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1 Rules versus Discretion in Trade Policy: An Empirical Analysis

Robert W. Staiger and Guido Tabellini

1.1 Introduction

An important determinant of the optimal setting of any (second-best) tariff policy is the degree to which the supply side of the economy can respond to the imposition of the tariff. This follows from the fact that a tariff is both a subsidy to producers and a tax on consumers of the import good, and therefore distorts two decisions. Thus, for instance, if a tariff is used to address an existing production distortion, the optimal tariff setting will come closer to free trade the less are resources able to respond to the tariff (the smaller the marginal impact of the tariff on the existing production distortion). Alternatively, if a tariff is imposed to address an existing consumption distortion, its optimal setting will come closer to completely eliminating the consumption distortion the less are resources able to respond to the tariff (the smaller the production distortion it induces on the margin). In the presence of a trade distortion (the case of a large country), the optimal tariff will be higher the less are resources able to respond to the tariff (the lower the foreign import demand elasticity). And if a tariff is used to redistribute income, not only the costs of distorted production but, as is well known from Stolper-Samuelson and specific factors results, the redistributional impacts of the tariff as well may depend crucially on the ability of productive resources to respond.

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All this suggests that governments may behave very differently when setting tariff levels depending on the degree to which the supply side of the economy is in a position to respond to the actual policy choice. An important determinant of the magnitude of this response is the timing of the government decisions relative to those of the private sector or, to put it differently, the freedom with which the government can reoptimize once private decisions are made. In particular, resources that can move after observing the government policy action can condition their sectoral location decision on the observed tariff choice. On the other hand, resources that move simultaneously with or before the government tariff choice must base their decisions on the expected (rather than actual) policy; the sectoral allocation of these resources is then taken as given by the government when it chooses a tariff level. The greater the government's opportunities to reoptimize, the greater is its degree of policy discretion relative to the private sector, and the greater is the proportion of factors that base their decisions on the expected government action, lowering the government's overall assessment of supply responsiveness when making its tariff decision.

Of course, in a repeated setting those factors of production that move prior to or simultaneously with the government tend to base their allocation decisions on expected tariff actions that turn out in equilibrium to be correct: hence, the government does not in fact find it possible to exploit the timing of its decisions to surprise the private sector. On the contrary, unless the government can credibly bind itself to a tariff policy which is not ex post optimal, its timing "advantage" will turn into a liability: the government loses control of the private sector's expectations and remains trapped in a suboptimal time-consistent tariff equilibrium.

It is this logic that underlies much of the recent literature on the efficacy of rules versus discretion in trade policy. For example, Staiger and Tabellini (1987) have analyzed the costs of policy discretion when a government attempts to use tariffs as a redistributive tool. Lapan (1988) has characterized the equilibrium when a large country attempts to impose its optimal tariff in a discretionary policy regime. And Staiger and Tabellini (1989) argue that, because of the second-best nature of most trade policy intervention, the issue of credibility is likely to be an important determinant of the extent as well as the efficacy of trade policy in most environments.

In addition to the small body of theoretical literature on credibility and trade policy, there is a large amount of work on rules versus discretion in macroeconomic policy, generated by the seminal paper of Kydland and Prescott (1977). However, as is true of all the work on rules versus discretion, this literature is almost exclusively theoretical.[1] This is a serious omission, given the very sharp normative implications of this debate for actual policymaking. It is perhaps this omission that explains why some economists have suspended their

1. Recent exceptions are Judd (1989) in public finance, Romer (1989) for monetary policy, and Edwards and Tabellini (1990) for monetary and fiscal policy.

judgment on the relevance of these issues, or have de facto ignored them in their research on economic policy.

In this paper we test empirically for evidence that trade policy depends on the degree of government discretion. We do this by studying government tariff choices in two distinct environments. One environment is that of tariffs set under the escape clause (section 201 of the U.S. Trade Act of 1974). We argue that these decisions afford the government with ample opportunity to reoptimize and with correspondingly little ability to commit. The other environment is the Tokyo Round of GATT negotiations and the determination of the set of exclusions from the general formula cuts. We argue that these decisions provided the government with a much diminished opportunity to reoptimize and with a correspondingly greater ability to commit. Comparing decisions made in these two environments allows us to ask whether different degrees of policy discretion have a measurable impact on trade policy decisions.

While we explore the effects of discretion in trade policy within the context of the escape clause, we feel that the issue is of much broader interest, especially in light of the recent literature on trade policy in the presence of imperfect markets. While much of this literature is concerned with various conditions under which activist trade policies are warranted, taken together the results of the literature suggest a second, more subtle, implication: The new activist trade policy, if it is to be pursued at all, must be pursued with discretion, judging each situation on a case by case basis.[2] As such, the current debate over the appropriate degree of activism in trade policy is unavoidably a debate over the appropriate degree of policy discretion as well. The results of our empirical analysis should thus be relevant to this broader debate.

The next two sections set out in some detail the theoretical framework discussed informally above. Section 1.4 motivates our empirical approach. Section 1.5, which describes the escape clause and Tokyo Round tariff-setting environments, argues that a crucial difference between the two is the degree of government discretion. We discuss the data and present our empirical findings in section 1.6 and present our conclusions in section 1.7. Data sources are described in the appendix.

1.2 Credibility and Trade Policy

1.2.1 The General Framework

In this section we formalize the argument that the timing of tariff-setting decisions relative to private sector decisions matters. We begin by abstracting

2. For instance, Dixit (1987) concludes: "The current median view of the profession in this matter can be fairly characterized as (i) a recognition that the existence of imperfect competition does modify or overturn some conventional beliefs about trade policy, and (ii) an awareness that the design of policy to fit each situation requires close attention to its specific details. This suggests that research should be directed toward improving our understanding of the realities of some industries that are likely candidates for strategic trade policies."

from distributional issues and consider a one-consumer economy within the general framework laid out by Dixit (1985). Our purpose here is to illustrate that the potential for credibility problems in trade policy is widespread. The next section focuses in detail on trade policy motivated by redistributive goals and derives the main testable implications of our theory.

Consider first a small open (one-consumer) economy that faces a given vector of world prices, r, and has exogenous domestic consumption and production distortions. The role of trade policy is to offset these distortions. Let the consumption and production distortions be summarized by the vectors α and β, respectively, and let τ be a vector of specific tariffs. Then, the relationship between domestic prices, world prices, distortions, and tariffs can be written as

$$p = r + \tau + \alpha, \tag{1}$$

$$q = r + \tau + \beta, \tag{2}$$

where p and q denote consumers' and producers' prices (in terms of a numeraire commodity). Let $E(1,p,u)$ be the expenditure function, with the numeraire good labeled by zero and its price normalized to unity, and with u the consumer's utility level. We assume for simplicity that all goods are traded. Define $\pi(1,q)$ as the profit function with the same convention about the numeraire. Profits are assumed to be taxed at 100 percent so that consumer and producer prices can be independently normalized. All tax and tariff revenues are returned to the consumer lump sum. Using standard properties of the expenditure and profit functions, the equilibrium balanced trade condition can be written as

$$E_0 - \pi_0 + r \cdot (E_p - \pi_q) = 0 \tag{3}$$

where subscripts denote derivatives.

Our timing assumptions are as follows. First sector i chooses a supply response to the vector of expected tariff choices of the government τ^e. Next, or simultaneously with sector i's choice, the government commits to its vector of tariffs τ. Then, after observing τ, sector i is permitted a dampened supply response to the difference between actual and expected tariffs, with the elasticity of sector i's ex post (after τ is observed) supply curve being $(1 - \psi_i)\ \varepsilon[0,1]$ of its ex ante (before τ is observed) elasticity. All consumption decisions are made after the government tariffs are in place. Thus, ψ_i parameterizes the inflexibility of sector i's supply decisions relative to the policy decisions of the government. If $\psi_i = 0$, all supply decisions are made after observing the governmental choice. In this case, the government can enter into binding policy commitments and there is no credibility problem. In the opposite extreme case, $\psi_i = 1$, all supply decisions are made before observing the policy, and the ex post supply response is zero. More generally, $1 > \psi_i > 0$, in which case the ex ante and ex post supply responses differ. Accordingly, the ex ante and ex post optimal policies also differ.

Naturally, in equilibrium the expected tariff τ^e coincides with the ex post optimal policy, and the government fulfills those expectations. In the literature on rules versus discretion, this equilibrium policy has been called the "time-consistent" policy, or the "discretionary" policy. Throughout this section we will simply call it the equilibrium policy, to emphasize that it is the optimal government response under a particular assumption about the timing of moves.

Differentiating (3) and using (1) and (2) provides the key relationship from which the equilibrium tariff is determined.:

$$(4) \qquad (E_{0u} + r \cdot E_{pu})du = (\alpha + \tau)'E_{pp}d\tau - (\beta + \tau)'[\pi_{qq}d\tau^e + (I - \psi)\pi_{qq}(d\tau - d\tau^e)],$$

where for simplicity ψ is taken to be a square diagonal matrix with ith diagonal element ψ_i, and I is the identity matrix of the same dimension. Throughout, primes will be used to denote transposes.

Under these timing assumptions, the government takes the expected tariff as given ($d\tau^e = 0$) when it sets policy: The expected tariff only matters for those production decisions that have already been made (and hence can no longer be altered) when the actual policy is determined. Moreover, in equilibrium policy surprises are ruled out ($\tau = \tau^e$). Thus, the equilibrium (ex-post optimal) policy is determined by

$$(5) \qquad (E_{0u} + r \cdot E_{pu})du = (\alpha + \tau)'E_{pp}d\tau - (\beta + \tau)'(I - \psi)\pi_{qq}d\tau.$$

The coefficient on the left-hand side of (5) is the income effect on all commodities, and it can be shown to be positive. Hence, the change in utility as tariffs are changed has the same sign as the right-hand side of (5). The terms $E_{pp}\, d\tau$ and $\pi_{qq}\, d\tau$ on the right-hand side denote the consumption and production substitution effects, respectively. Hence, the two terms on the right-hand side reflect the welfare effect of moving consumption and production when there are distortions or tariffs.

According to equation (5), the equilibrium policy depends on the matrix ψ that parameterizes the degree of government discretion relative to that of private producers. The traditional case considered in the literature on optimal trade policy is a special case of (5): it corresponds to $\psi = 0$, in which case the ex ante and ex post optimal policies coincide (i.e., the government can precommit in advance of *all* productive decisions). We now turn to a characterization of the equilibrium tariff response to production and consumption distortions when ψ_i is allowed to vary between 0 and 1 for all i.

