie 1994, 86). Investment in China declined over this period (Walmsley, Hertel, and Ianchovichina 2006), suggesting that while the United States' bargaining power, α, and foreign policy preference dissimilarity, γ, were high and while China was not a WTO member, hold-up problems were prevalent. Membership in the WTO was recognized as a means to increase investment in China. U.S. Senator Wellstone argued, "I think the evidence is pretty clear. [Permanent MFN status] will result in...more investment" (*The Congressional Record* 2000, S8676). Indeed, once China joined the WTO, investment and capital stocks grew dramatically (Walmsley, Hertel, and Ianchovichina 2006), as political hold-up problems were likely alleviated.

ESTIMATION STRATEGY

To test whether WTO membership increases trade between country pairs most vulnerable to hold-up problems, I estimate a gravity model of bilateral trade. Because of the multiplicity of methods available to estimate gravity models, I follow Head and Mayer (2013, 2), who "argue against sole reliance on any one method and instead advocate a toolkit approach," as "the methods should be used in concert to establish robustness." I therefore begin my analysis by employing a log-linear gravity model, which is the traditional workhorse model in the trade literature (Goldstein, Rivers, and Tomz 2007; Gowa 1995; Mansfield and Bronson 1997; Mansfield, Milner, and Rosendorff 2000; Rose 2004), before moving on to consider other, more recent models.

Baseline Model

The log-linear gravity model is estimated using OLS with robust standard errors, clustered at the directed dyad level.[30] In my baseline specification, I use year and directed dyad fixed effects, as fixed effects are robust to many types of misspecification and

[28] There are many exceptions to this rule. Under the GATT, exceptions include the following: Article I:2-4 based on Historical Preferences, Article IV(c) for Cinematographic Films, Article XX for General Exceptions such as those relating to morals or the environment, Article XXIV:3 for Frontier Traffic, Article XXIV:5 for FTAs and Customs Unions, Article XXI for Security Exceptions, the 1979 Enabling Clause, and the Marrakesh Agreement Article IX:3 Waiver. Many of these exceptions, such as the security clause, are rarely used, while others, such as the FTA exception, are used frequently. Similar MFN exceptions exist under the General Agreement for Trade in Services (GATS) and Trade-Related Aspects of Intellectual Property Rights (TRIPS).

[29] In 1972, Senator Jackson sponsored a bill known as the "Jackson-Vanik amendment," which blocks MFN status for countries that disallow freedom of emigration. The amendment requires the president to grant yearly MFN waivers to countries disallowing emigration and for Congress to renew MFN agreements every three years. In practice, the amendment has been applied mainly to former Communist countries (Lilley and Willkie 1994, 124).

[30] OLS has many desirable properties, as it provides easily interpretable average effects as the minimum mean square error linear approximation to the conditional expectation function (Angrist and Pischke 2008, 102). However, the results are robust to a variety of alternative specifications, discussed below.

endogeneity concerns. This specification is a reasonable starting point, and allows for comparability with previous work in this area (Dutt and Traca 2010; Eicher and Henn 2011; Goldstein, Rivers, and Tomz 2007; Herz and Wagner 2006; Liu 2009; Rose 2004; Tomz, Goldstein, and Rivers 2007). The data contain 185 countries from 1948 to 2003, resulting in 846,188 directed dyads in the dataset.[31]

The dependent variable, *Log Imports*, is the log of imports of the first country in a pair from the second (in constant 1995 U.S. dollars) and comes from the IMF's "Direction of Trade Statistics."[32] The key independent variables in the analysis include three measures of political dissimilarity and their interactions with WTO membership: First, *Large Power Difference* is an indicator of whether the difference in power between two countries is greater than the median difference in power in the sample.[33] This variable is constructed from the Correlates of War's Composite Index of National Capability (CINC) (Singer 1988), a widely used indicator of power (Geller 1993; Reed et al. 2008), which is derived from six variables: iron and steel production (thousands of tons), military expenditures (thousands of current year U.S. dollars), military personnel (thousands), primary energy consumption (thousands of coal-ton equivalents), total population (thousands), and urban population (population living in cities with population greater than 100,000; in thousands).[34] Second, *Nonallied* is an indicator of joint involvement in a political-military alliance (Leeds et al. 2002), where an alliance is defined as a defense pact, neutrality or nonaggression treaty, or entente agreement. Third, *Dissimilar Regime Types* is an indicator of whether one country in a pair is a democracy while the other is not, using Cheibub, Gandhi and Vreeland (2010)'s coding of democracies.

