UNILATERAL TRADE LIBERALIZATION AS LEADERSHIP IN TRADE NEGOTIATIONS*

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March 1997

Abstract: This paper constructs a model of bilateral trade negotiations in the presence of political risk to demonstrate that unilateral trade liberalization may be an optimal policy for a large country. The political risk takes the form of domestic opposition to trade agreements. Unilateral liberalization performs a risk-sharing function: when agreement implementation is blocked, the resulting tariffs are inefficient; a unilateral tariff reduction partially eliminates this inefficiency, but at a cost to the terms of trade of the liberalizing country. The quid pro quo comes in the form of more favorable terms for this country in any agreement that ends up being successful. The unilateral tariff reduction also diminishes the likelihood that a bilateral agreement is blocked, by reducing the incentive of domestic political interests to oppose it. We demonstrate the possibility of an inverse relationship between a country's monopoly power in trade and its optimal unilateral tariff.

*Thanks are due to Robert Baldwin, Jagdish Bhagwati, Robert Feenstra, Jonas Fisher, Andreas Hornstein, Robert Staiger, Ian Wooton, participants of the NBER Conference on International Trade Rules and Institutions, and participants of the 13th Annual Conference on International Trade, University of Western Ontario. Views expressed here do not reflect those of the U.S. General Accounting Office. All errors are ours alone.

I. INTRODUCTION

This paper constructs a model of bilateral trade negotiations in the presence of political risk to demonstrate that unilateral trade liberalization may be an optimal policy for a large country. The political risk takes the form of domestic opposition to trade agreements. In particular, despite the best efforts of the countries to reach agreement at the international level, domestic political interests and random shocks may conspire to block the implementation of tariff reductions. If this occurs in one country but not the other, then ex post the "free" country is faced with a unilateral tariff choice. One possibility is for this country to impose its optimal tariff, but if the bilateral relationship is ongoing, it may be better for this country to implement tariff reductions unilaterally until such time as a bilateral agreement can be successfully implemented. We show that this type of behavior will be called for in an efficient equilibrium.

The reasons for this are twofold. First, the unilateral tariff reduction performs a risk-sharing function. When agreement implementation is blocked, the resulting tariffs are inefficient. The unilateral tariff reduction partially eliminates this inefficiency, but at a cost to the terms of trade of the liberalizing country. The quid pro quo comes in the form of more favorable terms for this country in any agreement that ends up being successful. Second, the unilateral tariff reduction may diminish the likelihood that a bilateral agreement is blocked, by reducing the incentive of domestic political interests to oppose it. Import-competing producers will oppose an agreement based on a payoff comparison between the agreement and its alternative. If they expect the alternative to involve a high tariff imposed by the free country, then this provides them with a strong incentive to try and block the agreement. This is because import-competing producers benefit from tariffs, regardless of which country imposes them. If, however, they expect the free country to unilaterally liberalize whenever the agreement fails, their incentive to oppose the agreement is reduced, as there is effectively less of a difference between the agreement and its alternative. Before specifying the model in greater detail, let us turn to the motivation for the paper and its potential applications.

One of the hallmarks of United States trade policy in recent years has been its decidedly threatening posture. Through a variety of means, most notably Section 301 of the 1974 Trade Act and extensions thereof in the 1988 Omnibus Trade and Competitiveness Act, the U.S. has increasingly used the threat of trade sanctions in its attempts to persuade foreign governments to allow greater market access for U.S. firms. This approach has been called "aggressive unilateralism" (Bhagwati and Patrick, 1990), because although the approach calls for bilateral negotiations over foreign market access, the initiation of negotiations and the subsequent sanctions (in the event the negotiations are unsuccessful) are unilateral actions on the part of the U.S., which sidestep the usual WTO processes. The scope of this approach, and the U.S. commitment to it, was recently summarized by then-acting U.S. Trade Representative, Charlene Barshefsky:

> Thus, we continue to be engaged in bilateral market opening efforts with virtually every country with which we have a trading relationship: from China on textiles and wheat, to Japan on telecommunications, to Canada on agriculture, to Argentina on patent protection, to Korea on autos. There should be no misunderstanding. Now, as in the past, in many cases, market opening will occur only through intensive bilateral efforts, including the willingness to resort to our trade laws where negotiations fail to eliminate barriers and achieve fair access.[1]

The contrast between this approach and the U.S. policies of the mid-twentieth century could not be more striking. At the end of World War II, the U.S. sponsored what was to become the GATT. In the first three GATT negotiating rounds, the U.S. cut its average tariff rate by nearly 70 percent,[2] without substantive reciprocity from its major trading partners.[3] Tariff cuts agreed to by Europe and Japan in the early rounds were rendered ineffective by quantitative restrictions and exchange controls in those counties, until the late 1950s.[4] However, after this initial decade, the elimination of these restrictions and continued reciprocal tariff cuts through subsequent rounds brought protection down world wide.

There is an interesting parallel between his pattern of events and the experience of 19th century Europe. After more than two decades of unsuccessful attempts to negotiate lower tariffs with its trading

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[1]Statement of Ambassador Charlene Barshefsky before the Senate Finance Committee, January 29, 1997.

[2]Based on data of Finger (1979).

[3]Baldwin and Richardson (1984) point out that the US negotiators "offered greater tariff concessions than they received even on the usual measures of reciprocity." Bhagwati (1988) provides further support for this interpretation: "[A]lthough GATT was a contractarian agreement, the United States looked the other way when it came time to requiring GATT members to fulfill symmetric obligations."

[4]Curzon (1965), pp. 70-71.

partners,[5] Britain in the 1840s (by then the dominant country in world trade) embarked upon a policy of unilateral tariff reduction, manifested chiefly by its 1846 repeal of the Corn Laws. In the quarter of a century that followed the repeal of the Corn Laws, numerous other countries followed suit, either with unilateral trade reforms of their own,[6] or with bilateral tariff agreements, such as the Cobden-Chevalier treaty of 1860 between Britain and France. However, by the end of the 19th century, Britain had entered a period of relative decline, which was accompanied by the rise of a "fair trade" movement. From World War I onward, Britain abandoned its policy of unilateral free trade. Bhagwati and Irwin (1987) have noted that in Britain, as in the U.S. a century later, the decline in support for unilateral free trade coincided with a decline in its share of world trade, referring to this as the "diminished giant syndrome."

The historical events described above are well-known in the field of international trade, and there is a sizable literature devoted to explaining them. Most of the explanations proffered for the unilateral tariff reductions of the U.S. and Britain, and the waves of liberalization that followed, focus on the effects of domestic interest groups and non-economic objectives, such as ideology and national security. For example, Kindleberger (1975) explains the rise of free trade in Britain as owing to the rise of a pro-trade lobby, election reform, and free trade ideology. Kindleberger explains the subsequent spread of free trade throughout Europe between 1846 and 1860 as driven by free trade ideology. Irwin (1993) adds that the spread continued after 1860 as countries sought to join the Anglo-French trade bloc. Nelson (1987) explains the mid-twentieth century U.S. commitment to liberal trade as an attempt to strengthen its war-torn trading partners against the threat of communism.

There is a strain of literature in political science which posits a more all-encompassing relationship between these events, known as the "hegemonic stability hypothesis" (Gilpin, 1975; Yarbrough and Yarbrough, 1985). Roughly speaking, it maintains that free trade is a public good which, without a supra-national government, requires a large country to provide or enforce it. The idea has its origins in Kindleberger's (1973) thesis that the beggar-thy-neighbor policies of the Great Depression

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[5]According to McKeown (1983), "more often than not the British strategy [of concluding bilateral agreements] led other states to *increase* duties on British goods in retaliation for favors Britain had bestowed elsewhere." See also Bhagwati and Irwin (1987).

[6]According to Kindleberger (1975), the Netherlands, Belgium, Spain, Portugal, Denmark, Norway and Sweden all moved to free trade in the 1850s.

were the result of an the absence of large-country leadership. The hegemonic stability hypothesis has been criticized as being at odds with key historical facts (Conybeare, 1987; McKeown, 1983) and appears to have been rejected by those who favor domestic-interest-group explanations.[7]

This paper makes no attempt to resolve this debate or add to the already extensive historical work on the subject. Rather, our interest is in the apparent contradiction between the stylized facts and the standard terms-of-trade argument for a tariff. One of basic tenets of standard theory is that the welfare effect of a tariff depends on the tariff's effect on the terms of trade. A country capable of improving its terms of trade by imposing a tariff is said to have monopoly power in trade, and this power is normally associated with large countries. Mid-19th century Britain and mid-20th century U.S. were two of the largest trading nations in recorded history, and yet they chose to unilaterally liberalize. It is clear that these countries understood the potential for, and indeed suffered, considerable terms-of-trade losses as the immediate result of their unilateral tariff reductions. In Britain, economists such as Robert Torrens and John Stuart Mill, recognizing the adverse terms-of-trade effects, were skeptical about the repeal of the Corn Laws. Empirical work by Harley and McCloskey (1981) and Irwin (1988) would appear to vindicate their concerns. Similar evidence for the U.S. case is provided by Kreinin (1961).[8]

A second result that follows from the terms-of-trade argument is that a country's incentive to impose a tariff is typically decreasing (or not strongly increasing) in the foreign tariff level.[9] That is, tariffs are normally strategic substitutes. Yet in each case, the unilateral tariff reduction by the large country was followed by a wave of trade liberalization involving other countries that was not present prior to the unilateral action. It is puzzling that the other countries, who were unwilling or unable to make tariff concessions earlier, altered their trade policies after receiving free tariff concessions from the large country.

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[7]Magee, Brock and Young (1989) state "that what appears to be hegemonic behavior by the United States really comprises special-interest policies driven by US multilateral corporations."

[8]Examining US tariff reductions in 1955-56, Kreinin (1961, p. 314) concludes, "less than a third ... of the tariff concessions granted by the United States were passed on to the US consumer in the form of reduced import prices, while more than two-thirds ... accrued to the foreign suppliers and improved terms of trade of the exporting nations." However, this study does not go so far as to compute welfare changes.

[9]The intermediate case is that of constant-elasticity offer curves, studied by Johnson (1954). In this case, optimal tariffs are independent of each other.

Thus it would appear that policy makers not only ignored the terms of trade argument, but acted contrary to it. The extent of this clash between the stylized facts and the terms-of-trade argument casts doubt on the relevance not only of the standard theory of trade policy but also of other models which preserve the same basic positive relationship between monopoly power and tariffs. This includes most of the recent political economy models (e.g., Mayer, 1984; Grossman and Helpman, 1994; see Rodrik, 1995, for a summary), which have attempted to incorporate public choice considerations into the determination of trade policy. It seems appropriate, therefore, to re-examine this issue within a model specifically designed to show the potential benefits to a large country from unilateral liberalization and the potential spillover of liberalization that may result. The purpose of this paper then is not to provide the definitive explanation of the historical events surrounding the ascent and decline of the U.S. and Britain, but to reconcile economic theory with these events. The benefit of so doing is that it provides a framework in which to evaluate the current unilateral approach of the U.S. and a guide to similar issues for the future.

Another potential application of this model is to clarify the notion of "leadership" in trade policy. This term is commonly used, but rarely defined explicitly. According to Kindleberger, leadership involves the sacrifice of narrow self-interest in favor of policies that promote the well-being of the world trading (or monetary) system as a whole.[10] We have seen no theoretical explorations of this concept. Our model is an attempt to fill this void.

II. MODEL OVERVIEW

The underlying model of trade is fairly standard. What is novel is the timing of the actions and the presence of political risk. The timing is designed to reflect the sequence of events called for under Section 301: bilateral negotiation followed by unilateral action. In order to guarantee a positive probability that the unilateral action stage will be reached, we include political risk. We suppose there are two countries, H and F, that meet repeatedly to negotiate a bilateral tariff-reduction agreement. If

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[10]"For the large country, then, even one which is not wide open to the world economy, foreign economic policy frequently offers choices between short-run gains--which may or may not lead to long-run losses--and actions to stabilize the world economy in the long-term interest of the world and of the country itself." (Kindleberger, 1977, p. 11)

they reach an agreement, then it must be ratified by an unpredictable political process in *F* before it can be implemented. If ratification fails, *H* must decide on a tariff level to apply until the next round of negotiations. The distinction between negotiation and ratification can be seen as a distinction between executive and legislative roles in trade policy making. The executive must not only deal with foreign governments but also present agreements to a possibly reluctant legislature.[11]

We show that the optimal policy is for *H* is to unilaterally reduce its tariffs following ratification failure. This type of unilateral tariff reduction can be seen as part of a broader implicit risk-sharing arrangement between the two countries. In a conventional risk-sharing insurance contract, the insured agrees to pay a premium in the "good" state in exchange for a payment from the insurer in the "bad" state. Such a contract generates a surplus because the premium is usually of equal or greater value to the insurer than the insured in the good state, and the payout is of greater value to the insured than the insurer in the bad state. With sufficient bargaining power the insurer can capture this surplus in the premium it charges. In our model, the good state is that in which the agreement is ratified, and the "premium" is a transfer paid by *F* to *H* as part of the terms of the agreement. The bad state is that in which ratification fails. In this state, *H*'s "payout" is its unilateral liberalization which benefits *F* more than it costs *H*. The surplus generated by this implicit risk-sharing arrangement is the expected value of the world trade gains from *H*'s unilateral liberalization, and this surplus can be captured ex ante by *H* in its bargaining over the terms of the tariff-reduction agreement.