1.2.2 Production Distortions

Consider first the use of tariffs to address a production distortion ($\beta \neq 0$, $\alpha = 0$). The equilibrium tariff $\hat{\tau}$ is given, using (5), by the solution to

$$(6) \qquad \frac{du}{d\tau} = 0 = [E_{0u} + r \cdot E_{pu}]^{-1}[\hat{\tau}'E_{pp} - (\beta + \hat{\tau})'(I - \psi)\pi_{qq}]$$

or

$$\hat{\tau}' = \beta'(I - \psi)\pi_{qq}[E_{pp} - (I - \psi)\pi_{qq}]^{-1}. \tag{7}$$

Thus, the equilibrium tariff policy is affected by the timing of the government move. In particular, if $\psi = 0$ so that no supply-side decisions need be committed until after the government tariff choice is observed, then (7) coincides with the traditional expression for the optimal tariff in the presence of a production distortion (e.g., see Dixit 1985). At the other extreme, if $\psi = I$ so that all supply-side decisions must be made prior to or simultaneously with the government, the actual tariff set by the government will have no impact on the production distortion once expectations are given, and the equilibrium has $\hat{\tau} = 0$: the tariff will be completely ineffective as a policy tool to correct production distortions.

1.2.3 Consumption Distortions

Consider next the existence of consumption distortions. This corresponds to the case where $\alpha \neq 0$ and $\beta = 0$. The equilibrium tariff $\hat{\tau}$ is given, using (5), as the solution to

$$\frac{du}{d\tau} = 0 = [E_{0u} + r \cdot E_{pu}]^{-1}[(\alpha + \hat{\tau})'E_{pp} - \hat{\tau}'(I - \psi)\pi_{qq}] \tag{8}$$

or

$$\hat{\tau}' = -\alpha' E_{pp}[E_{pp} - (I - \psi)\pi_{qq}]^{-1}. \tag{9}$$

Again, the equilibrium tariff is affected by the timing of the government decision. If the government has no opportunity to surprise the supply side of the economy ($\psi = 0$), the equilibrium tariff coincides with that prescribed by the theory of optimal taxation (see again Dixit 1985). At the other extreme, if the government moves after all supply-side decisions have been made ($\psi = I$), then all production distortions introduced by the tariff will be ignored by the government in equilibrium, and $\hat{\tau}' = -\alpha'$: The equilibrium tariff completely eliminates the consumption distortions.

1.2.4 Terms of Trade

Finally, consider the case of a large country wishing to exploit its monopoly power in trade and unconcerned about the possibility of retaliation. For simplicity we assume that the matrix ψ applies both domestically and in the rest of the world. The large country analogue to equation (4) is

$$\begin{aligned}(E_{0u} + r \cdot E_{pu})du = (\tau + \alpha)'E_{pp}[dr + d\tau] \\ - (\tau + \beta)'[\pi_{qq}(dr^e + d\tau^e) + (I - \psi)\pi_{qq}((dr + d\tau) \\ - (dr^e + d\tau^e))] - m \cdot dr,\end{aligned} \tag{10}$$

where m is the vector of net imports from the rest of the world, and where the world price vector r is determined by

$$E_p - \pi_q = \pi_r^{\text{row}} - E_r^{\text{row}}, \tag{11}$$

with π^{row} and E^{row} the profit and expenditure functions, respectively, for the rest of the world. The large country analogue for (5) is then

$$\begin{aligned}(E_{0u} + r \cdot E_{pu})du = {} & (\alpha + \tau)'E_{pp}(dr + d\tau) \\ & - (\beta + \tau)'(I - \psi)\pi_{qq}(dr + d\tau) - m \cdot dr\end{aligned} \tag{12}$$

with

$$\begin{aligned}dr = {} & [(E_{pp} + E_{rr}^{\text{row}}) - (I - \psi)(\pi_{qq} + \pi_{rr}^{\text{row}})]^{-1}\{[(I - \\ & \psi)\pi_{qq} - E_{pp}]d\tau - [E_{pu} + E_{rr}^{\text{row}}]du\}.\end{aligned}$$

A trade distortion is represented by the condition $dr \neq 0$, $\alpha = 0$, and $\beta = 0$. The equilibrium tariff is given using (12) by the solution to

$$\frac{du}{d\tau} = 0, \tag{13}$$

which after manipulation yields

$$\hat{\tau}' = m'[(I - \psi)\pi_{rr}^{\text{row}} - E_{rr}^{\text{row}}]^{-1}. \tag{14}$$

As before, the equilibrium tariff vector for a large country is affected by the timing of government moves, and will in general be higher the greater is the proportion of resources that must allocate prior to or simultaneously with the government tariff decision (the closer ψ is to I) (see also Lapan 1988).

1.2.5 Discussion

These three instances of equilibrium trade policy lead to the same broad conclusion. In equilibrium, the degree of discretion in government decisions relative to that of the private sector has a profound impact on the chosen tariff policies. In particular, the greater the government's degree of discretion relative to the private sector, and therefore the greater the fraction of resources that move prior to, or simultaneously with, it (the closer ψ is to I), the smaller will be the assessment of factor supply responsiveness ($[I - \psi]\pi_{qq}$) implicit in the government's tariff choice. Naturally, the allocation of productive resources fully reflects the government policy even if the government moves after some productive decisions have been made. In other words, both the expected and the actual policy matter. However, in equilibrium the government does not take into account the effects of expected policies, but only those of actual policies. This discrepancy, between what the government takes into account and the overall effects of the (actual and expected) policy, increases with the extent of government discretion (i.e., with ψ). Hence, the welfare properties of the equilibrium depend on the extent of government discretion: the larger is the degree of discretion, the less the government takes into account the full effects of the policy and, ceteris paribus, the lower is social welfare. For this reason, policy discretion can be counterproductive.

1.3 Credible Trade Policy and Income Distribution

We now study trade policy motivated by redistributive goals. As argued in the next section, the observed policy interventions that we exploit in our empirical test largely reflect this motivation. The model of this section generalizes Staiger and Tabellini (1987), to which we refer the reader for a more detailed investigation of credible trade policy in this framework.

1.3.1 The Model

Consider a small open economy with two traded goods and two inputs to production, labor, and capital. Capital is immobile across sectors, and technology is homogeneous of degree 1 in both inputs. To simplify notation, we assume that both sectors share the same production function, and that each sector is endowed with one unit of capital. The production technologies are given by

$$(15) \qquad i = f(N^i), \quad i = x,y, \quad f'(\cdot) > 0, \quad f''(\cdot) < 0,$$

where $N^i \equiv$ labor employed in sector i; $x \equiv$ exported good; and $y \equiv$ imported good.

In each sector, firms combine labor with their fixed stock of capital, up to the point where the value of labor's marginal product is equated to the nominal wage measured in terms of any numeraire, W^i:

$$(16) \qquad P^x f'(N^x) = W^x; \quad P^y(1 + t)f'(N^y) = W^y$$

where P^x is the world price of the exported good, t is the ad valorem tariff on imports, and P^y is the world price of imports. Wages are assumed to be perfectly flexible so that equation (16) yields the nominal wage that clears the labor market in each sector.

Throughout this section, we consider the reaction of private agents and of the government to a shock that lowers the world price of good y. To simplify notation, let $P^x = 1$ and let P^y be the post-shock realization of the price of good y.

The aggregate supply of labor in the economy as a whole is assumed fixed and equal to $\bar{N}$. Labor is mobile between sectors and reallocates in response to the shock on the basis of the expected intersectoral wage differential. We contrast equilibrium trade policy under two opposite timing assumptions. Under *discretion*, the government sets policy after all the workers in sector y have chosen whether or not to reallocate to the other sector based on the expected wage differential. By (16), the expected wage differential subsequent to the shock but prior to the policy action is

$$(17) \qquad \frac{W^{ye}}{W^{xe}} = \frac{P^y(1 + t^e)f'[N^y(t^e)]}{f'[N^x(t^e)]}.$$

Under *commitment,* the timing is reversed: first the government irrevocably commits to a tariff. And then all the workers, having observed the policy, choose whether or not to reallocate from y to x based on the actual wage differential. In this case the actual wage differential is defined as in (17) with t replacing t^e. Consumption decisions are always made after the government policy is in place.

A crucial assumption of the model is that labor's intersectoral mobility comes only at a cost. Specifically, we assume that, whenever one unit of labor moves from one sector to the other, its marginal product falls by the fraction $(1 - \lambda)$, $1 > \lambda > 0$. These moving costs differ across individuals: the parameter λ is distributed uniformly on the unit interval across workers.

Consider the regime with discretion. Here, workers must make their sectoral allocation decision *before* observing the government action. Any worker for which $\lambda > W^{ye}/W^{xe}$ finds it optimal to reallocate from y to x. Let $\tilde{\lambda}^e \equiv W^{ye}/W^{xe}$ be the marginal worker, who is just ex ante indifferent between reallocating or not. It can be shown that $\tilde{\lambda}^e$ is an increasing function of the *expected* tariff, t^e. Intuitively, a higher expected tariff reduces the relative wage differential in sector x. Hence only the low moving-cost (high λ) workers find it optimal to reallocate. Similarly, consider the regime with commitment, and let $\tilde{\lambda} \equiv W^y/W^x$ be the marginal worker who is ex post indifferent between relocating or not (i.e., after the tariff is in place). It can be shown that $\tilde{\lambda}$ is an increasing function of the *actual* tariff, t. The intuition is the same as above. Under either regime, equilibrium requires that $t = t^e$, and hence $\tilde{\lambda} = \tilde{\lambda}^e$.

Based on this notation, and the assumption that λ is uniformly distributed in the population, we can write the fraction of workers who remain in sector y as $\tilde{\lambda}$ under commitment and $\tilde{\lambda}^e$ under discretion, respectively. To simplify the analysis, we express labor in efficiency units. Thus, the effective quantity of labor employed in each sector once the adjustment to the shock is completed is given by

$$(18) \qquad N^y = \tilde{\lambda} N_0^y,$$

$$(19) \qquad N^x = N_0^x + N_0^y \int_{\tilde{\lambda}}^{1} \lambda d\lambda = N_0^x + (1 - \tilde{\lambda}^2)/2.$$

where N_0^i is the initial employment in sector i.