The hypotheses state that the effects of *Large Power Difference*, *Nonallied*, and *Dissimilar Regime Types* on trade flows depend on whether states are WTO members. Thus, I interact each key independent variable with *Both in WTO*, an indicator of joint WTO membership.[35] I also include *One in WTO*, an indicator of whether only one state in a pair is a WTO member. Since WTO members may hold up nonmember partners, only *Both in WTO* is interacted with the key independent variables. Additionally, countries may trade more with partners that grant them special trading privileges, which is captured by several indicators: *Currency Union* indicates joint membership in a currency union, *RTA* indicates pairs that are part of a regional trade agreement, GSP_i indicates whether an importing country extends tariff preferences to its partner under the Generalized System of Preferences (GSP), and GSP_j indicates whether an exporting country provides its partner with GSP status. Since colonizers often accord special trade privileges to their colonies, I also include an indicator of whether the importer is a *Current Colonizer* of its partner and another indicator of whether the importer is a *Current Colony* of its partner. Finally, for each country, I control for the log of GDP and the log of GDP per capita, denoted Log(GDP) and Log(GDPPC) respectively, measured in logged constant 1995 U.S. dollars.[36]

Table 1 presents strong evidence that the WTO increases trade most for politically dissimilar country pairs. The difference between the percent effects for country pairs with dissimilar capabilities and those with similar capabilities is 215% (column 1), between nonallies and allies is 171% (column 2), and between pairs with dissimilar regime types and those with similar regime types is 83% (column 3). Among non-WTO members, having dissimilar capabilities reduces trade by 39%, while being nonallied depresses trade by 55%.[37] Additionally, the results demonstrate that WTO members trade more on average, along with larger, wealthier countries, and pairs in which one state grants preferential treatment to the other. The model explains over two-thirds of the variation in trade flows, as expected from a gravity model.

Capturing Multilateral Resistance Terms

While the baseline model is a reasonable starting point for the analysis, many scholars have pointed to the importance of capturing the "multilateral-resistance" terms, or country-specific barriers to international trade, as described by Anderson and van Wincoop (2003). Because these terms are likely to vary overtime, I now re-estimate the model including

[31] Note that many countries form or disappear during the period under observation.

[32] Import data were generously supplied by Liu (2009), who supplements Rose (2004)'s widely used trade dataset. Because it is well recognized that dropping observations with zero trade flows creates bias, I specify the dependent variable as $log(imports + 1)$ (McCallum 1995; Raballand 2003). These results are robust to a variety of alternative specifications, discussed below. Summary statistics for all variables are also presented in the Supplemental Appendix.

[33] The results are robust to alternative constructions of this variable, discussed below.

[34] The CINC measure is computed by adding all observations for each of the six capability components each year, converting each state's absolute component to a share of the international system, and averaging across the six components.

[35] In my baseline specifications, I focus on formal members of the WTO. Tomz, Goldstein, and Rivers (2007) note the existence of informal members, as well, which are entitled to the majority of the rights and responsibilities granted to WTO members. However, informal members include colonies, which did not have an independent foreign policy and therefore do not fit the theory, de facto members, who could not access the DSB and thus likely found it difficult to enforce agreements, and provincial members, who only obtained rights from members who agreed to grant them. *Both in WTO* therefore indicates joint formal membership, but I note that the results are robust to the inclusion of informal members.

[36] Some gravity specifications feature the logged product of GDPs in a country pair and the logged product of GDP per capitas in a country pair. These models typically specify the dependent variable as the average of imports and exports for a country pair, and therefore cannot distinguish between the importer and exporter's GDPs and GDP per capitas. Recent scholarship typically recommends against this practice (Baldwin and Taglioni 2006), but in the Online Appendix, I show that the results are robust to this specification.

[37] The effect of having dissimilar regime types is insignificant, but becomes negative and significant in many of the robustness checks presented below.

TABLE 1. Baseline Specification

	1	2	3
Lg Power Diff X WTO	0.649***		
	(0.070)		
Large Power Difference	−0.491***	−0.269***	−0.267***
	(0.071)	(0.065)	(0.065)
Nonallied X WTO		0.676***	
		(0.100)	
Nonallied	−0.427***	−0.806***	−0.421***
	(0.095)	(0.112)	(0.095)
Dissimilar Reg X WTO			0.259***
			(0.054)
Dissimilar Regime Types	0.159***	0.149***	0.042
	(0.032)	(0.032)	(0.040)
Both in WTO	0.858***	0.571***	1.032***
	(0.080)	(0.111)	(0.081)
One in WTO	0.735***	0.717***	0.718***
	(0.063)	(0.063)	(0.063)
Log(GDP)_i	2.007***	1.941***	1.964***
	(0.122)	(0.122)	(0.122)
Log(GDP)_j	2.780***	2.714***	2.735***
	(0.126)	(0.127)	(0.126)
Log(GDPPC)_i	0.055	0.134	0.117
	(0.113)	(0.114)	(0.113)
Log(GDPPC)_j	−0.814***	−0.734***	−0.749***
	(0.119)	(0.119)	(0.119)
RTA	0.484***	0.542***	0.498***
	(0.072)	(0.073)	(0.072)
GSP_i	0.488***	0.468***	0.480***
	(0.085)	(0.084)	(0.085)
GSP_j	0.599***	0.578***	0.590***
	(0.085)	(0.085)	(0.085)
Currency Union	2.173***	2.158***	2.177***
	(0.312)	(0.310)	(0.311)
Current Colony	−0.269	−0.397	−0.363
	(0.573)	(0.565)	(0.569)
Current Colonizer	−0.643	−0.775	−0.737
	(0.779)	(0.767)	(0.773)
Constant	−39.978***	−38.552***	−39.255***
	(1.640)	(1.658)	(1.646)
R-Squared	0.706	0.706	0.706
N	846188	846188	846188

