

Environmental Regulation in the Shadow of International Trade Law: A Principal-Agent Analysis*

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ABSTRACT

While environmental regulations can serve a valuable societal purpose, they also enable hidden protectionism. I analyze a principal-agent model of environmental regulation wherein citizens are the uninformed principal and government is the informed agent. In the model, import competitors may acquire protectionist benefits from stringent environmental regulations because foreign imports could potentially cause environmental damage. The analysis shows that while international trade law can constrain environmental regulations, it can also sometimes increase the level of environmental regulation if the citizens are sufficiently worried about the effect of protectionism on consumer prices. Additionally, international trade law will be beneficial to the citizens whenever it does not invalidate too many environmental regulations.

Keywords: Environmental regulation; international trade; international institutions; principal-agent models; democratic accountability.

JEL Code: D82, F55, Q58.

* A previous version of this manuscript was presented on April 26, 2010 at University of Pittsburgh for the Globalization and Natural Resources conference. In addition to the conference participants I thank Cassie Grafstrom, Thomas Hale, Daniel Kono, Yotam Margalit, Peter Rosendorff, Christina Schneider, Alasdair Young, two anonymous reviewers, and the editor of *Strategic Behavior and the Environment* for comments and advice.

INTRODUCTION

Environmental regulations reduce negative externalities, such as air pollution. However, many environmental regulations are also product or process standards that apply to imports (DeSombre, 1995; Vogel, 1995). While improving environmental quality, they protect domestic industries from foreign competition as quality non-tariff barriers to trade (Bhagwati, 2000; Kono, 2006).

The literature has debated the effect of international trade law on environmental regulation. Free traders worry that if governments can freely enact environmental regulations that apply to foreign imports, they use environmental regulations to protect import-competing special interests (Bhagwati, 2000; Biermann, 2001; Subramanian, 1992). For instance, wrote Krueger (1999, p. 914) in anticipation of the Doha Development Round, “[p]erhaps the issue that should be of greatest concern to developing countries is the push currently under way in some developed countries to achieve labour or environmental standards enforceable through the WTO.” Indeed, survey research by Henson and Loader (2001) shows that many developing countries consider sanitary and phytosanitary standards the most important impediment to agricultural exports to industrialized countries.¹

In contrast, environmentalists worry about the possibility that international trade law prevents badly needed environmental regulations. Eckersley (2004, p. 26) claims that the WTO “does serve to cramp the scope and operation” of multilateral environmental agreements. She calls this effect the “big chill,” as states refrain from international environmental cooperation because they fear sanctions under international trade law. Both Conca (2000) and Neumayer (2001) concur that international trade law threatens to cause a regulatory chill. These concerns are sometimes raised in conjunction with other objections to globalization and liberalization, as emblematic of “disciplinary neoliberalism” that deprives states of their regulatory sovereignty (Gill, 1995).

I construct a principal-agent model of environmental regulation in the shadow of international trade law. Citizens consume an imported good that could produce domestic or altruistic negative externalities, such as rainforest destruction or dolphin deaths. A government has relevant information about the magnitude of these negative externalities. In addition to worrying about negative externalities and consumer prices, the government also prefers to protect import competitors in exchange for political support, such as campaign contributions and voter mobilization (Grossman and Helpman, 2001; Peltzman, 1976; Stigler, 1971; Urpelainen, 2011). If international trade law applies, an international dispute resolution mechanism allows the exporter to litigate environmental regulation enacted by the government.

¹ Theoretically, stringent regulatory standards are harmful for developing country producers when their ability to comply with them is limited. This increases the cost of exporting and therefore raises a barrier to trade. Empirically, Henson and Loader (2001) analyze a survey of 65 developing countries implemented in April 1999. On a 1–5 Likert scale, with 1 presenting a “very significant” barrier to trade and 5 presenting a “very insignificant” barrier to trade, they find that sanitary and phytosanitary standards obtain the lowest mean of all policy instruments, namely 2.1. Of course, for some products and countries, this may not be the case.

Empirically, the model can be applied when two primary scope conditions are met. First, import-competing special interests must benefit from stringent environmental regulations. This condition holds when foreign competitors use relatively basic production technologies. For example, it could be applied to agricultural or manufacturing trade between wealthy industrialized and poor developing countries (Henson and Loader, 2001; Kono, 2006; Urpelainen, 2010). Second, the probability that foreign imports cause environmental damage must not be negligible. This condition applies to many activities from mining to forestry and heavy industries (Giljum and Eisenmenger, 2004). Again, North-South appears a primary candidate for applying the model.

The model has two new elements that drive the central analytical results. First, I model the dual uncertainty surrounding both the negative externality and the government's sensitivity to the demands of import competitors. Previous literature has focused either on the environment or protectionism (Bagwell and Staiger, 2005; Eckersley, 2004; Mansfield *et al.*, 2002). Second, I incorporate political delegation by allowing the citizens to authorize or prevent the government from banning imported goods. Previous research assumes that the government simply aggregates societal preferences on environmental regulation (Kelemen, 2001; Limão, 2005), but modern constitutional democracies also enable constitutional and other constraints on the government's regulatory authority (Keohane *et al.*, 2009; Maskin and Tirole, 2004).

The effect of international trade law on domestic environmental regulation is contingent. Suppose citizens believe their government does not heed to the protectionist demands of import-competing special interests. This means the citizens trust their government's choice of environmental regulation, *regardless* of international trade institutions. With or without international trade institutions, the government is free to select environmental regulations. Therefore, the additional constraint imposed by international trade institutions *reduces* domestic environmental regulation.

Suppose instead that citizens worry about their government's sensitivity to the demands of import-competing special interests. If this concern is serious enough, but the citizens also value environmental protection, international trade institutions can be pivotal. Without international trade institutions, citizens do not trust their government. Thus, they prefer to constrain the government's regulatory authority. However, international trade institutions can prevent the government from spurious environmental regulations that do little for the environment but discriminate against foreign producers, and thus raise consumer prices. Consequently, citizens believe that the government's ability to implement environmentally ineffective policies for protectionist purposes is limited. They increase the government's regulatory authority relative to the case without international trade institutions, and the level of domestic environmental regulation increases.