The remainder of the model is straightforward and is identical to that in Staiger and Tabellini (1987). Specifically, let I be national disposable income valued at domestic prices. Imposing the condition of balanced trade at world prices, abstracting from domestic taxes, and assuming that the tariff is nonprohibitive, it follows that, subsequent to the shock,

$$I = f(N^x) + P^y(1 + t)f(N^y) + T, \tag{20}$$

where the tariff revenue T is defined by

$$T = t[C^y - f(N^y)]P^y, \tag{21}$$

C^y being aggregate demand for the imported good y. Substituting (21) into (20), national income valued at domestic prices is given by

$$I = f(N^x) + P^y[f(N^y) + tC^y]. \tag{22}$$

To focus on the redistributive consequences of tariffs for the labor allocation decision, we assume that the distribution of income is determined solely on the basis of the wage differential between the two sectors. Thus, income from capital and tariff revenues is distributed to each worker in proportion to the share of his labor income in the economywide wage bill. Define the income share variable, φ, as

$$\varphi^i \equiv \frac{I^i}{I} = W^i/W \quad i = x,y,y\lambda, \tag{23}$$

where W is the average wage rate, I^i is total disposable income of a worker of the ith type (valued at domestic prices), and the superscripts x, y, and $y\lambda$ denote workers originally in sector x who remain there, workers originally in sector y who remain there, and workers of type λ originally in sector y who move to sector x, respectively. Using the previous notation, and recalling that $W^{y\lambda} = \lambda W^x$, the average wage rate W under commitment is

$$W = \frac{N_0^x W^x + N_0^y W^y[\bar{\lambda} + (1 - \bar{\lambda}^2)/2]}{\bar{N}}. \tag{24}$$

Under discretion, the average wage rate is defined as in (24) with $\bar{\lambda}^e$ replacing $\bar{\lambda}$.

Each worker consumes a bundle of x and y, chosen to maximize an identical homothetic utility function, subject to a standard budget constraint. The indirect utility function of a representative consumer of the ith type can be written in terms of the previous notation as

$$V^i = V(P^x, P^y, I^i), \quad i = x,y,y\lambda. \tag{25}$$

Letting V_p^i and V_I^i denote the partial derivatives of (25) with respect to P^y and I^i, respectively, the consumption of y on the part of consumers of the ith type can be expressed, using Roy's identity, as

$$C_i^y = -\frac{V_p^i}{V_I^i} = \varphi^i C^y, \quad i = x,y,y\lambda. \tag{26}$$

The second equality follows from the assumption that the common utility function is homothetic.

Finally, the government is assumed to care about the three types of workers in proportion to their frequency in the population. However, we allow the relative weights in the government objective function to be affected by political considerations, which we represent by the parameter α^y. Thus, under commitment the government maximizes:

$$\tilde{J} \equiv (1 - \alpha^y)N_0^x V^x + \alpha^y N_0^y \tilde{\lambda} V^y + \alpha^y N_0^y \int_{\tilde{\lambda}}^{1} V^{y\lambda} d\lambda$$

or, with normalization,

$$J \equiv \gamma V^x + \tilde{\lambda} V^y + \int_{\tilde{\lambda}}^{1} V^{y\lambda} d\lambda, \tag{27}$$

where $\gamma \equiv [(1 - \alpha^y)/\alpha^y]\, N_0^x/N_0^y$. Under discretion the government maximizes a function analogous to (27), except that $\tilde{\lambda}$ is replaced by $\tilde{\lambda}^e$. Note that a value of $\alpha^y = \frac{1}{2}$ would correspond to a utilitarian social welfare function, while $\alpha^y > \frac{1}{2}$ ($\alpha^y < \frac{1}{2}$) implies that workers in sector y receive relatively greater (lower) weight in the government decision. The determinants of α^y will be discussed in the following sections.

We assume the absence of any market mechanisms for reallocating the risk associated with the terms-of-trade shock. If such private insurance markets existed and worked perfectly, there would be no role for government intervention in the form of protection in our model.[3]

1.3.2 Equilibrium under Commitment

This subsection derives the equilibrium trade policy when the government can commit. Since the results here and in the next subsection form the basis for our empirical work, we impose the simplifying assumption of logarithmic utility to ensure a reasonably simple form for the equilibrium tariff. The first-order conditions for a government optimum are

$$\frac{dJ}{dt} = (V^y - V^{y\tilde{\lambda}})\frac{d\tilde{\lambda}}{dt} + \gamma\frac{dV^x}{dt} + \tilde{\lambda}\,\frac{dV^y}{dt} + \int_{\tilde{\lambda}}^{1} \frac{dV^{y\lambda}}{dt}\, d\lambda = 0, \tag{28}$$

where we have

$$\frac{dV^i}{dt} = P^y V_p^i + V_I^i[I\frac{d\varphi^i}{dt} + \varphi^i\frac{dI}{dt}] = V_I^i[I\frac{d\varphi^i}{dt} + \varphi^i(\frac{dI}{dt} - P^y C^y)]. \tag{29}$$

The second equality in (29) follows from (26). The first term on the right-hand side of (29) captures the direct redistributive effect of the tariff on the ith individual. The remaining terms capture the effect on the ith individual's welfare due to the consumption and production distortions of the tariff.

3. See Eaton and Grossman (1985) for a defense of this assumption and Dixit (1989) for a criticism of it.

After some simple algebra, we have[4]

$$\frac{dI}{dt} - P^y C^y = \frac{P^y t}{1 + t}[C^y + y\eta^y], \tag{30}$$

where η^y is the elasticity of output supply in sector y. By the assumption that the workers' utility function is logarithmic,

$$V_I^i = \frac{1}{I^i} = \frac{1}{\varphi^i I}. \tag{31}$$

Combining (29), (30) and (31), we obtain

$$\frac{dV^i}{dt} = \frac{1}{\varphi^i}\frac{d\varphi^i}{dt} - \frac{P^y t}{(1 + t)I}[C^y + y\eta^y]. \tag{32}$$

Moreover, in equilibrium $V^y = V^{y\tilde{\lambda}}$ by definition of $\tilde{\lambda}$. Hence, combining (32) and (31), we can rewrite the government first-order conditions as

$$\gamma \frac{1}{\varphi^x}\frac{d\varphi^x}{dt} + \tilde{\lambda}\frac{1}{\varphi^y}\frac{d\varphi^y}{dt} + \int_{\tilde{\lambda}}^{1} \frac{1}{\varphi^{y\lambda}}\frac{d\varphi^{y\lambda}}{dt}\, d\lambda = \frac{t}{1 + t}(1 + \gamma)P^y\,[C^y + y\eta^y]\,\frac{1}{I}. \tag{33}$$

The left-hand side of (33) is the marginal benefit of protection, taking the form of redistribution from high- to low-income workers. The right-hand side is the marginal cost of the tariff, net of tariff revenues, due to production and consumption distortions. At the optimum, the marginal benefit and the marginal cost of the tariff must be equal.

To complete the description of the equilibrium, it remains to discuss the effect of the tariff on the distribution of income. By (23) and (29), after some simplifications,

$$\frac{d\varphi^x}{dt} = -\frac{\varphi^y\varphi^x}{1 + h}\frac{d\tilde{\lambda}}{dt} < 0; \quad \frac{d\varphi^y}{dt} = \left(1 - \frac{\tilde{\lambda}\varphi^y}{1 + h}\right)\varphi^x\frac{d\tilde{\lambda}}{dt} > 0; \quad \frac{d\varphi^{y\tilde{\lambda}}}{dt} = -\frac{\lambda\varphi^y\varphi^x}{1 + h}\frac{d\tilde{\lambda}}{dt} < 0, \tag{34}$$

where $h \equiv N_0^x/N_0^y$ and the signs follow from $d\tilde{\lambda}/dt > 0$. Thus, a tariff redistributes in favor of those who remain in the injured sector. Intuitively, if workers were to reallocate from y to x based on the expectation of no protection subsequent to the shock, then a surprise tariff would leave this labor allocation unaffected and would raise the value of labor's marginal product in sector y directly by raising the domestic price of y; this, in turn, would increase W^y relative to W^x. However, in equilibrium, workers are not surprised by the gov-

4. Equation (30) has been derived from equations (22), (19), and (18) and by exploiting the definition of $\tilde{\lambda}$ and the assumption of a logarithmic utility function.

ernment action, so that this redistributive effect is partially offset by the fact that fewer workers will leave the injured sector y subsequent to the shock, knowing that protection is forthcoming. Nevertheless, since moving costs $(1 - \lambda)$ differ across individuals by assumption, and since workers choose to leave the injured sector y in ascending order of moving costs (descending order of λ), the fact that fewer workers leave sector y as a result of the tariff implies that the marginal worker who is just indifferent between staying in y and moving to x corresponds to a higher value of λ as a result of the government's tariff response (formally, $d\bar{\lambda}/dt > 0$). Hence in equilibrium the tariff succeeds in raising W^y/W^x, (which equals $\bar{\lambda}$) despite the induced effect on the allocation of labor.[5]

Combining (33) and (34) and simplifying, we obtain the equilibrium tariff under commitment:

$$\frac{t^c}{1 + t^c} = \frac{(N^y/\bar{N})(1 - \delta\varphi^y)\eta^w}{(P^yM^y/I)\eta^{M_y}}, \tag{35}$$

where $\delta \equiv [(1 + h(1 - \alpha^y)/\alpha^y)/(1 + h)]$ is a weight that reflects the government distributive goals, η^w is the elasticity of the equilibrium wage differential with respect to the tariff, M^y is imports of y, and η^{M_y} is import demand elasticity taken positively. It can be shown that $\eta^w \leq 1$: as noted above, the redistributive effects of protection are partially offset by the induced smaller reallocation of labor. The greater is labor mobility, the smaller is $d\bar{\lambda}/dt$, and as a result the smaller is the elasticity η^w. Note also that a government maximizing a utilitarian social welfare function ($\alpha = 1/2$) would correspond to $\delta = 1$, so that income equality (preserving the status quo) is the government's goal. However, if $\alpha^y > 1/2$ ($\alpha^y < 1/2$), then $\delta < 1$ ($\delta > 1$) and the government prefers income to be distributed unequally in favor of sector y (the rest of the economy).