Notes: Estimates from OLS regression. The unit of observation is the directed dyad year and the dependent variable is the natural log of (imports +1). The data cover 1948–2003. Robust standard errors, clustered by directed dyad, appear in parentheses. All models include year and directed dyad fixed effects, which are not shown. "*", "**", and "***" denote $p < 0.05$, $p < 0.01$, and $p < 0.001$, respectively.

importer-year, exporter-year, and directed dyad fixed effects.[38]

The results are similar using this specification, and strongly suggest that the WTO boosts trade for politically dissimilar country pairs in particular. Table 2 shows that the difference between the percent effects for pairs with dissimilar capabilities and those with similar capabilities is 45%, between nonallies and allies is 50%, and between pairs with dissimilar regime types and those with similar regime types is 32%. Outside of the WTO, trade is depressed by 12% for states with dissimilar capabilities, 31% for nonallies, and 11% for states with dissimilar regime types. Interestingly, the difference in the effect of WTO membership between dissimilar and similar country pairs is comparable to the coefficient on joint membership in a RTA.[39]

[38] To implement the regression with high dimensional fixed effects, I use the "reghdfe" procedure developed by Guimaraes, Portugal, and de Portugal (2010). Note that the Guimaraes, Portugal, and de Portugal (2010) algorithm renders other methods for dealing with the computational intensity of including high dimensional fixed effects inadvisable (Head and Mayer 2013).

[39] Note that the coefficient on *RTA*, 0.5, is in line with previous estimates. A meta analysis of 159 gravity models conducted by Head and Mayer (2013) reveals that the mean estimated RTA elasticity is 0.59, and the median is 0.47.

TABLE 2. Directed Dyad and Time-Varying Country Fixed Effects

	1	2	3
Lg Power Diff X WTO	0.440***		
	(0.067)		
Large Power Difference	−0.131	0.038	0.036
	(0.069)	(0.062)	(0.062)
Nonallied X WTO		0.606***	
		(0.101)	
Nonallied	−0.027	−0.370***	−0.029
	(0.098)	(0.111)	(0.098)
Dissimilar Reg X WTO			0.324***
			(0.050)
Dissimilar Regime Types	0.033	0.029	−0.112**
	(0.029)	(0.029)	(0.036)
Both in WTO	−0.200*	−0.508***	−0.131
	(0.079)	(0.117)	(0.077)
RTA	0.503***	0.537***	0.494***
	(0.070)	(0.071)	(0.070)
GSP_i	0.624***	0.598***	0.616***
	(0.118)	(0.118)	(0.118)
GSP_j	0.740***	0.714***	0.732***
	(0.117)	(0.117)	(0.117)
Currency Union	1.903***	1.885***	1.904***
	(0.283)	(0.283)	(0.283)
Current Colony	−0.243	−0.341	−0.295
	(0.686)	(0.690)	(0.689)
Current Colonizer	−0.667	−0.769	−0.719
	(0.657)	(0.655)	(0.657)
N	846188	846188	846188

Notes: Estimates from OLS regression. The unit of observation is the directed dyad year and the dependent variable is the natural log of (imports +1). The data cover 1948–2003. Robust standard errors, clustered by directed dyad, appear in parentheses. All models include directed dyad, importer-year, and exporter-year fixed effects, which are not shown. "*", "**", and "***" denote $p < 0.05$, $p < 0.01$, and $p < 0.001$, respectively.

Incorporating Zero Trade Flows

Although the log-linear gravity model provides easily interpretable estimates of average effects, a common critique is that it may not treat the observations containing zero trade flows adequately, particularly because the results may depend on the units of measurement. The appropriate method to deal with this issue hinges on the process that generates observations of zero trade. I adopt Eaton and Kortum (2001)'s approach, who stipulate that if ideal trade from exporter i to destination market n, X_{ni}, falls below a minimum amount of trade, no trade is observed. For example, zero trade flows may arise due to rounding or reporting thresholds, or due to unobserved costs of trading. The dependent variable is constructed by replacing the observations of zero trade with the minimum X_{ni} for a given n, $\underline{X}_{ni}$, before taking logs.[40] The model is then estimated using interval regression. Head and Mayer (2013), who refer to the model as the "EK Tobit," argue that this model is desirable because it satisfies the following criteria: (1) no exclusion restrictions are required, (2) it has a strong structural interpretation, and (3) in their Monte Carlo simulations, it is preferable to the alternatives under the assumption of log-normal errors.[41]

Using the EK Tobit, I again find results consistent with the theory, as Table 3 shows that the difference between the percent effects for pairs of states with dissimilar capabilities and those with similar capabilities is 14%, between nonallies and allies is 159%, and between pairs with dissimilar regime types and those with similar regime types is 72%.

Robustness Checks

In addition to the results presented above, I demonstrate the robustness of my findings to a variety of alternative empirical specifications. Each robustness check is estimated using the baseline specification, OLS with directed dyad and time-varying country fixed effects, and the EK Tobit. Due to space constraints, the results of the robustness checks are presented in the Supplemental Appendix. In virtually all specifications, my findings remain statistically and substantively significant.