Although I cast the argument in the context of environmental regulation, it applies to a wide range of regulatory policies, such as consumer safety and health standards. The results show how international institutions can help states simultaneously to solve seemingly intractable problems, contravening the conventional wisdom on inevitable tradeoffs between liberalization and regulatory sovereignty (Bagwell and Staiger, 2001; Conca, 2000; Eckersley, 2004).

THEORETICAL AND EMPIRICAL CONTEXT

Some environmental regulations, such as zoning requirements or environmental impact assessment criteria, have few effects on international trade. However, many important environmental regulations are product or process standards that often increase the cost of imported goods. For brevity, I refer to “environmental regulations” throughout, with the understanding that they apply to imports. My definition of environmental regulations is otherwise broad, so it also subsumes sanitary and phytosanitary standards.

Environmental protection under international trade law is complex because the true motivation behind any given regulatory policy is difficult to evaluate. In contrast to tariffs and quotas, it is hard to provide evidence of protectionism or lack thereof. International lawyers can perhaps challenge some environmental regulations because there are less distortionary alternatives. But often an environmental regulation does not explicitly discriminate against foreign producers, yet the compliance cost is conveniently higher for foreign competitors (Neumayer, 2001; Vogel, 1995). Such environmental regulations could both improve environmental quality and benefit import-competing special interests, so should they be upheld or invalidated under international trade law? The problem is particularly important now that multilateral trade negotiations focus on non-tariff barriers to trade (Blackhurst, 1981; Jackson, 1992).

Citizens do not usually have enough information to evaluate the merits of alternative environmental regulations (Lupia and McCubbins, 1998). Referring specifically to trade and the environment, Kono (2006, p. 370) writes that citizens have “neither the time nor the expertise for such evaluations.” If they had the requisite information, they could punish a government for catering to special interests — and thus increasing consumer prices — while rewarding it for preserving environmental quality. But most citizens are uninformed, so few democracies use referenda or other forms of direct democracy to enact environmental regulations.

To appreciate these difficulties, consider trade in genetically modified organisms. The European Union and many countries have imposed restrictions on agricultural products that are based on genetic modification (Bernauer, 2003; Pollack and Shaffer, 2009). Such restrictions present a dilemma for consumers. On the one hand, these restrictions could increase food prices if genetic modification reduces production costs. On the other hand, genetic modification could have unanticipated health or environmental effects.

Businesses, such as exporters, often combat costly environmental regulations (Brickman *et al.*, 1985; Henson and Loader, 2001; Vogel, 2003). This practice does not generally clash with international trade law, however, as the WTO does not require that countries maintain regulations. Thus, in this paper I focus only on instances wherein import competitors demand new regulations. This focus can be thought of as the central scope condition for applications of the model.

Although the WTO may be biased toward free trade, it appears to at least try to balance between toothless and overly aggressive interpretation of international trade law on environmental regulations (Neumayer, 2004). The multilateral trade regime gained a notorious reputation in the *Tuna Dolphin* case (1991), the first major dispute resolution case on environmental regulation. The dispute settlement panel invalidated an American

important ban on tuna products that result in dolphin deaths (DeSombre and Barkin, 2002). However, the United States did not comply with the regulation due to a strong negative reaction by the public (Kelemen, 2001). Recently, many scholars have argued that the WTO has improved its environmental credentials (DeSombre and Barkin, 2002; Frankel, 2008; Thomas, 2009; Young, 2005). In the *Shrimp Turtle* case (1999), the United States promptly revised environmental regulations that banned imports of shrimp caught using techniques killing sea turtles after an unfavorable ruling, and the Appellate Body declared that the revised regulations were in compliance with international trade. In *Retreated Tyres* (2007), a dispute resolution panel upheld a Brazilian import ban on retreated tyres (Thomas, 2009, p. 55).

The scholarly debate focuses almost exclusively on the *magnitude* of the effect of international trade law on environmental regulation. Both free traders and environmentalists seem to agree that international trade law reduces environmental regulation, either as a deterrent or by actually invalidating illegal policies (Bhagwati, 2000; Conca, 2000; Eckersley, 2004; Esty, 2001; Humphreys, 2006; Krueger, 1999). The underlying logic is that a democratic government aggregates preferences, benevolently or not, and enacts environmental regulations accordingly. If some environmental regulations violate international trade law, a government is less inclined toward implementing them. This approach omits the interaction between the obfuscation problem and democratic accountability. If citizens can choose what competencies a democratic government has to enact environmental regulation, either through formal constitutional restrictions or through electoral incentives, they can increase or decrease the political costs and benefits of enacting environmental regulation.

To address this problem, I develop a theory that relies on two key assumptions. First, I assume citizens recognize the need for some environmental regulation but also worry that the government could use it as a smokescreen to cater to special interests. In other words, citizens are concerned both about environmental quality and the effect of regulation on consumer prices. All environmental regulations have potential to increase consumer prices, but some of them do so while producing offsetting environmental benefits. Second, I assume citizens believe international trade institutions perform a useful function in combating protectionism. Citizens worry about increased consumer prices due to trade protection, so they prefer that international trade institutions constrain their own government's ability to offer such protection (Mansfield *et al.*, 2002).

MODELING DOMESTIC ENVIRONMENTAL REGULATION

A single democratic country imports a single indivisible good. A continuum of citizens *cum* consumers value the good, but it produces a negative externality through production or consumption, such as dolphin deaths or toxic waste, and the exact cost is unknown (Melser and Robertson, 2005). The government knows the magnitude of this negative externality, but unfortunately it also values profits to import-competing special interests (Grossman and Helpman, 2001).

As indicated in the introduction, the basic scope conditions of the theory are that (i) import competitors may acquire protectionist benefits from stringent environmental regulations and (ii) foreign imports could cause environmental destruction. These conditions may not apply to trade in services between industrialized countries, but they seem appropriate for North–South trade in agricultural or manufactured goods.

The model focuses specifically on imports. In general, domestic regulations also create rents and give rise to lobbying (Oye and Maxwell, 1994; Stigler, 1972). While most key assumptions of the model apply to domestic regulation as well, the model does not allow for lobbying by the victims of discriminatory regulation. This is plausible in the context of international trade but less so for domestic regulation.

