Protection as a Commitment Problem

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Abstract

Restrictions on trade are inefficient means of redistributing income compared to a wide variety of alternatives, so why are they used? I develop a dynamic model that demonstrates that commitment problems in the trade-lobbying process can account for this. Many industries that are harmed by open trade have an incentive to lobby for protection over compensatory transfers because liberalization has dynamic effects that can reduce an industry's future political influence. Thus, while all parties would prefer permanent transfers to protection, these transfers are subject to a commitment problem. The model also demonstrates that despite this, "compensating the losers" can still be an effective political strategy under certain scope conditions: even short-term compensation may disrupt protectionist equilibria. Thus, this paper helps to resolve an outstanding theoretical puzzle about the inefficiency of trade protection while providing a new interpretation of the compromise of "embedded liberalism", in a fashion that can help to explain the variation in compensation's successful use.

Introduction

Existing accounts of protectionism in the political economy literature have tended to focus on the redistributive consequences of trade policies. For instance, this work has addressed the conditions under which trade-related political divisions will be along factor or industry lines (Rogowski 1989, Scheve and Slaughter 2001, Hiscox 2002, Mayda and Rodrik 2005), and the conditions under which there may be divisions within industries between firms (Osgood 2016, Kim 2017). Broadly, this approach suggests that if the groups that benefit from trade protection are more politically influential than those that lose, we should expect governments to impose restrictions on trade.[1]

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[1]Related research addresses the factors which determine group influence, including lobbying (Grossman and Helpman 1994, Goldberg and Maggi 1999, Gawande and Bandyopadhyay 2000, Bombardini 2008, Gawande et al. 2012), democratization (Mansfield et al. 2000, Milner and Kubota 2005), and more.

However, if we accept the premise that trade policy is primarily a way of redistributing income, it remains unclear why the actors in a redistributive game would choose protection as the *means* for redistributing income over any number of alternatives available to the government. Indeed, there are strong theoretical reasons to believe that protection should be one of the least attractive options.

Consider that governments generally have many mechanisms for transferring income that are more efficient than trade protection - tax credits, adjustment assistance, etc. - which would increase the "size of the pie" being bargained over. Thus, if these mechanisms were used instead of protection, it should be possible to completely compensate all groups for any losses they would suffer under free trade, while generating a surplus that could be allocated so as to make all parties better off than they were under protection. This creates an analogous puzzle to one often discussed about inefficiency of war[2] - if Pareto-superior bargains are available to the actors in the trade policy game, why do we ever see protectionism?

Further complicating the story is that while governments often fail to compensate the losers, they don't *always*. The "embedded liberalism" literature has consistently found empirical support for the idea that governments use compensation in a way that increases support for freer trade (Ruggie 1982, Hays et al. 2009, Walter 2010, Margalit 2011). However, this literature leaves several questions unaddressed: who are the actors who receive this welfare-based compensation? Under which conditions will this bargain be effective in obtaining freer-trade, and under which will it falter? What accounts for the highly heterogeneous use of compensation and protection across sectors, industries, states, and time?

I develop a dynamic model that can help address these puzzles. The model identifies that interest groups that are harmed by the opening up of trade can have an incentive to lobby for protection over compensatory transfers because free-trade has dynamic effects (reduced profits, shrinking employment, disrupted interest group cohesion, etc.) that reduce a group's ability to lobby the government in future periods. Given this, interest groups that could initially extract favorable policy from the government may find they are unable to after the move to free trade. Thus while both parties would prefer permanent compensatory transfers to protectionism, interest groups know that governments will lose the incentive to maintain these transfers in the future, resulting in a commitment problem.

However, while these dynamic effects make protectionist policies more attractive, they are not always pivotal in the choices of interest groups. Protection becomes especially costly for the government to provide when the good in question is subject to high import demand elasticities (which increase deadweight losses from protection) and high lobby competition from downstream industries (such as when automobile manufacturers lobby against steel tariffs). Moreover, states' access to alternative means of compensating interest groups can vary (states with high fiscal capacity can do this more easily), and interest groups face dif-

[2]Fearon 1995, for instance.

fering degrees of dynamic decline with open trade (some groups may retain most of their political influence, while some may face complete dissolution in the face of import competition). The model illustrates how compensation may thus still be chosen by interest groups when various factors either make protection more costly to obtain or compensation more attractive.

Consequently, the model can improve our understanding of trade politics in two ways. First, it helps resolve a theoretical puzzle about the inefficiency of protection as a means of redistributing income: Pareto-improving bargains should exist, but these are not politically feasible due to commitment problems in the trade lobbying process. Second, the model develops an alternative theoretical foundation for embedded liberalism, in a way that can better account for its heterogeneity: compensation can indeed be an important part of a political bargain obtaining freer trade, but only when states possess sufficient capacity to implement alternative means of redistribution, and when import competing groups find protection more costly to obtain than it's worth (due to high import demand elasticities and political competition, or relatively low prospective rates of political decline).

Existing Arguments on The Inefficiency of Protectionism

While the "inefficiency puzzle" of war has proven central to the rationalist conflict literature, the political economy of trade literature has devoted surprisingly little attention to explaining the choice of trade as a redistributive tool over more efficient means. Grossman and Helpman (1994) has a paragraph that is dedicated to this question, which argues that special interest groups may benefit from tying the hands of the government. However, their argument is not formally developed (mostly included as an aside to the main argument), and provides very little scope for protectionism except as an unused "threat" that allows special interest groups to extract greater gains from a bargaining game. Kono (2006) is sometimes cited in relation to this question, but it focuses on explaining the move towards non-tariff barriers (NTBs) from tariffs, and does not directly address the question of why protectionism - whether NTBs or tariffs - would be used over more efficient mechanisms for redistributing income.

Dixit and Londregan (1995) addresses a related question - how redistribution can lead to inefficiency - with a distributive politics model that argues that voters that have advantageous political characteristics (e.g. swing voters) may make inefficient decisions if doing so allows them to retain these characteristics. For instance, voters in politically pivotal flood-prone areas may decide not to move to avoid losing redistributive transfers. However, the model does not address why the *form* of redistribution would be inefficient; indeed, transfers are explicitly modeled as efficient and lump-sum (Dixit and Londregan 1995, p.858).

Some explanations for the phenomenon of inefficient redistribution exist in the political economy literature more generally (e.g. Coate and Morris 1995, Acemoglu 2003, Drazen and Limao 2008), ranging from bargaining models to information asymmetries, but none of

these have been applied to international trade specifically. Acemoglu and Robinson (2001) comes closest; it argues industries might favor inefficient redistribution if it increases their size and correspondingly their political influence, and while the paper primarily focuses on farm subsidies and labor market policy, it briefly discusses how the model might apply to international trade. Their paper provides valuable insights, but the model is not a natural fit with trade. For instance, the main factor determining whether inefficient redistribution occurs is whether absolute rents increase quickly enough with group size in order to lead to an increase in per capita rents for the farmers who are around at the beginning of the game; with trade protection, per capita rents are likely always increasing, so this should always be satisfied, allowing very little scope for open trade. Similarly, their model generates comparative statics about factor specificity that are hard to square with the trade literature: they argue that high factor mobility might lead to more inefficient redistribution, while the trade literature suggests that high factor mobility shifts the political cleavages associated with protection from industry to factor lines (why would farmers have an incentive to switch industries if their returns are not diminished?).

In contrast, this paper seeks to address how commitment problems arise with trade in particular, by building off of trade theory more directly and using an approach to modeling lobbying in trade that is more consistent with the trade literature (i.e. a menu-auction). This allows the model to generate comparative statics relating to measurable trade parameters (like import demand elasticities) and other factors considered important by the trade literature (like competition from downstream industries) (Gawande et al. 2012).

Embedded Liberalism

Furthermore, while the broader political economy literature has outlined some explanations for inefficient redistribution, these models have generally provided less insight into when we might expect *efficient* redistribution instead. This project's model, in contrast, predicts both types of redistribution, allowing the paper to speak to the literature on "embedded liberalism", which broadly argues for a compensation story in which government spending can be a means of blunting opposition to openness from trade's losers. This literature began by arguing that the post-war expansion of the welfare state was an important example of this kind of compensation (Ruggie 1982). Rodrik 1998 brought statistical evidence to bear on this question, identifying a correlation between public sector size and external openness. Later work has continued to find empirical support for the hypothesis that compensation programs can be used to increase support for open trade, using data from trade adjustment assistance in the United States (Margalit 2011, Ritchie and You forthcoming), active labor market programs in the OECD (Hays et al. 2005, Hays 2009), and even survey experiments (Ehrlich and Hearn 2014).

While this literature has usefully demonstrated that compensation can be an important part of political bargains on trade, it generally has not explored in depth the conditions under which such compensation should be helpful, or which groups are most likely to be success-

ful in obtaining compensation. Moreover, in the wake of the "anti-globalization backlash" reflected in Brexit, the election of Donald Trump, and the rise of Marine Le Pen's National Front/Rally, there has been renewed interest amongst IPE scholars in these kinds of questions, as many have sought to understand why embedded liberalism failed to prevent this backlash (see, for instance, Mansfield and Rudra n.d.).

This paper provides an alternative theoretical framework for embedded liberalism that can be useful in answering these questions. Historically, the underlying theory assumed in the embedded liberalism literature has been that compensation is a means of ensuring against income volatility generated by external openness (Rodrik 1998, Burgoon 2001, Rudra 2002). This has proved to be inconsistent with a number of empirical regularities identified by trade scholars - most importantly, that it is not at all clear that openness increases volatility (Kim 2007, Gray and Potter 2012). The literature has also demonstrated that greater openness is associated with less government spending on social welfare in the developing world (Rudra 2002, Wibbels and Ahlquist 2011), which is difficult to square with a theory of compensation in which all states seek to reduce income volatility via social spending.

This paper's model instead adopts a more straightforward conception of embedded liberalism; that it is a compensatory *bargain* between import-competing actors and the government. This framework is consistent with the existing evidence, as there is no need to demonstrate a link between openness and volatility, and we would not expect trade-related compensation to target the recipients of social welfare in developing countries, given that the "losers" of trade in developing countries are more likely to be high-skilled workers (Rogowski 1989, Maydra and Rodrik 2005). Indeed, Nooruddin and Rudra (2014) find that developing countries are able to compensate some of the losers of trade by increasing public sector employment, with these jobs going to an elite class of workers.[3]

However, if we assume that embedded liberalism is a *bargain*, then explanations for its success and failure must be rooted in some understanding of this bargaining process. It is not sufficient, for instance, to simply explain why certain actors may have come to find trade more or less attractive, or to explain why the actors that oppose trade may have become more politically powerful; instead, we need to explain when the groups that oppose trade can be "bought off" by those that benefit, and when they cannot.

This paper contributes to our understanding of embedded liberalism by providing a model that predicts *both* that compensation will often be effective, and that it will often fail, with an explanation for embedded liberalism's limitations rooted in a theory of *bargaining failure.* This contrasts with existing explanations for the failure of embedded liberalism that focus on factors such as the development of global value chains, changes in technology, or

[3]Rickard (2012) argues that developing countries adopt compensatory strategies which deemphasize welfare spending in favor of more targeted production subsides, but those subsidies end up performing a similar function to tariffs in propping up import-competing industries, and should thus not be treated as a compensatory alternative to protection.

the rising discontent of unskilled workers left behind by globalization (Frieden 2018, Owen 2019, Mansfield and Rudra n.d.), which fundamentally explain why the need for compensatory bargains may have increased over time, but do *not* explain why those bargains failed to materialize.

Moreover, this paper's model can help to explain the broader patterns of compensation and protection across states, sectors, industries, and time. For instance, the partial reversal of the embedded liberalism welfare state bargain in the 1980s can be attributed to dynamics; if the groups that were being compensated via the welfare state had become weaker over time, the incentives to maintain the size of the welfare state would naturally have dissipated. More generally, the model provides a set of characteristics that circumscribe the conditions under which compensation can be a *politically efficient* strategy, allowing us a better understanding of when we should expect to observe it instead of protection.

Trade Dynamics

Throughout the political science literature, and particularly in the study of conflict, we have seen that dynamics can lead to inefficient policy.[4] However, despite the importance of dynamics in these other domains, the trade literature has largely treated the policymaking game as static[5], when we might realistically expect interest groups to be forward-looking and subject to change over time in both capacities and interests.

This project models the process of liberalization as leading deterministically to a reduction in the political influence of protectionist lobby groups, and argues that it is impossible to devise a policy that fully compensates these protectionist groups and maintains their political influence without sacrificing the gains associated with freer trade. The reason for this is that the dynamic effects that weaken protectionist interest groups arise from the very nature of the economic changes that need to occur in order for liberalization to generate these gains. Consider, first, a subsidy policy designed to prop-up the trade-threatened industry. This policy would likely have the desired effect of redistributing income to the protectionist group, but the main benefits of trade arise when inputs are allowed to relocate from comparative disadvantaged sectors to comparative advantaged sectors. This *requires* the decline of the comparative disadvantage industry; if subsidies are used to prevent this decline, they are performing a similar function as other protectionist measures.