First, a potential concern is that WTO membership may be endogenous, as countries may enter the WTO when they would have increased trade even if they had not joined the institution. However, to explain my findings, countries would have to enter the WTO when they would otherwise have increased trade *with politically dissimilar countries in particular*, which is a more difficult claim to argue. Further, the majority of my specifications include country-pair fixed effects, which many consider to be "the most promising approach" in the absence of an instrumental variable (Head and Mayer 2013, 31). Nonetheless, I perform two additional robustness checks designed to ameliorate this potential issue. I begin by exploiting an exogenous shock to the enforcement of trade agreements. In 1995, the GATT ceased to exist, and was replaced by the WTO. A major difference between the WTO and the GATT is that the WTO features a strengthened dispute settlement body,

[40] Due to the panel structure of the data, I replace zero trade flows with $\underline{X}_{nit}$, where t indicates the year.

[41] Head and Mayer (2013) show that the EK Tobit dominates the similar approach taken by Eaton and Tamura (1995) due to its sound structural interpretation and easier implementation. I follow the specification advocated by Head and Mayer (2013), which includes country and year fixed effects (rather than the directed dyad and year fixed effects used in my baseline model). However, I demonstrate the robustness of the results to the inclusion of directed dyad random effects in the Supplemental Appendix. (Note that a sufficient statistic permitting me to condition the fixed effects out of the likelihood does not exist.) Since dyadic fixed effects are not included, I add additional covariates found in standard gravity models: the *Log(Distance)* between country i and country j, an indicator of a shared *Border* between i and j, an indicator of whether i and j speak the *Same Language*, an indicator of whether i and j share the *Same Religion*, an indicator of whether i was ever a *Colony* of j, an indicator of whether i was ever a *Colonizer* of j, an indicator of whether i and j ever shared a *Common Colonizer*, the number of *Islands* in a pair, and the number of *Landlocked* countries in a pair. This data are from Liu (2009).

TABLE 3. EK Tobit

	1	2	3
Lg Power Diff X WTO	0.072		
	(0.050)		
Large Power Difference	0.080	0.112**	0.110**
	(0.044)	(0.039)	(0.039)
Nonallied X WTO		1.103***	
		(0.075)	
Nonallied	−0.057	−0.591***	−0.056
	(0.056)	(0.068)	(0.056)
Dissimilar Reg X WTO			0.247***
			(0.044)
Dissimilar Regime Types	0.167***	0.142***	0.048
	(0.025)	(0.024)	(0.033)
Both in WTO	0.627***	−0.235**	0.554***
	(0.061)	(0.084)	(0.060)
One in WTO	0.291***	0.343***	0.308***
	(0.048)	(0.048)	(0.048)
$Log(GDP)_i$	1.060***	1.008***	1.045***
	(0.082)	(0.082)	(0.082)
$Log(GDP)_j$	1.191***	1.151***	1.175***
	(0.087)	(0.087)	(0.087)
$Log(GDPPC)_i$	0.727***	0.765***	0.743***
	(0.077)	(0.077)	(0.077)
$Log(GDPPC)_j$	0.768***	0.792***	0.785***
	(0.083)	(0.083)	(0.083)
Log(Distance)	−1.941***	−1.952***	−1.943***
	(0.034)	(0.034)	(0.034)
RTA	0.922***	1.005***	0.925***
	(0.053)	(0.053)	(0.053)
Border	0.311*	0.277	0.312*
	(0.147)	(0.145)	(0.147)
Landlocked	−1.442**	−1.755***	−1.532**
	(0.499)	(0.500)	(0.500)
Islands	−1.218	−1.608*	−1.345
	(0.776)	(0.777)	(0.776)
Same Language	0.788***	0.674***	0.788***
	(0.069)	(0.069)	(0.069)
Same Religion	0.413***	0.388***	0.402***
	(0.039)	(0.039)	(0.039)
Colony	1.585***	1.673***	1.583***
	(0.197)	(0.195)	(0.197)
Colonizer	1.229***	1.311***	1.224***
	(0.214)	(0.213)	(0.214)
Common Colonizer	0.953***	0.966***	0.955***
	(0.061)	(0.061)	(0.061)
Current Colony	1.015*	0.932*	0.995*
	(0.403)	(0.398)	(0.406)
Current Colonizer	0.735	0.657	0.718
	(0.860)	(0.860)	(0.865)
GSP_i	1.747***	1.662***	1.728***
	(0.052)	(0.051)	(0.052)
GSP_j	1.790***	1.700***	1.771***
	(0.054)	(0.054)	(0.054)
Currency Union	1.418***	1.455***	1.432***
	(0.121)	(0.122)	(0.121)
Constant	2.134	4.221*	2.658
	(1.675)	(1.691)	(1.678)
N	843979	843979	843979

Notes: Estimates from interval regression. See text for details. The unit of observation is the directed dyad-year. The data cover 1948–2003. Robust standard errors, clustered by directed dyad, appear in parentheses. All models include year, importer, and exporter fixed effects, which are not shown. "*", "**", and "***" denote $p<0.05$, $p<0.01$, and $p<0.001$ respectively.

as described previously. The WTO's stronger enforcement capability implies that fewer political hold-up problems should occur between members of the WTO than occurred between members of the GATT. Therefore, the establishment of the WTO should increase trade most for those pairs of countries most vulnerable to hold-up problems in the GATT. To test this, I restrict the sample to pairs of states that were WTO members prior to 1990, circumventing possible selection bias. I then estimate the impact of the WTO on trade during the 1990–2000 period, finding confirmation of the theory. As an additional method to deal with endogeneity, I design a simple module of the model and empirics that tries to account for selection effects. I use the theory to identify which variables are important for determining WTO membership and then employ a selection model, substituting the indicator of joint WTO membership with the estimated probability of joint membership.