Model

The sequence of moves is as follows. First, all citizens simultaneously vote on whether the government can ban the imported good. Second, if the government can ban the imported good, it chooses whether to do so. Finally, if the government cannot or does not ban the good, each citizen chooses whether to purchase it or not.

Intuitively, the citizens vote on how much discretion the government should have in regulating imports. If the citizens believe the government abuses discretion to serve special interests, they should severely punish the government for enacting policies. If the citizens believe the government worries about the negative externality, they should permit the ban. This interpretation accords with the idea that the defining feature of democratic politics is electoral accountability. Under uncertainty, the citizens cannot punish the government based on its true intentions, so they must use their prior information to give proper incentives to the government (Fox and Shotts, 2009; Kono, 2006).

In reality, all democratic governments have some regulatory authority, so the cost of regulation to the government is a question of degree. However, the results do *not* depend on the assumption that the citizens can or must categorically proscribe regulation. All that is needed is that the citizens can somehow punish the government for regulation. I use the binary formulation only to reduce notation.

Similarly, it is not necessary that most citizens' primary criterion for judging their government's performance is environmental policy. As long as some voters are interested in environmental regulation, the government has an incentive to tailor regulations to popular demand. Indeed, there is empirical evidence for this contention. List and Sturm (2006) show that in the United States, "green" voters' preferences significantly influence environmental regulations under political competition. Under proportional electoral systems, this effect is often even stronger because environmentalists can form green parties. In Germany, the electoral success of the Greens allowed them to promote policies for renewable energy deployment (Jacobsson and Lauber, 2006; Lipp, 2007). More generally, Bernauer and Koubi (2009) find that green parties have improved air quality in 42 countries during the 1971–1996 period.

There are several mechanisms through which citizens can constrain the regulatory authority of the government. Consider constitutional checks and balances (Maskin and Tirole, 2004). In the United States, all major federal environmental legislation must be

approved by the House and the Senate. These bodies can also try to prevent the executive from regulating the environment, as the attempt by Senator Lisa Murkowski in early 2010 to prevent the EPA from implementing this regulation shows.² Such checks and balances mean that it is difficult for any particular wing of the government to enact environmental regulations. If these checks and balances were relaxed for environmental regulations, this would be interpreted as increased regulatory discretion.

The stringency of the constitutional constraints on environmental regulation in the United States also depends on the interpretation of the Constitution. Clause 3 of Section 8 of the Constitution states that the Congress shall have power “to regulate commerce with foreign nations, and among several states, and with the Indian tribes.” In essence, this clause provides a legal foundation for federal import bans. However, the description does not clearly define commerce, so the Supreme Court enjoys considerable leeway in the interpretation of the federal government’s regulatory authority in environmental affairs. For example, in recent years some legal scholars have noted that the increasingly conservative Supreme Court has given precedents that in effect curtail the federal government’s ability to enact environmental regulations (Crusto, 1998–1999). The Supreme Court’s ability to interpret the Constitution gives the Congress, and therefore indirectly the American public, an opportunity to constrain the executive’s ability to enact import bans through the selection of judges. The Supreme Court can distinguish between environmental and other regulations, so it can tailor constraints on executive authority to the specific case of environmental regulation.

In other countries, institutional constraints on environmental regulation also exist. For example, the German Basic Law imposes specific limitations on environmental regulators’ authority (Lange, 1999). German citizens and legislators can use it to change the government’s ability to enact environmental regulations. Currently, the Germany government’s ability to enact environmental regulations also depends on the precautionary principle. Already in 1978, the German Federal Administrative Tribunal argued that precaution is an essential element of environmental regulation (de Sadeleer, 2000, p. 145). By increasing or decreasing the salience of precaution in basic environmental law, German legislators can increase or decrease the government’s ability to enact environmental regulations in the long run.

Given the important role of uncertainty in the model, it is useful to lay out the informational scope conditions in a precise fashion. First, the model requires that citizens have enough political interest and information to punish the government for what they consider bad behavior. Second, the model requires that citizens do not have accurate information about the environmental benefits and consumer price effects of environmental regulations. These conditions are met if the citizens are politically savvy but not willing to pay the cost of information collection (Lupia and McCubbins, 1998).

To reduce notation, I assume the citizens have identical preferences. This simplifying assumption is not fully realistic, but all results hold even if the citizens hold heterogeneous preferences, as long as sufficiently many are genuinely concerned about the environment

² “Senator Murkowski Aims to Stop EPA Carbon Controls.” *Reuters* January 21, 2010.

and consumer prices. The citizens value consumption and detest the negative effect, so the payoff function for any given citizen is given by

$$I = \begin{cases} c - s \cdot n & | \mathbf{p} = 1 \\ -s \cdot n & | \mathbf{p} = 0 \end{cases}, \quad (1)$$

where $c > 0$ denotes the consumption value of the imported good, $n > 0$ denotes the unit cost of the negative externality, and $s \in [0, 1]$ denotes the proportion of citizens that purchase the good. A single consumer's decision to purchase the good has a negligible effect on the negative externality. For instance, a single can of tuna hardly causes any dolphin deaths, but one million cans could cause many. This assumption simplifies the analysis, but all results hold even if the negative effect is fully internalized by all citizens, as long as it is uncertain. Consequently, the results apply equally to altruistic environmental regulation, such as rainforest conservation, and harmful consumption effects, such as pesticides.³ Let $\mathbf{p} = 1$ if there is no ban and the citizen in focus purchases the good and $\mathbf{p} = 0$ otherwise. Under complete information, a ban is preferred by the citizens if and only if $c \geq n$.

The government has otherwise identical preferences, but it also assigns value to special interests in expectation of political support, such as campaign contributions or endorsements (Grossman and Helpman, 1996, 2001). This formulation accords with Peltzman's (1976) theory of regulation: governments balance the demands of rent-seeking special interests (import competitors) and the broader population (consumers of imported goods). The payoff function is thus

$$G = \begin{cases} s \cdot (c - n) + (1 - s) \cdot \pi & | \mathbf{p} = 1 \\ \pi & | \mathbf{p} = 0 \end{cases}, \quad (2)$$

where $\pi > 0$ denotes profits to the special interests. If the citizens do not purchase the imported good, they choose a domestic "safe choice" supplied by import-competing industries. As the proportion of consumers that purchase the good increases, profits to special interests grow. By banning the imported good, the government can maximize these profits.

