Explaining Managed Trade as Rational Cheating

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Abstract

Post–war "managed trade" policies feature low baseline tariffs combined with selective non–tariff protection. This paper interprets managed trade as a rational strategy to undermine trade liberalization agreements in the absence of credible external enforcement. Analyzing the Kennedy GATT Round, I explore the calculus that led the United States to undermine selectively across–the–board tariff reductions by introducing non–tariff barriers in industries with rapidly rising import demand. I show empirically that non–tariff barrier dynamics across 216 industries support a rational cheating interpretation of managed trade policy.

1. Introduction

The debate preceding passage of the North American Free Trade Agreement (NAFTA) highlighted the tensions that arise frequently between general tariff liberalization and the awarding of special industry protection. While NAFTA gradually will eliminate tariffs between the United States, Canada and Mexico, in order to secure its passage the Clinton Administration promised special protection to industries that anticipated sharp increases in import demand including sugar, textiles and citrus fruits.[1] These opposing actions mirror two broader trends in international trade relations during the post–war period. The first was a series of broadly–applied tariff reductions negotiated under the General Agreement on Tariffs and Trade (GATT).[2] By deepening economic integration among trading partners, liberalization increasingly exposed domestic industries to volatility from trade flows and prompted the second major trend — awarding special protection when import demand rises rapidly. Together, these trends form the basis of current "managed trade" policies: low baseline tariffs during periods of normal import volume combined with special (usually non–tariff) protection when import demand rises rapidly in a particular industry.[3]

This paper seeks to explain empirically the economic dynamics culminating in a policy of managed trade. Its focus is the 1964–67 Kennedy GATT Round, which dates the widespread introduction of managed trade into U.S. trade policy. In what was the largest single multilateral trade liberalization episode to date, the Kennedy Round agreement cut United States manufacturing tariffs by an average of 36%. As these cuts were phased in, real merchandise imports grew at 11.5% annually and the average import share in manufacturing rose from 4.8% to 7.4% (U.S. Department of Commerce, 1971; 1974a). The United States responded directly by unilaterally substituting import quotas, price floors and similar non–tariff barriers in more than one–quarter of the liberalized industries.[4] The subsequent Tokyo GATT Round (1973–79) sought to regulate non–tariff barriers to deter future attempts at undermining tariff liberalization agreements.

These central facts motivate the model that I develop to explain the Kennedy Round's dynamics. The model integrates two literatures from the theory of endogenous trade protection. The tariff bargaining literature provides the model's basic structure by emphasizing strategic interactions among forward–looking governments that negotiate liberal trade policies. Liberalization can define a prisoners' dilemma in which each country has a rational incentive to "cheat" by introducing non–tariff barriers to negate its tariff concessions. Cheating is rational when the short–run return from non–tariff protection exceeds the long–run penalty from foreign retaliation. I allow these returns and penalties to depend upon several government objectives. These may include preserving conservative social welfare or exploiting terms–of–trade power (objectives traditionally emphasized in tariff bargaining models), as well as maximizing political support (an objective traditionally emphasized in political influence models).[5]

This paper tests the following central hypothesis. Can post–Kennedy Round managed trade policies be explained as occurrences of rational cheating against an implicit trade liberalization agreement? Under this hypothesis, the incidence of rational cheating should vary across industries with their short–run return and long–run penalty from introducing special non–tariff barriers. Two empirical findings derived in the paper support this hypothesis. First, tariffs and non–tariff barriers acted as substitutes in equilibrium. Thus, industries that suffered the largest reductions in baseline tariffs, and thus which experienced the strongest rational cheating incentives, also were awarded the largest increases in special, non–tariff barriers. Second, the rate of substitution between tariffs and non–tariff barriers rose with an industry's short–run return from special protection and fell with its long–run expected penalty from retaliation. These returns and penalties varied with industry characteristics identified by both the tariff bargaining and political influence literatures. Specifically, the likelihood of non–tariff cheating was significantly higher in industries with elastic import demand, in slowly–growing,

technology–intensive industries with low import variability, and in industries with elastic import supply, low human capital intensity, and low producer concentration.

I begin by briefly reviewing and then integrating the tariff bargaining and political influence literatures to predict how special, non–tariff barriers would be substituted to offset negotiated tariff cuts. Next, I develop the empirical methodology for testing these predictions, and estimate the model for the Kennedy GATT Round. I conclude by summarizing and interpreting the regression analysis.