For this risk-sharing arrangement to be feasible, *H* must have an incentive to go through with the unilateral liberalization. Following a ratification failure, *H* has a short-run incentive to renege on the contract and choose the (higher) tariff which would exploit its monopoly power in trade. However, since the relationship between *H* and *F* is ongoing, such an action would imperil future agreements. That is, *F* will not agree to a liberalization agreement which favors *H* if it thinks *H* will not unilaterally liberalize in the event of ratification failure. The balance between the short-run incentive to renege and the long-run discounted expected value of future agreements limits the extent of *H*'s unilateral liberalization. This balance is affected by country size.

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[11]Putnam (1988) has labeled this type of framework a "two-level" game.

We show that the larger is *H* (that is, the greater its monopoly power in trade), the deeper may be its unilateral tariff reduction. This may appear contradictory, since the incentive to renege derives from monopoly power in trade. However, as *H*'s monopoly power rises, the discounted expected value of the insurance contract to *F* also rises. If it rises by more than does the incentive to renege, then the constraint on *H*'s unilateral liberalization is relaxed.

Finally, we study how *H*'s unilateral tariff reduction affects the political equilibrium in the foreign country in such a way that the policy might actually reduce the probability of ratification failure itself. We show that this will occur when the probability of failure is determined by the lobbying efforts of import-competing producers in *F*. Such producers are harmed by trade liberalization whether in the form of bilateral tariff reductions or the unilateral tariff reduction of *H*. Their "stake" in the ratification outcome is the expected difference between the producer surplus when the agreement passes and that when the agreement fails. The expectation of *H*'s unilateral tariff reduction reduces this expected difference, thereby reducing the level of lobbying and hence the probability of failure.

The remainder of the paper is organized as follows. Section III lays out the basic model with a constant failure probability in the foreign country, and demonstrates the risk-sharing argument for unilateral tariff reduction. Section IV illustrates the link between unilateral tariff reduction and country size. In section V, we introduce a myopic, import-competing lobby in *F* to endogenize the failure probability. We show how this reinforces the incentive for unilateral tariff reduction. Further, increases in country size reduce the failure probability and increase the efficiency of agreements that are ratified. Thus, larger countries can be expected to induce greater bilateral liberalization.

In sections VI and VII we consider two extensions of the endogenous political model. Section VI investigates the case in which there are two lobbies, one representing the interests of import-competing firms and the other, exporting firms. This case is of interest because *H*'s commitment to low unilateral tariffs, a policy that lowers the stake of the import-competing lobby, has the same impact on the export lobby. We demonstrate that, nevertheless, under fairly weak assumptions about the nature of political competition, unilateral liberalization continues to be the optimal commitment strategy. Section VII examines the case of a single, forward-looking, import-competing lobby. We find once again that

H's optimal commitment strategy uses unilateral tariffs that are as low as possible, except that now they vary over time. This variability alters the results on country size: while increased size enables more effective commitment, unilateral tariffs need not fall in every period. Section VIII concludes.

III. THE MODEL

A. Trade and Welfare

Consider a model of two countries, *H* and *F*, that produce and consume homogeneous goods, *X* and *Y*, under conditions of perfect competition, in each of an infinite number of discrete time periods t = 1, 2,.... Let good *Y* be the numeraire, let the marginal utility of income for consumers in both countries be fixed at unity, and suppose *H* exports good *X* to *F*. There are no intertemporal production or consumption decisions to be made in this model; instead, all of the interesting considerations are in the determination of trade policy. Each period, *H* imposes a tariff on *Y*, which can be represented by a export tax on *X*, while *F* imposes a tariff on imports of *X*. Let τ^H_t denote one plus the *ad valorem* export tax, let τ^F_t denote one plus the *ad valorem* import tariff, and let $\tau_t = \tau^H_t \, \tau^F_t$. The term τ_t is the percentage difference between *H* and *F* prices, or the aggregate tariff wedge.

A country's social welfare in each period is the sum of its consumer surplus, producer surplus and tariff revenue. The welfare of country i in period t is denoted $u^i(\tau^i_t, \tau^j_t)$, for $i, j = H, F, i \bullet j$. We assume that u^i is continuous and concave, with a interior maximum in τ^i_t, and is strictly decreasing in τ^j_t, for all nonprohibitive τ^i_t and τ^j_t. We assume that initially, $\tau^F_0 > 1$ and τ^H_0 is chosen so as to maximize $u^H(\tau^H, \tau^F_0)$ with respect to τ^H.

Total world welfare is denoted by, $w(\tau_t) = u^H(\tau^H_t, \tau^F_t) + u^F(\tau^F_t, \tau^H_t)$. Notice that this is a function of the aggregate tariff wedge alone and reaches a maximum at $\tau_t = 1$. We assume that for $\tau_t > 1$, $w'(\tau_t) < 0$ and $w''(\tau_t) \bullet 0$. Also, let the producers' surplus of the import-competing (X) sector in *F* be $r(\tau_t)$, where $r'(\tau_t) > 0$, $r''(\tau_t) \bullet 0$.

B. The Trade Policy Formation Game

Each period, countries play a trade policy formation game consisting of three stages: a bargaining stage, a ratification stage, and unilateral action stage. At the beginning of each period, representatives from each country enter into negotiations for the reduction of trade barriers. The objective of each representative is to maximize the expected present-discounted value of social welfare in the country it represents.[12] We shall adopt the simplest possible bargaining model: each period t, H offers a pair of tariff wedges, π^H_t and π^F_t, which F either accepts or rejects. If F rejects the offer, the tariffs remain at their initial levels, τ^H_0 and τ^F_0, for the period, and bargaining resumes in the next period. If F accepts the offer, then the pair π^H_t, π^F_t becomes a tentative agreement, and we move to the ratification stage.

For the tentative agreement to be enacted, it must be ratified through the political process of country F. We shall abstract from the details of this process, and assume only that the outcome is influenced by a lobby L, which represents the import-competing firms in country F. Let z_t be the probability that the tentative agreement in period t fails to be ratified. L can raise z_t by expending resources (contributions, effort, etc.). Let $k(z_t)$ be the minimum cost to L of achieving probability of failure z_t. We assume that $k(z_t)$ is an increasing, strictly convex function, such that $k(0) = k'(0) = 0$, and $k(1)$ • $r(\tau_0)$. Further, we assume that while H observes the outcome of the ratification process, it does not directly observe z_t or $k(z_t)$.[13] Additionally, we assume that the social cost to F of lobbying is $ak(z)$, where a • 0. In other words, a is the share of L's cost that is social waste. This allows for the possibility that some of L's lobbying expenditure is in the form of transfers to politicians ($a < 1$), or that it may have negative externalities ($a > 1$).

If the period t agreement fails to be ratified, then H chooses its tariff unilaterally. Let σ_t denote the aggregate tariff wedge resulting from H's unilateral choice. As there is no corresponding political process in H (or rather there are no import-competing lobbies in H), this choice is enacted with certainty.

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[12]None of the results of this paper would be substantively altered by using any "politically realistic" objective function, as defined by Baldwin (1987).

[13]This assumption has the attractive feature that it generates actual (rather than just "threatened") unilateral liberalization along the equilibrium path. Whether the representative of F observes z_t or not turns out to be irrelevant, provided it cannot convey the information to H.

Thus in period t, $\tau^H_t = \sigma_t / \tau^F_0$, $\tau^F_t = \tau^F_0$, each player receives its payoff corresponding to these tariff levels, and the game is repeated in the next period. On the other hand, if the agreement is ratified this period, then the tariffs π^H_t and π^F_t are enacted, remain in place indefinitely, and no further proposals are made.

In other words, there are three players H, F and L, playing a repeated game. The stage game is sequential: H chooses the pair π^H_t, π^F_t; F chooses to accept or reject; L chooses z_t; and finally H chooses σ_t. Each of these choices is a function of all previous actions, i.e., upon history. A strategy is an infinite sequence of such choice functions. A combination of three strategies, one for each player, constitutes a subgame perfect equilibrium, if at every possible history each player's strategy is optimal for the remainder of the game given the others' strategies. It is useful to think of a combination of strategies as giving rise to four infinite sequences of actions, $\Pi^H = \{\pi^H_1, \pi^H_2, ...\}$, $\Pi^F = \{\pi^F_1, \pi^F_2, ...\}$, $Z = \{z_1, z_2, ...\}$ and $\Sigma = \{\sigma_1, \sigma_2, ...\}$, where the realization of each action is contingent upon the failure of the most recent proposal. Such sequences we shall call paths.

Generically, there is a large set of subgame perfect equilibria in games like this; however, we shall be interested in only two. The first is the Markov-strategy equilibrium, or Markov perfect equilibrium (MPE), in which each player chooses its action based only upon the state prevailing at the time of its decision, and not directly on actions taken in previous periods. This means that H makes its decisions about π^H_t, π^F_t, and σ_t using no historical information, and F and L use only the values of π^H_t and π^F_t this period. By extension, each player's current action has no effect on actions taken in future periods (though they do influence the probability that future game nodes will be reached). Hence, the problem reduces to solving a one-shot game, where the expected payoffs in future periods are taken as parametric. Moreover, the MPE paths are stationary.

The second equilibrium of interest is the home country's best trigger-strategy equilibrium (TSE). In this equilibrium, H chooses the path of proposals and unilateral tariffs that gives it the highest expected long-term payoff, subject to the condition that at no stage would it wish to deviate from that path for fear of reversion to the MPE for the rest of time. Notice that we only require that the deviant actions of *H* trigger reversion to the MPE. Beyond this we place no restrictions on the strategies that can be used.

The reason we focus on these equilibria is that we are attempting to model commitment on the part of *H*. The MPE is the natural representation of the absence of commitment, while the TSE represents *H*'s maximal commitment sustainable by the fear of commitment breakdown. We believe this kind of commitment best reflects the idea of leadership mentioned earlier. Further, growing support for this focus can be found in the literature on reputation effects (e.g., Fudenburg and Levine, 1989; Schmidt, 1993).[14]

C. The Foreign Government

Each period *H* must decide on the levels of three tariffs, two as part of its proposal to *F*, and one as a response to the failure of ratification (should that occur). We can reduce this problem somewhat by considering the role of the foreign negotiator at the bargaining stage. By rejecting an agreement, *F* guarantees itself $u^F(\tau^F_0, \tau^H_0)$, and thus in any equilibrium *F*'s expected average discounted payoff must weakly exceed $u^F(\tau^F_0, \tau^H_0)$. That is,

$$U^F_t = E_Z(1 - \delta)\sum_{t=1}\delta^{t-1}u^F(\tau^F_t, \tau^H_t) \bullet u^F(\tau^F_0, \tau^H_0) \quad (1)$$

for all t, where $\delta \in (0, 1)$ is the discount factor, and E_Z is the expectation operator defined by the path Z. Because the TSE of interest is assumed to be best for *H*, (1) holds with equality in this equilibrium. In an MPE, *F* will accept any proposal under which $U^F_t \bullet (1 - \delta)u^F(\tau^F_0, \tau^H_0) + \delta U^F_{t+1}$, and *H* will never propose anything that leaves $U^F_t > (1 - \delta)u^F(\tau^F_0, \tau^H_0) + \delta U^F_{t+1}$. As this is true in every period, it follows that the unique MPE payoff for *F* also satisfies (1) with equality. Finally, because *H*'s proposal

[14]Using a model of one long-run player facing a sequence of short-run players (see the section VII), Fudenburg and Levine (1992) show that if there is a positive probability that the long-run player is a "commitment type", who always plays the strategy to which that player would most like to commit herself, then for a high enough discount factor, that player will achieve her best commitment payoff in any Nash equilibrium. Schmidt (1993) generalizes this result to two-player games of conflicting interests, where both players are long-run. With minor restrictions on the action sets, the long-run lobby case of section VII can be reduced to such a game between *H* and *L*.

consists of both π^H_t and π^F_t, H can ensure $U^F_t = u^F(\tau^F_0, \tau^H_0)$ for any aggregate tariff wedge π_t by promising the appropriate allocation of tariff revenue. Thus the game effectively reduces to one between H and L, with H choosing π_t to maximize expected world welfare, and allocating the tariff revenue to ensure the participation of F.[15]

Given paths Π, Σ, and Z , expected average world welfare in period t satisfies

$$W_t = (1 - z_t)w(\pi_t) + z_t[(1 - \delta)w(\sigma_t) + \delta W_{t+1}] - (1 - \delta)ak(z_t). \tag{2}$$

The objective of H is to maximize W_1.

D. Unilateral Tariff Reduction as Insurance

In this section we demonstrate the risk-sharing role of unilateral tariff reduction. This is facilitated by temporarily abstracting from foreign lobbying considerations and assuming that z_t is set exogenously at z for all t. This simplifying assumption implies that the equilibrium paths are stationary. Thus, we can re-write (2), letting $\sigma_t = \sigma$, $\pi_t = \pi$ and $W(\pi, \sigma) \equiv W_t = W_{t+1}$ for all t, as

$$W(\pi, \sigma) = (1 - \lambda)w(\pi) + \lambda w(\sigma) - \lambda\frac{ak(z)}{z} \tag{3}$$

where $\lambda \equiv (1 - \delta)z/(1 - \delta z)$. To interpret (3), suppose that the current period is t and that ratification is successful in period $t + s$. If s were certain, then present-discounted world welfare would be $W(\pi, \sigma)(s) = \delta^s w(\pi) + (1 - \delta^s)w(\sigma) - (1 - \delta^{s+1})ak(z)$, because there are s periods of σ, $s + 1$ periods of political costs $ak(z)$, and from period s onward the agreement π is in effect. However, s is not certain; rather, it is a geometrically distributed random variable, with density $f(s) = (1 - z)z^s$. Taking the expected value of $W(\pi, \sigma)(s)$ over s gives (3). Note that $E_s\delta^s = 1 - \lambda$, $E_s(1 - \delta^s) = \lambda$, and $E_s(1 - \delta^{s+1}) = \lambda/z$. Thus, λ can be

[15] Note that the participation of F is ensured *ex ante*. Should z take on some unexpected value, the realized welfare effect of that is borne by F. It follows that H does not learn past values of z by observing its own payoff.

interpreted as expected present-discounted value of income earned in periods of ratification failure, whereas 1 - λ is that for the date of ratification success and thereafter.