Equation (35) conforms with intuition. The numerator refers to the marginal benefits of protection, in the form of income redistribution, which enhance government welfare. The marginal benefits of protection are higher the larger is the fraction of employment in the injured sector, $N^y/\bar{N}$, the greater is α^y, the weight placed on the utility of an injured-sector worker, the greater is the extent of injury (the lower is φ^y), and the greater is the elasticity of the wage differential with respect to the tariff η^w (because the greater is the redistributive impact of trade protection). The denominator refers to the marginal production and consumption distortions of the tariff, captured by the elasticity of import demand, η^{M_y}, weighted by the import share of national income. The greater these distortions, the smaller is the equilibrium tariff. Finally, for con-

5. In this respect, the model differs from that of Staiger and Tabellini (1987), who assume a single value of λ for all workers and hence conclude that under commitment trade policy cannot affect the wage differential across sectors; in that model, the direct effects of the tariff are exactly offset by the induced smaller reallocation of labor from y to x.

venience in comparing the optimal tariff under commitment to that under discretion, we note that the assumption of logarithmic utility allows the denominator of the right-hand side of (35) to be written equivalently as $(P^yM^y/I)\eta^{M_y} = (P^yC^y/I)(1 + \sigma^y\eta^y)$ where σ^y is the ratio of output to consumption in sector y. With this, we rewrite (35) as

$$\frac{t^c}{1 + t^c} = \left[\frac{(N^y/\bar{N})(1 - \delta\varphi^y)}{(P^yC^y/I)}\right]\left[\frac{\eta^w}{1 + \sigma^y\eta^y}\right]. \tag{36}$$

1.3.3 Equilibrium under Discretion

We next derive the trade policy implemented when the government cannot commit. In this case, labor allocates based on the expectation of the tariff, and prior to observing the actual policy. Hence, when the policy is chosen, the government is forced to treat the labor allocation as given. In terms of the previous notation, $d\bar{\lambda}^e/dt = 0$. This has two effects on the government optimality conditions. On the one hand, the government neglects the production distortions induced by trade policy. Repeating the previous steps under the additional constraint $d\bar{\lambda}^e/dt = 0$, we can rewrite the government optimality condition as in (33), except that $y\eta^y$ disappears from the right-hand side (intuitively, the ex post output elasticity is zero, since all production decisions have been made once the tariff is implemented). On the other hand, the redistributive effects of trade policy now appear greater, since the direct effects of the tariff on P^y are not partially offset by the smaller reallocation of labor from y to x. Specifically, by (23) and (24), we can rewrite (34) as

$$\frac{d\varphi^x}{dt} = \frac{(\varphi^y)^2}{(1 + t)(1 + h)} < 0; \quad \frac{d\varphi^y}{dt} = \frac{\varphi^y[(1 + h) - \bar{\lambda}\varphi^y]}{(1 + t)(1 + h)} > 0; \tag{37}$$
$$\frac{d\varphi^{y\lambda}}{dt} = \frac{-\lambda(\varphi^y)^2}{(1 + t)(1 + h)} > 0.$$

The signs of (37) and (34) are the same. But the expressions in (37) can be shown to be larger in absolute value than those in (34).

Combining (37) with the analogue of (33) for the regime with discretion, we obtain the equilibrium tariff when the government cannot commit:

$$\frac{t^d}{1 + t^d} = \frac{(N^y/\bar{N})(1 - \delta\varphi^y)}{(P^yC^y/I)}, \tag{38}$$

which has the same intuitive interpretation as (36).

1.3.4 Commitment versus Discretion

We now compare the equilibrium under discretion to that under commitment. By (38) and (36), there are only two differences. They both are due to the fact that the ex post elasticities that are relevant under discretion differ from the ex ante elasticities that matter when the government can commit. First, the ex post elasticity of the wage differential is equal to unity. Hence, $\eta^w = 1$ in (38) but not in (36). This is because if the government cannot commit, it sets policy after the labor reallocation is completed. Hence, the redistributive effects of the tariff are not offset by a smaller reallocation of labor away from the injured sector, and the wage differential moves in the same proportion as the tariff. Second, the ex post elasticity of output supply is zero. Hence, $\eta^y = 0$ in (38) but not in (36). Again, this is because under discretion the government sets policy after production decisions have been made.

Since under commitment $\eta^w < 1$ and $\eta^y > 0$, equations (38) and (36) imply that $t^d > t^c$: The government provides more protection under discretion than under commitment. In equilibrium, however, the private sector correctly anticipates the trade policy decisions, so that any hope of actually using policy discretion to surprise the private sector is futile. Hence, the government welfare is higher with commitments than under discretion, since the latter equilibrium involves an excessive amount of protection. This and other normative issues are further addressed in Staiger and Tabellini (1987).

1.4 Empirical Methodology

In this section we discuss the framework within which our assessment of the empirical importance of discretion in the determination of trade policy will be carried out. To motivate our empirical methodology, we employ the distributional assumption on λ to rewrite the expression for the optimal tariff under commitment in (36) as

$$\frac{t^c}{1 + t^c} = \left[\frac{(N^y/\bar{N})(1 - \delta\varphi^y)}{(P^yC^y/I)}\right]\left[\frac{1}{1/\eta^w + \sigma^y\theta^y}\right], \tag{39}$$

where θ^y is the wage bill divided by the value of output in sector y. Comparing (39) with (38), the optimal tariff under commitment will lie further below its discretionary level the smaller is the ex ante redistributive effect of the tariff (η^w) and the larger the output share of consumption (σ^y) and the wage bill share of output (θ^y). These last two effects can be understood by recalling that under commitment the government takes into account the distortionary effect of its policies not only on consumption decisions but on labor allocation decisions as well, and through these on production decisions, while under discretion the government only takes into account the distortionary impact of its policies on consumption decisions; hence, the greater is the importance of labor in output (θ^y) and the greater is output relative to consumption (σ^y), the greater is the impact of this difference on tariff choices in the two environments. Finally, under the assumption that $f''(\cdot)$ is sufficiently close to zero, η^w

takes on a value of approximately one.[6] With this last simplifying assumption, and taking logs of (38) and (39), the optimal tariff under discretion is given by

$$(40) \qquad \ell n\left(\frac{t^d}{1 + t^d}\right) = \ell n(N^y/\bar{N}) + \ell n(1 - \delta\varphi^y) - \ell n(P^y C^y/I)$$

and under commitment given by

$$(41) \qquad \ell n\left(\frac{t^c}{1 + t^c}\right) \doteq \ell n(N^y/\bar{N}) + \ell n(1 - \delta\varphi^y) - \ell n(P^y C^y/I) - \sigma^y\theta^y.$$

Thus, (40) and (41) suggest a simple test for whether the degree of policy discretion matters; namely, to check whether the last term on the right-hand side of (41), $\sigma^y\theta^y$, enters as a significant explanatory variable in the tariff choices. According to our theory, it should have a negative and significant coefficient only if the government can enter binding commitments. The next two sections describe how we carry out this test.

1.5 Tariff Setting under Section 201 and the Tokyo Round

In this section we argue that tariff decisions made under the escape clause and exclusions granted from formula cuts under the Tokyo Round correspond roughly to the model outlined in section 1.3, with the former decisions reflecting a high degree of government discretion relative to the latter. Our approach is to analyze decisions made in these two environments within the framework provided by (40) and (41) and to test for evidence that the degree of discretion matters in the determination of tariff policy.

In one sense, the determination of escape-clause tariffs and the determination of exclusions from the Tokyo Round tariff-cutting rules represent the same conceptual experiment. In each case, an initial drop in the domestic price level for a particular sector had occurred (or was expected to occur), and the government was faced with a decision as to how to respond to this event. In the case of an escape-clause decision, the initial drop in the domestic price level would not typically have been policy-induced (the 1974 act dropped the requirement existing in the Trade Act of 1962 that trade concessions be the major cause of increased imports). In the case of determining Tokyo Round exclusions, the (expected) price drop was a direct result of the agreed-upon (Swiss) tariff-cutting rule. In both cases, given the initial sectoral injury (or

6. Explicit calculation yields the following expression for η^w:

$$\eta^w = 1/[1 - N^y\left(\frac{f''(N^y)}{f'(N^y)} + \lambda\frac{f''(N^x)}{f'(N^x)}\right)],$$

with η^w approaching one from below as $f''(\cdot)$ approaches zero. Thus, with $f''(\cdot)$ close to zero, the difference between the optimal tariff under commitment and that under discretion is due primarily to the perceived difference in distortions (rather than redistributive effects) brought about by the tariff.

expected injury), the government was then faced with the decision of choosing a tariff response: in the case of escape-clause action the tariff response would be set directly, while in the case of the Tokyo Round exclusions the tariff response would be chosen indirectly by setting an exclusion from the agreed-upon tariff reductions. In both cases, the government could anticipate that any action it took would be met by reciprocal responses from foreign trading partners: Article XIX of the GATT provides for this explicitly in the context of escape-clause actions (see Richardson 1988), while the give and take between governments in arriving at exclusions from the Tokyo Round tariff cuts is well documented (see Baldwin and Clarke 1987).

There are, however, three potentially important differences between these decision-making environments. The first concerns differences in the *constraints* under which the government operated. The second concerns possible differences in the perception of the degree of *permanence* of the government decision in each case. And the third concerns the degree of government *discretion* in each case and the timing of government decisions relative to those of the private sector.

As to the first, in escape-clause decisions the government was constrained not to lower tariffs below their current level. This constraint was absent when exclusions were determined to the Tokyo Round tariff-cutting rule. In fact, Baldwin and Clarke (1987) note that during the determination process the United States did offer "negative exclusions" (i.e., tariff cuts which were of greater magnitude than the tariff-cutting rule) on a range of low-tariff products. We will attempt to control for this difference in the empirical work to follow by restricting our attention when considering the Tokyo Round exclusions to sectors in which pre-Tokyo round tariffs exceeded 5 percent.[7] A related point concerns the possibility that the government could set exclusions from the Tokyo Round reductions with a more general equilibrium view in mind than would be possible in the context of the sector-by-sector decisions under escape clause actions. However, as Baldwin and Clarke (1987, 259, n. 1) note, "The procedure for determining what items would not be subject to the tariff-cutting rule and what withdrawals would be made in response to the other countries' exceptions was similar to traditional item-by-item negotiation." This suggests that general equilibrium considerations were not an important element in the determination of exclusions from the negotiated tariff reductions of the Tokyo Round.

As to the second difference, the Tokyo Round exclusions, once set, were in principle not explicitly meant to be temporary, while an escape-clause action is in principle an explicitly temporary measure, with its termination or decline contemplated from year to year. However, in practice, the differences in the duration of tariff responses under the two regimes is less pronounced. The mean duration of episodes of escape-clause protection initiated since 1975 is

7. Baldwin (1985) adopts a similar procedure.

approximately five years. The conclusion of the Tokyo Round negotiations in 1979 marked the seventh round of multilateral trade-barrier reductions that have been negotiated under GATT auspices since 1947, implying that the mean length of time between GATT rounds is between five and six years. Hence, in practice, the permanence of the government decisions which we consider under the two regimes is roughly equivalent.

This brings us to the third difference in the decision-making environment, that of the degree of government discretion with respect to the private sector. It is this difference that we attempt to exploit as the basis for our empirical work. In particular, the negotiated tariff reductions of the Tokyo Round, including exclusions from those reductions, were completed in 1979, and were implemented beginning in 1980 over a period of up to eight years. Thus, the determination of the exclusion from the general tariff-cutting rule was commonly known by the private sector well in advance of its actual implementation. Moreover, any government reconsideration of these decisions prior to the period of "open season" renegotiation which occurred three years after the conclusion of the Tokyo Round required the impacted industry to file an escape-clause petition. Since the initial filing of a section 201 petition involves substantial cost on the part of petitioners, the government's opportunity for reoptimization is quite limited in this setting. This in turn implies that, when determining the exclusions, the government would be making its tariff decision *before* the great bulk of resources affected by the decision would respond and would have limited opportunity to reoptimize once private sector decisions were made.