Now consider an alternative compensation policy, where the government provides income transfers to the individuals associated with a particular industry, but does not tie these transfers to those individuals remaining in the industry. This can be conceptualized as paying these workers to leave the industry so that the process of greater specialization in the face of trade competition can occur. This approach achieves the full gains of trade, but

[4]Powell (2004, 2006) discuss this in relation to conflict.

[5]Bailey et. al. 1997, Hathaway 1998 are exceptions.

necessarily leads to shrinking size of the industry as workers leave to find employment in other industries, reductions of the producer surpluses of the import-competing firms, and a shifting firm-composition towards exporting firms within import-competing industries. In the most extreme case, this can lead to what amounts to the total dissolution of the industry. In contrast, any domestic interest groups that benefit from trade liberalization grow in size, and obtain higher producer surpluses. All of these economic changes have political implications.

To start, insofar as the protectionist interest group is organized around an industry, having fewer members is likely to reduce its political influence. Large interest groups tend to be more influential than smaller ones, ceteris paribus (Chong and Gradstein 2010). Second, if the producer surplus of the industry is reduced, the lobby group retains fewer resources with which to make political contributions or fund lobbying activity, particularly if this group faces credit-constraints. Third, because of the shifting firm-composition within an industry, the remaining firms will tend to be weighted towards those that are less resistant to trade. Fourth, because any pro-trade interest groups experience the converse economic effects, a protectionist group now faces greater competition if they try to lobby for a return to protectionist policies. Thus, liberalization can create "lock-in", where it becomes more challenging to reverse the process once it has begun, while pro-protectionist lobby groups are weakened in their ability to obtain any kind of policy concession, trade-related or not.

Could compensating income transfers to the trade-distressed workers be used as resources with which to lobby the government for compensation? This is unlikely, for two reasons. Before liberalization had occurred, these workers were part of an organized industry that had, ostensibly, solved the collective action problem associated with lobbying the government. However, if workers have dispersed into several industries, it becomes much more challenging to continue to organize them in a cohesive fashion. Moreover, insofar as each worker is now part of some new, industry-level lobby, they are likely to be too small a proportion of this other special interest group for it to have an incentive to lobby to maintain compensation.

Secondly, the differing character of compensation transfers versus protectionist rents may lead to greater fractionalization amongst those lobbying for continued compensation. While protectionism is inherently a collective good, and thus can create incentives to lobby as a group (though the size of the group can vary based on industry characteristics and tariff specificity), compensation is a private transfer that can be provided to one part of the group but not the other. For instance, say an industry declines, and some percentage of the exiting workers find employment and some percentage do not; might this not create divisions between the newly unemployed and the newly employed, where the unemployed might not lobby so hard for transfers to be maintained for those who have found employment? Fractures within the group would lead to weakening of the political interest group as a whole.

It is also worth considering whether industries facing distress become more politically influential. It may sometimes appear that this is the case, as distressed industries are often able to obtain the most obvious concessions;[6] however, this likely conflates greater *preferences* for protection with greater *ability* to wield power to obtain concessions. Special interest groups that are distressed by foreign competition would naturally invest more resources in lobbying for protection, as the gains of obtaining it are higher (an industry that is not distressed is likely at a comparative advantage, and thus has less to gain from higher tariffs). However, variation on this dimension is unrelated to whether or not the group is more politically powerful - it simply affects how visible that influence is. In any event, this paper explicitly compare apples to apples by considering an industry that is already threatened by foreign competition and what happens if liberalization occurs. Under these circumstances, political influence is strictly declining as the industry declines with greater liberalization.

While liberalization reduces the influence of import-competing groups, the degree that influence declines is not equal across interest groups. Some groups face steeper declines than others, for a variety of reasons including firm heterogeneity, access to alternative production technologies, political geography, and more. I do not develop a model explaining the variation in dynamic decline in this paper (though I think this would be an exciting area for future inquiry), but I do analyze some specific cases with an eye to how variation in this dimension can condition choices between protection and compensation.

Model

Setup

The model outlined in this paper is a political support menu-auction model similar to Grossman and Helpman's Protection for Sale, in which two industry-level special interest groups (SIGs) compete to influence an incumbent government (SIGs are principals and the government is the agent). One SIG is the main import-competing "upstream" industry (SIG 1) that benefits from protection, while the other is a "downstream" industry (SIG 2) that prefers liberalization of the good in question (e.g. steel producers as an "upstream" industry and automobile manufacturers as a "downstream" industry). Thus, they have opposite preferences over the tariff rate τ, due to how it affects the price of some good.

The upstream SIG also has preferences over compensation R via some other, more efficient redistributive instrument. The downstream SIG is indifferent between levels of R; it is assumed that compensation does not affect the price of the good (which is true for the most efficient forms of transfers), and is functionally noncompetitive. While governments inevitably have to make trade-offs in deciding which groups to compensate from budgetary revenues, if there are a sufficiently large number of interest groups it seems likely that

[6] Baldwin and Robert-Nicoud (2007) surveys the economics literature addressing this question, noting several empirical regularities such as higher tariff rates in recessions.

groups would not see their interests as conflictual enough that they would actively lobby against another's transfers. The two SIG setup accounts for competition between special interest groups while remaining tractable.

These SIGs attempt to influence a government that is maximizing a weighted sum of voter welfare and lobby contributions, where contributions may mean literal contributions, but may also mean expenses by a lobby in service of a particular government. "Voter welfare" simply means the aggregate economic performance of the country as a whole. For simplicity, I assume that the upstream lobby has to choose whether to pursue only protectionism or only compensation via the more efficient redistributive instrument. This also focuses attention on the main comparison of interest to this paper.

Importantly, I assume that the dynamics described earlier lead to a reduction in political influence for the import-competing industry, but I do not explicitly model the source of these dynamics. This is by design: given that there are multiple mechanisms by which influence decreases with increased liberalization, and all the effects are in the same direction, I believe the assumption that there is a reduction in political influence is easier to justify than any particular formulation. I do, however, include a parameter in the model for the degree of dynamic decline, as this varies across interest groups - some face steeper declines with liberalization than others - in ways that matter for the equilibria generated by the model.

The game proceeds as follows:

1. Game begins in a state of protectionism, i.e. $S_t = P$.
2. SIG 1 chooses whether to pursue protection or compensation, i.e. chooses $T \in \{0,1\}$, where $T = 0$ means compensation and $T = 1$ means protection.
3. If $T = 0$, the tariff rate defaults to zero ($\tau = 0$), so SIG 2 obtains their preferred outcome without lobbying. SIG 1 then chooses what contributions to "bid" to the government in exchange for compensation R. If $T = 1$, both SIG 1 and SIG 2 set contribution schedules to try to influence the government.
4. Government chooses $R \in [0,\infty)$ or $\tau \in [0,\infty)$ depending on T and obtains the contributions defined by the schedules.
5. Period payoffs realized. If $T = 1$, the state of the world remains protectionist, and the game repeats from stage 1. If $T = 0$, the game transitions to a state of free trade ($S_t = F$), such that the import-competing interest group (SIG 1) experiences a decline in political influence. This is an absorbing state: there is no way to exit the free trade state once it is reached.[7]

[7]This is a simplification. The substantively important aspect of this assumption is that there is *some degree* of influence that is lost once trade is liberalized that cannot be regained. A version of the model with this assumption relaxed is included in the appendix.

$S_t = \{P, F\}$ is the state space at time t, R can take on any positive real number, and τ is bounded by zero below, so we rule out import subsidies. C_1 and C_2 represent the amount of contributions made by SIG 1 and SIG 2 respectively. The reduction in political influence is parameterized by a movement from ψ_P to ψ_F, with $\psi_F > \psi_P$; this parameter is a positive real number ($\psi_s \in \mathbb{R}^+$) that captures how costly making lobbying contributions is for SIG 1 (or equivalently, the efficiency of their contributions). This conceptualization fits naturally with how trade dynamics were described earlier in the paper: insofar as liberalization reduces industry profits and disrupts the organization and cohesiveness of interest groups, one would expect it to become more "costly" to make the same level of contribution as prior to liberalization. As a concrete example: having lower profits implies that contributions or other expenses will need to come via other sources, which may mean borrowing, diverting from research spending, etc. - these other means may impose higher costs than redirecting profits.

This setup leads to the following objective functions for any single period of the game.

- SIG 1: $u_1(\tau, R, T, S_t) = T\pi_1(\tau) + (1-T)(R + \pi_1(0)) - \psi_s C_1(\tau, R)$
- SIG 2: $u_2(\tau) = X + \beta\pi_2(\tau) - C_2(\tau)$
- Government: $G = C_1(\tau, R) + C_2(\tau) + \alpha W(\tau, R, \epsilon, \rho)$

Where $\beta \in [0, \infty)$ parameterizes the degree of lobby competition from a downstream industry. If $\beta = 0$, there is no competition, and SIG 2 obtains only income exogeneous to the model, X. If $\beta > 0$, this ensures that some share ($\beta\pi_2(\tau)$) of SIG 2's income is impacted by τ, with $\frac{\partial \pi_2}{\partial \tau} < 0$. Thus, at higher β, τ has a higher impact on SIG 2's income, which captures naturally the idea of conflictual interests between the two groups.

Meanwhile, SIG 1 always benefits from increases in τ, i.e. $\frac{\partial \pi_1}{\partial \tau} > 0$. This follows straightforwardly from the fact that one SIG is upstream and the other is downstream; SIG 1 gains from having their good protected, but SIG 2 loses from facing higher prices of some input in their production process. Furthermore, both π_1 and π_2 are concave functions, i.e. $\frac{\partial^2 \pi_1}{\partial \tau^2} < 0$, $\frac{\partial^2 \pi_2}{\partial \tau^2} < 0$. This is a natural assumption: early increases in τ provide a significant competitive advantage, while at some point, later increases in τ will have shut out all foreign competition leading to prices determined by domestic market conditions.

Voter welfare W is decreasing in both R and τ, and is concave in each.[8] α is the weighting placed on voter welfare by the government. Import demand elasticity ϵ has a conditioning effect on the rate that W decreases with τ, i.e. $\frac{\partial^2 W}{\partial \tau \partial \epsilon} < 0$. This follows straightforwardly from

[8]This rules out "optimal tariffs", which exist when a large country with sufficient market share can gain by imposing a tariff that improves their terms of trade (though this reduces *global* efficiency). Bagwell and Staiger 2002 provide an account that takes these seriously, discussing how terms-of-trade externalities might be resolved through reciprocal trade agreements. However, insofar as such agreements succeed in resolving terms-of-trade issues, protection is once again strictly welfare decreasing.

economic theory: if an industry faces a high import demand elasticity, then small changes in the price of a good have greater effects on consumption decisions, and thus tariffs will generate larger deadweight losses for the economy imposing a tariff. In contrast, a perfectly inelastic industry will produce no deadweight losses from tariff-based changes to the price, as this will not distort consumption decisions, and will simply result in a transfer in income from consumers to the government (the exporting industry increases the price by the amount of the tariff, but since the same amount is imported, the burden falls entirely on the importers while the government collects the tax revenue). Note as well that W is strictly decreasing in τ, which implies that $\frac{\partial W}{\partial \epsilon}(\tau) < 0$ at any $\tau > 0$, and $\frac{\partial W}{\partial \epsilon}(\tau) = 0$ at $\tau = 0$.

Fiscal capacity ρ has a similar (but opposite) conditioning effect on the rate that W decreases with R, i.e. $\frac{\partial^2 W}{\partial R \partial \rho} > 0$, $\frac{\partial W}{\partial \rho} > 0$ at any $R > 0$ and $\frac{\partial W}{\partial \rho} = 0$ at $R = 0$. Here, fiscal capacity is conceived of as the degree of efficiency of the alternative instrument. Countries with higher fiscal capacity have better non-tariff instruments for redistributing income; they may, for instance, have tax credits, trade adjustment assistance, etc. that can be used to redistribute income at relatively low cost. In contrast, low fiscal capacity countries may have fewer means of generating revenues besides tariffs, such that any compensation ends up being highly distortionary as well. The model allows for variation in this dimension, but makes the following assumption:

Assumption 1. *For any tariff rate τ', with $R' = \pi_1(\tau') - \pi_1(0)$, it is the case that $W(0,0,\epsilon,\rho) - W(\tau',0,\epsilon,\rho) > W(0,0,\epsilon,\rho) - W(0,R',\epsilon,\rho)$, for all ϵ and ρ*

This is the foundational assumption that compensation is a more efficient way of redistributing income than tariffs, though the degree of difference between the two instruments is conditioned by ϵ and ρ. This assumption is not usually very controversial, as given a nearly infinite set of possible things to tax in order to redistribute income, it seems unlikely that trade tariffs or non-tariff barriers are the most efficient option.[9] However, there is also work in the trade literature that addresses this question in detail (for instance, Dixit 1985). If this assumption did not hold, as might plausibly be argued for the case of less-developed countries with limited fiscal capacity, then the equilibrium outcome of the model is immediately clear: tariffs would always be chosen, as they are then the most efficient means of redistributing income *and* the means that best retains the political influence of the groups that receive it. This paper is not primarily interested in these cases, which I suspect make up (at most) a very small percentage of the total.