From (3) it is evident that because π does not affect z or λ, H should always propose free trade ($\pi = 1$). Also, lowering σ raises world welfare in periods of ratification failure and thus raises the total expected world welfare. Thus, $W(\pi, \sigma)$ is decreasing in σ for $\sigma > 1$.

If ratification should succeed, therefore, an agreement with $\pi = 1$ would go into effect, in which $\pi^H = 1/\pi^F$, where π^F is determined *ex ante* by

$$(4) \qquad U^F = (1 - \lambda)u^F(\pi^F, 1/\pi^F) + \lambda u^F(\tau^F{}_0, \sigma/\tau^F{}_0) - \lambda\frac{ak(z)}{z} = u^F(\tau^F{}_0, \tau^H{}_0).$$

The left-hand side of (4) is increasing in π^F and decreasing in σ. Thus, there is a positive relationship between the π^F and σ that satisfy (4). This reflects an implicit quid pro quo: the greater *H*'s sacrifice during periods of ratification failure (i.e., the lower is σ), the lower will be *F*'s (and the higher will be *H*'s) tariff in the agreement. Equation (4) is illustrated on the left panel of figure 1.

Next let us consider the choice of σ in each of the two equilibria. In a MPE, actions taken this period have no effect on choices made in future periods. Thus at the unilateral action stage of each period, the best that H can do is to maximize $u^H(\tau^H, \tau^F{}_0)$, which implies that in the MPE, $\sigma = \tau_0$. In a TSE, H may choose any path of unilateral tariffs it wants, subject to the constraint that it would not wish to deviate from that path for fear of reversion to the MPE. This constraint can be expressed as

$$(5) \qquad (1 - \delta)u^H(\sigma/\tau^F{}_0, \tau^F{}_0) + \delta W(1, \sigma) \bullet (1 - \delta)u^H(\tau^H{}_0, \tau^F{}_0) + \delta W(1, \tau_0).$$

The left-hand side of (5) is the payoff from remaining on the TSE path at the unilateral action stage of the current period and in all future periods, while the right-hand side is the payoff from an optimal deviation followed by the MPE.[16] Since $W(1, \sigma)$ is strictly decreasing in σ for $\sigma > 1$, *H*'s optimal choice of σ, call it σ^*, is the lowest value of σ satisfying (5) and σ • 1. Thus either σ^* is one or (5) holds with equality.

Figure 1: The Optimal Unilateral Tariff

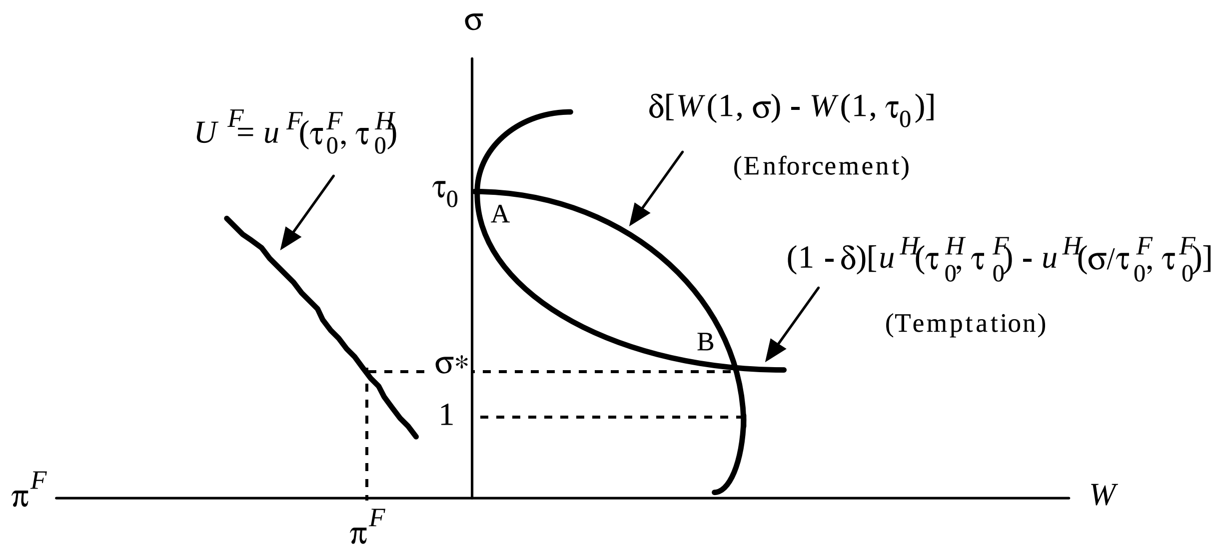

Figure 1 illustrates the optimal unilateral tariff. On the right panel, constraint (5) is drawn in the familiar "temptation vs. enforcement" form. Temptation is measured by the one-period gain from deviating, $(1 - \delta)[u^H(\tau^H_0, \tau^F_0) - u^H(\sigma/\tau^F_0, \tau^F_0)]$, while enforcement is the long-term loss from moving to an inferior equilibrium next period, $\delta[W(1, \sigma) - W(1, \tau_0)]$. That these are equal at $\sigma = \tau_0$ (point A) is obvious, but they may also be equal at other σ. The lowest such σ point is σ^* (at point B). It is also possible that temptation is less than enforcement at $\sigma = 1$, in which case $\sigma^* = 1$, and *H* unilaterally subsidizes exports to exactly offset τ^F_0. Once σ^* is found, equation (4), drawn on the left panel, determines π^F.

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[16] We also need to ensure that *H* would not wish to make a deviant proposal. This constraint is simply $W(1, \sigma)$ • $W(1, \tau_0)$, because reversion to the Markov equilibrium would occur within the same period as the deviant proposal. Thus (5) subsumes this constraint.

IV. UNILATERAL TARIFFS AND COUNTRY SIZE

The previous section established that a country, which is "large" in the sense of having a positive optimal one-shot tariff, will nevertheless benefit from committing to a low tariff, when random events hamper liberalization attempts in the foreign country. In this section, we attempt to make more precise the connection between country size and unilateral tariffs.

The aspect of country size most relevant to our analysis is that of monopoly power in trade, for it is the coincidence of low tariffs and apparently high monopoly power that makes the cases of Britain and the U.S. paradoxical at first blush. The home country's monopoly power is related to the foreign elasticity of import demand. In general, any alteration of this elasticity (achieved, for example, through a reallocation of the world's factor endowments) is likely to produce both changes in monopoly power and changes in world welfare *per se*. One way to isolate the change in monopoly power is with an endowment model.

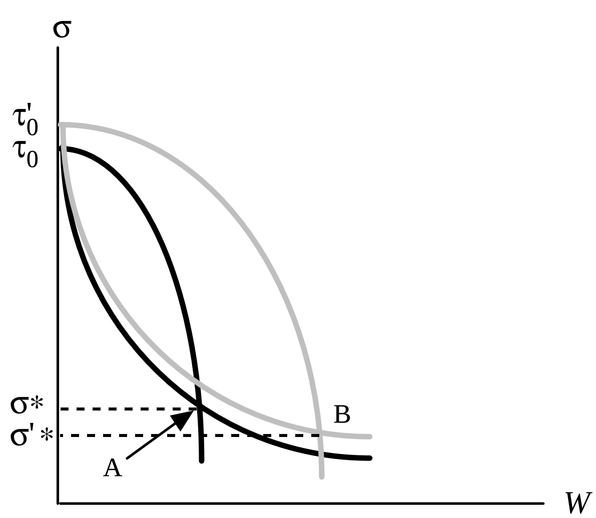
Suppose that in each period, the world is endowed with x units of good X. H's share of the world endowment is β, and F's share is $1 - \beta$. Consumers in each country have utility functions given by $v(c^i) + y^i$, where c^i and y^i denote consumption of goods X and Y, respectively. We assume that $v'(c) > 0$, $v''(c) < 0$, and that the elasticity of demand, $\eta = - v'(c)/v''(c)c$, is non-increasing in c. It follows that H's export supply is $x\beta - c(p^H)$, and F's import demand is $c(p^F) - (1 - \beta)x$, where p^i is consumer price of good X in country i, and $c(p) = v'^{-1}(p)$. The price of good Y is normalized to unity in both countries.

Using $p^F = \tau p^H$, the world market equilibrium is determined by, $c(\tau p^H) + c(p^H) = x$. Note that this depends on β only through τ, not on β directly. This property also carries over to world welfare, i.e., $w(\tau) = v(c(\tau p^H)) + v(c(p^H))$. To find H's optimal one-shot tariff, τ^H_0, we use the standard formula, $\tau^H_0 = \varepsilon^F/(\varepsilon^F - 1)$, where $\varepsilon^F = \eta\dfrac{c^F}{c^F - (1 - \beta)x}$ is the elasticity of foreign import demand. Given our earlier assumption about η, it follows that $d\tau^H_0/d\beta > 0$. Thus, β is a useful measure of country size in that it is positively related to H's monopoly power and is, by itself, world-welfare neutral. This leads to the following proposition:

Proposition 1: If $\varepsilon^F > 1$, then there exists $\underline{\delta z} < 1$, such that for $\delta z > \underline{\delta z}$, the optimal unilateral tariff σ^* is either one or is strictly decreasing in β.
(Proof in appendix.)

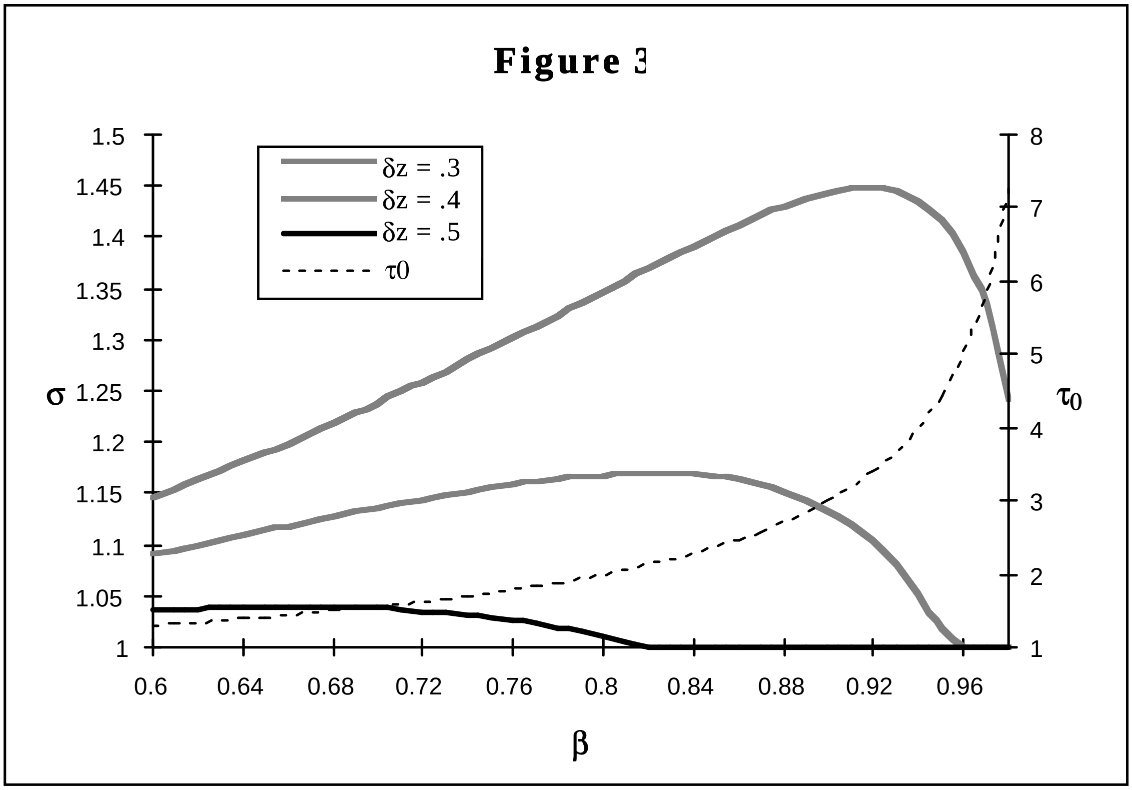
Proposition 1 establishes one of the central results of our model: despite their higher optimal one-shot tariffs, large countries may well choose lower tariffs unilaterally than their smaller counterparts. The intuition behind Proposition 1 is that an increase in *H*'s size increases its optimal one-shot tariff (illustrated by the increase from τ_0 to τ_0' in figure 2). For a given σ, this raises both temptation and enforcement (illustrated by rightward shift in both the temptation and enforcement curves). Temptation increases because the one-shot optimum tariff moves further away from σ, while enforcement increases because expected world welfare following a deviation falls. If enforcement increases by more than temptation, then a lower σ^* can be supported as a TSE (as represented by the shift from point A to B). To see the conditions under which the increase in enforcement dominates, note that it is proportional to the reduction in world-welfare brought on by the increase in τ_0, or $- \delta\lambda w'(\tau_0)(d\tau^H{}_0/d\beta)$. Recall that $\delta\lambda = (1 - \delta)\delta z/(1 - \delta z)$, which becomes infinite as δz approaches one. Thus, as long as the increase in temptation is bounded (which is guaranteed by $\varepsilon^F > 1$), a high enough δz will imply that enforcement increases by more than temptation.