Next, I demonstrate that the results are not sensitive to the particular measurement of the key independent variables. I first redefine *Large Power Difference* as an indicator of the one-third of dyads with the largest power differences, and then as a continuous, ordinal ranking of power difference.[42] I next use alternative measures of power differences, alliances, and regime dissimilarities. Power differences are measured using differences in total military personnel (Geller 1993; Reed et al. 2008), alliances are measured using Bueno de Mesquita (1975)'s coding of shared security interests,[43] and different regime types are measured using differences in Polity scores.[44] I also provide an additional check which measures political similarity using United Nations voting behavior similarity.[45]

Additionally, the findings do not depend on the specific covariate profile or sample. I ensure that the results are not driven by countries' resource endowments, as I control for *Capital Stock Per Worker* (Heston, Summers, and Aten 2006). I also separate *One in WTO* into *Importer in WTO* and *Exporter in WTO*. I then show that the effects are not due to especially influential dyads by dropping observations for which the residuals are greater than five times the standard deviation, and observations for which the residuals are greater than

[42] I choose an ordinal measure because *Large Power Difference* is highly skewed.

[43] Bueno de Mesquita (1975) measures the similarity of alliance profiles for country pairs.

[44] Polity scores are computed from measures of executive recruitment, constraints on executive authority, and political competition and range from −10 to 10 (Marshall et al. 2004). For ease of comparison with other results, I normalize the scores on a scale from 0 to 1, from least different to most different.

[45] The data come from Strezhnev and Voeten (2012), who provide two measures of *Similarity*. The first measure is scored from −1 to 1, from least to most similar. It is calculated as $1 - 2(d)/dmax$, where d is "the sum of metric distances between votes by dyad members in a given year" and $dmax$ is "the largest possible metric distance for those votes" (Strezhnev and Voeten 2012). The second measure ranges from 0 to 1 and is calculated as the total number of votes in which both states agree, divided by the total number of joint votes. Because many states had not joined the United Nations during the early years of the sample, the model is estimated over the post-1990 time period.

three times the standard deviation. Because the impact of joining the WTO may not occur immediately, I also analyze the model using data sampled at five-year intervals. Further, since the choice of the constant in the dependent variable, $log(imports + 1)$, can impose additional structure on the model, I present results using the following alternative specifications of the dependent variable: $log(imports + .01)$, $log(imports + 10)$, and $log(imports + 100)$.

Finally, I show that the results are not sensitive to the particular method chosen to deal with the presence of zero trade flows. There are many issues to consider with each potential alternative, so the discussion of these models and their results are presented in the Supplemental Appendix due to space constraints.[46]

Causal Mechanism

I have empirically demonstrated that the WTO increases trade most for politically dissimilar country pairs. According to the formal model, the mechanism driving these results is the WTO's ability to enforce long-term contracts, which enables members to solve political hold-up problems. Since WTO members need not worry about potential hold-up problems, they increase their investments in fixed capital such as infrastructure, roads, and factories to produce goods for trade with dissimilar partners in particular. The model therefore suggests two empirical tests of the mechanism. First, since the WTO boosts trade by improving contract enforcement, WTO membership should increase trade in goods that require such contracts. I test this hypothesis using industry-level trade data that varies in contract intensity. Second, I use country-level investment data to demonstrate that WTO membership increases fixed capital investment.

Contract Intensity I first examine the effect of WTO membership on trade in contract-intensive goods. The model is estimated using both OLS with directed dyad-industry and time-varying country fixed effects, and the EK Tobit with industry, year, and country fixed effects, from 1989 to 2000, with robust standard errors clustered at the directed dyad level. The dependent variable, *Log Imports*, denotes the natural log of the value of imports from one country to another in a particular industry, and is bottom-coded for the EK Tobit specification as described above.[47] The key independent variable is a measure of contract intensity interacted with joint WTO membership. Data on the *Contract Intensity* of final goods come from Nunn (2007) and are coded as the proportion of a good's intermediate inputs that are not sold on an organized exchange. Goods sold on an organized exchange have many potential buyers and sellers, and therefore do not require relationship-specific investments. Note that this measure is time-invariant over the sample period, and therefore only the interaction term appears in the regression due to the inclusion of fixed effects for year.[48] As above, I control for Log(GDP), Log(GDPPC), One in WTO, *RTA*, GSP_i, GSP_j, and *Currency Union*.