Analysis

We can now move on to an equilibrium analysis of the model. We start by examining what will happen if SIG 1 chooses to pursue protection. In equilibrium, given that SIG 1 is the first mover, they are effectively able to choose the τ that will eventually be implemented by taking into account in advance what SIG 2 and the Government will do in response. Thus

[9]This conclusion is strengthened when one considers reciprocal responses to trade protection.

we need to characterize their optimal τ.

In this case, given the sequencing of the game and full information, SIG 1 offers to contribute an amount in exchange for their chosen tariff rate that exactly compensates the government for both the weighted costs to voter welfare, and the foregone contributions from SIG 2. SIG 2 offers a schedule in which contributions exactly equal the benefit they would derive from lowering the tariff; in other words, their contribution schedule is "truthful", in the sense described by Bernheim and Whinston (1986).[10] Some non-truthful contribution schedules are possible in equilibrium, but only if they produce the same result as the truthful schedule, and truthful strategies are weakly dominant - thus I restrict attention to truthful schedules.[11] Government's only sequentially rational strategy is to choose the tariff rate that maximizes their weighted sum of contributions and voter welfare, which in equilibrium means they accept SIG 1's offer and implement the tariff level requested.

To see the intuition of this, note that SIG 2 is aware of Government's objective function and thus chooses a contribution schedule with full information about what tariff rate will be implemented in response to it, having already observed SIG 1's schedule. SIG 1 has no incentive to offer higher contributions than in the strategy profile outlined above, as they are obtaining their chosen tariff rate. If they, instead, offer a lower contribution, they will not achieve their chosen tariff outcome, as SIG 2 will exploit the gap by offering a contribution level that makes Government prefer implementing a lower tariff than what SIG 1 chose. Thus, SIG 1 chooses τ to maximize their objective function, taking into account that they will need to pay for SIG 2's foregone contributions and the cost of the welfare distortion to the Government.[12]

Thus we have:

$$\begin{aligned}
&u_1(\tau, S_t | T = 1, R = 0) \\
&= \pi_1(\tau) - \psi_s((\alpha W(0,0,\epsilon,\rho) - \alpha W(\tau,0,\epsilon,\rho)) + (X + \beta\pi_2(0) - (X + \beta\pi_2(\tau))) \\
&= \pi_1(\tau) + \psi_s(\alpha W(\tau,0,\epsilon,\rho) + \beta\pi_2(\tau) - \alpha W(0,0,\epsilon,\rho) - \beta\pi_2(0))
\end{aligned}$$

The above gives SIG 1's objective function, where they take into account SIG 2 and the Government's best responses. Taking the derivative with respect to τ and setting to zero

[10] Note: since the level of τ does not impact state variables, each actor considers only the current period when determining contribution schedules.

[11] For instance, SIG 2 could provide a schedule that includes lower or higher than truthful contributions for some tariff that is not chosen in equilibrium, so long as this is not enough to induce either Government to choose it or SIG 1 to change their strategy in anticipation of this schedule. Either of these changes would break the equilibrium, as SIG 2 would then want to divert to a truthful schedule (in the case of induced changes by SIG 1, this means the schedule would not be commitment credible for SIG 2).

[12] Technically, this describes an infinite set of subgame perfect strategies, but all of these strategies share a set of properties that makes them indistinguishable in terms of how they effect the outcome. For instance, SIG 1 could easily choose a contribution schedule that offers zero contributions for anything but their preferred tariff rate; given that their preferred tariff rate will be chosen in equilibrium.

returns the following first order condition.

$$\frac{\partial u_1(\tau, S_t|T=1,R=0)}{\partial \tau} = \frac{\partial \pi_1}{\partial \tau} + \psi_s \left(\alpha \frac{\partial W}{\partial \tau} + \beta \frac{\partial \pi_2}{\partial \tau} \right) = 0$$

This implicitly characterizes an optimal τ^*, when τ^* is at an interior solution. A corner solution of $\tau^* = 0$ is obtained when the above partial derivative is negative at $\tau = 0$, given strict concavity and monotonicity assumptions, i.e. when:

$$\frac{\partial u_1(\tau, S_t|T=1,R=0)}{\partial \tau}(\tau=0) = \frac{\partial \pi_1}{\partial \tau}(\tau=0) + \psi_s \left(\alpha \frac{\partial W}{\partial \tau}(\tau=0) + \beta \frac{\partial \pi_2}{\partial \tau}(\tau=0) \right) < 0$$

We can now derive the comparative statics to determine how τ^* changes with ϵ and β using the implicit function theorem. This leads to the following proposition.

Proposition 1. *The tariff rate chosen by SIG 1 (τ^*) is weakly decreasing in β and ϵ, i.e. $\frac{\partial \tau^*}{\partial \beta} \leq 0$ and $\frac{\partial \tau^*}{\partial \epsilon} \leq 0$, and is strictly decreasing when τ^* is at an interior solution.*

Proof in the appendix. These comparative statics should be familiar to those who have read Grossman and Helpman (1994). They provide a good baseline for thinking about the moving parts in this paper, before dynamics are introduced. The intuition is that increases in ϵ and β both increase the costs to government from a tariff that SIG 1 has to compensate them for, either by increasing the welfare costs of that tariff (with ϵ) or by increasing the degree to which competing groups oppose the tariff (with β), leading to more foregone contributions from these groups. Substantively, a corner solution is when protection is too costly or the interest group is too politically weak for any positive tariff rate to be profitably obtained.

However, to generate insights about the choice between protectionism and compensation, we need to understand how the indirect utility function $\gamma(\epsilon, \beta, \rho, S_t|T=1) \equiv u_1^*(\tau^*, S_t|T=1, R=0)$ changes with these parameters. I derive these comparative statics as well.

Lemma 1. *The single-period indirect utility function γ is weakly decreasing in β and ϵ whenever SIG 1 pursues protection, i.e. $\frac{\partial \gamma}{\partial \beta}(T=1) \leq 0$ and $\frac{\partial \gamma}{\partial \epsilon}(T=1) \leq 0$, and is strictly decreasing when τ^* is at an interior solution.*

These comparative statics are fairly intuitive given Proposition 1, and are proven in the appendix. As ϵ and β increase, obtaining higher tariffs becomes more costly, making tariffs a less attractive means of obtaining transfers from the government.

We can now examine what happens when SIG 1 chooses compensation (i.e. when $T = 0$). In this case, SIG 2 is no longer relevant to the game, as they are indifferent between levels of compensation R. Outside of this, SIG 1's decision problem looks very similar to when they were determining the optimal tariff rate; they still need to compensate the Government for the welfare costs of compensation, just not for any foregone revenues from SIG 2. This produces the following:

$$u_1(R, S_t|T=0, \tau=0) = R + \pi_1(0) - \psi_s((\alpha W(0,0,\epsilon,\rho) - \alpha W(0,R,\epsilon,\rho))$$

Which leads to the following first order condition:

$$\frac{\partial u_1(R, S_t | T = 0, \tau = 0)}{\partial R} = 1 + \psi_s \left(\alpha \frac{\partial W(0, R, \epsilon, \rho)}{\partial R} \right) = 0$$

This implicitly characterizes an optimal R^* when R^* is an interior solution, and a $\gamma(\epsilon, \rho | T = 0) \equiv u_1^*(R^*, S_t | T = 0, \tau = 0)$. A corner solution of $R^* = 0$ obtains when:

$$\frac{\partial u_1(R, S_t | T = 0, \tau = 0)}{\partial R}(R = 0) = 1 + \psi_s \left(\alpha \frac{\partial W(0, R, \epsilon, \rho)}{\partial R}(R = 0) \right) < 0$$

I derive comparative statics in a similar fashion to when protection was chosen.

Proposition 2. *The optimal compensation level chosen by SIG 1 (R^*) is weakly increasing in fiscal capacity ρ, as is the single-period indirect utility for when compensation is chosen (i.e. $\gamma(T = 0)$). These are strict when R^* is at an interior solution.*

Proof is in the appendix. The intuition here is similar to that of tariffs and import demand elasticities; as fiscal capacity increases, compensation becomes a more attractive instrument, leading to higher levels of compensation, and a higher utility from choosing compensation. A corner solution of $R^* = 0$ is, substantively, the case of uncompensated free trade.

To determine whether SIG 1 would choose compensation or protection in any single period of the game, we have to compare the indirect utility obtained when protection or compensation is chosen. Given the assumptions of the model, we have the following:

Proposition 3. *In any single period of the game, compensation is weakly preferred to protection, i.e. $\gamma(\epsilon, \rho, \beta, S_t | T = 0) \geq \gamma(\epsilon, \rho, \beta, S_t | T = 1)$, for all ϵ, ρ, and β, and compensation is strictly preferred except when $R^* = 0$.*

The proof of this is in the appendix, but the intuition is immediately clear. Compensation is simply a less costly way of obtaining transfers from the government, both in welfare terms (it is less distortionary), and because it does not require compensating for foregone contributions from SIG 2. Since it is less costly, in any single period SIG 1 will be able to profitably obtain more of it, and their indirect utility will be correspondingly higher. This is, in effect, a statement of the puzzle around which this paper is framed: *why would an interest group choose protection when compensation is less costly?*

This also leads to the following useful lemma.

Lemma 2. *In any single period of the game, if $R^* = 0$ then $\tau^* = 0$ as well.*

Proof of this is in the appendix. The intuition is clear; since R is a more efficient means of transferring income, if an interest group cannot obtain any rents via R, they will also be unable to obtain any via τ.

We also need to derive comparative statics with respect to ψ_s, which captures the political influence of SIG 1. This will be important when dynamics are introduced into the model.

Proposition 4. *The optimal tariff rate τ^*, optimal amount of compensation R^*, and the single-period indirect utility function γ are weakly decreasing in political influence ψ_s, i.e. $\frac{\partial \tau^*}{\partial \psi_s} \leq 0$, $\frac{\partial R^*}{\partial \psi_s} \leq 0$ and $\frac{\partial \gamma}{\partial \psi_s} \leq 0$, and are strictly decreasing except in cases of corner solutions.*

Proof is in the appendix. The intuition is that as political influence decreases, described here as an increase in the cost of lobbying contributions/activity, the ability to obtain any kind of favorable policy decreases, reducing the indirect utility obtained from either instrument.

With this in hand, we can now consider the dynamic setting outlined in the setup to the model. To simplify the exposition, I introduce the following notation:

- $\chi^P(\epsilon, \beta, \psi_P) = \gamma(\epsilon, \rho, \beta, S_t = P | T = 1)$
- $\chi^F(\epsilon, \beta, \psi_F) = \gamma(\epsilon, \rho, \beta, S_t = F | T = 1)$
- $\phi^P(\rho, \psi_P) = \gamma(\epsilon, \rho, \beta, S_t = P | T = 0)$
- $\phi^F(\rho, \psi_F) = \gamma(\epsilon, \rho, \beta, S_t = F | T = 0)$

χ^P and χ^F give the single period indirect utility obtained from tariffs in protectionist and free trade states respectively. ϕ^P and ϕ^F give the single period indirect utility obtained from compensation in protectionist and free trade states respectively. From Proposition 3, we know that $\phi^P > \chi^P$ and $\phi^F > \chi^F$ (except when $R^* = 0$). This leads to the following lemma:

Lemma 3. *In a free trade state, compensation is always chosen over protection.*

Proof is immediate. This follows from the fact that $\phi^F > \chi^F$, and the fact that $S_t = F$ is an absorbing state; there is no possibility of exiting the state, and thus no possible advantage to choosing tariffs, given that tariffs lead to a lower level of transfers than compensation.[13]

Furthermore, given that $\psi_F > \psi_P$, Proposition 4 implies that $\chi^F \leq \chi^P$ and $\phi^F \leq \phi^P$, and these inequalities will all be strict except in cases of corner solutions. Given the dynamic setup outlined earlier, we can thus consider the following pure strategy Markov (state-dependent) strategies for SIG 1, having ruled out choosing protection in free trade states in Lemma 3.

- $\sigma^1 = (T = 0 \text{ if } S_t = P, T = 0 \text{ if } S_t = F)$
- $\sigma^2 = (T = 1 \text{ if } S_t = P, T = 0 \text{ if } S_t = F)$

With σ^1, SIG 1 chooses compensation in either state of the world. Thus, after the first round, the state transitions from protectionism ($S_t = P$) to free trade ($S_t = F$). With σ^2, SIG 1 chooses protection when in a protectionist state, which maintains their political influence in future periods. SIG 1 would choose compensation if they were in a free trade state, but given σ^2, they never reach one. These two strategies produce the following value functions, which describe the discounted present value of each strategy, with discount factor δ.