2. A Theory of Managed Trade

Background

Trade liberalization agreements present a prisoners' dilemma: all countries can enjoy higher social welfare with low tariffs, yet each country can gain from unilateral defection by introducing non–tariff barriers to undermine its tariff concessions. Because the GATT lacked a credible, external enforcement mechanism to punish defection, tariff liberalization was honored only when the incentives created by the agreement were consistent with international cooperation. Trade agreements therefore had to be written so as to be *self*–enforcing, so that the credible threat of future retaliation by trading partners served as the enforcement mechanism.[6] This intuition can be formalized in a repeated game where a rational government compares its short–run return from cheating — granting selective industries special, non–tariff protection — against its long–run penalty from retaliation, which may escalate into a trade war.

Bagwell and Staiger (1990) model implicit cooperation among trading partners by infinitely repeating a static non–cooperative tariff–setting game. Countries can self–enforce low tariffs by threatening to punish cheating by reverting to the retaliatory (non–cooperative) high–tariff equilibrium from the subgame. Whether this threat is credible — a necessary condition for sustaining low tariff rates — depends critically upon the industry's current import volume. Bagwell and Staiger (1990, p. 787) demonstrate that

implicit cooperation over tariff levels is sustainable during periods of "normal" import volume. Under these circumstances, the threat of reverting to the non–cooperative tariff level proves to be a sufficiently costly deterrence that outweighs the short–run return from undermining the negotiated tariff.

When current import demand rises sharply above its normal volume, however, the short–run return from cheating increases rapidly, and threatens to undermine a tariff–cutting agreement. The Kennedy Round tariff cuts precipitated a sharp, prolonged rise in import demand, which grew at more than ten percent per annum. In principle, these import pressures could have been vented through pre–negotiated "safety valves" without sacrificing the integrity of the Kennedy Round tariff cuts. Safety valves include the Escape Clause, which offers short–term protection when import demand rises sharply for any reason, and countervailing duty and anti–dumping laws, which grant protection to offset the effects of "unfair" import competition. However, during the 1960s, statutory and institutional barriers effectively constrained the use of these safety valves in the United States.[7] The result was that rising import pressures could be vented only by *unilaterally* granting special, non–tariff protection to selective industries. Administratively, non–tariff barriers such as import quotas and price floors were preferred instruments for cheating because their tariff–equivalent rose automatically with the industry's import penetration, thus acting like a variable–rate tariff.

In a model of implicit tariff cooperation, the short–run return from cheating may take a variety of forms, depending upon the government's objective function. A government that is motivated by conservative social welfare objectives will allocate special protection so as to mitigate sharp drops in the real incomes of import–competing sectors when import penetration rises (Corden, 1974). Hillman (1982) shows that a government that cares solely about maximizing political support also may grant temporary protection to declining industries that lobby for non–tariff barriers.[8] Finally, rational cheating may be motivated by revenues from trade taxes. Periods of high import demand raise the short–

run incentive to exercise an industry's power over its terms–of–trade by restricting imports.[9] As Hillman (1982) notes, disparate government objectives may lead to very similar trade policies being adopted. Thus, rather than seeking to distinguish between possible objectives, I focus upon predicting how the *intensity* of these motives should vary across industries, as revealed empirically in different rates of non–tariff cheating.[10]

The long–run penalty for cheating is borne when trading partners respond with a grim punishment strategy: permanently raising their own industry's tariff to the one–shot, non–cooperative (or prisoners' dilemma) level. Baldwin (1990) shows that an attractive rule–of–thumb strategy is to retaliate only against the cheating industry. This tit–for–tat retaliation rule offers the advantage that it directly reduces the cheating industry's marginal benefit of lobbying for special protection, and therefore it should reduce the equilibrium level of non–tariff barriers. During the Kennedy Round era, retaliation usually was directed narrowly at the cheating industry, lending empirical support to this modeling assumption. The long–run penalty for cheating also will vary with the government's objective function. Retaliation can impose social welfare costs, from reduced foreign market access for exporting industries; political costs, from reduced political support from industries losing protection; and revenue costs, from reduced government tariff receipts as imports fall. The sum total of these costs comprise the long–run penalty for cheating.