Neither the citizen's payoff I nor the government's payoff G is common knowledge, but the prior probability distributions are commonly known:

1. The consumption value c is drawn from a continuously differentiable prior probability distribution $C(c)$ on the real line.
2. The negative effect n and the profits π are drawn from a continuously differentiable joint prior probability distribution $F(\pi, n)$ on pairs of non-negative real numbers.

Nature reveals the value c to the citizen and the pair (n, π) to the government. Both are revealed only after the citizen has chosen the set of policy instruments available to the

³ For a discussion, see Bhagwati (2000).

government. Intuitively, the set of policy instruments available to the government are chosen for the long term while the decision to ban any particular import is made for the short term. Let ρ denote the probability measure and E the expectation operator.

The randomly determined elements of the pair (n, π) could be correlated or independent. The results hold in the difficult case of environmental regulations that must discriminate to be efficacious, but also in the easy case of environmental regulations that need not discriminate to be effective. The main results would also hold if only one of these elements were subject to uncertainty, but for realism I assume both are probabilistic.

Why cannot the citizens obtain accurate information on the pair (n, π) ? I assume that the prior probability distribution contains all information available to the citizens. Importantly, the cost of information acquisition is the only justification for the existence of the government. The government is potentially useful because it uses to protect the citizens of a society. Under complete information, the citizens could instead vote on the ban without any government discretion (Maskin and Tirole, 2004).

The model can be generalized by adding a noisy signal about the effect of environmental regulation that the citizens observe, perhaps because environmentalists or economists discuss it in public (Lupia and McCubbins, 2000; Milner, 1997). The citizens could condition their support for the government on the signal, so democratic accountability improves. Adding another layer of complexity does not generate new substantive results, however, so it is better to use the simpler model.

Why should the government not learn the value of the consumption value c ? A basic premise of information economics is that individuals are usually better informed regarding their own preferences than the government (Farrell, 1987; Hayek, 1945). Thus, it seems plausible to assume that it would be hard for the government to fully aggregate the preferences of the society without any errors.

Equilibrium

I employ the perfect Bayesian equilibrium in weakly undominated strategies. The citizens first choose the set of policy instruments available to the government based on prior information and the equilibrium response of the government. In weakly undominated strategies, voting will be sincere. If the government can ban the good, it does so depending on the values (n, π) . Finally, each citizen decides whether to purchase the good if it is available.

The model can be solved backwards. First, I solve for the consumption decision with and without a ban. Second, I solve for the choice of the government if it can ban the good. Finally, I compare the expected payoffs to the citizens. The game has a unique equilibrium outside a set of measure zero.

Each citizen must choose based on its prior information and the revealed consumption value c . She rationally discounts the negative externality and thus purchases the good if and only if

$$c \geq 0. \quad (3)$$

This determines a unique cutoff strategy. The negative effect n does not enter this decision because the effect of any individual citizen's consumption decision is negligible.

The citizens are identical, so the proportion of citizens that purchase the good must be either $s = 0$ or $s = 1$.

Suppose now the citizens authorize the government to ban the good. Given that the government does not know the consumption value c , it assigns a probability $\rho(c \geq 0)$ on the citizen purchasing the good if there is no ban. The ban is profitable to the government if and only if

$$\pi \geq E(c \mid c \geq 0) - n. \quad (4)$$

This expression identifies a unique cutoff $k^* = \pi + n$ for the government. Given the decision rule that the consumer uses, the government bans the good if and only if the sum of special-interest profits π and the negative externality n exceeds the loss of consumption value in expectation.

The citizens allow the ban if and only if the expected value without the possibility of a ban

$$\rho(c \geq 0) \cdot E(c - n \mid c \geq 0) \quad (5)$$

does not exceed the expected value with the possibility of a ban

$$\rho(\pi + n < k^*) \cdot \rho(c \geq 0) \cdot E(c - n \mid \pi + n < k^*, c \geq 0). \quad (6)$$

The ban prevents consumption when $\pi + n \geq k^*$. The expected effect is harmful to the citizen if this condition is usually met so that n is low while π is high, and beneficial otherwise.

The unique equilibrium of the game can now be summarized as follows. First, the citizen uses the zero cutoff $c \geq 0$ for purchasing the good. If the government is allowed to enact the ban, it uses the cutoff k^* for the sum of profits to special interests if the citizen does not purchase the good and the negative externality. The citizen thus permits the ban if and only if the possibility of a ban increases its expected payoff.

What remains is to characterize the conditions under which the citizen prefers to give the government free hands. The analytical challenge is to obtain a precise enough characterization for general probability distributions.⁴

Proposition 1 *The citizen allows (not) a ban if the expectation of the negative effect $E(n)$ is high (low) enough and the expectation of the special-interest profits $E(\pi)$ is low (high) enough.*

The ban is useful because it solves the free-rider problem, but harmful if it allows the government to cater to special interests. When the negative effect is small enough or special-interest profits are important for the government, government intervention is unambiguously harmful. In these circumstances, the government rarely imposes bans to remove negative externalities, but it imposes many bans to cater to special interests. Thus, the loss of consumption value exceeds the benefit of reduced negative externalities. If the expected cost of the negative effect is high enough and the government relatively benefit instead, the citizen authorizes the ban.

⁴ All proofs are given in a mathematical appendix.

MODELING THE SHADOW OF INTERNATIONAL TRADE LAW

I model the effect of international trade law by allowing an exporting country to adjudicate a ban by the government using an international dispute resolution mechanism, such as the Dispute Settlement Understanding of the WTO. The exporting country does so if the ban is discriminatory and not based on a negative externality.

Model

Consider the previous model but suppose the exporting country is also an active player that makes strictly positive profits if the citizen purchases the good. Without loss of generality, the exporting country moves in the model only if the government has enacted a ban. In that case, it can challenge the ban. If it does not act, the ban stands. If it acts, a dispute resolution mechanism decides whether the ban is lifted so that the citizen can purchase the good.