[13] Technically, when $R^* = 0$ and $\tau^* = 0$, an interest group will be indifferent between protection and compensation. However, in this case the instruments are identical, so for simplicity I rule out protection.

- $V_1(\sigma^1) = \phi^P + \delta\frac{\phi^F}{1-\delta}$
- $V_1(\sigma^2) = \frac{\chi^P}{1-\delta}$

ϕ^P is the single period payoff obtained from pursuing compensation in a protectionist state, $\delta\frac{\phi^F}{1-\delta}$ is the value of the discounted infinite stream of compensation payoffs obtained after the state transitions to free trade, while $\frac{\chi^P}{1-\delta}$ is the value of the discounted infinite stream of protection payoffs. SIG 1 prefers to adopt strategy σ^1 whenever $V_1(\sigma^1) > V_1(\sigma^2)$, prefers σ^2 when the inequality is reversed, and is indifferent when they are exactly equal. This allows us to come to the following conclusion.

Proposition 5. *The unique Markov Perfect Equilibrium of the model is:*

1. *If $\phi^P + \delta\frac{\phi^F}{1-\delta} > \frac{\chi^P}{1-\delta}$, SIG 1 chooses $T = 0$ in stage 1 of the first period of the game. SIG 1 sets a contribution schedule, then obtains a compensation payoff ϕ^P. The state then transitions to free trade, and SIG 1 obtains a payoff of ϕ^F for all future periods, with SIG 2 obtaining $u_2 = X + \beta\pi_2(0)$ in all periods of the game, and Government obtaining $C_1(0, R^*(S_t = P)) + \alpha W(0, R^*(S_t = P), \epsilon, \rho)$ in the first period and $C_1(0, R^*(S_t = F) + \alpha W(0, R^*(S_t = F), \epsilon, \rho)$ in all subsequent periods.*

2. *If $\phi^P + \delta\frac{\phi^F}{1-\delta} < \frac{\chi^P}{1-\delta}$, SIG 1 chooses $T = 1$ in stage 1. SIG 1 and SIG 2 set contribution schedules, the government chooses τ^*, and the game repeats indefinitely. In every period of the game, SIG 1 obtains a payoff of χ^P, SIG 2 gets $u_2 = X + \beta\pi_2(\tau^*)$, and Government gets $C_1(\tau^*(S_t = P), 0) + \alpha W(\tau^*(S_t = F), 0, \epsilon, \rho)$.*

3. *If $\phi^P + \delta\frac{\phi^F}{1-\delta} = \frac{\chi^P}{1-\delta}$, SIG 1 can randomize between strategies, allowing for a number of protectionist states followed by a transition to free trade and compensation thereafter.*

Proof follows from preceding discussion. This is the core result of the model. Despite the fact that SIG 1 prefers compensation to protection in any single period of the game (see Proposition 3), *they will still often choose to lobby for protection instead*, since this allows them to retain their political influence and potentially obtain higher rents (if $\phi^F < \chi^P$) in future periods. Thus, the puzzle outlined in the introduction to this paper is resolved by introducing dynamics. Interest groups cannot obtain their preferred outcome of high levels of compensation in perpetuity, because the resultant reduction in their political influence reduces the incentives of Government to accommodate them; the bargaining process between SIG 1 and the Government is subject to a commitment problem.

If $\phi^F > \chi^P$, then the outcome will always be equilibrium 1; this is because even with reduced influence in future periods, SIG 1 is still obtaining a higher payoff from compensation than they would obtain from pursuing protection in any state. This could, conceivably, be the case for industries where protection is very "expensive" for an interest group to "purchase" (e.g. if it's a highly elastic commodity for which there exist powerful downstream lobbies) and if

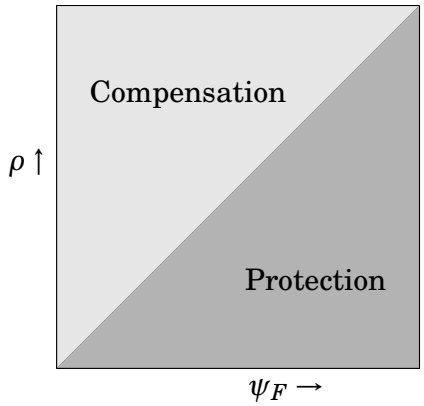

Figure 1: Comparative Statics for ρ (fiscal capacity) and ψ_F (dynamic decline). (Holding fixed ϵ, β, and ψ_P)

the degree of dynamic decline is relatively small (ψ_F is relatively low).

However, I expect that in most cases, $\phi^F < \chi^P$, i.e. import-competing SIGs will experience a decrease in rents extracted from the government after liberalization reduces their political influence. In some cases, you even see the total dissolution of the interest group in question after liberalization: this would lead to a very high ψ_F, and a very low ϕ^F. In this case, you may still get compensation instead of protection, so long as $\phi^P > \frac{\chi^P}{1-\delta} - \delta\frac{\phi^F}{1-\delta}$. In other words, compensation will still be chosen over protection if the single-shot benefit SIG 1 can obtain in the current period exceeds the difference between the discounted stream of tariff payoffs and the discounted stream of reduced-influence compensation payoffs.

Now recall the comparative statics identified earlier in Lemma 1 and Proposition 3, i.e. $\frac{\partial \chi^P}{\partial \epsilon} \leq 0$, $\frac{\partial \chi^P}{\partial \beta}$, $\frac{\partial \phi^P}{\partial \rho} \geq 0$, $\frac{\partial \phi^F}{\partial \rho} \geq 0$, and $\frac{\partial \phi^F}{\partial \psi_F} \leq 0$. Through the effects these parameters have on χ^P, ϕ^F, and ϕ^P, we can determine the following:

Proposition 6. *Higher import demand elasticities, lobby competition, and fiscal capacity all increase the likelihood that compensation will be chosen as an alternative to protection, while a higher degree of dynamic decline increases the likelihood of protection.*

Proof follows from preceding discussion. The intuition of this proposition is that higher import demand elasticities and lobby competition increase the cost of protection, while higher fiscal capacity reduces the cost of compensation. A higher degree of dynamic decline reduces the payoffs to the interest group once free trade has been enacted, reducing their incentive to accept liberalization.

At this point, it is worth specifically considering the implications of the corner solutions of $\tau^* = 0$ and $R^* = 0$, as these are substantively interesting, albeit technically complicating. If $\tau^* = 0$ when the state of the world is protectionist ($S_t = P$), then the outcome will be free

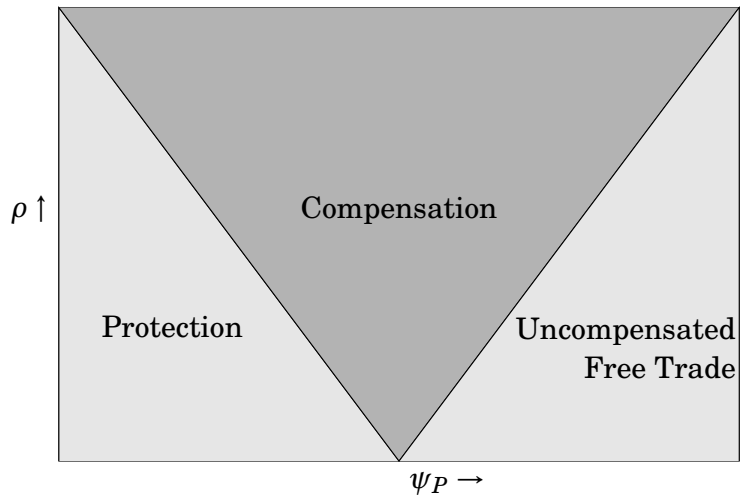

Figure 2: When Do We Get Uncompensated Free Trade?
The effects of ρ (fiscal capacity) and ψ_P (costs of lobbying in protectionist state).
(Holding fixed ϵ, β, and ψ_F)

trade, as any amount of compensation will strictly dominate. If $R^* = 0$ when $S_t = P$, we have the case of *uncompensated* free trade; the interest group is not influential enough to obtain either compensation or protection in either state of the world, so free trade is pursued as a default, leading to payoffs of $\pi_1(0)$ in all periods. Once a corner solution is obtained, further movement in the parameters of the model do not lead to any additional changes in the equilibria. However, we can assess the impact of the parameters on the likelihood that such a corner solution will be the outcome, which leads to the following proposition.

Proposition 7. *Increases in ϵ and β increase the likelihood of a corner solution of $\tau^* = 0$, decreases in ρ increase the likelihood of a corner solution of $R^* = 0$, and increases in ψ_s increase the likelihood of both corner solutions.*

Proof is in the appendix. The most substantively interesting case described by this proposition is that of uncompensated free trade ($R^* = 0$); this paper has focused on the choice between protection and compensation, but empirically, we observe many cases of interest groups receiving neither. The model suggests this is most likely when an interest group starts the game off in a relatively weak position (ψ_P is high) or when fiscal capacity (ρ) is low. ψ_P could be high for a number of reasons; for instance, an interest group might not have successfully overcome the collective action problems associated with lobbying the government, or might not be located in a politically important geographic area.

We can now identify the conditions under which compensation can make liberalization possible when it otherwise would not be. We have the following proposition:

Proposition 8. *Free trade is achieved because of the existence of compensation when both $\frac{\chi^P}{1-\delta} < \phi^P + \delta\frac{\phi^F}{1-\delta}$ and $\tau^*(S_t = P) \neq 0$. If $\tau^* = 0$ when $S_t = P$, free trade would have been the*

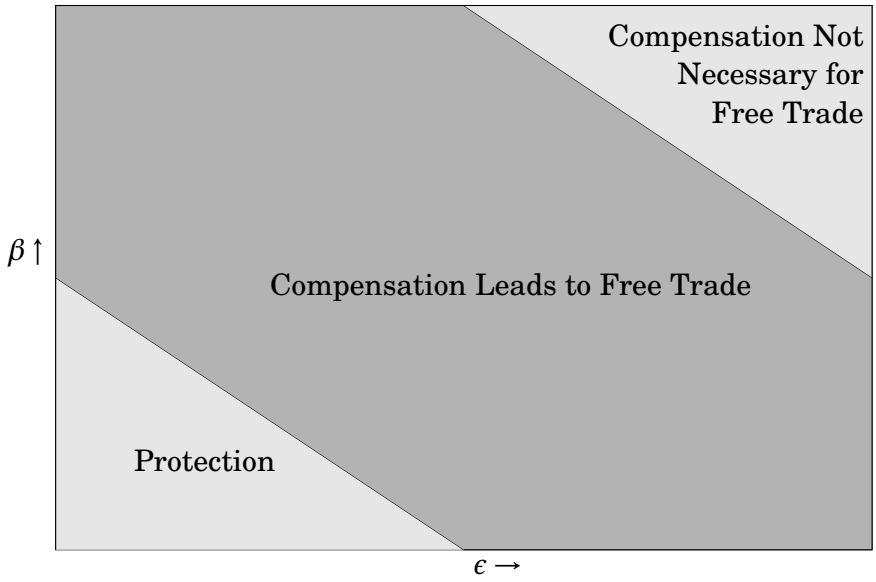

Figure 3: When Does Compensation Lead to Free Trade?
The effects of β (lobby competition) and ϵ (import demand elasticity).
(Holding fixed ρ, ψ_P, and ψ_F)

outcome anyway, with or without compensation. When, $\frac{\chi^P}{1-\delta} > \phi^P + \delta\frac{\phi^F}{1-\delta}$*, compensation has no effect on the outcome, as it is not chosen.*

Proof is immediate. This follows because SIG 1 always has the option of not pursuing a tariff and achieving a payoff of $\pi_1(0)$ (i.e. if $\tau^* = 0$), in which case they accept free trade rather than engaging in any lobbying activity. If, however, $\tau^* \neq 0$ when $S_t = P$, then lobbying and obtaining a tariff is profitable for SIG 1, and they will do so if that is the only option available to them. However, so long as that payoff is less than what they get from compensation, they will deviate to compensation instead.

This provides theoretical foundations for determining when compensation can be an important part of a bargain obtaining free trade, instead of something that interest groups will use when it's available but which does not change the outcome. Embedded liberalism suggests that compensation is an important part of the political story of liberalization: this model gives conditions under which this is true, namely that fiscal capacity is sufficiently high to make compensation an attractive option, and import demand elasticities and lobby competition are high enough to keep protection from being more attractive than compensation, but low enough that free trade would not be chosen without compensation (See Figure 3).

Other Forms of Political Competition in Trade

The model frames political competition over trade as between industry-level interest groups, with some groups upstream in a production process while others are downstream. This char-

acterizes a significant portion of trade politics, but there are two other forms of competition that the model can speak to that are worth flagging explicitly: (1) competition between exporters and import-competitors; (2) firm-level competition over particularistic trade policies.

To start, much of trade liberalization occurs in the context of reciprocal trade commitments made under some broader trade agreement. In this environment, the set of actors impacted by retaining a protectionist policy expands; export industries that want increased access to foreign markets are pitted directly against import-competing industries that might want to retain protection, and even within an industry, you have competition between firms that export and firms that do not (Osgood 2017). This can be incorporated into the model fairly straightforwardly: it would simply increase the value of β, i.e. the parameter reflecting the degree of political competition.