Predictions

By comparing an industry's short–run return and long–run penalty from cheating, it is possible to predict where the pressures would have been strongest to undermine the Kennedy Round's tariff cuts. A rational cheating theory offers two sets of predictions. First, tariff and non–tariffs should act as partial substitutes, which implies that the probability than an industry received special, non–tariff protection should rise with the magnitude of its tariff concession. *Ceteris paribus*, import demand will tend to rise by

more in industries with above–average tariff cuts. Rising import demand increases the short–run return from protecting the industry for political support, conservative social welfare or tariff revenue objectives. It follows that liberalization will be harder to sustain or, equivalently, that cheating will be more likely to break out in these industries. In contrast, governments should be more likely to find that implicit cooperation remains the dominant strategy in industries that suffered smaller than average tariff cuts.

Second, for a given–sized tariff cut, the rate of substitution between tariffs and non–tariff barriers should rise with an industry's short–run return from special protection and fall with its long–run expected penalty from retaliation. The tariff bargaining and political influence literatures link short–run returns and long–run penalties to observable industry characteristics. The short–run return from non–tariff cheating will tend to be higher where import demand is more elastic, where lobbying costs are lower, and where deadweight external costs from protection are smaller. The long–run penalty for non–tariff cheating will tend to be smaller in industries with shorter export horizons, smaller future rent streams, and greater market uncertainty. In the next section, I explain the logic behind each of these predictions, and provide empirical evidence on their validity during the Kennedy GATT Round.

3. Explaining Managed Trade in the Kennedy Round

Methodology and Data

I collected data for 216 4–digit United States manufacturing industries, representing 54.4% of the population that was subject to the Kennedy Round agreement. The average absolute tariff reduction for these industries was 2.6%, which represented a 19.6% fall relative to pre–Kennedy tariff levels. Non–tariff barriers were introduced subsequently into 85 or 39.4% of these industries. The Kennedy Round's tariff cuts were phased in between January 1968 and January 1972. Data constraints require that I use the year 1965 as representative of the pre–Kennedy era and 1970 for the post–Kennedy period.

By 1970, the United States had implemented approximately 80% of its Kennedy Round cuts, and the 1970 interim tariff rates were strongly correlated with industries' end–of–transition rates in 1972.

The rational cheating model links changes in industries' non–tariff barriers to their tariff reductions, and allows this relationship to interact systematically with industry characteristics. Let Δ NTB$_i$ denote the change in industry i's non–tariff barriers from the pre–Kennedy to post–Kennedy period, and let Δ Tariff$_i$ denote the corresponding change in the industry's tariff rate. Algebraically, the model is then

$$(1) \qquad \Delta \text{NTB}_i = \alpha_0 + \alpha_1 \Delta \text{Tariff}_i + \varepsilon_i .$$

I explain the construction of the non–tariff and tariff variables in turn. Summary statistics for all variables appear in Table 1.

The variable Δ NTB$_i$ is an index from the U.S. International Trade Commission (1975b) measuring how pervasive are non–tariff barriers in each industry. As earlier noted, non–tariff barriers represented the primary form of special industry protection because escape clause, anti–dumping and countervailing duty statutes were seldom used during the Kennedy Round era. The Δ NTB$_i$ index assigns a weight from 0 to 3 to each of 15 categories of non–tariff barriers in proportion to their restrictiveness. The index weights quantitative restrictions and import price floors most heavily, and also includes other non–tariff barriers such as import licensing and state trading requirements. An industry's index value then is calculated by summing the weights for all non–tariff barriers in place in that industry, and dividing by the index's maximum potential value. Higher index values thus reflect more comprehensive non–tariff protection.[11]

Non–tariff data are available only for 1970. Marvel and Ray (1983, p. 195) note, however, that manufacturing non–tariff barriers first became prevalent only after the Kennedy Round. Following their lead, therefore, for 1965 I set NTB$_i$ = 0 and replace Δ NTB$_i$ with the 1970 non–tariff level, NTB$_i$, in equation (1):

$$(1)' \qquad NTB_i = \alpha_0 + \alpha_{1i} \Delta Tariff_i + \varepsilon_i .$$

I experimented with both tobit and probit estimation; in the latter, NTB_i was replaced with a dummy variable equal to one if the non–tariff index was positive. Consistent with previous studies of the Kennedy Round, probit estimation yielded consistently better fits for all variables, and therefore I report only those regression results.[12]