Table 4 provides strong evidence that WTO members trade more contract-intensive goods. The results are similar in both specifications and indicate that WTO membership increases trade in goods with the highest level of contract intensity by about 19%, while decreasing trade in goods with the lowest level of contract-intensity by about 14%.[49] These results are robust to alternative specifications, shown in the Supplemental Appendix. I demonstrate the robustness of the results to the inclusion of a measure of intra-industry trade, as this variable may be correlated with *Contract Intensity*.[50] Additionally, as predicted by the theory, I show that the WTO increases trade in contract-intensive goods most for pairs of states with dissimilar capabilities, dissimilar regime types, and that are non-allied.

Fixed Capital Investment To test whether WTO membership increases fixed capital investment, I use OLS with year and country fixed effects, with robust standard errors clustered at the country level. The data include 167 countries from 1960 to 2010.[51] The dependent variable is *Log Fixed Capital Investment*, which is measured in logged constant U.S. dollars and includes "outlays on additions to the fixed assets of the economy plus net changes in the level of inventories" (*World Bank* 2011). Unlike ongoing operating expenses, fixed capital investments are sunk costs in physical infrastructure, which are precisely the investments that are most affected by hold-up problems. The key independent variable, *WTO Member*, is an indicator of whether a country is a member of the WTO. Since investment

[46] To account for the possibility that allies and similar regimes engaged in greater levels of trade initially, I interact the treatment variables with import levels in the year prior to the start of the analysis. Conditional on the interaction with prior levels of trade, the WTO continues to boost trade for dissimilar pairs of states in particular. Further, I display the robustness of dropping great powers from the analysis, and I control for similar interests using UN scores and alliance portfolio similarity.

[47] That is, X_{ni} is replaced with $\underline{X}_{ni}$ for a given industry. For industry-level directed dyadic trade data, I use updated data from Feenstra (1996).

[48] The industry-level trade data are classified according to the four-digit Standard International Trade Classification (SITC) Revision 2 system, while the contract intensity data are classified according to the Bureau of Economic Analysis (BEA)'s Input-Output (I-O) system. To match the data, I first convert the four-digit SITC codes into the 10-digit Harmonized System (HS) codes, using the concordance provided by Feenstra (1996). I then convert the 10-digit HS codes into I-O codes using the concordance available from the BEA. The SITC codes do not match perfectly with the I-O codes, however, because the SITC codes are at a higher level of aggregation. To deal with SITC industries that map into multiple I-O industries, I follow Nunn (2007) and choose the I-O industry for which the greatest number of HS industries link the two. If an equal number of links arise, which occurs rarely in the data, I make the choice manually. Thus, each SITC code is mapped onto only one I-O industry.

[49] Calculated using the results in column 1.

[50] As is standard in the literature, I measure intra-industry trade using the Grubel-Loyd index, which is calculated as $1 - (X_i - M_I)/(X_i + M_i)$, where X is exports, M is imports, and i indexes the industry.

[51] Due to missing fixed capital investment data, I am left with 4,327 observations.

TABLE 4. Contract Intensity

	1	2
Contract Intensity X WTO	0.326***	0.365***
	(0.063)	(0.089)
Both in WTO	−0.149***	−0.218
	(0.036)	(0.144)
RTA	0.167**	0.326***
	(0.051)	(0.058)
GSP_i	0.074*	0.293***
	(0.033)	(0.076)
GSP_j	0.051*	−0.093
	(0.029)	(0.051)
Currency Union	0.074	−0.245**
	(0.215)	(0.091)
One in WTO		0.040***
		(0.014)
$Log(GDP_i)$		−0.360
		(0.360)
$Log(GDP_j)$		−0.199
		(0.127)
$Log(GDPPC_i)$		1.948***
		(0.191)
$Log(GDPPC_j)$		1.387***
		(0.158)
Log(Distance)		−0.490***
		(0.060)
Border		0.542***
		(0.107)
Landlocked		−1.682**
		(0.582)
Islands		0.238
		(0.621)
Same Language		0.219***
		(0.063)
Same Religion		0.016
		(0.045)
Colony		0.492***
		(0.087)
Colonizer		0.083
		(0.104)
Common Colonizer		0.086
		(0.061)
N	2896707	2895855

Notes: Column 1 shows estimates from OLS regression. The dependent variable is the natural log of (imports +1). The model includes directed dyad industry, importer-year, and exporter-year fixed effects, which are not shown. Constant is not shown. Column 2 shows estimates from interval regression. The model includes year, importer, exporter, and industry fixed effects. The data cover 1989–2000 and the unit of observation is the directed dyad-industry year. All models include robust standard errors, clustered by directed dyad, which appear in parentheses. Note that the measure of contract intensity is time invariant. "*", "**", and "***" denote $p < 0.05$, $p < 0.01$, and $p < 0.001$, respectively.

may be higher in larger, wealthier economies, I control for Log(GDP) and Log(GDPPC).