The procedure for setting escape-clause tariffs, on the other hand, offers the government ample opportunity to reoptimize once private sector decisions have been made. Because some degree of injury must precede the filing of a section 201 petition that has any hope of getting to the president, many of the allocational decisions of the private sector are likely to be made by the time the president determines the tariff response.[8] Moreover, escape clause tariffs are automatically subject to annual review, providing additional opportunities for the government to reoptimize conditional on private sector decisions. Even a presidential decision that protection is not in the national economic interest does not rule out a later opportunity to reoptimize; the law states that an industry may refile the *same* petition with the ITC provided that one year has elapsed since the ITC's previous report to the president concerning this petition.[9] Thus, the petitioner's cost of refiling is small, and the opportunity for reoptimization on the part of the government is accordingly large.

8. For example, in establishing the threat of serious injury, the law instructs the ITC to consider evidence of "a decline in sales, a higher and growing inventory, and a downward trend in profits, wages, or employment (or increasing underemployment) in the domestic industry concerned" (Public Law 93-617, 2 January 1975).

9. The requirement that one year elapse since the petition was last filed can also be waived when the ITC determines that "good cause" exists.

Note that this argument has nothing to do with whether escape-clause actions have "surprised" the private sector more or less than the tariff exclusions under the Tokyo Round. In fact, in our theoretical work the equilibrium policy involves no surprise. The question is whether, in determining the policy, the supply responses were taken into account by the government equally under these two institutional environments.

This discussion leads us to conclude that the most significant difference between the environments within which Tokyo Round exclusions and escape-clause tariffs were chosen appears to be the degree of discretion enjoyed by the government relative to the private sector. Hence, an analysis of the different tariff decisions made under the two regimes may provide evidence on the degree to which discretion matters in determining the character of trade policy. We turn next to the data and our empirical results.

1.6 Empirical Results

Our empirical strategy can now be easily described. We wish to estimate a version of equation (41) for tariff decisions made by the president under the escape clause and for exclusions granted from the formula cuts under the Tokyo Round. Our theory implies that the last variable in the right-hand side of (41), $\sigma^y\theta^y$, should enter negatively and significantly only in the Tokyo Round exclusions and not in the escape-clause decisions. Rejecting this implication would mean that the government has found a way to cope with the credibility problems of policy discretion, through reputation or otherwise. A failure to reject this implication, on the other hand, would suggest that reputation is not a good substitute for commitment and that policy discretion imposes a binding credibility constraint on trade policy.

However, in implementing this strategy we face a difficulty: We are not really committed to the assumptions about functional forms that are implicit in (41). Moreover, the theoretical model of section 1.3 treats as a "black box" the many political economy considerations which enter into our model through the parameter α^y and which are likely to be important in the actual determination of trade policy. We deal with this problem by checking whether our results are robust across several alternative specifications. In particular, we consider a number of variations on the simple linear equation

$$(42) \qquad t = \beta_1 + \beta_2(N^y/\bar{N}) + \beta_3(P^yC^y/I) + \beta_4(\sigma^y\theta^y) + \beta_5\Gamma + \varepsilon,$$

where Γ denotes a column vector of variables that proxy for the term $(1 - \varphi^y\delta)$ in the theoretical model of equation (41), β_5 is the corresponding row vector of coefficients, and ε is a classical disturbance term.

As explained in section 1.4, the term $(1 - \varphi^y\delta)$ reflects the government distributive goals. As a proxy we use the extent of injury (that is, how far relative income in the injured sector has fallen from its status quo) and a number of different political variables suggested by the existing literature on the political economy of trade policy.

According to our theory, the tariff response should be larger the greater the fraction of the labor force employed in the injured sector and the smaller is consumption of the injured sector good as a fraction of total expenditure, irrespective of whether the government can or cannot make policy commitments. Thus, we would expect β_2 to be positive, and β_3 to be negative, regardless of the government's ability to commit. Moreover, and also irrespective of the ability to commit, we expect the tariff response to be positively related to the extent of injury. However, since only under commitment does the government take into account the distortionary effects of its policies on labor allocation decisions and through these on production, the tariff response should be lower the greater is the importance of the wage bill in output and the greater is output relative to consumption *only if the government can commit to its tariff choices*. We thus expect β_4 to be negative under the Tokyo Round and zero under the escape-clause procedure.

A complete listing of data sources is provided in the Appendix. While it is possible to obtain measures of ad valorem exclusions from the formula cuts negotiated under the Tokyo Round by four-digit SIC manufacturing industry, presidential responses under the escape clause often take the form of quantitative restrictions. Rather than employing various elasticity measures to convert these to tariff equivalents, we choose simply to treat the president's escape-clause decision as a 0/1 variable, and estimate equation (42) as a Probit model for escape-clause decisions. Of the forty presidential escape-clause decisions in our sample, fifteen cases ended in some form of presidential action (other than expedited adjustment assistance reviews, which were counted as no action).

An important issue of sample selection is raised by the fact that the forty observations of presidential escape-clause decisions in our sample were not generated randomly but were instead determined by the joint requirement that (*a*) the industry chose to file an escape-clause petition and that (*b*) the ITC found the industry to be facing serious injury or a threat thereof. If the random factors influencing the decisions at either of the first two stages are correlated with the error term in the tariff equation (42), as they would be, for example, if an unobserved industry characteristic influenced decisions at all three stages, then simple probit estimators of the coefficients of (42) will be biased and inconsistent. In fact, in a study of ITC injury determination decisions relating to escape-clause, antidumping, and countervailing-duty investigations, Hansen (1990) produced evidence of self-selection among industries filing for protection; the likelihood of a positive ITC ruling was found to be a determinant of the industry decision of whether to apply. Nevertheless, it seems unlikely that sample-selection issues pose a serious problem at the presidential decision stage, since self-selection in the filing decision is presumably more reflective of the likelihood of getting past the initial screening of the ITC than of a favorable presidential finding, while the ITC injury determination is itself logically separable from the presidential decision of whether protection is in the national interest, and determinants of the ITC and presidential decisions are as a consequence likely to be distinct. Thus, we proceed to estimate (42) as a simple Probit model, and postpone a more rigorous treatment of sample selection issues to future research.

The explanatory variables by sector suggested by our theory include the ratio of production worker employment to total manufacturing production-worker employment, the ratio of consumption to national income, and a measure of the sectoral shock, as well as the ratio of the production-worker wage bill to consumption.[10] As a measure of the shock for the escape-clause equation, we try the change in the import penetration ratio and the change in the wage in the period leading into the presidential decision; for the Tokyo Round exclusion equation we use the formula tariff reduction. In addition to the explanatory variables suggested by our theory, we consider a host of political variables discussed by Baldwin (1985). These include a measure of establishment size, four-firm concentration ratio, value-added share of output, employment, import penetration ratio, and average wage, as well as a number of dummies constructed to control for political differences (e.g., presidential party, proximity of the decision to an election date) and cyclical differences (e.g., aggregate trade balance as a fraction of GNP) across escape-clause decisions.

In estimating equation (42) for the four-digit SIC Tokyo Round exclusions, 1978 values at the four-digit SIC level were used for all explanatory variables, on the grounds that this was the most recent year of data that could enter into decisions completed in 1979. Also since as noted in the previous section, low-tariff products often received negative exclusions as a way of maintaining deep average cuts in the face of exclusions in other sectors, we restrict our sample for the Tokyo Round exclusion equation to four-digit sectors with ad valorem pre–Tokyo Round tariffs greater than 5 percent. For the escape-clause equation, measures of explanatory variables were taken from the relevant four-digit SIC sector in which the petitioning industry belonged for the year prior to the year in which the presidential decision was made.[11]

We begin with estimates of equation (42) in the context of presidential escape-clause decisions. Table 1.1 presents probit results under a variety of

10. Note that consumption here includes intermediate products, since it is constructed as sales minus exports plus imports.

11. In particular, we do not have data tailored to the particular set of industries represented by each section 201 petition. While in principle such data could be collected from the published case reports themselves, in practice the data published in these reports are irregular and incomplete. Moreover, it is not uncommon for the reports to provide four-digit SIC data when more detailed data are unavailable. While we plan to construct a more detailed data set in future work, it seems unlikely that the error introduced by using four-digit SIC data (as opposed to the specific set of industries within the four-digit grouping that were covered by the petition) could account for our results.

Table 1.1 Presidential Escape Clause Decisions[a] (Probit)

Variable[b]	Eq. (1)	Eq. (2)	Eq. (3)	Eq. (4)
Constant	−8.78	4.74	6.91	−7.29
	(−1.74)	(0.73)	(0.76)	(−0.66)
COMMIT	191.64	6.32	24.57	43.45
	(2.39)	(1.74)	(1.47)	(1.34)
PREMP	703.13	−0.39	0.77	0.67
	(0.60)	(−0.26)	(0.71)	(0.53)
CONS	2.49	2.80	0.42	1.53
	(1.37)	(1.51)	(0.45)	(0.97)
SHOCK	29.93	10.37	3.01	7.66
	(1.73)	(1.22)	(0.46)	(1.02)
REP201	9.56	3.13	1.31	2.63
	(2.32)	(2.11)	(1.97)	(1.80)
VALOUT	−65.88	−8.32	−13.67	−6.93
	(−2.40)	(−2.03)	(−2.09)	(−2.09)
IMPEN	28.00	2.32	4.71	2.01
	(2.47)	(1.98)	(1.84)	(1.53)
ESTSIZE	−28.40	−1.81	−1.44	−1.58
	(−2.06)	(−2.07)	(−0.62)	(−1.80)
CONCEN	0.04	−0.69	−0.02	−0.41
	(1.03)	(−0.76)	(−0.80)	(−0.48)
No. of observations	40	40	40	40

Note: Specifications: Eq. (1): all variables in levels; eq. (2): all variables in logs, except SHOCK and REP201; eq. (3): PREMP, CONS in logs, all other variables in levels; and eq. (4): COMMIT, SHOCK, REP201 in levels, all other variables in logs.

[a]Dependent variable: 1 if president imposed protection, 0 otherwise.