Figure 2



Proposition 1 applies to cases where $\varepsilon^F > 1$ and δz is high enough. However, these conditions are not necessary for σ^* and β to be negatively related. To see this most clearly, suppose that $v(c) = \ln(c)$. In this case, $\tau_0 = (1/2)\left[\sqrt{1 + 4\tau^F_0/(1 - \beta)} - 1\right]$, which implies that as β approaches one, τ_0 becomes infinite. The reason is that, as *F* 's endowment becomes small, its import demand becomes approximately its total demand, c^F, which in this case is unit elastic (i.e., $\varepsilon^F \rightarrow \eta = 1$). With unit elasticity, *H* would always be able to decrease its volume of exports (thereby retaining more of its endowment of X for domestic consumption) without decreasing the value of its exports at world prices (which is equal to its volume of Y imports). Thus, *H* would choose an arbitrarily high tariff in the one-shot game. A convenient feature of this example, therefore, is that by appropriately choosing β, we can choose any τ_0 between 1 and infinity, or in other words, there is no limit to the monopoly power we can assign to *H*.

Figure 3 plots σ^* for different values of δz and β, using $\tau^F_0 = 1.2$. For purposes of comparison, the optimal one-shot tariff τ_0, measured along the right ordinate, rises rapidly as we increase β. The optimal unilateral tariff σ^*, measured along the left ordinate, rises with β up to a point and then falls thereafter. Thus, both the smallest and largest countries can be expected to have the lowest unilateral tariffs. A feature of this example is that the value of δz influences only the critical value of β determining when σ^* falls. The optimal unilateral tariff must always fall for sufficiently high β because as τ_0 approaches infinity, the limit on temptation becomes a finite number, while enforcement approaches infinity. That is, $[u^H(\tau_0, \tau^F_0) - u^H(\sigma, \tau^F_0)] \rightarrow -\ln(\sigma/(\sigma + 1))$, and $[(w(\sigma) - w(\tau_0)] \rightarrow [w(\sigma) - \ln(0)] = \infty$. In the more general case, σ falls only for sufficiently high values of δz.



V. *Endogenous Ratification*

We now return to the framework introduced in section III.B. in which each period, if a tentative agreement is reached, the foreign lobby *L* must decide how much to spend in an effort to defeat the agreement's ratification. The lobby is assumed to maximize the expected value of some fraction *b* of the import-competing producers' surplus, net of lobbying costs. This may be justified by supposing that the lobby represents the owners of specific capital in the *X* sector (with, say, labor entering into production of both goods with constant returns to scale), and that the utility these capital-owners derive from consuming *X* is small relative to their capital income.[17] The parameter $b \in [0, 1]$ is the fraction of the total producer surplus internalized by the lobby. A higher *b* can be thought of as indicating a lobby that is better able to solve the free rider problem.

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[17]This is stronger than necessary. It is only necessary that the utility of the *x*-specific-capital owners be increasing and weakly convex in tariffs.

A. *Ratification with a Short-Run Lobby*

We shall consider two polar assumptions about relevant time-horizon for *L*. In this section, we assume that *L* is a short-run player: while it is informed about all past play, it is interested in maximizing only the expected value current producer surplus net of lobbying costs, or

$$R_t = b[(1 - z_t)r(\pi_t) + z_t r(\sigma_t)] - k(z_t). \tag{7}$$

The advantage of this assumption is that it implies stationary paths of tariffs in *H*'s best TSE, because no time-varying strategy that *H* can employ will induce *L* to play anything other than its static best response. While its primary virtue is analytical convenience, this assumption may be reasonable in cases where the specific capital depreciates rapidly and current capital owners are unable to contract with future ones. In section VII, we show how the results carry over to the case where *L* is a long-run player, maximizing the expected present-discounted value of the infinite stream of producer surpluses net of lobbying costs.

Because of the stationarity of the paths, we can continue to suppress the time subscripts on π and σ. As long as $\sigma \bullet \pi$, the solution to (7) is given by the first-order condition,

$$b(r(\sigma) - r(\pi)) = k'(z) \tag{8}$$

otherwise $z = 0$. The term on the left-hand side of (8) can be interpreted as *L*'s "stake" in the political outcome. Let us denote the stake $s = b(r(\sigma) - r(\pi))$. *L*'s choice of z is then $z = z(s)$, and note that $z'(s) = \frac{1}{k''(z)} \bullet 0$ for $s > 0$. Raising *L*'s stake, by raising σ or b or by lowering π, raises the amount of resources *L* is willing to spend to defeat the agreement, which in turn raises the probability of failure.

Because the proposed tariff π affects lobbying expenditure, *H* will not necessarily propose free trade. To determine the optimal tariff proposal, for a given σ, we differentiate (3) with respect to π, noting that now λ is a function of $z(s)$. This gives the following first-order condition:

(9) $$(1 - \lambda)w'(\pi) + \phi(\pi, \sigma)r'(\pi) = 0$$

where $\phi(\pi, \sigma) = b\left\{\frac{a\lambda}{z}k'z' + \lambda'z'[w(\pi) - w(\sigma) + \delta ak]\right\}$ • 0. In other words, the problem is equivalent to maximizing a weighted social welfare function, where ϕ is the extra weight given to foreign producer surplus. A marginal reduction in π causes a direct increase in world welfare of $-(1 - \lambda)w'(\pi)$. The discount factor $1 - \lambda$ is applied because π only obtains after ratification success. This accounts for the first term in (9). A reduction in π also increases the lobby's stake in the political outcome by $br'(\pi)$. This increases lobbying expenditure by $k'z'$, which has a discounted social cost of $a\lambda/z$. The increased lobbying expenditure, by increasing the probability of failure, increases the expected time before ratification occurs. This "delay cost" is measured by the welfare forgone in each period of ratification failure, $w(\pi) - w(\sigma) + \delta ak$, multiplied by the change in its discount factor, $\lambda'z'$. Grouping these terms into ϕ, we interpret ϕ as the lobbying-related social cost (benefit) of an increase (decrease) in the foreign producer stake.

Let $\pi(\sigma)$ denote the value of π that satisfies condition (9), and let $z(\sigma) = z(s(\pi(\sigma),\sigma))$ and $\phi(\sigma) = \phi(\pi(\sigma), \sigma)$. Lemma 1 details some properties of $\pi(\sigma)$, $z(\sigma)$ and $\phi(\sigma)$.

Lemma 1: Properties of $\pi(\sigma)$, $z(\sigma)$ and $\phi(\sigma)$

(A) The optimal proposal $\pi(\sigma)$ lies strictly between free trade and the unilateral tariff if $\sigma > 1$, and is free trade if $\sigma = 1$. That is, $\pi(\sigma) \in (1, \sigma)$ for $\sigma > 1$, and $\pi(1) = 1$.

(B) The political weight $\phi(\sigma)$ is non-negative.

(C) As the unilateral tariff falls, either the optimal proposal falls, $\frac{d\pi}{d\sigma}$ • 0, or the probability of failure falls, $\frac{dz}{d\sigma}$ • 0, or both.

(D) A sufficient condition for $\frac{d\pi}{d\sigma}$ • 0 is $-\frac{z''}{z'}(1 - z)$ • 1.

(E) A sufficient condition for $\frac{dz}{d\sigma} \bullet 0$ is $\frac{d}{d\pi}\left(\frac{w'(\pi)}{r'(\pi)}\right) \bullet \frac{d}{d\tau}\left(\frac{w'(\tau)}{r'(\tau)}\right) < 0$ for all $\tau \in [\pi, \sigma]$.[18]

(Proof in appendix.)

The intuition behind (A) is straightforward. The home government would never propose free trade (unless σ is already free trade), because the loss of world welfare from a slightly higher tariff would be zero, while the reduction in the probability of failure (and hence the likelihood of actually realizing this low tariff) would be positive. On the other hand, the home government would not propose σ, for, while this would guarantee success, it would result in a tariff no better than failure. (B) follows directly from (A), because z, λ, z', k, and $w(\pi) - w(\sigma)$ are all positive. (C) follows from (8). A reduction in σ, ceteris paribus, will lead to a lower stake, and therefore a lower z. This outcome will be reinforced if π rises in response to the fall in σ. However, if instead π were to fall, it may fall enough to cause a net increase in the stake and increase z. Thus, it cannot be that both z and π rise in response to a fall in σ. (D) and (E) simply give conditions under which both z and π fall in response to a fall in σ.

With this in hand, we can examine the effect of the unilateral tariff σ on world welfare. Differentiating (3) with respect to σ and using (9) produces

(10) $$\frac{dW}{d\sigma} = \lambda w'(\sigma) - \phi(\sigma) r'(\sigma) < 0.$$

This implies that the home country always gains by reducing σ. Intuitively, lowering σ increases the world welfare that obtains when the agreement fails by $-\lambda w'(\sigma)$. This effect was also present in the earlier model (section III) with exogenous ratification. However, with endogenous ratification, a reduction in σ has the added benefit of reducing the lobby's stake, and the social value of this is $\phi(\sigma) r'(\sigma)$.

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[18] Necessary (and much weaker) conditions for (D) and (E) are, respectively,
$\left(\frac{\lambda''}{\lambda'} + \frac{1}{(1-\lambda)} - \frac{k'''}{k''}\right)\phi + \frac{\lambda ab}{z} - \lambda'\frac{w'(\sigma)}{r'(\sigma)} \bullet 0$, and $\frac{d}{d\pi}\left(\frac{w'(\pi)}{r'(\pi)}\right) \bullet \left(\frac{w'(\sigma)}{r'(\sigma)} - \frac{w'(\pi)}{r'(\pi)}\right)\frac{b\lambda' r'(\pi)}{(1-\lambda)k''}$.

As before, what limits the home country's ability to lower σ is the TSE constraint (5), which becomes

$$(11) \qquad (1 - \delta)u^H(\sigma/\tau^F{}_0, \tau^F{}_0) + \delta W(\pi(\sigma), \sigma) \bullet (1 - \delta)u^H(\tau^H{}_0, \tau^F{}_0) + \delta W(\pi(\tau_0), \tau_0)$$

where $\pi(\sigma)$ and $\pi(\tau_0)$ are the optimal proposals in the TSE and MPE, respectively.

According to (10), the presence of endogenous foreign political opposition provides an added incentive for unilateral tariff reduction. We would like to know if this added incentive actually translates into a lower optimal unilateral tariff, given that the choice of the tariff is constrained by the TSE constraint (11). To do this, consider the optimal unilateral tariff that satisfies (11), call it σ^* (and suppose it is greater than 1). Associated with this σ^* is a probability of failure $z(\sigma^*)$. Now we ask, if this same probability of failure were given exogenously, would σ^* still be supported in a TSE? If not, then it follows that the endogeneity of political opposition produces lower unilateral tariffs.[19] Answering this question amounts to comparing the level of enforcement under the endogenous and exogenous cases. The result is found in the next proposition.

Proposition 2: The optimal unilateral tariff σ^* which is supportable under endogenous ratification is lower than that supportable under exogenous ratification if $\sigma^* > 1$, $\frac{dz}{d\sigma} \bullet 0$, and $\frac{d\pi}{d\sigma} \bullet 0$. That is, the endogeneity of political opposition produces lower unilateral tariffs.
(Proof in appendix.)

Next, we return to the issue of country size to determine whether or not the optimal unilateral tariff decreases with the home endowment under endogenous ratification. One problem that arises with endogenous ratification that was not present before is that the size of the foreign endowment may have a

[19] It is shown in the proof of proposition 2 that if σ^* cannot be supported as a TSE when z is set exogenously, then no smaller σ can be supported as a TSE either.

direct effect on the stake of the foreign import-competing producers, and hence on their lobbying behavior. In the endowment model, equation (8) becomes

$$b(1 - \beta)[p^F(\sigma) - p^F(\pi)] = k'(z). \tag{12}$$

Thus, not only does β affect the stake through its potential effects on σ and π, but it has a direct effect in that the stake is proportional to $(1 - \beta)$, the size of the foreign endowment. Indeed, (12) implies that, for a given differential in prices between the two states, a smaller industry (higher β) will lobby less and therefore be less effective in preventing ratification.

Of course, this assumes that *b*, the fraction of the producer surplus that the lobby internalizes, is fixed. However, there is good reason to suppose that it is not. It can be argued that smaller industries are better able to solve the free rider problem that may plague cooperative efforts between firms (Olson, 1965). Rather than take a stand on issue of whether industry size increases or decreases the industry's lobbying power, we shall simply assume that *b* is a function of $(1 - \beta)$, and let the elasticity of *b* with respect to $(1 - \beta)$ be χ. A unit elasticity ($\chi = 1$) corresponds to the case where an increased internalization of the stake exactly offsets the direct reduction in the stake associated with a rise in β, and thus the net effect of an increase in β on z is zero (for a given price differential).[20] If $\chi > 1$, then an increase in β in causes an increase in z, and if $\chi < 1$, an increase in β in causes a decrease in z, ceteris paribus. The central result is stated in proposition 3.

Proposition 3: If $\varepsilon^F > 1$, then there exists $\underline{\delta z_0} < 1$ and $\underline{\chi} < 1$, such that for all $\delta z_0 \bullet \underline{\delta z_0}$ and $\chi \bullet \underline{\chi}$, the optimal unilateral tariff σ^* is either one or is decreasing in the home endowment β.
(Proof in appendix).