International dispute resolution is a complex bargaining process (Reinhardt, 2001; Rosendorff, 2005). The outcome is probabilistic and usually results in an informal settlement or even additional bargaining (Busch and Reinhardt, 2003; Gilligan *et al.*, 2010; Hudec, 1993; Reinhardt, 2001). To simplify, I omit these considerations and assume that both the exporting country and the dispute resolution mechanism learn the true negative externality n and special-interest profits π at a low enough cost $\varepsilon \rightarrow 0$.

This information structure endows the dispute resolution mechanism with impressive capabilities. In reality, both the negative effect and the special-interest profits are imperfectly observable to all concerned parties (Kono, 2006; Neumayer, 2001; Reinhardt, 2001). In particular, it may be difficult for the dispute resolution mechanism to observe the value of political contributions to the government. Thus, while it may easily learn the value of n , the cost of observing the value of π may be high (Downs and Rocke, 1995; Rosendorff, 2005). My simplifying assumption is not necessary for the results, however, as long as the dispute resolution mechanism has an informational advantage over the citizens. For example, the main results would hold even if the dispute resolution mechanism only learns the value of n .

The dispute resolution mechanism is calibrated to remove the ban if and only if the negative effect n is low but special-interest profits π are high. A low negative effect implies that the ban is not environmentally justified while high special-interest profits π imply that it is discriminatory, as high profits are otherwise impossible in a competitive market economy. In other words, I assume the dispute resolution mechanism (i) rewards environmental benefits and (ii) imposes a penalty for discriminatory economic effects. This rule seems appropriate because it incorporates both economic and environmental criteria, as the WTO also does in reality. The dispute resolution mechanism balances environmental and economic goals, and rejects environmental regulations if the environmental benefits are not substantial enough to warrant the harm caused to foreign exporters is. Formally, if $\pi - n \geq m^*$ and the exporting country challenges the ban, the dispute resolution mechanism removes it so that the citizen can purchase the good. Thus, the cutoff m^* tells us how demanding international trade law is. If m^*

is high, large environmental benefits are required to justify even minor discrimination against foreign exporters. If m^* is low, international trade law is cautious and generally upholds environmental regulations unless their discriminatory effects clearly dominate the environmental benefits.

To illustrate the role of international trade institutions, consider disputes concerning environmental regulations in the GATT/WTO and the European Community. Kelemen (2001) shows that in such cases, legal rulings have upheld environmental regulations whenever these regulations are compatible with international trade law and invalidating them would create a domestic political backlash in the violating country. Assuming that domestic political backlash is more likely if the environmental regulation produces tangible environmental benefits, and therefore garners the support of environmental lobby groups, the two principles that Kelemen (2001) identifies loosely correspond to the cutoff rule assumed here.

Compliance with international trade agreements is inevitably imperfect (Bechtel and Tosun, 2009; Gilligan *et al.*, 2010; Rosendorff, 2005). Thus, I assume that with prior probability $\lambda \in (0, 1)$, the dispute resolution mechanism fails to remove the ban. For example, the government may choose not to comply because it believes that retaliation by exporters will not be forthcoming. Formally, if $\pi - n \geq m^*$ and the government attempts to enact a ban, it succeeds with probability $1 - \lambda$. Otherwise there is no ban. The probability of success may, for example, depend on the effectiveness of retaliation (Mercurio, 2009; Guzman and Simmons, 2005), the mechanism's ability to provide information to voters (Mansfield *et al.*, 2002), or environmental interest groups' response to the ruling (DeSombre and Barkin, 2002; Kelemen, 2001). Since the probability of successful enforcement may range from arbitrarily small to arbitrarily large, the formulation is fully general.

Is there any reason to believe that international institutions in particular may prove useful in this regard? Two factors weaken the ability of an independent *domestic* authority to replace international trade institutions as an effective arbitrator and judge. First, in trade issues, there may be few domestic constituencies with an active interest in resisting protectionist environmental regulations. By contrast, foreign exporters have a direct interest in helping a dispute resolution mechanism to constraint protectionism (Dai, 2002). Second, protectionist special interests may exert influence to prevent the government from creating an effective domestic authority (Becker, 1983; Peltzman, 1976; Stigler, 1971).

Equilibrium

What is the effect of international trade law? To begin with, note that international trade law has no effect unless the citizens have given the government discretion over the ban. The expected payoff to the citizens given by (3) remains unaltered, as does the expected payoff to the government.

Consider now the effect of international trade law when the government does hold the authority to ban the good. Fix the minimum cutoff for intervention m^* above which the dispute resolution mechanism lifts the ban upon request by the exporting country.

Given that the exporting country never prefers to uphold the ban, it litigates if and only if $\pi - n \geq m^*$. The condition for imposing the ban, previously given by (4), is now replaced with a dual condition. First, if

$$m^* + n > \pi > E(c \mid c \geq c^*(1)) - n, \quad (7)$$

a ban is certain. The first inequality states that the ban is not vulnerable to adjudication while the second equality states that the ban is profitable to the government. Second, if

$$\pi > m^* + n \geq E(c \mid c \geq c^*(1)) - n, \quad (8)$$

the probability of a ban is λ . In equilibrium, the government always attempts to impose the ban but does not necessarily succeed.

Two cases must be considered. First, suppose the cutoff m^* is high so that the dispute resolution mechanism is averse to banning legitimate environmental regulation. International trade law turns out to unambiguously benefit the citizens, as it prevents bans by the government when the negative effect n is low but special-interest profits π are high. Let us summarize this reasoning as follows:

Proposition 2 *If the cutoff m^* above which the ban is lifted in the shadow of international trade law is high enough, the expected payoff to the citizens in the subgame with governmental discretion over the ban increases.*

International trade law benefits the citizens because it offers the opportunity to audit a government that is to ban the imported good. If the dispute resolution mechanism is not too aggressive, it has an unambiguously beneficial effect because it rarely makes a false negative error that would prevent a ban when it is really needed. The dispute resolution mechanism disciplines the government, so the government can credibly commit to banning the good only if the negative effect is substantial enough.