[b]See text for variable descriptions and differences among equations; *t*-statistics in parentheses.

specifications. Of the list of political variables described above, five were at least occasionally significant, and are included in each specification listed in the table. These include the import penetration ratio (IMPEN), the ratio of value added to output (VALOUT), average employment per establishment as a measure of establishment size (ESTSIZE), the four-firm concentration ratio for 1976 (CONCEN), and a dummy variable that takes a value of 1 if the industry has previously filed a section 201 petition (REP201). As Baldwin (1985) notes, industries with low import penetration ratios are unlikely to be viewed by government officials as attractive candidates for protection, implying that the expected sign of the coefficient on the political variable IMPEN is positive. Inclusion of the variable VALOUT is motivated by the "pressure group" model of tariff determination (Olson 1965); the smaller an industry's value added share of output, the larger will be the percentage change in factor rewards associated with a given tariff change, and thus the greater the industry's incentive to fight for protection. Thus, the expected sign of the coefficient on the political variable VALOUT is negative. Also, according to the pressure group model, variables such as ESTSIZE and CONCEN that are related to the ability of an industry to internalize free-rider problems should be important determinants of industry protection. According to this argument, the coefficients on ESTSIZE and CONCEN are expected to be positive. However, under the "adding-machine" model as put forth by Caves (1976), governments are more concerned with protecting industries composed of a large number of small firms than industries which are highly concentrated, suggesting that the coefficients on ESTSIZE and CONCEN should be negative. Thus, we have no strong prior beliefs on the signs of these coefficients. Finally, REP201 is included to control for any repetition effect that may be present.

The specifications presented in table 1.1 include (42) estimated in levels (eq. [1]), in logs (eq. [2]), and in the form which most closely mirrors (41)—$\sigma^y\theta^y$ in levels and the remaining economic variables in logs—with political variables in levels (eq. [3]) or logs (eq. [4]). The variable SHOCK is measured as the change in import penetration ratio going into the year in which the escape-clause petition was considered. The coefficient on SHOCK is always of the expected sign but never significant at the 5 percent level, although it is occasionally significant at the 10 percent level (this is also true when SHOCK is measured as the change in wage). The coefficients on the political variables VALOUT and IMPEN are always of the expected sign and typically significant. The coefficients on the political variables ESTSIZE and CONCEN are typically negative and occasionally significant, lending some support to the adding machine model. The coefficient on the political dummy variable REP201 is always positive and typically significant, implying that industries that have previously filed a section 201 petition have a better chance of receiving escape clause protection. The coefficients on CONS (consumption as a fraction of GNP) and PREMP (production-worker employment as a fraction of total manufacturing production-worker employment) are often of the wrong sign but never significant, while the coefficient on COMMIT ($\sigma^y\theta^y$, which reduces to the ratio of production-worker wage bill to consumption) is always of the wrong sign and occasionally significant.

The first two columns of table 1.2 present the results of estimation when COMMIT is dropped from the equation, as is appropriate if escape-clause decisions are characterized by a high degree of policy discretion. The first column (eq. [1]) presents the equation in levels while the second column (eq. [2]) presents the equation in logs. Now, all coefficients take their theoretically expected signs. In particular, the coefficients on each of the economic variables PREEMP, CONS, and SHOCK take their expected signs, although only the coefficient on PREEMP is significant. The apparent unimportance of the cost of protection to consumers in the escape-clause decision (the insignificant coefficient on CONS) is consistent with the empirical findings of other studies of tariff determination and reflects perhaps a greater concern with producer as opposed to consumer interests in setting escape-clause tariffs. The uniformly poor performance of our SHOCK measures in the escape-clause equations is not

Table 1.2 Presidential Escape Clause Decisions[a] (Probit)

Variable[b]	Eq. (1)	Eq. (2)	Eq. (3)
Constant	2.37	8.73	2.68
	(0.98)	(1.91)	(0.73)
COMMIT	. . .	. . .	. . .
WAGE	. . .	. . .	−1.22
			(−0.11)
PREMP	1178.96	2.11	1174.72
	(2.23)	(2.33)	(2.23)
CONS	−0.70	−0.50	−0.68
	(−1.55)	(−0.80)	(−1.43)
SHOCK	15.44	5.10	15.51
	(1.58)	(0.70)	(1.56)
REP201	2.21	1.52	2.26
	(2.18)	(2.05)	(2.01)
VALOUT	−12.95	−4.73	−13.24
	(−2.12)	(−2.19)	(−1.98)
IMPEN	2.37	0.69	2.18
	(1.25)	(1.62)	(0.89)
ESTSIZE	−8.46	−0.78	−8.72
	(−1.44)	(−1.51)	(−1.37)
CONCEN	0.01	−0.29	0.01
	(0.25)	(−0.39)	(0.27)
No. of observations	40	40	40

Note: Specifications: Eq. (1): all variables in levels; eq. (2): all variables in logs, except SHOCK and REP201; and eq. (3): all variables in levels.

[a]Dependent variable: 1 if president imposed protection, 0 otherwise.

[b]See text for variable descriptions and differences among equations; t-statistics in parentheses.

entirely surprising either; this may in part reflect the fact that, as discussed above, the ITC sends to the president only those petitions associated with industries facing serious injury or an established threat thereof. Finally, the negative and significant coefficient on VALOUT and the generally negative but insignificant coefficients on ESTSIZE and CONCEN lend some support to both the pressure group and adding machine political economy models of tariff determination.

In summary, under no specification do we find the coefficient on COMMIT to be significantly less than zero, while dropping this variable leaves us with an equation that conforms reasonably well to theoretical predictions.[12] We conclude that presidential escape-clause decisions appear to conform to the predictions of a model in which tariffs are set without the ability to commit.

We turn next to analogous estimates for the exclusions to the formula cuts

12. We also experimented with dropping variables other than COMMIT from the estimating equation. In all specifications, the coefficient on COMMIT was never found to be significant and of the right sign.

negotiated in the Tokyo Round. Here we have ad valorem exclusion measures for 369 four-digit SIC sectors, and can thus estimate equation (42) by OLS rather than Probit. The Swiss formula for determining post–Tokyo Round tariffs was $z = (14x)/(14 + x)$, where x is the pre–Tokyo Round ad valorem tariff and z is the post–Tokyo Round tariff. Thus, for instance, a sector whose pre–Tokyo Round ad valorem tariff was 14 percent would, according to the Swiss rule, receive a seven percentage-point reduction in its ad valorem tariff as a result of the Tokyo Round. If, after exclusions, the actual tariff change emerging from the Tokyo Round for that sector was, say, a three percentage-point reduction in the pre–Tokyo Round ad valorem tariff, then the ad valorem exclusion from the (Swiss) formula cut for that sector would be four percentage points. It is this ad valorem exclusion—the difference between the post–Tokyo Round tariff and the tariff that would have resulted under the Swiss rule—that we use as our dependent variable.

As mentioned above, we restrict our sample to sectors with a pre–Tokyo Round tariff larger than 5 percent, leaving a total sample size of 201 sectors. In addition to eliminating from our sample those low-tariff sectors whose negative exclusions were used to balance the positive exclusions of other sectors, this also serves to provide a "minimum injury" standard associated with the Swiss formula cuts; all sectors in the sample faced formula tariff cuts of no less than 1.3 percentage points.[13] Finally, while the most natural measure for SHOCK would be the Swiss formula reductions themselves, these are likely to be endogenous, since the formula was designed to cut high tariffs by more than low tariffs (to achieve some degree of "harmonization"), and since the same characteristics that lead industries to enjoy high pre–Tokyo Round tariffs are likely also to enter into their ability to secure exclusions from the formula cuts. To avoid this problem of endogeneity and still make some attempt to control for the size of the shock, we have constructed the exclusion measure as a percentage of the formula reduction for that sector. As it turns out, our results are the same whether this measure or simply the ad valorem exclusion is used as the dependent variable in equation (42). Since the latter specification conforms more closely to earlier empirical work along these lines (see, e.g., Baldwin 1985), we present our results in the form of ad valorem exclusions.

The first four columns of table 1.3 present the results. As before, (42) is estimated in levels (eq. [1]), in logs (eq. [2]), and in the form which most closely mirrors (41) with political variables in levels (eq. [3]) or logs (eq. [4]). The political variables that were at least occasionally significant are the same as in the escape-clause estimation, except that REP201 no longer applies.

The coefficients on the political variables VALOUT and IMPEN are always of the expected sign and often significant. While the coefficient on CONCEN is never significant, the positive and sometimes significant coefficient on

13. While we do not present results on the full sample, they are roughly equivalent.

Table 1.3 **Tokyo Round Exclusions from Swiss Formula Cuts[a] (OLS)**

Variable[b]	Eq. (1)	Eq. (2)	Eq. (3)	Eq. (4)	Eq. (5)
Constant	0.013	−0.027	0.013	0.016	0.027
	(1.64)	(−1.13)	(0.91)	(0.75)	(2.71)
COMMIT	0.008	−0.021	−0.049	−0.050	. . .
	(0.19)	(−2.34)	(−0.85)	(−0.93)	
WAGE	. . .	. . .	. . .	. . .	−0.002
					(−2.21)
PREMP	0.567	0.016	0.008	0.007	−0.197
	(0.48)	(2.39)	(1.43)	(1.27)	(−0.17)
CONS	−1.205	−0.018	−0.008	−0.009	0.397
	(−0.74)	(−2.86)	(−1.58)	(−1.80)	(0.23)
VALOUT	−0.033	−0.013	−0.033	−0.020	−0.028
	(−1.80)	(−1.53)	(−1.75)	(−2.37)	(−1.90)
IMPEN	0.025	0.002	0.019	0.003	0.014
	(1.85)	(2.08)	(1.39)	(2.52)	(1.03)
ESTSIZE	0.015	0.008	0.015	0.007	0.018
	(1.42)	(3.26)	(1.44)	(2.81)	(1.76)
CONCEN	0.001	−0.005	0.001	−0.004	0.001
	(0.43)	(−1.17)	(0.63)	(−0.88)	(0.80)
R^2	.05	.15	.06	.13	.08
No. of observations	201	199	201	199	201

Note: Specifications: Eq. (1): all variables in levels; eq. (2): all variables in logs; eq. (3): PREMP, CONS in logs, all other variables in levels; and eq. (4): COMMIT in levels, all other variables in logs; and eq. (5): all variables in levels.

[a]Dependent variable: ad valorem exclusion from Swiss formula cut.

[b]See text for variable descriptions and differences among equations; *t*-statistics in parentheses.

ESTSIZE tends to support the pressure group model. When entered as levels, none of the coefficients on COMMIT, PREMP, or CONS are significant. However, when entered as logs, the coefficients on COMMIT, PREMP, and CONS are all significant and of the expected sign. The finding of a negative and significant coefficient on COMMIT in the (logs) exclusion equation, and the absence of such a finding for any of the escape-clause equations, suggests that the different degree of policy commitment across the two decision-making environments may indeed have a measurable impact on the determination of trade policy. Clearly, however, this conclusion is sensitive to the specification of our estimating equation.