The results presented in Table 5 indicate that, as expected, WTO membership increases fixed capital investment by about 21%. I also present the results of several robustness checks in the Supplemental Appendix: First, incentives to invest often depend on the cost of capital. Thus, I demonstrate that the results are robust to the inclusion of the *Real Interest Rate* (*World Bank* 2011), along with other covariates that may affect the investment decision, such as *Economic Growth* (*World Bank* 2011) and an indicator of whether a country is a *Democracy* (Cheibub, Gandhi, and Vreeland 2010). Second, by increasing fixed capital investment, WTO membership should also increase trade in goods that require such investment, particularly between dissimilar country pairs. I therefore show that WTO membership boosts trade in capital-intensive goods between pairs that differ in terms of capabilities, regime types, and alliances.[52]

TABLE 5. Fixed Capital Investment

WTO Member	0.194*
	(0.086)
Log(GDPPC)	0.436**
	(0.164)
Log(GDP)	−0.191*
	(0.077)
Constant	23.958***
	(0.532)
R-Squared	0.975
N	4327

Notes: Estimates from OLS regression. The unit of observation is the country year and the dependent variable is the natural log of fixed capital investment. The data cover 1960–2010. Robust standard errors, clustered by country, appear in parentheses. The model includes year and country fixed effects, which are not shown. "*", "**", and "***" denote $p < 0.05$, $p < 0.01$, and $p < 0.001$, respectively.

CONCLUSION

This paper shows that international institutions can help to solve political hold-up problems by reducing states' abilities to hold up their partners for foreign policy concessions. While scholars have identified a variety of mechanisms through which international institutions encourage cooperation, I generate novel

[52] Note that, in the final robustness check, not all coefficients are estimated precisely, but their signs and magnitudes comport with the theoretical expectation. To construct *Capital Intensity*, I first calculated Balassa's Revealed Comparative Advantage (RCA), or $\omega^i_j = X^i_j/(\sum_{j^i} X^i_j)$ where j^i is the set of goods exported by country i and X^i_j is the export of good j by country i. I use updated export data from Feenstra (1996). Next, capital intensity was computed as $k_j = \sum_{i|} \omega^i_j K^i$ where K^i is the capital stock of country i. To determine capital stock, I obtained a measure of capital stock per worker from Heston, Summers, and Aten (2006) and multiplied it by the number of workers in the country, from *World Bank* (2011). Multiplying by the RCA provided a measure of the revealed capital intensity of each good j.

insights by incorporating the logic of political hold-up problems, which has not been systematically theorized in the international institutions literature. Using the example of the WTO to illustrate the argument, the paper develops a formal model which shows that hold-up problems are most acute for politically dissimilar pairs of states, in which one state has the ability and incentive to extract concessions from its partner. The WTO allows states to solve political hold-up problems by enforcing long-term agreements, increasing trade and investment between states that differ in terms of capabilities, regime types, and alliances. The hypotheses derived from the model are tested using bilateral trade data over a 56-year time span. The empirical analysis strongly supports the theoretical predictions, demonstrating that international institutions can normalize relations between politically asymmetric states.

These findings add to the current understanding of the WTO's benefits. The canonical justification for the existence of the WTO focuses on the WTO's ability to solve a terms-of-trade prisoner's dilemma. This emphasis on economics has led previous researchers to overlook important political benefits of membership: The WTO can decouple economic and political relations by facilitating trade between states that would otherwise face large impediments to economic exchange due to political dissimilarities.

The theoretical framework presented here can also shed light on many additional questions in international relations. Future work might examine the implications of political hold-up problems on other institutions or issue areas, such as the indirect effects of international institutions. This paper shows that the WTO prevents the use of trade policies for political leverage. However, it seems unlikely that states abandon their attempts to wield political influence over their partners. Instead, states may substitute towards the use of alternative, less constrained policies, such as foreign aid or diplomatic tools. Future scholarship may therefore investigate whether, by increasing cooperation in the area it governs, an international institution can politicize other policy areas outside of the institution's domain.

Supplementary Materials

To view supplementary material for this article, please visit http://dx.doi.org/10.1017/S0003055413000646

APPENDIX

Proof of Proposition 1.

I first demonstrate that investment is efficient by considering the first-best solution to the bargaining problem with complete contracts and cash transfers available. The first-best solution maximizes the joint surplus. Countries select the first-best tariff, foreign policy, and investment levels, τ^{fb}, f^{fb}, and i^{fb} such that τ^{fb}, f^{fb}, $i^{fb} = \text{argmax}\ u^H(\tau, f, i) + u^F(\tau, f, i) = \text{argmax}\ i[\Omega^H(\tau) + \Omega^F(\tau)] - i + f - \gamma f$. $f^{fb} = \bar{f}$ if $\gamma \geq 1$, and $f^{fb} = 0$ otherwise. The first-best tariff solves $0 = \Omega^H{}_\tau(\tau) + \Omega^F{}_\tau(\tau)$. By assumption, $\max_\tau\ \Omega^H(\tau) + \Omega^F(\tau) \geq 1$, so investment takes place.