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[20]This would occur if there were a finite number of firms, proportional to the foreign endowment, all of whom voluntarily (and simulteneously) choose to contribute to the lobby. In this case, the total contributions in the Nash equilibrium would be invariant to β. This is because, although the number of firms rises with the endowment $(1 - \beta)$, each firm contributes proportionally less.

Proposition 3 is the endogenous lobbying analog of Proposition 1. As in Proposition 1, the inverse relationship between the optimal unilateral tariff and country size depends on δz_0 being sufficiently high. A slight difference here is that z_0, the probability of failure in the MPE, is endogenous. It is determined by (9) and (12) for the case of $\sigma = \tau_0$, and thus it depends on all of the model parameters.

An additional result can be obtained from Proposition 3 if we assume $\frac{dz}{d\tau_0} > 0$ (see Lemma 1E), in which case z_0 is increasing in β. Then the larger and more patient the home country the higher will be δz_0 and the more likely it will be that the optimal tariff is decreasing in β. Thus, for high δ, the optimal unilateral tariff as a function of country size will be an inverted "U", as in figure 3. Moreover, if $\frac{d\pi}{d\sigma} > 0$ and $\frac{dz}{d\sigma} > 0$, then both the tariff proposal and the probability of failure will follow the same pattern.

VI. COMPETING LOBBIES

The essence of the argument for unilateral tariff reduction in the endogenous lobby case is that, not only does unilateral liberalization serve a risk-sharing role (as in section III), but it also favorably influences the behavior of the import-competing lobby in *F*. Specifically, unilateral tariff reduction reduces the lobby's stake in the ratification outcome, causing it to reduce its lobbying expenditure. This has a clear social benefit, because it increases the likelihood of ratification and reduces the social waste associated with the lobbying expenditure itself.

A natural objection to this line of reasoning is that it is dependent on there being only one import-competing lobby. Imagine instead that the political fight over foreign ratification involves a competition between an import-competing (anti-trade) lobby and an exporting (pro-trade) lobby. Now apply the above logic: a unilateral liberalization by *H* (in the event of ratification failure) reduces the stake of the import-competing lobby, but it also reduces the stake of the export lobby.[21] It is not obvious what will happen to lobbying expenditure. If one lobby reduces its expenditure, the other lobby may

[21]Recall that the stake is the difference between a lobby's rents if ratification fails and its rents if ratification suceeds. A commitment by H to unilateral tariff reduction after ratification failure reduces this difference, not only for the import-competing lobby but also for the exporting lobby.

increase its expenditure in response. Even if we could guarantee that both lobbies reduce their expenditures, it is not clear what would happen to the probability of failure. We show in this section that in spite of these complexities, fairly weak assumptions about the nature of political competition ensure that endogenous lobbying continues to reinforce the incentive for unilateral liberalization.

Suppose there are two lobbies in the foreign country, L_x and L_y, representing specific factors used in the *X* and *Y* sectors, respectively (*X* is import-competing, *Y* is exporting). Producer surplus in each of the two sectors is denoted by $r_x(\tau)$ and $r_y(\tau)$, with $r_x' > 0$, $r_y' < 0$, and $r_x'' \bullet 0$, $r_y'' \bullet 0$. The lobbies are assumed to simultaneously choose expenditure levels, k_x and k_y, in an effort to alter the probability that the current agreement will be ratified. We maintain the assumption that the lobbies are short-run players. We model competition between the two lobbies as a contest. Let the probability of failure be given by

(13) $$z = z(k_x, k_y).$$

In an abuse of notation, we let z_x and z_y denote the partial derivatives of z with respect to k_x and k_y, respectively. We assume $z_x > 0$ and $z_y < 0$, which simply means that L_x spends resources to raise the probability of failure, while L_y spends resources to lower it. Each lobby maximizes (*b* times) its expected producer surplus net of lobbying costs, taking the spending of the other lobby as given. The first-order condition for lobby L_i is

(14) $$z_i b[r_i(\sigma) - r_i(\pi)] = 1.$$

The second-order condition requires that $z_{xx} < 0$ and $z_{yy} > 0$. We also assume

(15) $$|z_{ii}| > |z_{xy}|$$

for $i = x, y$. Thus, it is assumed that a lobby's own expenditure has a greater effect on its "marginal product" of expenditure than does its opponent's expenditure. This assumption is much weaker than, though consistent with, those routinely used in probabilistic two-party election models (see, e.g., Hillman, 1989, Magee, Brock and Young, 1989).[22]

World welfare in this case becomes

$$W(\pi, \sigma) = (1 - \lambda)w(\pi) + \lambda w(\sigma) - \lambda\frac{a(k_x + k_y)}{z} \quad . \tag{16}$$

The first-order condition for an optimal proposal is

$$(1 - \lambda)w'(\pi) + \phi_x(\pi, \sigma)r'_x(\pi) + \phi_y(\pi, \sigma)r'_y(\pi) = 0 \tag{17}$$

where ϕ_x and $-\phi_y$ are the lobbying-related social costs of an increase in the producer stake of sectors X and Y, respectively.[23] Intuitively, we might expect an increase in the stake of the import-competing lobby to be socially costly (i.e, $\phi_x > 0$), as, ceteris paribus, L_X would respond by raising its expenditure and thereby increase the probability of failure. However, the social impact of an increase in the export lobby's stake appears ambiguous, because, ceteris paribus, L_Y would increase its expenditure, which is costly *per se* but reduces the probability of failure. Both of these intuitive statements turn out to be correct, and this is shown in the proof of proposition 4 below. Now reducing π increases the stake of *both* lobbies, and the net social cost of this is captured by the term $\phi_x r'_x(\pi) + \phi_y r'_y(\pi)$. This must be positive for (17) to have an interior solution, that is, for $\pi(\sigma) \in (1, \sigma)$.

Differentiating (16) with respect to σ and using (17) gives

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[22]Such as the logit form, $z = \frac{k_x}{k_x + k_y}$.

[23]$\phi_i(\pi, \sigma) = \left\{(z_i z_{jj} - z_j z_{xy})[w(\pi) - w(\sigma) + \delta a(k_x + k_y)] + \frac{a\lambda}{z}(z_{jj} - z_{xy})\right\}\frac{(z_i)^2}{(z_{xy})^2 - z_{xx}z_{yy}}$ for $i, j = x, y$, and $i \bullet j$.

$$(18) \qquad \frac{dW}{d\sigma} = \lambda w'(\sigma) - [\phi_x(\sigma)r'_x(\sigma) + \phi_y(\sigma)r'_y(\sigma)].$$

The term $\phi_x r'_x(\sigma) + \phi_y r'_y(\sigma)$ is the net social benefit of reducing σ. If, as we showed above, a reduction in π, which causes a increase in the stake of both lobbies, results in a positive net social cost, then does a reduction in σ, which causes decrease in the stake of both lobbies, result in a positive net social benefit? If so, then it would augment the insurance incentive for unilateral tariff reduction, and the home government would always wish to choose σ to be as low as possible, subject to the TSE constraint (11). The answer is found in the next proposition:

Proposition 4: If the optimal proposal is interior, then reducing σ, by decreasing the stakes, results in a positive net (lobbying-related) social benefit, and thus *H* would always gain by reducing σ.
(Proof in appendix.)

The proof of proposition 4 establishes that $\phi_x > 0$. The reason this needs to be proved is that k_x, k_y and z arise from a Nash equilibrium determined by equations (14). A change in the stake of lobby (in this case the import-competing lobby) alters this Nash equilibrium, and the comparative statics are potentially complex. Assumption (15) amounts to a regularity condition which ensures that, if the stake of one (or both) lobby(ies) rises, then the total lobbying expenditure $k_x + k_y$ must rise. Even though this does not sign the effect of this change on z, it is enough to ensure that $\phi_x > 0$. Then it is straightforward algebra to show that $\phi_x r'_x(\sigma) + \phi_y r'_y(\sigma) \bullet \phi_x r'_x(\pi) + \phi_y r'_y(\pi)$, due to the convexity of r_x and r_y.

The significance of proposition 4 is that the presence of a second lobby need not alter the basic results of the one lobby case. More precisely, if an increase in the stake of the import-competing lobby induces a political reaction which is socially costly (just as in the one lobby case), and if that cost is large enough so that the optimal proposal is greater than free trade (just as in the one lobby case), then the effect of unilateral tariff reduction is essentially the same as in the one lobby case. The existence of the export lobby is immaterial. Intuitively, if *H* limits its tariff proposal to a level greater than free trade, it must be because it fears the political backlash from that would occur if it were to propose a lower tariff. When it comes to reducing its unilateral tariff, therefore, *H* is considering this from an initial situation in which the import-competing lobby has, in a sense, the "upper hand." Thus, at the margin, a unilateral tariff reduction is welfare improving because it reduces the stake of this politically-decisive, anti-trade lobby.

VII. THE LONG-RUN LOBBY CASE

In this section we consider the case of a single long-run lobby, whose objective function is the discounted present value of the entire time path of producer surpluses net of lobbying costs. This is a significant departure from the short-run lobby case, for as we shall see, it gives rise to the use of time-varying strategies. This makes the generalization of the comparative static results of the short-run lobby case problematic. We find once again that in the TSE, *H* uses unilateral tariffs that are as low as possible, subject to the analog of constraint (11). However, unlike in the short-run lobby case, if this constraint is relaxed by an increase in country size, unilateral tariffs need not fall in every period.

Given Π and Σ, the average expected payoff of *L* is now determined by

$$(19) \qquad R_t = (1 - z_t)br(\pi_t) + z_t[(1 - \delta)br(\sigma_t) + \delta R_{t+1}] - (1 - \delta)k(z_t)$$

for all t. If $\sigma_t \bullet \pi_t$ for all t, L's choice z_t will satisfy the first-order condition

$$(20) \qquad (1 - \delta)br(\sigma_t) + \delta R_{t+1} - br(\pi_t) = (1 - \delta)k'(z_t).$$

Differentiating (20) gives, $\frac{\bullet z_t}{\bullet \pi_t} = \frac{- br'(\pi_t)}{k''(z_t)(1 - \delta)} \bullet 0$, and $\frac{\bullet z_t}{\bullet \sigma_t} = \frac{br'(\sigma_t)}{k''(z_t)} \bullet 0$. Condition (20) differs from (8) in that L's stake now includes R_{t+1}, which is determined by the paths of future proposals and unilateral tariffs. The discount factor also enters. As δ rises, current lobbying costs become small relative to the long-term stake.

The MPE continues to be characterized by $\sigma_t = \tau_0$ for all t; however, the corresponding proposal and failure probability are slightly different. Using $R_t = R_{t+1}$ in (19) and (20), and differentiating (2) using $W_t = W_{t+1}$, gives two first-order conditions which simultaneously determine the MPE proposal $\pi(\tau_0)$ and failure probability z_0

(21) $$\lambda_0' b[r(\tau_0) - r(\pi(\tau_0)] = \frac{\lambda_0}{z_0} k'(z_0) + \lambda_0' \delta k(z_0) \text{ and}$$

(22) $$(1 - \lambda_0) w'(\pi(\tau_0)) + \phi_0 \frac{r'(\pi(\tau_0))}{(1 - \delta)} = 0.$$

The left hand side of (21) is the marginal benefit to increasing z through lobbying: it reflects the gain to increasing the expected number of periods of ratification failure. The right-hand side is the marginal cost: it consists of the per-period marginal cost, appropriately discounted, plus the cost of increasing the expected number of periods of ratification failure. Equation (22) is the first-order condition for the home government optimal proposal. It is identical to (9), except for the $1 - \delta$ in the denominator of the second term. This reflects the fact that the proposal, should it be ratified, has a permanent effect on the payoff of the lobby. Let W_0 denote the value of (2) in the MPE.

Next we consider TSEs. Again, the constraint that H would not wish to deviate for fear of reversion to the MPE is

(23) $$(1 - \delta)u^H(\sigma_t/\tau^F{}_0, \tau^F{}_0) + \delta W_{t+1}(\Pi, \Sigma) \bullet (1 - \delta)u^H(\tau^H{}_0, \tau^F{}_0) + \delta W_0$$

for all t, where $W_t(\Pi, \Sigma)$ is the value of (2) given paths (Π, Σ).

H's best TSE path (Π^*, Σ^*) will maximize $W_1(\Pi, \Sigma)$ subject to (23). Although this solution will generally be non-stationary, we can establish the key property of the unilateral tariff path Σ^* quite simply.

Proposition 5: For any two equilibrium paths (Π, Σ) and $(\Pi, \tilde{\Sigma})$, such that $\Sigma \geq \tilde{\Sigma} > 0$,[24] $W_1(\Pi, \tilde{\Sigma}) > W_1(\Pi, \Sigma)$ and $W_t(\Pi, \tilde{\Sigma}) \geq W_t(\Pi, \Sigma)$ for all t.

(Proof in appendix.)

Proposition 5 states that no matter what equilibrium path of proposals we wish to examine, using lower unilateral tariffs *at any time* raises world welfare. The intuition of the proof is that lowering σ_t for any t lowers the probability of failure in t, thereby lowering the expected payoff to L. A lower R_t lowers L's stake in period t - 1, which lowers z_{t-1}, and so on. All of these lower z's at each step along given (equilibrium) path of proposals, coupled with direct welfare benefit of lower unilateral tariffs, give higher expected world welfare. The implication of Proposition 5 is that (Π^*, Σ^*) involves the lowest possible unilateral tariffs, so that either (23) binds or $\sigma^*_t = 1$ in every period. This is stated formally in the following corollary:

Corollary: There exists some $\bar{\delta}$, such that if $\delta \geq \bar{\delta}$, then $\sigma^*_t = \pi^*_t = 1$, and $z_t = 0$ for all t. Otherwise, $\sigma^*_t > 1$ and constraint (23) binds for all t.