To get a better sense of what the data is telling us, we return to equations (40) and (41) and note that an additional implication of the model of section 1.3 is that the wage level should enter negatively in the determination of the tariff response under commitment (through the wage bill W^yN^y) but should be absent under discretion (except possibly through the shock measure). Intuitively, all else equal, a higher wage reflects a higher marginal product of labor, and thus a higher elasticity of output with respect to employment, which reduces the tariff response under commitment but not in its absence. In fact, a comparison of (40) and (41) confirms that the wage level is the only additional information entering into the determination of the equilibrium tariff under commitment which is not present under discretion. Moreover, replacing the variable COMMIT with the wage level should have little effect on coefficient estimates in the escape-clause equation but should make of indeterminant sign the coefficients on PREMP and CONS in the exclusion equation, since by (41) the total effect of a change in N^y on t (both directly and indirectly through θ^y) is composed of two effects of opposite sign, and similarly for P^yC^y. In summary, denoting as WAGE the production-worker wage, (40) and (41) imply

$$t^d = t^d\,(\overset{(0)}{\text{WAGE}},\ \overset{(+)}{\text{PREMP}},\ \overset{(-)}{\text{CONS}},.),$$

$$t^c = t^c\,(\overset{(-)}{\text{WAGE}},\ \overset{(?)}{\text{PREMP}},\ \overset{(?)}{\text{CONS}},.).$$

Thus, estimating an equation of the form

$$(43)\qquad t = \beta_1 + \beta_2(N^y/\bar{N}) + \beta_3(P^yC^y/I) + \beta_4(W^y) + \beta_5\Gamma + \varepsilon,$$

we expect to find the coefficient on WAGE insignificantly different from zero and little change in the other coefficients for the escape-clause equation, and a significantly negative coefficient on WAGE for the exclusion equation, with the coefficients on PREMP and CONS of indeterminant sign. Note also that the hypothesized relationship between the wage level and the tariff response is distinct from that which comes out of the "social change" model of tariff determination (Ball 1967), since this political model would imply that WAGE should be negatively related to tariff responses in both the escape-clause and Tokyo Round exclusion equations (reflecting the hypothesized desire to bring about a more egalitarian income distribution rather than simply aiming to preserve the status quo), while our model suggests that it should only appear negatively in the latter.

The last columns of tables 1.2 and 1.3 present the results of estimation of equation (43) for the escape-clause and the Tokyo Round exclusions. For each equation, only the results under a level specification are reported, since the log specification contains no additional information over the regression of table 1.3 (when all variables are measured in logs, eq. [43] is just a rearrangement of eq. [42]). The results conform to the model's predictions, and reinforce the tentative conclusions drawn from the previous regressions. The coefficient on WAGE in the escape-clause equation is never significant, and leaves the performance of the equation largely unaffected. In contrast, the coefficient on WAGE in the Tokyo Round exclusion equation is always significant and of the expected sign and, as expected, the coefficients on PREMP and CONS become insignificantly different from zero. Combined with the results presented in the previous regressions, we view these results as generally pointing to the empirical importance of the degree of government discretion in the determination of trade policy.

1.7 Conclusions

The debate on rules versus discretion has received a great deal of attention in the theory of economic policy, in macroeconomics, public finance, and trade policy. But the existing literature has focused almost exclusively on theoretical aspects of this debate. To date there has been little empirical study of how relevant the distinction between rules and discretion is in the real world and no study within the context of trade policy.

Trade policy lends itself particularly well to an empirical investigation of these issues, for two reasons. First, as developed in section 1.3, the theory yields very sharp predictions of how trade policy chosen under discretion differs from that chosen under rules. Second, and perhaps more important, trade policy in the United States is implemented under a variety of institutional arrangements. A major difference between some of these arrangements is the commitment technologies that they provide. Hence, by comparing the policies implemented within these different environments, one can examine whether or not the capacity to undertake binding policy commitments matters.

We have attempted to do just that by comparing trade policy actions taken in the highly discretionary environment of escape-clause decisions with those taken under less discretion within the context of the Tokyo Round. While our empirical results are far from conclusive, they are at least suggestive that the degree of discretion matters in trade policy decisions. Perhaps more importantly, our results signal the need for further empirical work before one can conclude with confidence that the degree of discretion does—or that it does not—matter in the determination of trade policy.

Data Appendix

This appendix defines the variables and describes the data sources underlying our reported empirical results. We do not include sources for those variables (e.g., certain political variables) which we experimented with but did not report. All the independent variables were constructed from data contained in the National Bureau of Economic Research (NBER) Trade and Immigration Data Set. This is an annual data set covering four-digit SIC manufacturing industries from 1958 through 1985.

All independent variables in the Tokyo Round regressions were constructed using 1978 values, except for the four-firm concentration ratio which was available only for 1976. All independent variables for the escape clause regressions were taken from the four-digit industry (or industries) associated with the petition, with the year being that associated with the month fifteen months prior to the ITC ruling date. Where a single petition spanned several four-digit SIC industries, we treated each four-digit industry as a separate presidential decision on the grounds that the president did often distinguish among industries or products of a given petition in the final escape-clause determination (e.g., Color TV [TA-201-19] and Non-Electric Cookware [TA-201–39]). The rule for choosing the year associated with each escape clause petition reflects our attempt to generate preshock variables and leads to independent variables that are measured generally one to two years prior to the year of the ITC ruling. We experimented with other rules, with no change in the results. The one exception to this rule was the four-firm concentration ratio which, as noted, was only available for 1976.

The dependent variables for the Tokyo Round regressions were constructed from World Bank data supplied to us by Kishore Gawande and Daniel Trefler. The exclusions from the Swiss rule cuts were constructed by beginning with line-item changes and aggregating up to the four-digit SIC level using 1980 U.S. trade weights. The dependent variable for the escape-clause regressions was constructed by assigning a zero to presidential decisions which ended in no action or expedited adjustment assistance procedures, and a one otherwise.

The variable definitions and their data sources are:

COMMIT:	ratio of production worker payroll to consumption (CONS)
WAGE:	average production worker wage, deflated by CPI
PREMP:	ratio of production worker employment to total production worker employment in U.S. manufacturing sector
CONS:	ratio of shipments minus net exports to GNP
VALOUT:	ratio of value added to shipments
IMPEN:	ratio of imports to consumption (CONS)
ESTSIZE:	average employment per establishment
CONCEN:	four-firm concentration ratio for 1976
SHOCK:	annual percentage change in IMPEN or WAGE
REP201:	dummy variable that takes a value of one if a president has considered an escape-clause petition from the industry before, and zero otherwise

References

Baldwin, R. E. 1985. *The political economy of U.S. import policy.* Cambridge, Mass.: MIT Press.

Baldwin, R. E., and R. N. Clarke. 1987. Game-modeling multinational trade negotiations. *Journal of Policy Modeling* 9.

Ball, D. S. 1967. United States effective tariffs and labor's share. *Journal of Political Economy* 75.

Buckler, M., and C. Almon. 1972. Imports and exports in an input-output model. *American Statistical Association,* Proceedings of the Business and Economic Statistics Section.

Caves, R. E. 1976. Economic models of political choice: Canada's tariff structure. *Canadian Journal of Economics* 9.
Dixit, A. 1985. Tax policy in open economies. In *Handbook of Public Economics*, ed. A. J. Auerbach and M. Feldstein. Amsterdam: North-Holland.
———. 1987. Strategic aspects of trade policy. In *Advances in Economic Theory: Fifth World Congress*, ed. T. F. Bewley. New York: Cambridge University Press.
———. 1989. Trade and insurance with imperfectly observed outcomes. *Quarterly Journal of Economics* 104.
Eaton, J., and G. M. Grossman. 1985. Tariffs as insurance: Optimal commercial policy when domestic markets are incomplete. *Canadian Journal of Economics* 18.
Edwards, S., and G. Tabellini. 1990. Explaining fiscal deficits and inflation in developing countries. *Journal of International Money and Finance.*
Hansen, W. L. 1990. The International Trade Commission and the politics of protectionism. *American Political Science Review* 84.
Judd, K. 1989. Optimal taxation in dynamic stochastic economies: Theory and evidence. Manuscript.
Kydland, F. and E. Prescott. 1977. Rules rather than discretion: the inconsistency of optimal plans. *Journal of Political Economy* 85.
Lapan, H. E. 1988. The optimal tariff, production lags and time consistency. *American Economic Review* 78.
Olson, Mancur. 1965. *The logic of collective action: Public goods and the theory of groups.* Cambridge, Mass.: Harvard University Press.
Richardson, J. David. 1988. Safeguards issues in the Uruguay Round and beyond. In *Issues in the Uruguay Round,* ed. Robert E. Baldwin and J. David Richardson. NBER Conference Report. Cambridge, Mass.: National Bureau of Economic Research.
Romer, D. 1989. Does the absence of precommitment in monetary policy matter? A simple test. Manuscript.
Staiger, R. W., and G. Tabellini. 1987. Discretionary trade policy and excessive protection. *American Economic Review* 77.
———. 1989. Rules and discretion in trade policy. *European Economic Review* 33.
White, H. 1980. A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica* 48.

Comment Richard H. Clarida

I enjoyed and learned from this paper, even though I think the best parts are too short and some nice implications are left out. The authors are to be commended for their empirical strategy; I think they make exactly the right choice by employing exclusion restrictions to test their theory. The authors are also to be congratulated for explicitly incorporating distribution effects into their 1987 model. Before I comment in more detail on these two main parts of the paper, let me first discuss the role of discretionary trade policy in an economy in which ex post supply elasticities differ from ex ante supply elasticities, and in which tariffs are the only instrument available to the policymaker.

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As outlined in section 1.2 of the paper, because under discretion the government moves after supply has responded to any expected tariff, the optimal discretionary policy ignores the ex ante supply elasticity to the expected tariffs. When there are only production distortions, the optimal equilibrium—time-consistent—tariff is increasing in the ex post supply elasticity: if the technology is putty-clay, the equilibrium tariff is zero, while if the technology is putty-putty, the equilibrium tariff is positive and equates the marginal benefit of reducing the production distortion with the marginal cost of distorting consumption. When there are consumption distortions, the optimal tariff is decreasing in the ex post supply elasticity. If the technology is putty-clay, the optimal time-consistent tariff ignores the induced distortion in production and is set to eliminate the consumption distortion. If the technology is putty-putty, the optimal time-consistent tariff is lower because the marginal benefit of reducing the consumption distortion must be equated to the marginal cost of the induced distortion in production. Note that there is no presumption that tariffs set under discretion—a putty-clay world in which firms "move first"—will be higher than under commitment—a putty-putty world in which firms can fully adjust factor proportions after the policymaker's "move."

I now turn to the authors' two-sector model of trade policy as a tool of income redistribution. In this model—which is a generalization of the authors' 1987 paper—the cost of changing sectors differs among workers in the import-competing sector. A fall in the price of imports redistributes income away from workers who are stuck in the import sector to workers in the export sector. Because workers differ in their cost of changing sectors, trade policy can influence the wage differential between sectors. The policymaker selects the tariff to maximize a social welfare function that weighs the utility of workers by their population share. There are three types of workers: workers in the export sector who stay there; workers in the import sector who shift to the export sector; and high-adjustment-cost workers who are stuck in import sector.