I next demonstrate the threat point of the bargaining problem by characterizing the noncooperative equilibrium. The model is simple to solve. Since neither party is bound by an agreement, each plays its preferred policy. If $i = 0$, F plays $f = 0$ and any value of τ can be supported since no good is produced. Both countries receive a payoff of 0. If $i = 1$, F plays $f = 0$ and H plays $\tau = \tau^N$, which is the Nash tariff level, or the tariff that maximizes H's utility: $\tau^N = \text{argmax}_\tau\ u^H(\tau, f, i) = \Omega^H{}_\tau(\tau)$. In this case, F receives $\Omega^F(\tau^N)$ and H receives $\Omega^H(\tau^N)$. The level of investment undertaken by F maximizes its utility, given that H plays τ^N if F invests, so that F invests if $\Omega^F(\tau^N) - 1 \geq 0$.[53] The threat point for H is $\Omega^H(\tau^N)$ and the threat point for F is $\Omega^F(\tau^N)$.

I now characterize the solution of the short-term bargaining problem. Suppose F has invested. The bargaining problem is

$$\max_{\tau,f}[\Omega^H(\tau) + f\ - \Omega^H(\tau^N)]^\alpha[\Omega^F(\tau) - \gamma f\ - \Omega^F(\tau^N)]^{1-\alpha}.$$

Differentiating with respect to f, the first-order condition is

$$\begin{aligned}&\alpha[\Omega^H(\tau) + f\ - \Omega^H(\tau^N)]^{\alpha-1}[\Omega^F(\tau) - \gamma f\ - \Omega^F(\tau^N)]^{1-\alpha}\\ &\quad - \gamma(1-\alpha)[\Omega^F(\tau) - \gamma f\ - \Omega^F(\tau^N)]^{-\alpha}\\ &\quad \times [\Omega^H(\tau) + f\ - \Omega^H(\tau^N)]^\alpha = 0.\end{aligned}$$

Differentiating with respect to τ, the first-order condition is

$$\begin{aligned}&\alpha[\Omega^H(\tau) + f\ - \Omega^H(\tau^N)]^{\alpha-1}\Omega^H_\tau(\tau)[\Omega^F(\tau) - \gamma f\ - \Omega^F(\tau^N)]^{1-\alpha}\\ &\quad + (1-\alpha)[\Omega^F(\tau) - \gamma f\ - \Omega^F(\tau^N)]^{-\alpha}\Omega^F_\tau(\tau)\\ &\quad \times [\Omega^H(\tau) + f\ - \Omega^H(\tau^N)]^\alpha = 0.\end{aligned}$$

With two equations and two unknowns, an expression for τ^{st} and f^{st}, the solution to the short-term bargaining problem, can be found. Combining first-order conditions,

$$\frac{-\Omega^H_\tau(\tau)}{\Omega^F_\tau(\tau)} = \frac{1}{\gamma}. \tag{1}$$

Rearranging equation (1), it is apparent that with short-term agreements, $-\frac{\Omega^F_\tau(\tau)}{\gamma} = \Omega^H_\tau(\tau)$, rather than $0 = \Omega^H{}_\tau(\tau)$ as in the no trade agreements case. $-\frac{\Omega^F_\tau(\tau)}{\gamma}$ is weakly positive since F has negative marginal utility with respect to the tariff and since γ is positive, so $\tau^{st} \leq \tau^N$. By inserting τ^{st} back in to the derivative, f^{st} can be solved for

$$f^{st} = \frac{\alpha}{\gamma}[\Omega^F(\tau^{st}) - \Omega^F(\tau^N)] - (1-\alpha)[\Omega^H(\tau^{st}) - \Omega^H(\tau^N)]. \tag{2}$$

Hold-up problems still occur if $\Omega^F(\tau^{st}) - \gamma f^{st} - 1 < 0$, as $i = 0$, whereas in the first-best case, $i = 1$.[54] Examining the equation for f^{st}, it is clear that f^{st} increases as α increases. Since α is continuous from 0 to 1, when H's bargaining power is sufficiently large, hold-up problems occur.

[53] Note that when F's utility from selling g is very low, investment is inefficient. This does not represent a hold-up problem, because the first-best solution would then include $i = 0$. However, I have assumed that $i = 1$ in the first-best scenario, so this situation never occurs.

[54] There are many parameter values for which $i = 1$ in the first-best case, and $i = 0$ in the short-term agreement case. This occurs any time $\Omega(\tau^{fb}) \geq 1 + f^{fb}$ and $\Omega(\tau^{st}) < 1 + f^{st}$.

Proof of Proposition 2. As shown in the proof of Proposition 1, a hold-up problem occurs when $\Omega^F(\tau^{st}) - \gamma f^{st} - 1 < 0$. Substituting for f^{st} and simplifying:

$$\Omega^F(\tau^{st}) - \{\alpha[\Omega^F(\tau^{st}) - \Omega^F(\tau^N)] - \gamma(1-\alpha) \times [\Omega^H(\tau^{st}) - \Omega^H(\tau^N)]\} - 1 < 0. \quad \textbf{(3)}$$

Examining equation (1), it is clear that as γ increases, τ^{st} increases, so the first term in equation (3) is decreasing in γ. Because H derives less utility under the short-term tariff than under the Nash tariff, the third term in equation (3) is negative, and is therefore decreasing in γ. Thus, for sufficiently high γ, or when there are large differences in H's and F's foreign policy preferences, hold-up problems occur.

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