(Proof in appendix.)

According to the corollary, the TSE can be of two types. For a high enough discount factor, the paths of proposals, unilateral tariffs and failure probabilities are constant over time. Free trade is proposed every period, the optimal unilateral policy is also free trade, and the resulting failure probability is zero. Thus, free trade is reached immediately with probability one.

For lower discount factors, the characterization of the paths is more problematic. In general, the proposals, unilateral tariffs and failure probabilities will vary over time. The results of simulations (details of which are found in our working paper) reveal that along the TSE path, the proposal is typically highest in the first period, followed by lower values in later periods, ultimately converging to a

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[24]That is, at least one element in $\tilde{\Sigma}$ is strictly lower than its counterpart in Σ, none is greater, and all are greater than zero.

steady-state. The intuition behind this time profile is that in periods two and following, *H* punishes *L* with decidedly unattractive proposals to lower R_1. This lowers L's stake in the first period, making it less inclined to fight the first, relatively attractive, proposal. The time-varying nature of the proposal path implies that $W_t(\Pi, \Sigma)$ varies over time, which implies that the TSE constraint (23) will be different in each period, and thus Σ will be time-varying as well (in our simulations σ_t declines along with π_t).

All of this has interesting implications for the results on country size. An increase in the endowment of the home country will typically increase both temptation and enforcement, just as in the short-run lobby case. However, in the long-run lobby case, since the TSE constraint (23) is different in each period, it may be that temptation rises relative to enforcement in some periods and falls relative to enforcement in other periods. Thus, it could be that σ_t rises in some periods and falls in other periods in response to an increase in the home endowment.

VIII. CONCLUSIONS

In a standard trade model, the primary effect of a unilateral liberalization is to worsen the terms of trade of the liberalizing country. If one looks no further than this, then there appears to be a profound contradiction between theory and practice, particularly in the cases of nineteenth century Britain and postwar U.S. However, when one takes into account the liberalizing effect the unilateral action may have on other countries, it is quite possible that unilateral liberalization results in a net welfare improvement. This paper has illustrated just two of the possibly many liberalizing effects of a unilateral tariff reduction. First, we showed that by committing to a unilateral tariff reduction in the event of agreement failure, the home country partially insures the foreign country against its political risk, and in exchange receives better terms from trade agreements that are successful. Second, unilateral tariff reduction lowers the political stakes associated with trade liberalization in the foreign country, thereby lowering the overall political cost of reaching and implementing trade agreements. This may lead to an increased probability of successful trade agreements, with deeper tariff cuts therein. In both of these scenarios, we confirmed that a policy of unilateral tariff reduction is welfare-improving for the home country.

The idea that a unilateral tariff reduction may help to liberalize other countries was evident among the British and American policy makers in their respective times. During the British debates over repeal of the Corn Laws, Lord Overstone argued, "other countries witnessing our prosperity will find it necessary to follow our example."[25] Similarly, Robert Peel asserted, "Let us trust to the influence of public opinion in other countries--let us trust that our example, with the proof of practical benefits we derive from it, will at no remote period insure the adoption of the principles on which we have acted."[26] In the U.S. case, Secretary of State Cordell Hull, in a December 1939 speech, argued that a liberal trade stance by the U.S. should serve as "a cornerstone around which the nations could rebuild their commerce on liberal lines when the war ended."[27] On the same point, Baldwin (1984) notes, "since the late nineteenth century, the Democrats ... maintained that low U.S. tariffs encouraged low foreign tariffs and thus indirectly stimulated U.S. exports." We do not pretend that these policy makers had our model in mind when making these statements. However, regardless of the mechanism they conjectured, their predictions may have been accurate. In each case, the unilateral tariff reduction by the large country was followed by a wave of trade liberalization involving other countries that was not present prior to the unilateral action. Irwin (1988) argues that after taking into account the subsequent liberalizations of its trading partners, Britain quite possibly gained by more than its initial loss from its unilateral tariff reduction.

There are numerous reasonable extensions of our model, which are not formally presented here, because they do not appear to significantly alter the basic results. It might be reasonable, for example, to assume that political opposition to trade liberalization is present in both countries, not just the foreign country. In this case, if ever political opposition were to block trade liberalization in one country but not the other, the country with the mandate to reduce tariffs would be in exactly the same position as the home country is in our model. It would have the same incentive as the home country to unilaterally exercise its mandate to reduce tariffs, perhaps even more so, as it may anticipate difficulty in having its

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[25]As quoted in Irwin (1988, p. 1158).

[26]As quoted in Bhagwati (1988, p. 29). Both Peel and Overstone clearly believed that unilateral tariff reduction would benefit Britian even without foreign reciprocity.

[27]As quoted in Wilkinson (1960), p. 16.

mandate renewed in the future. Such was the position of the U.S. in the early GATT rounds, after the Reciprocal Trade Agreements Act had authorized the President to reduce tariffs by up to 50 percent (Curzon, 1965, p. 81).

Another reasonable extension might be to explicitly model inter-sectoral factor movements to capture the notion that a reallocation of foreign factors, induced by the home unilateral tariff reduction, might alter the political viability of the foreign import-competing industry over time. With dynamic adjustment of capital, we would expect a low unilateral tariff to induce capital to exit the *X* sector. This, by itself, may well reduce the political stake of the *X* sector (and raise that of the *Y* sector) over time.[28] Thus, it appears that such an approach would strengthen our results.

While our model shows that a policy of low unilateral tariffs may be welfare-improving, we also show that there may be an inverse relationship between the level of the unilateral tariff and the degree of a country's monopoly power in trade. Thus, there is no inconsistency between monopoly power and low unilateral tariffs. Some have claimed that a "diminished giant" status accounts for the more aggressive approach of U.S. trade policy in recent years, and for the rise of Britain's "fair trade" movement in the late 19th century. Our model is consistent with this view.

Charlene Barshefsky recently asserted that "[F]rom the early weeks of his first term, President Clinton made clear his view that the policies which brought us prosperity in the 1950's and 60's would not suffice for the 1990's"[29] [italics added]. The natural question that arises in view of our model is whether this sentiment reflects the higher optimal unilateral tariff associated with a country which has lost some of its monopoly power in trade, or whether the decision has been made to forego long run gains in favor of short run benefits.

IX. APPENDIX

Proof of Proposition 1:

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[28]While the political stakes per unit of capital can rise or fall, the decline (rise) in the amount of *X*-sector (*Y*-sector) capital would lead one to expect the total *X*-sector (*Y*-sector) stake to fall (rise) over time. For detailed treatments of the effects of price changes on factor returns with dynamic adjustment, see Mussa (1978) and Neary (1978).

[29]Statement of Ambassador Charlene Barshefsky before the Senate Finance Committee, January 29, 1997.

From (5), σ can be supported as a TSE iff

$$\Lambda(\sigma, \beta) = \delta z[w(\sigma) - w(\tau_0)] - (1 - \delta z)[u^H(\tau^H{}_0, \tau^F{}_0; \beta) - u^H(\sigma/\tau^F{}_0, \tau^F{}_0; \beta)] \bullet 0.$$

Since σ* is the minimum σ subject to $\Lambda(\sigma, \beta) \bullet 0$ and $\sigma \bullet 1$, it must be the case that either σ* = 1 or $\Lambda(\sigma^*, \beta) = 0$. Thus if σ* > 1, we can totally differentiate $\Lambda(\sigma^*, \beta) = 0$ to deterimine $\bullet\sigma^*/\bullet\beta$. Differentiating yields

(A1) $$\frac{\bullet\sigma^*}{\bullet\beta} = - \frac{\dfrac{\bullet\Lambda(\sigma^*, \beta)}{\bullet\beta}}{\dfrac{\bullet\Lambda(\sigma^*, \beta)}{\bullet\sigma}} .$$

The denominator of (A1) is nonnegative, according to the Kuhn-Tucker theorem (which implies that $1 = \rho\bullet\Lambda(\sigma^*, \tau_0)/\bullet\sigma$ for some nonnegative scalar ρ). Using $\bullet w(\tau, \beta)/\bullet\beta = 0$ (from the definition of β) and $\bullet u^H(\tau^H{}_0, \tau^F{}_0; \beta)/\bullet\tau^H{}_0 = 0$ (the envelope theorem), $\bullet\Lambda(\sigma^*, \beta)/\bullet\beta$ works out to be

(A2) $$\frac{\bullet\Lambda(\sigma^*, \beta)}{\bullet\beta} = - \delta z w'(\tau_0)\frac{d\tau^H{}_0}{d\beta} - (1 - \delta z)\left(\frac{\bullet u^H(\tau^H{}_0, \tau^F{}_0; \beta)}{\bullet\beta} - \frac{\bullet u^H(\sigma/\tau^F{}_0, \tau^F{}_0; \beta)}{\bullet\beta}\right).$$

(A2) must be positive for high enough δz, because by defintion, $w'(\tau_0) < 0$, and $d\tau^H{}_0/d\beta > 0$, so long as the term in brackets is bounded. To see that it is, note that $\dfrac{\bullet u^H(\tau^H, \tau^F{}_0; \beta)}{\bullet\beta} = x(p^H - \tau^H)$, and that, for all $\tau^H \bullet \tau^H{}_0 = \varepsilon^F/(\varepsilon^F - 1)$. Thus, τ^H and hence p^H is bounded, if $\varepsilon^F > 1$. QED

Proof of Lemma 1:

(A) The proof is in two steps. First, we show that no π outside of the interval [1, σ] can be an optimal proposal. Second, we show that if σ > 1, then π(σ) ≠ 1 and π(σ) ≠ σ. Together these imply the optimal proposal π(σ) ∈ (1, σ), if σ > 1, and π(1) = 1.

Step 1: Suppose $\tilde{\pi} < 1$ is an optimal proposal. Then it must be that $W(\tilde{\pi}, \sigma) \bullet W(1, \sigma)$. Using equation (3), we can write

(A3) $$W(1, \sigma) - W(\tilde{\pi}, \sigma) = [\lambda(\tilde{\pi}, \sigma) - \lambda(1, \sigma)][w(1) - w(\sigma)] + [1 - \lambda(\tilde{\pi}, \sigma)][w(1) - w(\tilde{\pi})] + \frac{\lambda(\tilde{\pi}, \sigma)}{z(\tilde{\pi}, \sigma)} k[z(\tilde{\pi}, \sigma)] - \frac{\lambda(1, \sigma)}{z(1, \sigma)} k[z(1, \sigma)] .$$

From (8), we know $z(\tilde{\pi}, \sigma) > z(1, \sigma)$, which implies $\lambda(\tilde{\pi}, \sigma) > \lambda(1, \sigma)$, $\lambda(\tilde{\pi}, \sigma)/z(\tilde{\pi}, \sigma) > \lambda(1, \sigma)/z(1, \sigma)$ and $k[z(\tilde{\pi}, \sigma)] > k[z(1, \sigma)]$. From the definition of w(·), we know $w(1) > w(\tilde{\pi})$ and $w(1) \bullet w(\sigma)$. Together these imply $[W(1, \sigma) - W(\tilde{\pi}, \sigma)] > 0$, which is a contradiction.

Next suppose $\tilde{\pi} > \sigma$ is an optimal proposal. Then it must be that $W(\tilde{\pi}, \sigma) \bullet W(\sigma, \sigma)$. From (8), we know $z(\tilde{\pi}, \sigma) = z(\sigma, \sigma) = 0$, implying that, $W(\tilde{\pi}, \sigma) = w(\tilde{\pi})$, and $W(\sigma, \sigma) = w(\sigma)$. From the definition of w(·), we know $w(\tilde{\pi}) < w(\sigma)$, which contradicts $W(\tilde{\pi}, \sigma) \bullet W(\sigma, \sigma)$.

Step 2: If σ > 1 and π(σ) = 1, then φ(1, σ) > 0, λ > 0, and therefore $\dfrac{\bullet W(1,\sigma)}{\bullet\pi} > 0$. If σ > 1 and π(σ) = σ, then φ(σ, σ) = 0, λ = 0, and therefore $\dfrac{\bullet W(\sigma,\sigma)}{\bullet\pi} = w'(\sigma) < 0$. Since W(π,σ) is continuous in π, increasing at π = 1 and decreasing at π = σ, the maximum of W(π, σ) with respect to π must be interior. If σ = 1, then the set [1, σ] is a singleton, and thus π(1) = 1.

(B) This follows directly from (A) and the definition of $\phi(\sigma)$.

(C) Differentiating $z(\sigma)$ gives $\frac{dz}{d\sigma} = z_\sigma + z_\pi \frac{d\pi}{d\sigma}$. Recalling that $z_\sigma > 0$ and $z_\pi < 0$, it follows that if $\frac{d\pi}{d\sigma} < 0$, then $\frac{dz}{d\sigma} > 0$, and if $\frac{dz}{d\sigma} < 0$, then $\frac{d\pi}{d\sigma} > 0$. Thus, $\frac{dz}{d\sigma}$ and $\frac{d\pi}{d\sigma}$ cannot both be negative.