The optimal tariff—and thus income redistribution—depends of course on whether the policymaker has discretion in setting the tariff. If the tariff is set after workers have chosen their sector of employment, the optimal tariff is increasing in the share of employment in the import sector, increasing in the magnitude of the terms of trade shock, and decreasing in the share of expenditure that falls on the import competing good. Under discretion, the tariff is not influenced by the induced production distortion as measured by the share of wages in the total output of the import competing good. By contrast, under commitment, the larger the share of wages in total output, the larger is the production distortion induced by redistribution and, thus, the smaller is the tariff. Indeed, strictly speaking, the theory predicts that given the share of employment in the import sector, the magnitude of the terms of trade shock, and the share of expenditure that falls on the import competing good, the difference between the optimal tariff under discretion and commitment depends entirely on the magnitude of the production distortion as measured by the share of wages in the total output of the import competing good. Thus, because the policymaker's objective is to redistribute income to injured workers, the optimal tariff is larger under discretion than under commitment, because the induced production distortions are ignored under the former regime.

This result provides a key restriction that is sufficient to distinguish between a tariff set under commitment from a tariff set with discretion. Under commitment, the magnitude of the production distortion induced by a tariff should be negatively correlated with the level of the tariff once the influence of the share of employment in the import sector, the magnitude of the terms of trade shock, and the share of expenditure that falls on the import competing good are taken into account. By contrast, the level of a tariff set with discretion should be uncorrelated with the magnitude of the induced production distortion once employment, the size of the shock, and the induced consumption distortion are taken into account. This exclusion restriction provides the basis for the authors' empirical work. In my view, this is a real contribution of the paper because it allows for a simple test of the proposition that discretion matters in the setting of trade policy. In a regime such as the Tokyo Round of the GATT in which tariffs—and their exclusions—are negotiated over a number of years in advance of their implementation, and largely in advance of any private sector resource flows that occur as a result, an optimal tariff should incorporate the production distortion that will be induced. By contrast, the granting of escape clause (section 201) relief occurs only after a finding of injury to an import competing sector has been established by the ITC and thus, so it is postulated, after the bulk of factor supply decisions have been made. In such a regime, the "optimal" granting of escape-clause relief should not take into account the magnitude of the production distortion that has been induced by the expectation of the granting of the relief!

I must say that, while I applauded the elegance of this test, before reading section 1.6 of the paper I was skeptical that the outcome of such an empirical exercise would support the restriction that the share of wages in output does not enter significantly in the granting of section 201 relief, and that the wage share enters *negatively* in an equation predicting size of Tokyo Round exclusions. The empirical work has changed these priors, at least to some extent. As reported in table 1.2, when the share of wages is excluded from probit equations for predicting escape-clause decisions, the employment and consumption variables enter with the expected signs—positive and negative, respectively—are usually significant. When the wage share is included in the equations, nothing except the political dummy variables is significant. The results for the Tokyo Round exclusion equations are somewhat more supportive of the theory. To my surprise, the wage variable enters negatively in three of the four specifications, and is even statistically significant in one. In all equations the employment and consumption variables enter with the "correct" signs, and all three variables are statistically significant in one of the specifications (eq. [2] in table 1.3).

To sum up, this is a good paper. It develops an interesting theoretical model that is used to devise an elegant test of the role of discretion in the granting of protection. It applies this test to data sets that, certainly based on my priors, could have been expected to reject the predictions of the theory. I was surprised that a variable that acts as a proxy for the magnitude of the consumption distortion generally enters with a negative coefficient, since the conventional wisdom is that those who grant protection usually ignore the "hidden" costs that such protection imposes on consumers. My one particular complaint with the empirical work is that I would have liked to see all of the equations run *sans* the political dummy variables. If the results depend on any particular choice of dummies, this should be reported specifically. I will close with the following observation. It is often argued—sometimes by me—that presidential discretion in the granting of protection is valuable because a president is much less subject to the rent seeking of firms and workers from one particular state or industry than are the congressional committee chairmen who would be expected to draft the "rules of the game" in any regime in which the president's discretion is diminished. This argument overlooks the fact, documented nicely in this paper, that there is a cost to discretion, in that social welfare can be enhanced if policymakers can make binding commitments. Thus, it is not at all clear that costly discretion dominates a rules regime in which the rules are subject to rent seeking.

Comment Michael O. Moore

Robert W. Staiger and Guido Tabellini attempt in this paper to evaluate empirically the role of discretion in trade policy outcomes. The project is based on a generalization of theoretical work they have developed elsewhere.[1] The generalization, like the earlier research, is insightful. Their attempts to test the theory empirically are more problematic, however.

The theoretical construct is offered as an alternative to political economy models to explain the existence of suboptimal tariff rates. The critical result is that a benevolent government with discretion will impose higher (and nonoptimal) tariffs than those in a regime of precommitment because of time-consistency problems. This prediction is also consistent with lobbying models in the political economy tradition; the more discretion vote-seeking politicians

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1. R. W. Staiger and G. Tabellini, "Discretionary Trade Policy and Excessive Protection," *American Economic Review* 77 (1987): 823–37.

have, the more likely they might be influenced by lobbying efforts. In this sense, the *general* predictions of this model and lobbying models may not be empirically distinguishable from one another. This makes estimation based explicitly on a theoretical model all the more useful. Fortunately, the authors' model has an implication that a particular form of supply response will influence tariffs in a regime of commitment. There is no equivalent prediction from lobbying models of which I am aware. Consequently, testing for such supply responses has significant potential, not only in determining whether commitment matters in general but also whether this particular type, rather than political commitment, explains trade policy.

The authors go on to argue that a benevolent redistributionist government would prefer commitment because it yields lower tariffs and higher social welfare but is unable to do so because this policy is time-inconsistent. This seems at odds (at least on a casual basis) with many recent trade policy "reforms." Congress has moved to remove discretion from the hands of the president and the U.S. Trade Representative, most notably in the "Super 301" provisions of the 1988 Omnibus Trade Act. This change may have been instituted to force the government to precommit to lower tariffs but I have my doubts. Rather, it seems to be either a "backdoor" means of obtaining protection or perhaps a way to force market access through a commitment to retaliatory import restrictions.

This brings up a more general issue. The degree of discretion and commitment available to the government is not entirely exogenous. In the United States, Congress can choose how much trade policy authority to delegate and, moreover, how much it should tie its own hands. Naturally, one can argue that a unilateral announcement by Congress that trade policy will be nondiscretionary may not be credible in a final equilibrium. However, until the laws are changed, the government may have very little leeway in making decisions. Important examples of this include U.S. antidumping and countervailing-duty procedures. A more general theory (though clearly not the intent of this paper) might help explain why the "government" chooses to precommit in some policy areas but retain discretion in others. A related issue is why would some industries pursue protection through the escape clause and others through GATT-round exclusions. If firms can choose between them, why would any industry ever seek protection through a process where there is commitment, since, according to Staiger and Tabellini's model, they would receive lower tariffs.[2]

In the empirical section, Staiger and Tabellini use the results of their model along with assumptions about specific functional forms to derive estimable equations. They then estimate parameters for two policy outcomes, distin-

2. Insight into this issue may be found in M. Moore and S. Suranovic, "Lobbying vs. Administered Protection: Endogenous Industry Choice and National Welfare," *Journal of International Economics* (forthcoming, 1992).

guished primarily, they argue, by the degree of commitment. While this attempt is welcome (few political economy models have yielded specific equations to be estimated), the implementation has certain difficulties.

For example, the models derived from the theory involve the natural logs of both $t/(1 + t)$ and the explanatory variables. Since the major advantage of theory-based econometrics involves the derivation of specific relationships, the use of the *level* of t as the dependent variable is troubling.

The focus of the study is on the predictive power of supply-side responses in explaining tariff rates. The variable derived from theory, $1/\eta^w + \sigma^y\omega^y$, was unavailable because of data problems with η^w. Two alternative measures were proposed: $\sigma^y\omega^y = w^yN^y/P^yC^y$ and w^y. Some difficulties clearly arise in how to interpret the estimates associated with these "instrumental" variables. Discussion about the nature of the resulting bias would be useful.

The optimal tariff for both discretion and commitment depends positively on $(1 - \sigma^y) = (w - w^y)/w$, where w is the average wage rate. For industries with low wages, the optimal tariff is positive. Thus, this model provides an alternative to equity-concern models for why low-wage workers receive high tariffs.[3] This formulation also means that higher-than-average industry wage rates should lead to a *negative* optimal tariff. Given that some of the U.S.'s most protected industries have high wages (the auto and steel industries, for example), some interpretation of this result would be appropriate.

Perhaps the most problematic aspect of the empirical work involves the data used in the escape clause analysis. The authors choose to use four-digit level SIC data for explaining these outcomes. This seems inappropriate given that the industries must offer the International Trade Commission (ITC) much more disaggregated data in support of their petition. Use of this publicly available data might be much more helpful in prediction.

The authors have chosen two processes characterized by differing levels of precommitment. However, there are many other differences in these two procedures, involving different institutions and decision-makers. Consequently, one should be careful in assigning all differences in the empirical results to precommitment. One way to avoid this would be to analyze an alternative pair of trade policy outcomes, in particular the ITC decisions in antidumping/countervailing duty cases and ITC escape clause decisions. In the former, considerable precommitment is apparent. If the ITC rules affirmatively (assuming a positive dumping or subsidy margin), the result is either a duty, a price-undertaking, or a VER-type arrangement. An industry with a "good" case may feel confident that some protection will be forthcoming. With the escape clause decision, the ITC makes a serious injury ruling but does not commit

3. For the traditional reasoning, see N. Fielke, "The Tariff Structure for Manufacturing Industries in the United States: A Test of Some Traditional Explanations," *Columbia Journal of World Business* 11, no. 4 (Winter 1976): 98–104; and R. E. Baldwin, *The Political Economy of U.S. Import Policy* (Cambridge, Mass.: MIT Press, 1985).

the government to any action; the president makes the final decision. This pair of decisions has three advantages: (*a*) the same dependent variable would be used, (*b*) the same institution is making the decision (the only difference then would be the level of commitment), and (*c*) similar explanatory variables would be available.

Staiger and Tabellini have made a useful contribution in this paper, most importantly by deriving equations from theory to test for the importance of discretion. The particular implementation strategy has problems, in large part because of data availability. The final results would be more persuasive if they took advantage of available ITC data sets. Finally, other pairs of policies might be more appropriate for resolving whether commitment plays an important role in trade outcomes.