Second, suppose the cutoff m^* is low, so that the dispute resolution mechanism is aggressive and upholds only exceptionally legitimate environmental regulations. Suppose also that the mechanism is capable of enforcing rulings:

Proposition 3 *If the cutoff m^* above which the ban is lifted in the shadow of international trade law is low enough and the probability of successful enforcement $1 - \lambda$ is high enough, the expected payoff to the citizens in the subgame with governmental discretion over the ban approximates that obtained when the government cannot ban the import.*

If the dispute resolution mechanism is aggressive enough, it constitutes an effective counterforce to the ban as a policy instrument. The government can only ban drastic negative effects, which are unlikely to ever occur. This is the problem that those worrying about a big chill caused by international trade law in environmental regulation emphasize (Eckersley, 2004). However, as the two previous propositions show, the big chill depends on specific rules used by the dispute resolution mechanism, so the problem can be avoided if that is what powerful states desire.

The conventional wisdom is that international trade law must constrain environmental regulation. To investigate the validity of this argument, let us first consider the situation in which there was a possibility of a ban in the absence of international trade law. The conventional wisdom holds here:

Proposition 4 *Suppose the citizens permit the ban in the absence of international trade law. The effect of international trade law on the probability that the government enacts a ban is negative.*

International trade law excludes a subset of bans that the government desires. Thus, if the government used to freely enact bans because the citizens expected this to be beneficial in the long run, international trade law indeed decreases the frequency of bans.

But the conventional wisdom fails if there was previously no ban:

Proposition 5 *Suppose the citizens did not permit the ban without international trade law. If the cutoff m^* is high enough or the probability of successful enforcement $1 - \lambda$ is low enough, international trade law has no effect. If the cutoff m^* is low enough and the enforcement probability $1 - \lambda$ is high enough, the citizens permit the ban. This results in a positive probability of a ban.*

If international trade law is intrusive enough and compliance is expected, it is beneficial for the citizens because they can be certain that only “good” environmental regulations survive international dispute resolution. The government is unable to enact environmental regulations that result in a large increase in consumer prices without corresponding environmental benefits, so the citizens can safely delegate to the government. In this case, they allow the ban because they can but win, so the frequency of bans actually increases. Paradoxically, the dispute resolution is designed to aggressively prevent certain bans, but this prompts an increase in the overall frequency of the bans. Because international trade law helps the citizens hold the government accountable, it reduces the influence of special interests, so citizens can give the government more discretion.

What about the government that also cares about the special interests?

Proposition 6 *If the citizens did not allow the ban without international trade law, the government’s expected payoff increases with international trade law. If the citizens allowed the ban without international trade law, the government’s expected payoff decreases with international trade law.*

If the citizens were previously so suspicious as to preclude the ban, international trade law creates a contracting opportunity that benefits both the citizens and the government. The citizens can now trust that harmful bans are not imposed while the government can both protect the citizens and sometimes even cater to special interests. This is clearly a win–win situation. In contrast, if the ban was previously possible, international trade law binds the government. It loses the opportunity to ban goods when special-interest pressures are strong, and there is no corresponding informational benefit because the citizens are

better able to identify special-interest politics and purchase the good anyway. Somewhat surprisingly, the government may join international trade institutions exactly because by doing so, the scope of its regulatory authority expands. This allows the government to (i) eradicate negative externalities and even (ii) sometimes protect special interests against foreign competition, as long as the discriminatory effect of environmental regulation is not overwhelming.

THE TRADE-ENVIRONMENT NEXUS REVISITED

According to the model, international trade law should increase environmental regulation when the following conditions are met. First, citizens should worry about increased consumer prices because their government is sensitive to the demands of import-competing special interests. Second, citizens should value environmental quality. If these two conditions are met, the emergence of international trade institutions means that citizens have less reason to worry about protectionism. Therefore, they can afford to increase their government's regulatory authority. This causes an increase in environmental regulation, but the increase in protectionism is limited due to international trade law.

The result should apply not only to industrialized but also to developing countries. While the conventional wisdom was that developing countries cannot enact environmental regulations for competitiveness reasons, Dasgupta *et al.* (2006) show that governance and vulnerability indices are substantively strong and statistically significant predictors of atmospheric concentrations of suspended particulate matter. These governance indices are increasing in the income of a country. On an ascending scale from 1 to 6, "low income" countries have a mean of 2.89 while "lower middle income" countries have a mean of 3.41 and "upper middle income" countries have a mean of 4.24 (Dasgupta *et al.*, 2006, p. 1600). Controlling for *per capita* income, environmental governance capabilities have a positive independent effect on environmental regulation. To the extent that good governance reduces the influence of special interests, this evidence is compatible with the notion that citizens of democratic developing countries only reward the government for environmental regulation if they can trust it.

One of the defining features of the trade-environment debate in the WTO is the continuous adjustment of the governing principles through precedents and deliberation in the Committee on Trade and Environment. The existence of a real tradeoff shows that such oscillation is inevitable and often desirable, as citizens in different countries assess the relative importance of lower consumer prices and improving or maintaining environmental quality. *Shrimp Turtle* and *Retreated Tyres* bolstered the environmental credentials of the WTO, alleviating some of the earlier fears raised by *Tuna Dolphin* that the WTO might invalidate popular environmental regulations. Such continuous adjustment is important because too aggressive international trade law is often more harmful than no international trade law while too lax international trade law has no effect on protectionism.

One of the most surprising results of the analysis is that intrusive international trade law could sometimes have the largest positive effect on environmental regulation.

This result is particularly important in light of the fact that developing countries have expressed a strong preference for a dispute resolution mechanism that prevents “green protectionism” by industrialized countries (Bhagwati, 2000; Biermann, 2001; Krueger, 1999; Neumayer, 2001). My analysis suggests that developing countries could benefit from such a dispute resolution mechanism in other ways as well. If their governments have particular difficulties in committing to good governance, as the empirical evidence shows (Keefer, 2007; Mansfield and Pevehouse, 2006), international trade law could allow a credible commitment, not only to liberalization, but also to improved environmental regulation.

To illustrate the model’s predictions in greater detail, I now investigate the development of Chile’s environmental policy. The model suggests that international trade institutions can increase public demand for environmental regulations because international trade law prevents the executive from exploiting environmental regulations to discriminate against foreign producers. This effect should be particularly strong if international trade law is intrusive. During President Lagos’s tenure (2000–2006), Chile formed historical preferential trading agreements with the European Union (2002) and the United States (2003). Both agreements significantly curtailed Chile’s ability to form new environmental policies and alarmed environmental organizations across the world. However, soon after these agreements were formed, President Lagos implemented a series of important environmental reforms that previous research directly links to the international trade institutions.