However, we also see that in cases of very high levels of product differentiation, tariff codes can become sufficiently fine-grained so as to make protection a particularistic good, captured by only one or a very small number of firms (Kim 2017). Under these conditions, we would expect lobbying to occur at the firm level (Bombardini and Trebbi 2012), and the underlying economic model we can use to understand the situation differs somewhat from the comparative-advantage framework that has been the focus in this paper.

This too can be understood through the lens of this model. To start, if protectionist policies operate at the firm level, then much of the costs of trade protection will arise because of the misallocation of resources across firms: indeed, for trade in industries characterized by high product differentiation, much of the gains from more open trade have arisen from a reallocation of production from less productive to more efficient firms[14], while particularistic policies have been shown to produce significant welfare costs when they result in firms growing bigger than they should be, leading to a less efficient allocation of labor, capital, and other factors of production (Huneeus and Kim 2019).

Given this, we still have the fundamental dilemma described earlier in this paper: trade protection produces welfare costs due to a misallocation of resources, and any compensatory policy that allows the gains from trade to be realized by reallocating these resources will result in a reduction of political influence in the groups that favor protectionism. In this case, protection-seeking firms know that losing protection means they will shrink in size, lose profits, and lose employees, all of which is strongly associated with firm-level political influence (Bombardini 2008, Osgood et al. 2016, Osgood 2017). So as with industry-level trade, the dynamic story remains the same: protectionist firms *could* be bought with compensatory policies, but firms are wary of accepting these due to the reductions in future political influence they are tied to, and thus will only accept them in cases where the prospective decline

[14]This additional source of gains from trade has been one of the key insights of the heterogeneous firms in trade literature, or "New New Trade Theory". Trefler (2004) finds that the gains from exiting inefficient producers accounts for half of the productivity gains from the Canada-US Free Trade Agreement. More broadly, Melitz and Trefler (2012) provide a review of work on gains from trade when firms matter.

is limited (which would plausibly occur in cases of more limited product differentiation), or in cases where the costs of pursuing protection are especially high (i.e. when the resource misallocation costs are especially high).

Robustness

The model as outlined makes a number of simplifying assumptions to ensure tractability, and to allow for a cleaner exposition of the main results. An appendix addressing the robustness of the results to relaxing these assumptions can be found online, which includes: (1) a discussion of the sequencing of the game within any period; (2) a discussion of the choice to model lobbying as an auction in which interest groups bid to buy policy; (3) a version of the model in which free-trade is not a fully absorbing state, but one in which interest groups can regain some (but not all) of their lost political power by lobbying to reimpose protection. This analysis suggests that the core results are not dependent on the particular structure of the model, and the alternative version of the dynamic model produces some interesting new empirical implications, which are also discussed in the appendix.

Applications of the Model

This paper was designed to accomplish two goals. First, it has sought to provide an answer to a theoretical puzzle about trade protection: why is it used over more efficient means of redistributing income? Second, it has looked to provide a theory of compensation in trade politics, including when and how compensation can be a useful part of a bargain obtaining free trade. In pursuit of the second goal, the model has produced clear empirical implications that can be a useful lens for examining the real world use of protection and compensation.

To start, compensation should play an important role in trade politics, but we would expect the bulk of compensation to come in the form of temporary measures that help cover the difference in costs to a special interest group between lobbying to maintain tariffs and adjusting to the costs of more open trade. Long-term measures, in which governments provide continued support to members of interest groups who lost out from open trade, should be rare due to commitment problems in the lobbying process.

In fact, most compensatory policies we observe appear to follow this pattern. Trade Adjustment Assistance (TAA) in the United States provides support to those hurt by exposure to trade in the form of job training, wage supplements, and income support, but these benefits can only be claimed for a period of about two years (Collins 2014). Similarly, active labour-market policies (ALMP) popular in several countries in Europe are a collection of temporary measures including job-training, job search assistance, and the creation of short-term public-sector jobs for the recently unemployed (Bonoli 2010, Vlandas 2013).

Table 1: What Makes Each Outcome More Likely?

Protection	**Compensation**	**Uncompensated Free Trade**
Low ρ (fiscal capacity)	High ρ (fiscal capacity)	Low ρ (fiscal capacity)
Low ϵ (elasticity)	High ϵ (elasticity)	High ψ_P (low initial political power)
Low β (lobby competition)	High β (lobby competition)	
High ψ_F (dynamic decline)	Low ψ_F (dynamic decline)	

However, while the model predicts compensation will often be an important tool that governments can use to achieve political bargains on open trade, it also suggests that these bargains will not be possible in many cases. This should lead to industry strongholds, where protection is retained indefinitely, despite its inefficiency. We see plenty of examples of this as well: for instance, in the United States, sugar, dairy, canned tuna, and footwear are obvious cases. Footwear is discussed in depth later in this paper.

Finally, we should expect the variation in these outcomes (i.e. temporary compensation versus indefinite protection) across industries and countries to be explained by parameters identified by the model. The impact of these parameters is summarized in Table 1.

The Steel Industry

We can also examine specific cases of protection and compensation through the lens of the model. For instance, consider the steel industry in the United States. US Steel is a highly elastic commodity[15] with many powerful downstream interests (Blonigen 2016).

However, steel is also a case where the anticipated degree of dynamic decline of the industry has shifted over time due to the development of a new production technology: minimills. Minimills drastically increased the productivity of the steel industry, and are far more capital-intensive than traditional steel production processes.[16] Prior to the advent of minimills, the steel industry faced a very steep prospective decline if steel were liberalized, and lobbied hard (and successfully) to obtain protection via voluntary export restraints (VERs) and comprehensive quotas at several points. However, as minimills became more prominent around the late 1980s to early 1990s, this prospective decline became less severe: increased foreign competition would decrease the competitiveness of steel produced via traditional "vertically integrated" processes, but the industry could survive by shifting more of their production towards minimills (Collard-Wexler and Loecker 2015).

What was the seeming consequence of this shift in the degree of dynamic decline (ψ_F)? As a VER Agreement neared expiry in 1992, steel firms gave up on lobbying for an extension

[15]Import demand elasticity estimates in Kee, Nicita, and Olarreaga (2008) provide an average elasticity of -3.32 across steel tariff categories , compared to a median of -1.39 across all tariff categories in the US. This puts steel at approximately the 78th percentile in the US.

[16]Collard-Wexler and Loecker (2015) discusses minimills development in detail.

(Moore 1996 p. 28). In the 27 years since, while the steel industry has sometimes lobbied for limited forms of protection, generally via anti-dumping and safeguard provisions in trade law, they have given up on ambitions of the more comprehensive protection of the 1970s and 1980s. Their more limited demands have rarely been met for long: Bush's 2002 steel tariffs were reversed quickly under pressure from the EU, and as of writing this, even President Trump has agreed to lift tariffs imposed on steel from Canada and Mexico.[17]

Meanwhile, during this period, the steel industry has been one of the main recipients of trade adjustment assistance (TAA), which has often been explicitly marketed politically as a partial solution to the industry's concerns. For instance, a 2015 statement from Minnesota Governor Mark Clayton and Senators Klobuchar and Franken explicitly claimed credit for TAA approval for steel workers, suggesting it came as a result of phone calls they made to the Department of Labor (Clayton, Franken, and Klobuchar 2015).

Thus, this case follows the predictions of the model almost exactly. High elasticities and downstream competition made protecting steel fairly costly for the government, but when the steel industry was faced with a steep economic decline they were willing to invest the lobbying activity required to obtain it. When a shift in the degree of dynamic decline occurred in the late 1980s to early 1990s, this disrupted that equilibrium, leading to a shift towards compensation and liberalized trade in steel. However, because the degree of dynamic decline was (relatively) modest, the industry has remained somewhat politically influential, able to obtain compensation and some other temporary concessions, but with a clearly observable reduction in their influence from several decades ago. Moreover, while it is impossible to know for certain what the outcome would have been otherwise, compensation has been treated by politicians as an important part of the political bargain that made liberalized trade in steel feasible.

The Footwear Industry

The footwear industry retains some of the highest import tariffs in the United States, at an effective rate of 9.8% - the highest of any manufactured good (USITC 2011). At the same time, it is an industry in which the vast majority of domestic consumption is satisfied via imports - 98%, worth 26 billion dollars each year (USITC 2015)! Thus, while these tariffs cost consumers billions of dollars each year via increased costs of footwear, the domestic footwear industry being protected is actually very small, employing only about 12,000 workers.

The most prominent company in this domestic industry is New Balance Athletics. New Balance has been extraordinarily active in lobbying government officials to maintain these tariffs, often leveraging their manufacturing facilities in Maine, which employ a few thousand workers in the state. This lobbying became especially politically contentious in April 2016, when it became clear that the Trans-Pacific Partnership (TPP) was likely to liberal-

[17] Washington Post, 17 May 2019.

ize (on a delayed schedule) import tariffs on Vietnamese footwear. New Balance successfully lobbied both Maine Senators (Susan Collins and Angus King) to oppose the TPP, with Angus King explicitly linking his opposition to the TPP to New Balance, saying in a statement that "if the TPP, when finalized, does not adequately address the needs of US athletic footwear manufacturers it would be very unlikely that I would support its passage." (King 2013).

This lobbying effort became even more contentious on November 10, 2016, when the New Balance vice president of public affairs made a statement to the Wall Street Journal in which he claimed "The Obama administration turned a deaf ear to us and frankly, with President-elect Trump, we feel things are going to move in the right direction", later clarifying that this was in reference to Trump's opposition to the Trans-Pacific Partnership.[18] This was taken by white supremacists as a statement of support, leading them to champion the shoes as the "Official Shoes of White People", which eventually led to a statement by New Balance denying any association with bigotry.

Given that New Balance's statement of support for President Trump was made in the immediate wake of an exceptionally contentious election, it entailed significant costs for them in terms of public relations, with many speculating that they might have been better served by keeping quiet. However, one should consider their actions as part of a continued effort to lobby against the TPP, which Trump later withdrew from on January 23, 2017.

To summarize, New Balance invested an extraordinary amount to lobby the government against reducing footwear tariffs. However, strikingly, New Balance actually produces 75% of their shoes abroad and imports them into the United States, such that the majority of their production is subject to the kinds of tariffs they lobbied so hard against.[19] It is thus unclear how much footwear tariff reductions would impact them financially. Why, then, would they lobby so actively against them?

The model of this paper can provide insight into this question. The US footwear industry is clearly characterized by low import demand elasticities, given that high tariffs have not kept foreign exporters from obtaining a 98% market share. Furthermore, while large companies like Nike (which imports all of its footwear from manufacturing facilities abroad) lobbied for the tariff reductions, these companies were able to pass off some share of the costs of the tariffs to consumers, and also had a number of other lobbying priorities, such as intellectual property and domestic taxation. Thus, the lobbying costs for New Balance of maintaining footwear tariffs were not as high as one might initially expect.

While eliminating import tariffs would not significantly hurt New Balance's profits directly, it would eliminate the competitiveness of their US manufacturing operations in Maine, such that they would have to shift production overseas. This would significantly reduce New Bal-

[18] Wall Street Journal, 10 November 2016.
[19] Wall Street Journal, 30 September 2014.

ance's political influence in the future, given how effectively they had leveraged these factories in their past lobbying activities. Consequently, this provides a clean example where a policy change would bring about a reduction in influence without much affecting profits or other parts of the interest group's objective function.

How might New Balance use continued political influence to their gain? On November 30, 2016, Senators Collins and King announced that they had insured that a provision would be included in the National Defense Authorization Act of 2017 that would require the US military to buy 125,000 pairs a year of New Balance shoes (King 2016). This is essentially a pure political rent, and it was obtained because New Balance retained its political influence by keeping its US manufacturing alive via tariffs on footwear.

Thus, this case illustrates several aspects of this paper's model: how low import demand elasticities (ϵ) and lobby competition (β) can make trade tariffs less costly for the government to provide (even when the costs to consumers seem high), and how high prospective reductions in political influence (high ψ_F) can motivate interest groups to pursue protection in order to retain political influence in the future.

More generally, the examples of footwear and steel illustrate something broader about the politics of trade. In the rationalist conflict literature, the realization that the actors involved were not choosing between war and the status quo but between war and negotiated bargains led to a shift in focus in empirical analysis to the characteristics resulting in bargaining breakdown: primarily commitment problems and information asymmetries. In a similar fashion, this paper's model leads one to focus on the characteristics blocking compensatory alternatives to protection in explaining trade policy patterns: namely, *dynamic* effects, and the resulting commitment problems. Indeed, it is unlikely that the standard political economy account would predict that steel, a large and powerful industry, would largely lose protection while the tiny domestic footwear industry would achieve some of the highest levels of it, but a focus on dynamic considerations can help to resolve this puzzle.