(D) Total differentiation of equation (9) yields

$$\frac{d\pi}{d\sigma} = - \frac{\phi_\sigma r'(\pi) - \lambda' z_\sigma w'(\pi)}{(1 - \lambda)w''(\pi) + \phi r''(\pi) + \phi_\pi r'(\pi) - \lambda' z_\pi w'(\pi)} .$$

Note the denominator is negative, by the second-order condition. Thus, $\pi'(\sigma) > 0$ if and only if

(A4) $$\phi_\sigma r'(\pi) - \lambda' z_\sigma w'(\pi) > 0.$$

Recall $\phi(\pi, \sigma) = \frac{b}{k''}\left\{\frac{\lambda}{z} ak' + \lambda'[w(\pi) - w(\sigma) + \delta ak]\right\}$ • 0, so (A4) becomes

(A5) $$\phi_\sigma = - \frac{w'(\sigma)}{r'(\sigma)} z_\sigma \lambda' + \phi_z z_\sigma.$$

Next, substitute (A5) into (A4) and to get the following condition:

(A6) $$\phi_z - \lambda'\left(\frac{w'(\sigma)}{r'(\sigma)} + \frac{w'(\pi)}{r'(\pi)}\right) > 0.$$

Differentiation of ϕ with respect to z gives

$$\phi_z = \frac{-k'''}{k''} \phi + \frac{b}{k''}\left\{\frac{\lambda'}{z} ak' - \frac{\lambda}{z^2} ak' + \frac{\lambda}{z} ak'' + \lambda''[w(\pi) - w(\sigma) + \delta ak] + \lambda'\delta ak'\right\} .$$

Recall that $\lambda = \frac{(1 - \delta)z}{1 - \delta z}$, so $\lambda' = \frac{(1 - \delta)}{(1 - \delta z)^2}$ and $\lambda'' = \frac{2\delta(1 - \delta)}{(1 - \delta z)^3}$. Thus

$$\phi_z = \frac{-k'''}{k''} \phi + \frac{(1 - \delta)}{(1 - \delta z)} \frac{b}{k''}\left\{\frac{ak'}{(1 - \delta z)z} - \frac{ak'}{z} + ak'' + \frac{2\delta}{(1 - \delta z)^2}[w(\pi) - w(\sigma) + \delta ak] + \frac{\delta ak'}{1 - \delta z}\right\}$$

or

$$\phi_z = \frac{-k'''}{k''} \phi + \frac{\lambda''}{\lambda'} \phi + \frac{\lambda ab}{z} .$$

So, (A6) becomes

(A7) $$\left(\frac{\lambda''}{\lambda'} - \frac{k'''}{k''}\right) \phi + \frac{\lambda ab}{z} - \lambda'\left(\frac{w'(\sigma)}{r'(\sigma)} + \frac{w'(\pi)}{r'(\pi)}\right) > 0.$$

Using (9) we arrive at

(A8) $$\left(\frac{\lambda''}{\lambda'} + \frac{1}{(1 - \lambda)} - \frac{k'''}{k''}\right)\phi + \frac{\lambda ab}{z} - \lambda'\frac{w'(\sigma)}{r'(\sigma)} > 0.$$

This is the equation stated in footnote 23. It is satisfied if $\frac{k'''}{k''}(1 - z) \bullet 1$.

(E) We wish to show that $z'(\sigma) = z_\sigma + z_\pi \pi'(\sigma) > 0$. Using $z_\sigma = \frac{br'(\sigma)}{k''(z)}$ and $z_\pi = \frac{- br'(\pi)}{k''(z)}$ gives the condition $\frac{r'(\sigma)}{r'(\pi)} > \pi'(\sigma)$, or

(A9) $$\frac{r'(\sigma)}{r'(\pi)} > - \frac{\phi_\sigma r'(\pi) - \lambda' z_\sigma w'(\pi)}{(1 - \lambda)w''(\pi) + \phi r''(\pi) + \phi_\pi r'(\pi) - \lambda z_\pi w'(\pi)} .$$

Using the fact that the denominator of (A9) is negative, and $\frac{w'(\pi)}{r'(\pi)}(1 - \lambda) = - \phi$, produces:

(A10) $$\frac{r'(\sigma)}{r'(\pi)} [-(1 - \lambda)w''(\pi) - \phi r''(\pi) - \phi_\pi r'(\pi) + \lambda z_\pi w'(\pi)] > \phi_\sigma r'(\pi) - \lambda' z_\sigma w'(\pi).$$

Using $w'(\pi) = - \frac{\phi r'(\pi)}{(1 - \lambda)}$, $\phi_\sigma = - w'(\sigma)\frac{b\lambda'}{k''} + \phi_z z_\sigma$, $\phi_\pi = w'(\pi)\frac{b\lambda'}{k''} + \phi_z z_\pi$, and the definitions of z_σ and z_π in (A10), we find (after some manipulation):

$$-(1 - \lambda)r'(\sigma)\frac{w''(\pi)}{r'(\pi)} - \phi r'(\sigma)\frac{r''(\pi)}{r'(\pi)} + (w'(\sigma)r'(\pi) - r'(\sigma)w'(\pi)) \frac{b\lambda'}{k''} > 0.$$

Once again we use $\frac{w'(\pi)}{r'(\pi)}(1 - \lambda) = - \phi$, which produces

$$\left(- \frac{w''(\pi)}{w'(\pi)} + \frac{r''(\pi)}{r'(\pi)}\right)\frac{w'(\pi)}{r'(\pi)} + \left(\frac{w'(\sigma)}{r'(\sigma)} - \frac{w'(\pi)}{r'(\pi)}\right)\frac{b\lambda' r'(\pi)}{(1 - \lambda)k''} > 0$$

or

(A11) $$\frac{d}{d\pi}\left(\frac{w'(\pi)}{r'(\pi)}\right) \bullet \left(\frac{w'(\sigma)}{r'(\sigma)} - \frac{w'(\pi)}{r'(\pi)}\right)\frac{b\lambda' r'(\pi)}{(1 - \lambda)k''} .$$

Expression (A11) is the necessary condition found in footnote 23. To get our sufficient condition, we apply the Mean-Value Theorem to the righthand side of (A11), which gives

(A12) $$\frac{d}{d\pi}\left(\frac{w'(\pi)}{r'(\pi)}\right) \bullet \frac{d}{d\pi}\left(\frac{w'(\tau)}{r'(\tau)}\right)(\sigma - \pi)\frac{b\lambda' r'(\pi)}{(1 - \lambda)k''}$$

for some $\tau \in [\pi, \sigma]$. It can be shown that $(\sigma - \pi) \frac{b\lambda' r'(\pi)}{(1 - \lambda)k''} < 1$, and thus it is sufficient condition for (A12) that $\frac{d}{d\pi}\left(\frac{w'(\pi)}{r'(\pi)}\right)$ $\bullet \frac{d}{d\tau}\left(\frac{w'(\tau)}{r'(\tau)}\right) < 0$ for all $\tau \in [\pi, \sigma]$. QED

Proof of Proposition 2:

If $\sigma^* > 1$, then (11) must be satisfied with equality. In other words, if we let $T(\sigma^*)$ denote temptation, and $E(\sigma^*)$ denote enforcement, then $T(\sigma^*) = E(\sigma^*)$. Now fix $\bar{z} = z(\sigma^*)$, and let $\bar{E}(\sigma^*)$ denote enforcement when $\bar{z}$ is taken as exogenous. We aim to show that $T(\sigma^*) > \bar{E}(\sigma^*)$ (and hence σ^* is not supportable as a TSE in the exogenous case) by showing that $E(\sigma^*) > \bar{E}(\sigma^*)$. Let us write out $E(\sigma^*)$ and $\bar{E}(\sigma^*)$:

$$E(\sigma^*) = \delta\left\{\left[(1 - \bar{\lambda})w(\pi(\sigma^*)) + \bar{\lambda}w(\sigma^*) - \frac{\bar{\lambda}ak(\bar{z})}{\bar{z}}\right] - \left[(1 - \lambda_0)w(\pi(\tau_0)) + \lambda_0 w(\tau_0) - \frac{\lambda_0 ak(z_0)}{z_0}\right]\right\}$$

$$\bar{E}(\sigma^*) = \delta\left\{\left[(1-\bar{\lambda})w(1) + \bar{\lambda}w(\sigma^*) - \frac{\bar{\lambda}ak(\bar{z})}{\bar{z}}\right] - \left[(1-\bar{\lambda})w(1) + \bar{\lambda}w(\tau_0) - \frac{\bar{\lambda}ak(\bar{z})}{\bar{z}}\right]\right\}$$
$$= \delta\bar{\lambda}\,[w(\sigma^*) - w(\tau_0)]$$

where $\bar{\lambda} = \lambda(\bar{z})$, $z_0 = z(\tau_0)$, and $\lambda_0 = \lambda(z_0)$. Taking the difference gives

$$E(\sigma^*) - \bar{E}(\sigma^*) = \delta\left[(1-\bar{\lambda})w(\pi(\sigma^*)) - (1-\lambda_0)w(\pi(\tau_0)) + (\bar{\lambda} - \lambda_0)w(\tau_0) + \frac{\lambda_0 ak(z_0)}{z_0} - \frac{\bar{\lambda}ak(\bar{z})}{\bar{z}}\right]$$

which is positive if and only if

(A13) $$(1-\bar{\lambda})[w(\pi(\sigma^*)) - w(\pi(\tau_0))] + (\lambda_0 - \bar{\lambda})[w(\pi(\tau_0)) - w(\tau_0)] + \frac{\lambda_0 ak(z_0)}{z_0} - \frac{\bar{\lambda}ak(\bar{z})}{\bar{z}} > 0.$$

If $z'(\sigma) > 0$, then $z_0 > \bar{z}$, and $\lambda_0 > \bar{\lambda}$. If $\pi'(\sigma) > 0$, then $\pi(\tau_0) > \pi(\sigma^*)$ and thus $w(\pi(\sigma^*)) > w(\pi(\tau_0))$. We also know from lemma 1 (A) that $\pi(\tau_0) < \tau_0$, and thus, $w(\pi(\tau_0)) > w(\tau_0)$. Together these guarantee (A13).

Note that under our assumptions, temptation is convex and enforcement is concave. Consequently, $T(\sigma)$ and cross $E(\sigma)$ from above only once. This ensures that there are no σ lower than σ^* that are supportable as a TSE in the exogenous case. QED

Proof of Proposition 3:
The argument follows that of the proof of proposition 1, with a few additional issues that will be noted below. The relevant TSE constraint is (11):

$$\Lambda(\sigma, \beta) = \delta[W(\pi(\sigma), \sigma) - W(\pi(\tau_0), \tau_0)] - (1-\delta)[u^H(\tau^H{}_0, \tau^F{}_0; \beta) - u^H(\sigma/\tau^F{}_0, \tau^F{}_0; \beta)] \bullet 0.$$

We wish to show $\frac{\bullet\Lambda(\sigma^*,\beta)}{\bullet\beta} \bullet 0$. (9) implies, $\frac{\bullet W(\pi(\sigma),\sigma)}{\bullet\beta} = -\phi\frac{\bullet z}{\bullet\beta}$, and $\frac{\bullet W(\pi(\tau_0),\tau_0)}{\bullet\beta} = -\phi_0\frac{\bullet z_0}{\bullet\beta} + [\lambda_0 w'(\tau_0) - \phi_0 r'(\tau_0)]\frac{d\tau^H{}_0}{d\beta}$. Thus,

(A14) $$\frac{\bullet\Lambda(\sigma^*, \beta)}{\bullet\beta} = \delta\left(\phi_0\frac{\bullet z_0}{\bullet\beta} - \phi\frac{\bullet z}{\bullet\beta} - \lambda_0 w'(\tau_0)\frac{d\tau^H{}_0}{d\beta} + \phi_0 r'(\tau_0)\frac{d\tau^H{}_0}{d\beta}\right)$$
$$- (1-\delta)\left(\frac{\bullet u^H(\tau^H{}_0, \tau^F{}_0; \beta)}{\bullet\beta} - \frac{\bullet u^H(\sigma/\tau^F{}_0, \tau^F{}_0; \beta)}{\bullet\beta}\right).$$

Multplying (A14) by $(1 - \delta z_0)/(1 - \delta)$ and substituting in for ϕ_0 and ϕ gives the condition

(A15) $$\delta b\left\{a\frac{k'_0}{k''_0} + \frac{1}{(1-\delta z_0)k''_0}[w(\pi_0) - w(\tau_0) + \delta ak_0]\right\}\left(\frac{\bullet z_0}{\bullet\beta} + r'(\tau_0)\frac{d\tau^H{}_0}{d\beta}\right) - \delta z_0 w'(\tau_0)\frac{d\tau^H{}_0}{d\beta}$$
$$- (1-\delta z_0)\delta b\left\{\frac{a}{1-\delta z}\frac{k'}{k''} + \frac{1}{(1-\delta z)^2 k''}[w(\pi) - w(\sigma) + \delta ak]\right\}\frac{\bullet z}{\bullet\beta}$$
$$- (1-\delta z_0)\left(\frac{\bullet u^H(\tau^H{}_0, \tau^F{}_0; \beta)}{\bullet\beta} - \frac{\bullet u^H(\sigma/\tau^F{}_0, \tau^F{}_0; \beta)}{\bullet\beta}\right) \bullet 0.$$

For high enough δz_0, (A15) must hold, provided $\left(\frac{\bullet z_0}{\bullet\beta} + r'(\tau_0)\frac{d\tau^{H}_0}{d\beta}\right) > 0$. As z_0 satisfies the first-order condition, $k'(z_0) = [1 - \beta]b(1-\beta)[p^F(\tau_0) - p^F(\pi_0)]$, we can totally differentiate it to get $\frac{\bullet z_0}{\bullet\beta} = \frac{(\chi - 1)k'(z_0)}{(1-\beta)k''(z_0)}$. Thus, $\left(\frac{\bullet z_0}{\bullet\beta} + r'(\tau_0)\frac{d\tau^{H}_0}{d\beta}\right) > 0$ if and only if $\chi > 1 - r'(\tau_0)(1-\beta)[k''(z_0)/k'(z_0)](d\tau^{H}_0/d\beta) \equiv \underline{\chi}$. QED