While the agreements with the European Union and the United States did pay lip service to strengthening environmental regulations by forming an Environment Affairs Council that meets every year, they did not directly force Chile to change its existing environmental regulations. For example, a 2003 environmental review mandated by the United States Congress praised Chile’s existing environmental legislation for its “existence and achievements” (Tecklin *et al.*, 2011, p. 890). Neither the European Union nor the United States have since demanded changes in Chile’s environmental regulations, even though environmentalists continue to criticize the agreements for not including adequate environmental safeguards.⁵

Although these agreements did not mandate specific any specific policies, and thus could not have a direct effect on environmental regulations, their formation was followed by a flurry of environmental legislation. This is consistent with the model’s predictions. During the first three years of his tenure, President Lagos approved only five new environmental regulations; however, during the remaining four years, he approved another ten (Mendy, 2010, p. 85). Moreover, of the five legislations enacted in the 2000–2002 period, all were amendments to existing law. Conversely, four entirely new laws were enacted during the 2003–2006 period. In sum, environmental regulation significantly increased in the years following Chile’s preferential trading agreements.

Moreover, the model predicts that international trade institutions should result in institutional reforms that expand the executive’s regulatory authority. Chile’s

⁵ See <http://www.citizenstrade.org/ctc/trade-policies/existing-trade-agreements/other-bilateral-trade-agreements/u-s-chile-free-trade-agreement>. Accessed January 31, 2012.

environmental policy reform accords with this idea. Of the ten laws enacted in the 2003–2006 period, five enacted new environmental institutions or administrative structures for public management the environment (Mendy, 2010, p. 85). Indeed, some of these were directly relevant to international trade. On October 15, 2004, President Lagos introduced law number 20.089, “Crea Sistema Nacional de Certificación de Productos Orgánicos Agrícolas,” which imposes a comprehensive system of technical standards and certification requirements on organic products. The law was officially published on December 21, 2005 (Mendy, 2010, p. 87). Article IV of the law specifically notes that the system is applied to agricultural imports as well, and Article V of the law states that any infringements be sanctioned by authorities according to Chilean law.⁶ During Michele Bachelet’s term (2006–2010), Chile also formed a national environmental ministry.⁷

The model also predicts that the formation of trade institutions should be followed by increased public support for environmental regulation. While environmental regulation had been a secondary issue in Chile, by the election year of 2005 “presidential candidates locked in a tight race proposed major environmental reforms as part of their campaign platforms, and simultaneously a number of reform proposals were launched in the Chilean Congress” (Tecklin *et al.*, 2011, p. 891).⁸

While not direct evidence of causality, these facts are consistent with the model’s predictions. Chile formed international trade institutions to boost economic growth, but these institutions contributed, along with other internal and external factors, to increased public demand for, and acceptance of, environmental regulation. This account also fits the more general pattern of Chile’s environmental policy, described as follows by Tecklin *et al.* (2011, p. 880): “Environmental policymaking has been driven primarily by external forces linked to economic globalisation rather than by the kind of internal societal and political changes commonly identified as drivers of environmental policy in the comparative literature on environmental regulation.”

CONCLUSION

The debate on international trade law and environmental regulation is representative of the broader discussion concerning sovereignty and democratic accountability in an era of economic and political globalization. Unfortunately, there are few systematic theoretical treatments or comprehensive empirical assessments that help evaluate the validity of such treatments. This paper contributes to the debate by providing a rigorous but simple theoretical account.

⁶ The English text of the law is titled “Traducción Regulation n° of Law 20.89.” Santiago, Chile, on April 13, 2006.

⁷ An important factor that contributed to the formation of the environmental ministry was Chile’s bid for membership in the Organization for Economic Cooperation and Development.

⁸ An important watershed in Chile’s environmental policy reform was the death of thousands of waterfowl in the protected *Rio Cruces* wetlands due to waste discharge by the Forestal Arauco pulp mill.

The analysis has positive and normative implications. From a positive perspective, the key implication is that the effect of international trade law on environmental regulation is contingent. If environmental regulation was previously rarely enacted because the citizens distrust a government prone to special-interest politics, international trade law has the effect of encouraging new regulation. In contrast, if the extant level of regulation is high because the citizens believe that the government protects them from negative effects, international trade law most likely reduces the level of regulation. But even then, the quality of environmental regulation improves as long as the international trade institutions are not too biased.

From a normative perspective, the contracting approach that I have adopted shows that neither disciplinary neoliberalism nor optimal obfuscation are a probable consequence of dispute resolution in international trade institutions. Citizens benefit from international trade institutions, as they can indirectly audit the government and hold the government responsible for the consequences of environmental regulation. The synergies between international trade law and environmental regulation, previously unacknowledged by all too many pundits, are quite natural. The obstacles to adequate environmental regulation and trade liberalization often relate to special interests, so any opportunities for the citizens to hold the government accountable should be welcome.

The following three extensions warrant discussion. First, the analysis has omitted international negative externalities. Here, the government has less incentive to unilaterally reduce the consumption of a good even under complete information, so the issue is further complicated by an enforcement problem (Bhagwati, 2000; Fearon, 1998). Second, another important issue that I have not addressed is the use of soft policy instruments, such as eco-labels (Melser and Robertson, 2005). If the government can inform the citizens of whether it thinks the good is “bad” or “good,” the set of contracting opportunities may expand. Finally, I have downplayed the potential bias towards liberalization that international trade institutions may have (Humphreys, 2006; Kahler, 2004; Lake, 2009). The emerging consensus among trade-environment scholars seems to be that while there may be some bias in the WTO, it is not excessive (DeSombre and Barkin, 2002; Thomas, 2009; Young, 2005). Even if there were a liberalization bias, it would not invalidate the qualitative predictions that I have made. However, it might reduce the magnitude of the effect and prevent democratic societies from achieving a high level of environmental protection.