Conclusion

This paper has developed a dynamic model that can help to address two outstanding puzzles in the political economy of trade literature: (1) Why is trade protection often used by governments despite the fact that it is an inefficient means of redistributing income? (2) Given that both protection and compensation appear to be used by governments, what accounts for their heterogeneous use across states, sectors, industries, and time? With respect to the first puzzle, the model identifies how the dynamic effects of liberalization on the strength of competing lobby groups can lead to instances where protectionism - though less efficient - may be preferred by lobby groups because the Pareto superior compensation transfers are subject to a commitment problem.

With respect to the second puzzle, the model provides a theoretical framework in which governments would be expected to employ both compensation and protection, and provides conditions circumscribing their use, depending on parameters such as import demand elasticities, downstream lobby competition, the anticipated degree of dynamic decline, and fiscal capacity. This can provide insight into both the empirical patterns of compensation and protection, and the conditions under which compensation is actually pivotal in producing liberalization, allowing for a new interpretation of the compromise of embedded liberalism.

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Appendix for Protection as a Commitment Problem

Sequencing

It is worth addressing whether or not the sequencing of the game within any period matters for the outcome. I assume that SIG 1 sets their contribution schedule first and thus gets a first-mover advantage to essentially determine the eventual tariff rate that is implemented (subject to needing to pay for the additional costs to Government). There are two reasons to believe this assumption is unobjectionable. First, this sequencing seems to approximate what trade politics often looks like: industry groups that oppose tariff increases rarely begin lobbying before the protectionist interest group begins advocating for a tariff, and instead seem to behave in a more reactive fashion. In the case of the steel industry, for instance, steel interest groups have often initiated lobbying for a tariff, with automobile manufacturers responding afterwards with their own lobbying activity against it. It is thus reasonable to assume protectionist groups may be able to structure their initial demands in order to obtain some advantage.

However, a much more important response is that while the sequencing is very important for the distribution of the surplus from the bargaining process, it should have minimal effect on the policy outcomes generated by this process. Note that if the model produces a positive τ^* when protection is chosen, it implies that there is some surplus to the bargaining process generated by a tariff; the Government is eventually paid for both their weight on the welfare costs of the tariff and the costs of the tariff to SIG 2.[1] If SIG 2 valued a zero tariff more than SIG 1 values the higher tariff, they could pay the government the difference and have a zero tariff implemented; a $\tau^* > 0$ thus implies that this is not the case. This also implies that τ^* is the value of τ that maximizes this surplus, as SIG 1 is taking both SIG 2 and the Government's marginal costs into account.

The main consequence of SIG 1 going first is that they are able to structure their initial offer in a way that they extract the entirety of the surplus available to the two interest groups; for instance, in a protectionist state, the value of the total surplus is $\Omega = \chi^P$, and is obtained by SIG 1. Now, instead of analyzing a specific alternative model, let's consider a larger class of bargaining models that assign bargaining power $\theta \in [0,1]$ to SIG 1, and $1-\theta$ to SIG 2, such

[1] This might seem slightly odd, since tariffs are value-destroying, but this occurs because many of those who experience the costs of tariffs (e.g. consumers) only enter into the bargaining process via the welfare component of the government's utility function, which has the effect of downweighting them relative to the interest groups in the game.

that SIG 1 obtains $\theta\Omega$ and SIG 2 obtains $(1-\theta)\Omega$. This allows us to generate the following proposition:

Proposition 9. *Any bargaining model that assigns strictly positive bargaining power to SIG 1 (i.e. $\theta > 0$) produces the same results as the baseline model.*

Proof is in the proofs section of the appendix. The main exception to note here is that if SIG 1 has *no* bargaining power at all, then the results could change, because SIG 1 becomes indifferent between all outcomes of the game in all periods. However, as long as they receive some positive fixed fraction of the surplus in every period, it does not change the trade-offs they face between different policy options.

The Lobbying Process

One might also question the assumptions the model makes about the lobbying process. This paper adopts an exchange model approach to the lobbying process, in which contributions are traded for policies, but there are broadly two other categories of lobbying models that are discussed in the literature: (1) signaling models (e.g. Austen-Smith and Wright 1992, 1994); (2) legislative subsidy models (Hall and Deardorff 2006).

Signaling models posit that SIGs have private information about several factors that are relevant to legislators, such as the levels of constituency support for a particular policy, but these SIGs have incentives to misrepresent this private information in order to try to convince the legislator to adopt the SIG's preferred policy. Thus, costly lobbying becomes a way of signaling credibly this payoff-relevant information to the government.

However, this approach to understanding lobbying provides fewer clues as to which groups are likely to be able to obtain protection. In many cases with trade, the relevant information is widely known: it is clear which interest groups benefit and lose from protection, and that it harms consumers. There is some new work in trade politics that uses signaling models to better understand how firms can persuade the government to pursue their legal cases via international trade institutions (see Brutger 2017), but this work complements, rather than substitutes for traditional approaches to understanding lobbying which likely explain a more substantial part of the variation.

Legislative subsidy models argue that rather than trying to change the effective preferences of legislators, either by offering lobbying contributions in exchange for policy or by providing legislators with payoff-relevant information, lobbying is often designed to relax the budget constraint of legislators who have similar interests. Thus, legislators act "as if" they are working on behalf of the lobby group's preferences, when in actuality they are just more effectively pursuing their own interests.

While this approach also has some weaknesses when applied to trade politics, it is also unclear that the policy implications would be very different from those of exchange models. As the authors note, with a diverse set of legislators to choose between, legislators that

favor policies that are also favored by powerful SIGs will obtain the greatest subsidies, and will thus be the most productive in pursuing their agenda. Policy should consequently be biased towards those who can organize and make campaign contributions, pay professional lobbyists, and finance organizations that support them (Hall and Deardorff 2006 p. 14). In this sense, the predictions about the factors that underlie interest group influence are essentially the same, suggesting few differences in the predictions generated by adopting such a model instead of an exchange model like the one employed by this paper.

Alternative Dynamic Model: Non-Absorbing Liberalization

Do the core intuitions of the model hold if an interest group can partially regain some of their political influence by lobbying for protection in a free trade state, even if they are unable to fully reverse the process? This section introduces a model where this is possible, which produces some new interesting equilibria, but which fundamentally retains the trade-off of higher net returns from compensation but with dynamic reductions in influence that drives the results in the version of the model in the main paper.

To do this, let's consider a variant of the model where there are three states of the world - $S_t \in \{F, M, P\}$ - where in addition to the free trade and protectionist states of the world from the main model, we add in a "moderate" state where a group is able to regain some of their political influence after free trade is realized by pursuing protection. So we have $\psi_F > \psi_M > \psi_P$, with state transitions handled as follows:

- If $S_t = P$ and compensation is chosen, then the state transitions to $S_t = F$. If protection is chosen, then the states remains $S_t = P$.
- If $S_t = F$ and compensation is chosen, then the state remains $S_t = F$. If protection is chosen, then the state transitions to $S_t = M$.
- If $S_t = M$ and compensation is chosen, then the state transitions to $S_t = F$. If protection is chosen, then the state remains $S_t = M$.

So, once liberalization has occurred from the initial state $S_t = P$, it is impossible to return to that state, but some amount of political influence can be regained by pursuing protection in a free trade state. The rest of the model remains identical to that found in the main text.

With this in hand, we can now consider all possible Markov strategies for SIG 1, where we define such a strategy as a triple:

$$\sigma_i = (l, j, k) = (T = l | S_t = P, T = j | S_t = M, T = k | S_t = F)$$

In other words, each strategy chooses protection or compensation for each possible state of the world. We have the following eight strategies:

1. $\sigma_1 = (0, 0, 0)$ - Always liberalize

2. $\sigma_2 = (0,1,0)$ - Always liberalize unless $S_t = M$
3. $\sigma_3 = (0,0,1)$ - Liberalize, then alternate
4. $\sigma_4 = (0,1,1)$ - Liberalize at first, then always protect
5. $\sigma_5 = (1,0,0)$ - Protect, but liberalize off the path
6. $\sigma_6 = (1,0,1)$ - Protect, but mix of liberalize and protect off the path.
7. $\sigma_7 = (1,1,0)$ - Protect, but mix of liberalize and protect off the path.
8. $\sigma_8 = (1,1,1)$ - Always protect.

To determine the Markov Perfect Equilibria (MPE) of this new version of the dynamic model, we need to determine the conditions under which each of these strategies will be chosen. To start, we can determine the payoffs each strategy achieves for SIG 1, where a number of these strategies will produce observationally equivalent outcomes, leading to identical payoffs. Using the notation from the main paper, where ϕ^S is the payoff to compensation in any state S and χ^S is the payoff to protection in any state S, we get the following:

1. $V(\sigma_1) = V(\sigma_2) = \phi^P + \delta \frac{\phi^F}{1-\delta}$
2. $V(\sigma_3) = \phi^P + \delta \frac{\chi^F + \delta\phi^M}{1-\delta^2}$
3. $V(\sigma_4) = \phi^P + \delta\chi^F + \delta^2 \frac{\chi^M}{1-\delta}$
4. $V(\sigma_5) = V(\sigma_6) = V(\sigma_7) = V(\sigma_8) = \frac{\chi^P}{1-\delta}$

σ_1 and σ_2 produce outcomes that are observationally equivalent to the compensation equilibrium from the original version of the model, while $\sigma_5, \sigma_6, \sigma_7, \sigma_8$ produce outcomes that are observationally equivalent to the protectionist equilibrium from the original model. Thus of these strategies, only σ_3 and σ_4 produce new empirical implications relative to the original model. I will start by characterizing these new equilibria, before discussing how the main trade off between protection and compensation that was the primary subject of inquiry in the original model is affected by the changes in this version of the model.

Consider first σ_3. Central to this analysis will be two conditions that determine whether or not there is alternation between $S_t = F$ and $S_t = M$, once one of those states is reached. These two conditions can be obtained by conjecturing that the strategy is $\sigma_3 = (0,0,1)$ and then determining what the payoffs must be in order to make this incentive compatible in every state.

We get the first condition as follows:

$$\frac{\phi^F}{1-\delta} \leq \frac{\chi^F + \delta\phi^M}{1-\delta^2}$$
$$\leftrightarrow \phi^F \leq \frac{\chi^F + \delta\phi^M}{1+\delta}$$
$$\leftrightarrow \phi^F - \chi^F \leq \delta(\phi^M - \phi^F)[1]$$

Calling this Condition 1, this is obtained by starting from $S_t = F$ and determining whether or not SIG 1 would decide to choose protection instead of compensation under the assumption that compensation will be chosen when $S_t = M$, leading to alternation between the two states and periods of protection and compensation. Note that the identical condition can be obtained from simply determining when $V(\sigma_3) \geq V(\sigma_1) = V(\sigma_2)$, since these two ways of thinking about the decision are equivalent.

However, another condition must be jointly satisfied for alternation to be incentive compatible, namely we must start from $S_t = M$ and determine whether compensation is a best response, given the assumption of alternation.

$$\frac{\chi^M}{1-\delta} \leq \frac{\phi^M + \delta\chi^F}{1-\delta^2}$$
$$\leftrightarrow \chi^M + \delta\chi^M \leq \phi^M + \delta\chi^F$$
$$\leftrightarrow \chi^M - \phi^M \leq \delta(\chi^F - \chi^M)$$
$$\leftrightarrow \phi^M - \chi^M \geq \delta(\chi^M - \chi^F)[2]$$

Similarly, this condition can also be obtained by determining when $V(\sigma_3) \geq V(\sigma_4)$. So another way of characterizing the conditions for alternation is:

$$V(\sigma_3) \geq max\{V(\sigma_1), V(\sigma_4)\}$$

Conditions 1 & 2 must be jointly satisfied to allow for alternation between states. Intuitively, these conditions imply that: [1] the payoff difference between compensation in a "moderate" state and in a "free trade" state is high enough to outweigh the cost of accepting the lower payoff obtained from choosing protection in a free trade state; [2] the payoff difference between protection in a moderate state and in a free trade state is low enough to incentivize taking the higher compensation payoff when in a moderate state. You might, for instance, have both of these conditions satisfied if an interest group obtains very little via either mechanism in a free trade state, so occasionally engages in protection so as to transition things to a moderate state, but also if in that moderate state compensation payoffs are significantly higher than protectionist payoffs.

If conditions 1 and 2 are satisfied, we can then determine whether or not liberalization would occur in the first period, when $S_t = P$. Determining this is a straightforward comparison of the payoff from "always protection" in the main model to a payoff of compensation for one period followed by the discounted alternation payoff, i.e. $V(\sigma_6) \leq V(\sigma_3)$ iff:

$$\frac{\chi^P}{1-\delta} \leq \phi^P + \delta\left(\frac{\chi^F + \delta\phi^M}{1-\delta^2}\right)$$

The intuition here is similar to that from the main model, in that in the initial free trade state SIG 1 is still deciding whether or not to give up some amount of influence permanently in exchange for a higher initial compensation payoff. However, the observable implications if σ_3 is chosen are somewhat different than any equilibrium in the original model: instead, we would expect some amount of influence to be given up in some initial period, followed by alternating cycles of compensation and protection.