Proof of Proposition 4:

The proof is in two stages: first, we show that if $\pi(\sigma) \in (1, \sigma)$, then $\phi_x > 0$; second, we show that $\phi_x > 0$ implies $\frac{dW}{d\sigma} < 0$.
If $\pi(\sigma) \in (1, \sigma)$, then from (17), $\phi_x r'_x(\pi) + \phi_y r'_y(\pi) > 0$. Since $r'_x(\pi) > 0$ and $r'_y(\pi) < 0$, it follows that if $\phi_x < 0$, then $\phi_y < 0$. In other words, if ϕ_x is negative, both ϕ_x and ϕ_y are negative.
Now we show that it is not possible for both ϕ_x and ϕ_y to be negative. Using the definitions of ϕ_i from footnote 28,

$$\phi_x = \left\{(z_x z_{yy} - z_y z_{xy})[w(\pi) - w(\sigma) + \delta a(k_x + k_y)] + \frac{a\lambda}{z}(z_{yy} - z_{xy})\right\}\frac{(z_x)^2}{(z_{xy})^2 - z_{xx}z_{yy}}\text{, and}$$

$$\phi_y = \left\{(z_y z_{xx} - z_x z_{xy})[w(\pi) - w(\sigma) + \delta a(k_x + k_y)] + \frac{a\lambda}{z}(z_{xx} - z_{xy})\right\}\frac{(z_y)^2}{(z_{xy})^2 - z_{xx}z_{yy}}\text{,}$$

it is clear that $\phi_x < 0$, if and only if

$$(z_x z_{yy} - z_y z_{xy}) + \Lambda(z_{yy} - z_{xy}) < 0 \tag{A16}$$

where $\Lambda = \frac{a\lambda}{z[w(\pi) - w(\sigma) + \delta a(k_x + k_y)]} > 0$. Given our assumption that $(z_{yy} - z_{xy}) > 0$ (see equation (15)), in order for (A16) to hold, it must be that $z_{xy} < 0$ and $(z_y + \Lambda) < 0$. Now $\phi_y < 0$ if and only if

$$(z_y z_{xx} - z_x z_{xy}) + \Lambda(z_{xx} - z_{xy}) < 0 \tag{A17}$$

or $\frac{(z_y + \Lambda)}{(z_x + \Lambda)} z_{xx} < z_{xy}$. But $z_{xx} < 0$, and thus (A17) contradicts (A16). Thus, it is not possible for both ϕ_x and ϕ_y to be negative, implying that $\phi_x \bullet 0$.
For the second part of the proof, we differentiate (16) with respect to σ, using (17), which yeilds:

$$\frac{\bullet W}{\bullet\sigma} = \lambda w'(\sigma) - [\phi_x(\sigma)r'_x(\sigma) + \phi_y(\sigma)r'_y(\sigma)]. \tag{A18}$$

From (17), we have $\phi_x r'_x(\pi) + \phi_y r'_y(\pi) > 0$ or $\left[\phi_x\frac{r'_x(\pi)}{-r'_y(\pi)} - \phi_y\right] > 0$. Thus $\phi_x\frac{r'_x(\sigma)}{-r'_y(\sigma)} - \phi_y$ must also be positive as $\frac{r'_x(\sigma)}{-r'_y(\sigma)} \bullet \frac{r'_x(\pi)}{-r'_y(\pi)}$, which follows from the fact that, $r_x'(\tau) > 0$, $r_x''(\tau) > 0$, and $r_y'(\tau) < 0$, $r_y''(\tau) > 0$. It follows directly that (A18) is negative. QED

Proof of Proposition 5:

Consider the constructed path $\hat{\Sigma} = \{\tilde{\sigma}_1, \tilde{\sigma}_2, ..., \tilde{\sigma}_T, \sigma_{T+1}, \sigma_{T+2}, ...\}$, and suppose, without loss of generality, that $\tilde{\sigma}_T < \sigma_T$. We wish to show that $W_t(\Pi, \hat{\Sigma}) \bullet W_t(\Pi, \Sigma)$ for all t. We begin by showing that $R_T(\Pi, \Sigma) > R_T(\Pi, \hat{\Sigma})$. Condition (20), along with the fact that $R_{T+1}(\Pi, \hat{\Sigma}) = R_{T+1}(\Pi, \Sigma)$ implies that $z_T > \hat{z}_T$, $k(z_T) > k(\hat{z}_T)$. Using (19) and (20) gives, (A19) $$R_T(\Pi, \Sigma) - R_T(\Pi, \hat{\Sigma}) = (1 - \delta)\{(\hat{z}_T - z_T)k'(z_T) - [k(z_T) - k(\hat{z}_T)] + \hat{z}_T[r(\sigma_T) - r(\tilde{\sigma}_T)]\}.$$

By the Mean-Value Theorem, there is a $\zeta \in [z_T, \hat{z}_T]$ such that $k(z_T) - k(\hat{z}_T) = (\hat{z}_T - z_T)k'(\zeta)$. Since $k'(z_T) > k'(\zeta)$, and $r(\sigma_T) > r(\tilde{\sigma}_T)$, (A19) must be positive.

Next consider period T-1. Since $R_T(\Pi, \hat{\Sigma}) < R_T(\Pi, \Sigma)$, and $r(\tilde{\sigma}_{T-1})$ is not greater than $r(\sigma_{T-1})$, it must be that, $R_{T-1}(\Pi, \hat{\Sigma}) < R_{T-1}(\Pi, \Sigma)$, $\hat{z}_{T-1} < z_{T-1}$ and $k(\hat{z}_{T-1}) < k(z_{T-1})$. Backward induction implies that this is true for all t • T. Now since $\hat{z}_t < z_t$ and $k(\hat{z}_t) < k(z_t)$ for all t • T, $W_t(\Pi, \hat{\Sigma})$ • $W_t(\Pi, \Sigma)$ for all t • T, and $W_1(\Pi, \hat{\Sigma})$ • $W_1(\Pi, \Sigma)$.
Finally, note that if $W_t(\Pi, \tilde{\Sigma}) < W_t(\Pi, \Sigma)$, then for $\delta < 1$ there must exist T • t such that the path $\hat{\Sigma}$ defined by T would give $W_t(\Pi, \hat{\Sigma}) < W_t(\Pi, \Sigma)$ (this follows from the fact that $W_t(\Pi, \tilde{\Sigma})$ is bounded, namely by $w(1)$ and $W(\tau_0)$, see Streufert (1989), but this contradicts what we have already shown. QED

Proof of Corollary:
Compare the paths (Π, Σ), in which $\sigma_t = 1$ for some t, with the path (1, 1), in which $\sigma_t = \pi_t = 1$ for all t. Notice that along (1, 1), $z_t = 0$ and $W_t(1, 1) = w(1)$ for all t. If (Π, Σ), is an equilibrium path, then in any t such that $\sigma_t = 1$, it must that $(1 - \delta)u^H(1/\tau^F_0, \tau^F_0) + \delta W_{t+1}(\Pi, \Sigma)$ • $(1 - \delta)u^H(\tau^H_0, \tau^F_0) + \delta W(\tau_0)$. Thus the path (1, 1) must also be an equilibrium, as $w(1)$ • $W_{t+1}(\Pi, \Sigma)$. Since (Π^*, Σ^*) is defined to be the best equilibrium path, this implies that, if $\sigma_t^* = 0$ for some t, then $(\Pi^*, \Sigma^*) = (1, 1)$, and if (1, 1) is not an equilibrium path, then $\sigma_t^* > 1$ for all t. Finally, define $\bar{\delta}$ such that,

$$(1 - \bar{\delta})u^H(1/\tau^F_0, \tau^F_0) + \bar{\delta}\, w(1) = (1 - \bar{\delta})u^H(\tau^H_0, \tau^F_0) + \bar{\delta}\, W(\tau_0).$$ QED

X. REFERENCES

Baldwin, Richard (1987) "Politically Realistic Objective Funcitons and Trade Policy," *Economics Letters*, XXIV, 287-90.

Baldwin, Robert E. (1984) "U.S. Trade Policy Since World War II," in Robert E. Baldwin and Anne O. Krueger, eds., *The Structure and Evolution of Recent U.S. Trade Policy*, Chicago: The University of Chicago Press.

Baldwin, Robert E., and J. David Richardson (1984), "Recent U.S. Trade Policy and its Global Implications," National Bureau of Economic Research Working Paper No. 1330.

Bhagwati, Jagdish (1988), *Protectionism*, Cambridge: The MIT Press.

Bhagwati, Jagdish N., and Douglas A. Irwin (1987), "The Return of the Reciprocitarians -- US Trade Policy Today," *The World Economy*, 10, 2, 109-130.

Bhagwati, Jagdish N. and Hugh Patrick (1990), *Aggressive Unilateralism*, Ann Arbor, MI: University of Michigan Press.

Conybeare, John A. C. (1987), *Trade Wars: The Theory and Practice of International Commercial Rivalry*, New York: Columbia University Press.

Curzon, Gerard (1965), *Multilateral Commercial Diplomacy*, London: Michael Joseph.

Finger, J. M. (1979), "Trade Liberalization: A Public Choice Perspective," in R. C. Amacher, G. Haberler and T. D. Willett (eds.), *Challenges to a Liberal International Economic Order*, Washington, D. C.: American Enterprise Institute.

Fudenberg, D., and D. K. Levine (1989), "Reputation and Equilibrium Selection in Games with a Patient Player," *Econometrica*, 57, 759-778.

Gilpin, R. (1975), *U.S. Power and the Multinational Corporation*, New York: Basic Books.

Grossman, Gene M. and Elhanan Helpman (1992), "Protection for Sale," *American Economic Review*, 84, 4, 833-850.

Harley, C. Knick, and Donald N. McCloskey (1981) "Foreign Trade: Competition and the Expanding International Economy," in Roderick Floud and Donald McCloskey, eds., *The Economic History of Britain Since 1700, vol. 2, 1800 to the 1970s*, New York: Cambridge University Press.

Hillman, Arye (1989), *The Political Economy of Protection*, Chur, Switzerland: Harwood Academic Publishers.

Irwin, Douglas (1988), "Welfare Effects of British Free Trade: Debate and Evidence from the 1840s," *Journal of Political Economy*, 96, 6, 1142-1164.

Irwin, Douglas (1993), "Multilateral and Bilateral Trade Policies in the World Trading System: An Historical Perspective," in *New Dimensions in Regional Integration,* eds. J. De Melo and A. Panagaria, Cambridge University Press.

Johnson, H. G. (1954), "Optimum Tariffs and Retaliation," *Review of Economic Studies*, 21, 142-153.

Kindleberger, Charles P. (1973), *The World In Depression: 1929-1939.* Berkeley: University of California Press.

Kindleberger, Charles P. (1975), "The Rise of Free Trade in Western Europe, 1820-1875," *Journal of Economic History*, March, 20-55.

Kindleberger, Charles P. (1977), *America in the World Economy*, New York : Foreign Policy Association.

Kreinin, M. E. (1961), "Effects of Tariff Changes on the Prices and Volume of Imports," *American Economic Review*, 25, 3.

Magee, Stephen P., William A. Brock, and Leslie Young (1989), *Black Hole Tariffs and Endogenous Policy Theory*, New York: Cambridge University Press.

Mayer, Wolfgang (1984), "Endogeneous Tariff Formation," *American Economic Review*, 74, 970-985.

McKeown, Timothy J. (1983), "Hegemonic Stability Theory and 19th Century Tariff Levels In Europe," *International Organization*, 37, 1, 73-91.

Mussa, Michael (1978), "Dynamic Adjustment in the Heckscher-Ohlin-Samuelson Model," *Journal of Political Economy*, 86, 5, 775-792.

Neary, J. Peter (1978), "Short-run Capital Specificity and the Pure Theory of International Trade," *Economic Journal*, 88, 351, 448-510.

Nelson, Douglas (1987), "The Domestic Political Preconditions of U.S. Trade Policy: Liberal Structure and Protectionist Dynamics," paper presented at Conference on Political Economy of Trade: Theory and Policy, World Bank, Washington, D.C.

Olson, Mancur (1965), *The Logic of Collective Action: Public Goods and Theory of Groups*, Cambridge, Mass: Harvard University Press.

Putnam, Robert D. (1988), "Diplomacy and Domestic Politics: The Logic of Two-Level Games," *International Organization*, 42, 427-460.

Rodrik, Dani (1995) "The Political Economy of Trade Policy," in *Handbook of International Economics*, Vol. 3, eds. Gene M. Grossman and Kenneth Rogoff, 1457-1494, Amsterdam: North-Holland.

Schmidt, Klaus M. (1993), "Reputation and Equilibrium Characterization in Repeated Games with Confliting Interests," *Econometrica*, 61, 2, 325-351.

Streufert, Peter A. (1989), "Biconvergent Recursive Utility and Dynamic Programming: Two Special Cases Using Arbitrary Action Spaces," University of Wisconsin-Madison, SSRI working paper 8912.

Wilkinson, Joe R. (1960), *Politics and Trade Policy*, Washington, D.C.: Public Affairs Press.

Yarbrough, Beth V. and Robert M. Yarbrough (1985), "Free Trade, Hegemony, and the Theory of Agency," *Kyklos*, 38, 348-364.