Yet the most profound extensions and challenges pertain to public opinion. On the one hand, my simple model does not capture the complex causal pathways from environmental and economic concern to the expansion of regulatory authority under international trade law. On the other hand, I have also ignored the consequences of alternate preference constellations, such as the role of nationalist sentiments or negative attitudes toward international trade (DeSombre and Barkin, 2002; Meunier, 2000). It is my hope that the simple rationalist baseline that I have provided will lay a solid foundation for more realistic and nuanced models of environmental regulation in the shadow of international trade law.

APPENDIX

Proof of Proposition 1. Note that $(n, \pi) \geq (0, 0)$. With $E(n)$ low enough and $E(\pi)$ high enough, the expected value (5) strictly exceeds (6). With $E(n)$ high enough and $E(\pi)$ low enough, the expected value (6) strictly exceeds (5). ■

Proof of Proposition 2. Let m^* be high enough. Now (5) remains unaltered while the government continues to use the previous cutoff k^* , except that it can only ban the imported good with probability λ when $\pi - n \geq m^*$. Expression (6) is replaced by the following expression:

$$\begin{aligned} & \rho(\pi + n < k^*) \cdot \rho(c \geq 0) \cdot E(c - n \mid \pi + n < k^*, c \geq 0) \\ & + \lambda \cdot \rho(\pi + n \geq k^* \wedge \pi - n \geq m^*) \cdot \rho(c \geq 0) \\ & \cdot E(c - n \mid \pi + n \geq k^* \wedge \pi - n \geq m^*, c \geq 0). \end{aligned}$$

The first row of this expression gives the expected payoff when the government is unwilling to ban the product, so that $\pi + n < k^*$. The second row gives the expected payoff when the government is willing but not legally able to ban the product, so that $\pi + n \geq k^*$ and $\pi - n \geq m^*$. In this case, the probability of a ban is only λ given that the dispute resolution mechanism successfully invalidates it with probability $1 - \lambda$. In any other contingency, the citizen's expected payoff is zero.

With m^* high enough, we have

$$E(c - n \mid \pi + n \geq k^* \wedge \pi - n \geq m^*, c \geq 0) > 0.$$

But $\pi + n \geq k^* \wedge \pi - n \geq m^*, c \geq 0$ is the only case in which a previously possible ban is sometimes not enacted by the government, so the only effect of international trade law is to allow consumption that is profitable in expectation. The claim follows. ■

Proof of Proposition 3. Let m^* and λ be low enough. Now the modified expression that replaces (5), as derived in the proof of the previous proposition,

$$\begin{aligned} & \rho(\pi + n < k^*) \cdot \rho(c \geq 0) \cdot E(c - n \mid \pi + n < k^*, c \geq 0) \\ & + \lambda \cdot \rho(\pi + n \geq k^* \wedge \pi - n \geq m^*) \cdot \rho(c \geq 0) \\ & \cdot E(c - n \mid \pi + n \geq k^* \wedge \pi - n \geq m^*, c \geq 0), \end{aligned}$$

can be approximated by

$$\rho(\pi + n < k^*) \cdot \rho(c \geq 0) \cdot E(c - n \mid \pi + n < k^*, c \geq 0),$$

and thus it also approximates (5) to arbitrarily high precision. ■

Proof of Proposition 4. The consumer's decision rule for purchasing continues to be $c \geq 0$ and the government's cutoff k^* is unaltered. Thus, the only effect of international trade law is to sometimes prevent bans when $\pi - n \geq m^*$ and $\pi + n \geq k^*$. ■

Proof of Proposition 5. With m^* or λ high enough, (6) approximates the citizens' payoff in the subgame with the possibility of a ban under international trade law to arbitrarily high precision. But since the citizens did not allow a ban without international trade law, (6) must be strictly lower than (5).

Suppose instead λ is low enough, so that the government can ban the good only if $\pi - n < m^*$. The conditional expectation of consumer utility given that the government bans the good in the subgame with the possibility of a ban and the consumer would purchase the good is approximately

$$E(c - n \mid \pi - n \leq m^*, \pi + n \geq k^*, c \geq 0).$$

In any other scenario except $\pi - n \leq m^*, \pi + n \geq k^*, c \geq 0$, the payoff is identical with and without a ban. Under the assumption that $m^* \rightarrow -\infty$, this expression must be strictly negative. Thus, the payoff in the subgame that allows a ban must be higher than the payoff in the subgame that does not allow a ban. ■

Proof of Proposition 6. Suppose first the citizen did not allow the ban without international trade law. In that case, the expected payoff to the government is

$$\rho(c < 0) \cdot E(\pi) + \rho(c \geq 0) \cdot E(c - n \mid c \geq 0).$$

If the ban is allowed under international trade law, the first term remains unchanged while the second term is replaced with

$$\begin{aligned} & \rho(\pi + n < k^*) \cdot \rho(c \geq 0) \cdot E(c - n \mid \pi + n < k^*, c \geq 0) \\ & + \rho(\pi + n \geq k^* \wedge \pi - n < m^*) \cdot \rho(c \geq 0) \\ & \cdot E(\pi \mid \pi + n \geq k^* \wedge \pi - n \leq m^*, c \geq 0) \\ & + \lambda \cdot \rho(\pi + n \geq k^* \wedge \pi - n \geq m^*) \\ & \cdot \rho(c \geq 0) \cdot E(c - n \mid \pi + n \geq k^* \wedge \pi - n \leq m^*, c \geq 0) \\ & + (1 - \lambda) \cdot \rho(\pi + n \geq k^* \wedge \pi - n \geq m^*) \\ & \cdot \rho(c \geq 0) \cdot E(\pi \mid \pi + n \geq k^* \wedge \pi - n \leq m^*, c \geq 0). \end{aligned}$$

The first row captures the situation in which the government is unwilling to impose a ban; the second row captures the situation in which the government is willing and legally able to impose it; the third row captures the situation in which the government is willing but legally unable to impose it, and the dispute resolution mechanism enforces the ban; the fourth row captures the situation in which the dispute resolution fails to enforce the ban. These outcomes exhaust the set of logical possibilities. Given that k^* is optimal, the

value of this summation must exceed $\rho(c \geq 0) \cdot E(c - n \mid c \geq 0)$, and thus the claim follows.

Suppose now the citizen allowed the ban without international trade law. The only effect of international trade law is to prevent the ban in some circumstances where it increases the expected payoff to the government, so the claim follows. ■

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