In fact, the US steel industry fits better with this version of the model than the original model, as steel has given up some amount of influence and market share since the 1980s, but has experienced alternating cycles of compensation and protection since then. So this version of the model can possibly better explain these kinds of cases.

One other new equilibrium which is observably different from those obtained in the earlier version of the model is $\sigma_4 = (0,1,1)$. In this case, there is liberalization in some initial period, followed by protection every following period. Similarly to σ_3, we start by determining what would happen following this period of liberalization, where the conditions for things getting "stuck" in $S_t = M$ can be written as:

$$V(\sigma_4) \geq max\{V(\sigma_1), V(\sigma_3)\}$$

Or, breaking this apart into separate conditions:

$$V(\sigma_4) \geq V(\sigma_3) \leftrightarrow \chi^M + \delta\chi^M \geq \phi^M + \delta\chi^F \tag{3}$$

$$V(\sigma_4) \geq V(\sigma_1) \leftrightarrow \phi^F - \chi^F \leq \delta(\chi^M - \chi^F) \tag{4}$$

Condition 3 is simply the reversal of Condition 2 from before, and can be interpreted similarly: the additional payoff from compensation in the short term (while $S_t = M$) has to be low enough that it's not worth it to accept a lower payoff in the subsequent period, when SIG 1 will be faced with $S_t = F$.

Condition 4 ensures that the additional payoff that could be obtained by switching to compensation when $S_t = F$ is less than the additional payoff that could be obtained from protecting in the short term in order to regain some political influence, and then continuing to protect to retain that influence.

Finally, we need to determine whether liberalization will occur in the first period, i.e. we need to find where $V(\sigma_4) \geq V(\sigma_8)$, which is when:

$$\phi^P + \delta\chi^F + \delta^2\frac{\chi^M}{1-\delta} \geq \frac{\chi^P}{1-\delta}$$

The intuition here is, again, similar to the original model, in that SIG 1 is deciding whether to give up some amount of influence in the future (characterized by the difference between

ψ_M and ψ_P) in exchange for a higher compensation payoff in the short term (i.e. ϕ^P). The main empirical difference is that the eventual equilibrium is largely one of continued protection, but with some reduction in the level of protection, and some reduction in influence for SIG 1, relative to the initial period.

A case that fits this especially well is the Canadian dairy industry, which has accepted billions of dollars in compensation in exchange for allowing increased access by foreign producers to the Canadian market as part of various trade agreements, but with that access remaining sharply limited.[2] Interest groups representing Canadian dairy producers have thus been willing to give up some degree of influence and profits in exchange for very high short term compensation payoffs, but they remain interested in retaining the bulk of their influence.

Finally, we can consider the equilibria that are observationally equivalent to those obtained in the original version of the model. First, let's determine the conditions that allow for the "full liberalization" equilibrium of a continuing state of $S_t = F$ with compensation for SIG 1, i.e. strategies σ_1 and σ_2. Since these strategies produce identical payoffs, we can first consider the conditions defined by:

$$V(\sigma_1) \geq max\{V(\sigma_3), V(\sigma_4)\}$$

The two conditions generated by this are simply the reversals of conditions 1 and 4 respectively. The intuition is similarly straightforward: compensation must be high enough to deter SIG 1 from lobbying for protection to regain influence, where they can use that increased influence either to continue to lobby for protection indefinitely, or to obtain a higher compensation payoff after regaining influence, followed by a return to a free trade state (this is the alternation scenario). If neither of these rationales for accepting the short term costs of lobbying for protection holds, then SIG 1 accepts the long term "full liberalization" outcome.

Having established this, all that remains is to determine whether SIG 1 chooses protection in the first period, or allows for full liberalization in exchange for the short term compensation at the beginning of the game, i.e. whether $V(\sigma_1) \geq V(\sigma_5)$. This condition is identical to that from the original model:

$$\phi^P + \delta \frac{\phi^F}{1-\delta} \geq \frac{\chi^P}{1-\delta}$$

With the intuition of this equilibrium being identical to what was discussed in the main paper.

For thoroughness, it is worth addressing what determines whether σ_1 or σ_2 is the equilibrium strategy; in this case, it depends on whether SIG 1 would rather stay in a protectionist state if they reached $S_t = M$, even though reaching that state is off the equilibrium path. This would be the case if:

[2] National Post, 20 March 2019.

$$\frac{\chi^M}{1-\delta} \geq \phi^P + \frac{\phi^F}{1-\delta}$$

We should similarly determine the off-equilibrium-path conditions that distinguish $\sigma_5, \sigma_6, \sigma_7, \sigma_8$. These, in fact, have been characterized by the earlier parts of this section: when the conditions hold for any of the earlier strategies *except* for the one that compares it to the "always protect" equilibrium, then those are the strategies that are played off the path. For instance, if conditions 1 and 2 hold, resulting in alternation off the path, but $V(\sigma_6) \geq V(\sigma_3)$, then we would have the strategy σ_6.

While all these strategies are observationally equivalent, it is useful to distinguish them in order to think more clearly about the counterfactual which protection is being chosen over. In the case of σ_5, σ_7, protection in the first period is being chosen over the alternative of full liberalization and limited compensation going forward. In the case of σ_6, protection is being chosen over a mix of compensation and more limited protection going forward. Finally, with σ_8, protection is being chosen over continued protection in the future, but with some reduction in future political influence.

To summarize: in each case, the main trade-off interest groups face is between some degree of reduced influence in exchange for a higher compensation payoff relative to what they can obtain via protection. However, this new version of the dynamic model produces two substantively different equilibria: one in which after the initial period of liberalization there is a mix of protection and compensation going forward, and one in which there is an initial, partial liberalization followed by continued protection, but at a lower level going forward than what was initially obtained. Both of these equilibria have empirical instantiations, in addition to the "compensate then liberalize" and "protectionist stronghold" equilibria discussed in the original paper.

Proofs of Propositions

Proof of Proposition 1

The first order condition characterizing τ^* is:

$$\frac{\partial u_1(\tau, S_t | T = 1, R = 0)}{\partial \tau} = \frac{\partial \pi_1}{\partial \tau} + \psi_s \left(\alpha \frac{\partial W}{\partial \tau} + \beta \frac{\partial \pi_2}{\partial \tau} \right) = 0$$

First, implicitly differentiate the first order condition (for expositional purposes, call this H) with respect to τ.

$$\frac{\partial H}{\partial \tau} = \frac{\partial^2 \pi_1}{\partial \tau^2} + \psi_s \alpha \frac{\partial^2 W}{\partial \tau^2} + \psi_s \beta \frac{\partial^2 \pi_2}{\partial \tau^2}$$

Note that all these terms are negative as a result of earlier concavity assumptions. Next, differentiate H with respect to ϵ.

$$\frac{\partial H}{\partial \epsilon} = \psi_s \alpha \frac{\partial^2 W}{\partial \tau \partial \epsilon}$$

This is also negative, given the assumption made on the conditioning effect of ϵ. Now, apply implicit function theorem:

$$\frac{\partial \tau^*}{\partial \epsilon} = -\frac{\psi_s \alpha \frac{\partial^2 W}{\partial \tau \partial \epsilon}}{\frac{\partial^2 \pi_1}{\partial \tau^2} + \psi_s \alpha \frac{\partial^2 W}{\partial \tau^2} + \psi_s \beta \frac{\partial^2 \pi_2}{\partial \tau^2}} < 0$$

Which is, thus, clearly negative. However, if $\tau^* = 0$, then it is at the bound and cannot be reduced any further. A similar approach is applied to determining the effect of β.

$$\frac{\partial H}{\partial \beta} = \psi_s \frac{\partial \pi_2}{\partial \tau}$$

Applying implicit function theorem again returns:

$$\frac{\partial \tau^*}{\partial \beta} = -\frac{\frac{\partial \pi_2}{\partial \tau}}{\frac{\partial^2 \pi_1}{\partial \tau^2} + \alpha \frac{\partial^2 W}{\partial \tau^2} + \beta \frac{\partial^2 \pi_2}{\partial \tau^2}} < 0$$

Which is clearly negative given that SIG 2 is a downstream SIG and thus wants lower τ, implying that $\frac{\partial \pi_2}{\partial \tau} < 0$. Again, if $\tau^* = 0$, then it is at the bound and cannot be reduced any further.

Proof of Lemma 1

We have the objective function for SIG 1:

$$u_1(\tau, S_t | T = 1, R = 0) = \pi_1(\tau) + \psi_s(\alpha W(\tau, 0, \epsilon, \rho) + \beta \pi_2(\tau) - \alpha W(0, 0, \epsilon, \rho) - \beta \pi_2(0))$$

We can determine how the indirect utility function $\gamma(T = 1) = u_1(\tau^*, S_t | T = 1, R = 0)$ varies with the parameters by applying envelope theorem. Take the simple partial derivative of the objective function with respect to each parameter, and then evaluate at the optimum. So for ϵ, we have:

$$\frac{\partial \gamma}{\partial \epsilon}(T = 1) = \psi_s \alpha \frac{\partial W}{\partial \epsilon}(\tau = \tau^*) + \psi_s \alpha \frac{\partial W}{\partial \epsilon}(\tau = 0)$$

Which since we have assumed in the model setup that $\frac{\partial W}{\partial \epsilon}(\tau = 0) = 0$ (i.e. that import demand elasticities only matter to welfare if tariffs are positive) gives us:

$$\frac{\partial \gamma}{\partial \epsilon}(T = 1) = \psi_s \alpha \frac{\partial W}{\partial \epsilon}(\tau = \tau^*)$$

This will be negative for any $\tau^* > 0$, given that we have assumed that $\frac{\partial W}{\partial \epsilon}(\tau) > 0$ for any $\tau > 0$. If $\tau^* = 0$, then the above with be zero, as we have assumed that $\frac{\partial W}{\partial \epsilon}(\tau = 0) = 0$.

Similarly, we find the comparative statics for β as follows:

$$\frac{\partial \gamma}{\partial \beta}(T = 1) = \psi_s(\pi_2(\tau^*) - \pi_2(0))$$

Given that $\frac{\partial \pi_2}{\partial \tau} < 0$, we know that for any $\tau^* > 0$, $\pi_2(\tau^*) < \pi_2(0)$, such that $\pi_2(\tau^*) - \pi_2(0) < 0$. Thus, for any $\tau^* > 0$, $\frac{\partial \gamma}{\partial \beta}(T=1) < 0$. However, if $\tau^* = 0$, then $\pi_2(\tau^*) - \pi_2(0) = 0$, so $\frac{\partial \gamma}{\partial \beta}(T=1) = 0$ as well.

Proof of Proposition 2

We have the following first order condition characterizing the optimal R^*.

$$\frac{\partial u_1(R, S_t | T=0, \tau=0)}{\partial R} = 1 + \psi_s \left(\alpha \frac{\partial W(0, R, \epsilon, \rho)}{\partial R} \right) = 0$$

First, implicitly differentiate the first order condition (call this H for expositional purposes) with respect to R.

$$\frac{\partial H}{\partial R} = \psi_s \alpha \frac{\partial^2 W}{\partial R^2}$$

By earlier concavity assumptions, this is negative. Next, differentiate H with respect to ρ.

$$\frac{\partial H}{\partial \rho} = \psi_s \alpha \frac{\partial^2 W}{\partial R \partial \rho}$$

Which is positive, given the assumption made about the conditioning effect of ρ. Applying implicit function theorem, we get:

$$\frac{\partial R^*}{\partial \rho} = -\frac{\psi_s \alpha \frac{\partial^2 W}{\partial R \partial \rho}}{\psi_s \alpha \frac{\partial^2 W}{\partial R^2}} = -\frac{\frac{\partial^2 W}{\partial R \partial \rho}}{\frac{\partial^2 W}{\partial R^2}}$$

Which is positive, as a result of the above. However, if $R^* = 0$, then it is at the lower bound, such that decreases in ρ cannot have any additional effect.

Next, we wish to determine how $\gamma(T=0)$ varies with ρ. We have the objective function for SIG 1:

$$u_1(R, S_t | T=0, \tau=0) = R + \pi_1(0) - \psi_s((\alpha W(0, 0, \epsilon, \rho) - \alpha W(0, R, \epsilon, \rho))$$

We use envelope theorem. Take the simple partial derivative with to ρ and then evaluate at R^*:

$$\frac{\partial \gamma}{\partial \rho}(T=0) = \psi_s \alpha \left(\frac{\partial W}{\partial \rho}(R^*) - \frac{\partial W}{\partial \rho}(0) \right)$$

Which since it was assumed that $\frac{\partial W}{\partial \rho}(0) = 0$, gives us:

$$\frac{\partial \gamma}{\partial \rho}(T=0) = \psi_s \alpha \frac{\partial W}{\partial \rho}(R^*)$$

Which is strictly positive for any $R^* > 0$, and is equal to zero at $R^* = 0$, by earlier assumptions.

Proof of Proposition 3

Consider any optimal tariff rate τ^*. We can construct an $\hat{R}$ that provides the equivalent amount of transfers to SIG 1:

$$\hat{R} = \pi_1(\tau^*) - \pi_1(0)$$

Now we can compare the utility obtained from τ^* and $\hat{R}$, taking into account the required lobby contributions. In particular, we have:

$$u_1(\tau^*, S_t | T = 1, R = 0) = \pi_1(\tau^*) + \psi_s(\alpha W(\tau^*, 0, \epsilon, \rho) + \beta\pi_2(\tau^*) - \alpha W(0, 0, \epsilon, \rho) - \beta\pi_2(0))$$

and:

$$u_1(\hat{R}, S_t | T = 0, \tau = 0) = \hat{R} + \pi_1(0) - \psi_s((\alpha W(0, 0, \epsilon, \rho) - \alpha W(0, \hat{R}, \epsilon, \rho))$$

We have constructed $\hat{R}$ such that it is equal to $\pi_1(\tau^*) - \pi_1(0)$, and thus, $\hat{R} + \pi_1(0) = \pi_1(\tau^*) - \pi_1(0) + \pi_1(0) = \pi_1(\tau^*)$. Therefore, $u_1(\tau^*, S_t | T = 1, R = 0) < u_1(\hat{R}, S_t | T = 0, \tau = 0)$ iff:

$$\alpha W(\tau^*, 0, \epsilon, \rho) + \beta\pi_2(\tau^*) - \alpha W(0, 0, \epsilon, \rho) - \beta\pi_2(0) < \alpha W(0, \hat{R}, \epsilon, \rho) - \alpha W(0, 0, \epsilon, \rho)$$

Given that $\frac{\partial \pi_2}{\partial \tau} < 0$, we know that $\pi_2(\tau^*) \leq \pi_2(0)$, such that $\pi_2(\tau^*) - \pi_2(0) \leq 0$. Moreover, by Assumption 1, we know that $\alpha W(\tau^*, 0, \epsilon, \rho) - \alpha W(0, 0, \epsilon, \rho) < \alpha W(0, \hat{R}, \epsilon, \rho) - \alpha W(0, 0, \epsilon, \rho)$. Thus, $u_1(\tau^*, S_t | T = 1, R = 0) < u_1(\hat{R}, S_t | T = 0, \tau = 0)$, implying $\hat{R}$ is preferred to τ^* in any single period of the game.

$\hat{R}$ thus demonstrates that there exists a compensation level that improves upon τ^* in any single period. By properties of optimality, it must be the case that $u_1(\hat{R}, S_t | T = 0, \tau = 0) \leq u_1(R^*, S_t | T = 0, \tau = 0) = \gamma(T = 0)$.

If $\tau^* = 0$, then either $R^* > 0$, which is preferred, or $R^* = 0$, in which case the payoffs to both protection and compensation are equal to $\pi_1(0)$.

This completes the proof of Proposition 3.

Proof of Lemma 2

Proof by contrapositive. Proposition 3 demonstrates that for any $\tau \neq 0$, there exists an $R \neq 0$ that is strictly preferred to it. Thus, $\tau^* \neq 0 \rightarrow R^* \neq 0$, which is logically equivalent to $R^* = 0 \rightarrow \tau^* = 0$. This completes the proof of Lemma 2.

Proof of Proposition 4

We start by showing that $\frac{\partial \tau^*}{\partial \psi_s} \leq 0$. The first order condition characterizing τ^* is:

$$\frac{\partial u_1(\tau, S_t | T = 1, R = 0)}{\partial \tau} = \frac{\partial \pi_1}{\partial \tau} + \psi_s \left(\alpha \frac{\partial W}{\partial \tau} + \beta \frac{\partial \pi_2}{\partial \tau} \right) = 0$$

First, implicitly differentiate the first order condition (for expositional purposes, call this H) with respect to τ.

$$\frac{\partial H}{\partial \tau} = \frac{\partial^2 \pi_1}{\partial \tau^2} + \psi_s \alpha \frac{\partial^2 W}{\partial \tau^2} + \psi_s \beta \frac{\partial^2 \pi_2}{\partial \tau^2}$$

Note that all these terms are negative as a result of earlier concavity assumptions. Next, differentiate H with respect to ψ_s:

$$\frac{\partial H}{\partial \psi_s} = \alpha \frac{\partial W}{\partial \tau} + \beta \frac{\partial \pi_2}{\partial \tau}$$

Since $\frac{\partial W}{\partial \tau} < 0$ and $\frac{\partial \pi_2}{\partial \tau}$ by earlier assumption, this is clearly also negative. Thus, by implicit function theorem we have that:

$$\frac{\partial \tau^*}{\partial \psi} = -\frac{\alpha \frac{\partial W}{\partial \tau} + \beta \frac{\partial \pi_2}{\partial \tau}}{\frac{\partial^2 \pi_1}{\partial \tau^2} + \psi_s \alpha \frac{\partial^2 W}{\partial \tau^2} + \psi_s \beta \frac{\partial^2 \pi_2}{\partial \tau^2}} < 0$$

The comparative statics are strict unless $\tau^* = 0$, in which case increases in ψ_s cannot reduce τ^* below its lower bound.

Next, let's show that $\frac{\partial R^*}{\partial \psi} \leq 0$. We have the following first order condition characterizing the optimal R^*.

$$\frac{\partial u_1(R, S_t | T = 0, \tau = 0)}{\partial R} = 1 + \psi_s \left(\alpha \frac{\partial W(0, R, \epsilon, \rho)}{\partial R} \right) = 0$$

First, implicitly differentiate the first order condition (call this H for expositional purposes) with respect to R.

$$\frac{\partial H}{\partial R} = \psi_s \alpha \frac{\partial^2 W}{\partial R^2}$$

By earlier concavity assumptions, this is negative. Next, differentiate H with respect to ψ.

$$\frac{\partial H}{\partial \psi} = \alpha \frac{\partial W(0, R, \epsilon, \rho)}{\partial R}$$

Which is also negative by earlier concavity assumption. Thus, by implicit function theorem, we have:

$$\frac{\partial R^*}{\partial \psi} = -\frac{\alpha \frac{\partial W(0,R,\epsilon,\rho)}{\partial R}}{\psi_s \alpha \frac{\partial^2 W}{\partial R^2}} < 0$$

This comparative static is also strict unless $R^* = 0$.

Next, let's show that both $\gamma(T = 0)$ and $\gamma(T = 1)$ are decreasing in ψ_s. First, we take the objective function for SIG 1 when $T = 1$, i.e.:

$$u_1(\tau, S_t | T = 1, R = 0) = \pi_1(\tau) + \psi_s(\alpha W(\tau, 0, \epsilon, \rho) + \beta \pi_2(\tau) - \alpha W(0, 0, \epsilon, \rho) - \beta \pi_2(0))$$

To find $\frac{\partial \gamma}{\partial \psi_s}(T = 1)$, we apply envelope theorem to the above, taking the simple partial derivative with respect to ψ_s and evaluating at τ^*.

$$\frac{\partial \gamma}{\partial \psi_s}(T = 1) = \alpha W(\tau^*, 0, \epsilon, \rho) + \beta \pi_2(\tau^*) - \alpha W(0, 0, \epsilon, \rho) - \beta \pi_2(0)$$

Since $\frac{\partial W}{\partial \tau} < 0$ and $\frac{\partial pi_2}{\partial \tau} < 0$, it must be the case that $\alpha W(0, 0, \epsilon, \rho) > \alpha W(\tau^*, 0, \epsilon, \rho)$ and $\beta \pi_2(0) > \beta \pi_2(\tau^*)$. Thus, $\frac{\partial \gamma}{\partial \psi_s}(T = 1) < 0$ at any $\tau^* \neq 0$. If $\tau^* = 0$, the above expression is also equal to

zero.

Similarly, we take the objective function when $T = 0$:

$$u_1(R, S_t | T = 0, \tau = 0) = R + \pi_1(0) - \psi_s((\alpha W(0,0,\epsilon,\rho) - \alpha W(0,R,\epsilon,\rho))$$

Then we apply envelope theorem, obtaining:

$$\frac{\partial \gamma}{\partial \psi_s}(T = 0) = \alpha W(0,0,\epsilon,\rho) - \alpha W(0,R,\epsilon,\rho)$$

Which since $\frac{\partial W}{\partial R} < 0$, $\alpha W(0,R,\epsilon,\rho) > \alpha W(0,0,\epsilon,\rho)$, which implies that $\frac{\partial \gamma}{\partial \psi_s}(T = 0) < 0$, at any $R^* \neq 0$. If $R^* = 0$, the above expression is also equal to zero.

This completes the proof of Proposition 4.

Proof of Proposition 7

Recall that a corner solution of $\tau^* = 0$ is obtained when:

$$\frac{\partial u_1(\tau, S_t | T = 1, R = 0)}{\partial \tau}(\tau = 0) = \frac{\partial \pi_1}{\partial \tau}(\tau = 0) + \psi_s \left(\alpha \frac{\partial W}{\partial \tau}(\tau = 0) + \beta \frac{\partial \pi_2}{\partial \tau}(\tau = 0) \right) < 0$$

To determine the impact of parameters on the likelihood that this will hold, we simply need to find out which parameters decrease $\frac{\partial u_1}{\partial \tau}$. So we differentiate u_1 again with respect to the different parameters, obtaining the following:

$$\frac{\partial^2 u_1(\tau, S_t | T = 1, R = 0)}{\partial \tau \partial \epsilon} = \psi_s \alpha \frac{\partial^2 W}{\partial \tau \partial \epsilon}$$
$$\frac{\partial^2 u_1(\tau, S_t | T = 1, R = 0)}{\partial \tau \partial \beta} = \psi_s \frac{\partial \pi_2}{\partial \tau}$$
$$\frac{\partial^2 u_1(\tau, S_t | T = 1, R = 0)}{\partial \tau \partial \psi_s} = \alpha \frac{\partial W}{\partial \tau} + \beta \frac{\partial \pi_2}{\partial \tau}$$

By earlier assumption, we have that $\psi_s > 0$, $\alpha > 0$, $\frac{\partial^2 W}{\partial \tau \partial \epsilon} < 0$, $\forall \tau \neq 0$. So the first of these is clearly negative. Similarly, since $\psi_s > 0$ and $\frac{\partial \pi_2}{\partial \tau} < 0$, the second is negative. Finally, since $\alpha > 0$, $\frac{\partial W}{\partial \tau} < 0$, $\beta > 0$, and $\frac{\partial \pi_2}{\partial \tau} < 0$, the third is also negative. Therefore, increases in ϵ, β and ψ_s all lead it to be more likely that the condition leading to $\tau^* = 0$ will hold by decreasing $\frac{\partial u_1}{\partial \tau}$.

Similarly, for compensation we have the following condition leading to $R^* = 0$.

$$\frac{\partial u_1(R, S_t | T = 0, \tau = 0)}{\partial R}(R = 0) = 1 + \psi_s \left(\alpha \frac{\partial W(0,R,\epsilon,\rho)}{\partial R}(R = 0) \right) < 0$$

So we differentiate as follows:

$$\frac{\partial^2 u_1(R, S_t | T = 0, \tau = 0)}{\partial R \partial \rho} = \psi_s \alpha \frac{\partial^2 W(0,R,\epsilon,\rho)}{\partial R \partial \rho}$$
$$\frac{\partial^2 u_1(R, S_t | T = 0, \tau = 0)}{\partial R \partial \psi_s} = \alpha \frac{\partial W(0,R,\epsilon,\rho)}{\partial R}$$

Since $\psi_s > 0$, $\alpha > 0$, and $\frac{\partial^2 W(0,R,\epsilon,\rho)}{\partial R \partial \rho} > 0$, $\forall R \neq 0$, the first of these is positive. Since $\alpha > 0$ and $\frac{\partial W(0,R,\epsilon,\rho)}{\partial R} < 0$, the second is negative. So increases in ρ lead to a lower likelihood of a corner solution of $R^* = 0$, while increases in ψ_s increase the likelihood of $R^* = 0$. This completes the proof of Proposition 7.

Proof of Proposition 9

The shift in bargaining power leads to the following new value functions $V_1'(\sigma^1)$ and $V_1'(\sigma^2)$ for SIG 1, which we can compare to the original value functions $V_1(\sigma^1)$ and $V_1(\sigma^2)$

- $V_1'(\sigma^1) = \theta\phi^P + \delta\frac{\theta\phi^F}{1-\delta} = \theta V_1(\sigma^1)$
- $V_1'(\sigma^2) = \frac{\theta\chi^P}{1-\delta} = \theta V_1(\sigma^2)$

Thus, $V_1'(\sigma^1) > V_1'(\sigma^2)$ if and only if:

$$\theta V_1(\sigma^1) > \theta V_1(\sigma^2)$$

Which for any $\theta > 0$ is equivalent to:

$$V_1(\sigma^1) > V_1(\sigma^2)$$

This completes the proof of Proposition 9.

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