I adopt a sequential model of protection in which tariffs are chosen first followed by non–tariff barriers. In addition to the econometric support that the sequential model has received (Ray, 1981; Marvel and Ray, 1983), this approach is consistent with the fact that the sample's non–tariff barriers were not part of the Kennedy Round negotiations but instead arose as a unilateral response to the negotiated tariff reductions. There are two potential interpretations of the sequential model.[13] One is that the government was "surprised" by the magnitude of import competition brought about by the tariff cuts. The subsequent introduction of non–tariff barriers therefore would reflect the government's revised assessment of the affected industries' viability under tariff liberalization. An alternative interpretation is that non–tariff barriers were triggered by anticipated rises in import demand. Thus, the Kennedy Round represented a concerted substitution between protectionist instruments in which the government anticipated the need to offset particularly deep negotiated tariff reductions, and chose to do so by raising non–tariff barriers unilaterally. This second interpretation appears to be more consistent with economic historians' accounts of the Kennedy Round negotiations (Evans, 1971).

Consistent with the sequential model, I use two–stage estimation in which first $\Delta Tariff_i$ is estimated from an ordinary least squares regression. The predicted value from this regression ($P\Delta Tariff_i$) then becomes an instrument in a second–stage probit regression that seeks to explain the inter-industry distribution of non–tariff barriers. This sequential model endogenizes industries' success at both gaining partial exemptions from the Kennedy Round's proposed across–the–board tariff cut and at securing additional, non–tariff barriers.

Results for the first–stage regression are reported in Table 2. The dependent variable ($Tariff_{1970}$) is the nominal tariff rate in 1970 applied to each four–digit industry.[14] Selection of independent variables was guided by prior models of inter–industry variation in post–Kennedy tariff rates. The chosen regressors were the industry's 1965 tariff rate ($Tariff_{1965}$), the four–firm industrial concentration ratio (CR), the average annual growth rate in real shipments for 1958–63 (GRSHIP), the percentage of employees in science or engineering tasks (TECH), the ratio of personal consumption expenditures to total output (CONS), and the percentage of industry employees that were unionized (UNION). The coefficient signs are consistent with previous empirical analyses (Ray, 1981; Baldwin, 1985). For the purposes of this paper, however, the first–stage regression serves mainly to instrument for post–Kennedy tariff rates. The regression's fitted value has a high adjusted–R^2 and, by construction, is independent of the error term ε_i. I define $P\Delta Tariff_i$ as the predicted 1970 tariff minus its 1965 level, and use this as an instrument in the second–stage probit regressions that are the central focus of this paper.

Probit Estimation

This section estimates a version of equation (1)′ to test two central predictions from the rational cheating model. The first test concerns the sign of α_{1i}. If the Kennedy Round agreement proved not to be sustainable in some industries, then tariffs and non–tariff barriers would have acted as partial substitutes. Industries that suffered larger tariff cuts would have been proportionately more susceptible to cheating, and therefore they should have received larger increases in non–tariff protection. Hence, α_{1i} should be negative under this interpretation.

The second set of tests concern the (absolute) magnitude of the coefficient α_{1i}. The rational cheating model predicts that the rate of substitution between tariff and non–tariff barriers should have been stronger — that is, $\alpha_{1i} < 0$ should be larger in absolute value — in industries where the short–run return to cheating is higher and the long–run penalty

from retaliation is lower. This occurs in industries with more elastic import demand, shorter expected horizons, smaller future rent streams, lower lobbying costs, smaller deadweight external costs from protection, and greater market uncertainty. The logic underlying these variables is discussed more fully in the regression results section below.

To test these predictions, I express α_{1i} as a function of a vector of industry characteristics that reflect these factors,

$$(2) \qquad \alpha_{1i} = \gamma_0 + \gamma_1 E_D + \gamma_2 GR + \gamma_3 TECH + \gamma_4 VIM + \gamma_5 E_S + \gamma_6 PK + \gamma_7 HK + \gamma_8 CR,$$

where E_D is the (absolute) elasticity of demand for imports, GR is the industry's growth rate, TECH measures technology intensity, VIM is the variability of industry imports, E_S is the elasticity of supply for imports, PK measures physical capital intensity, HK measures human capital intensity, and CR is the industrial concentration ratio. Substituting equation (2) into (1)′, and instrumenting for $\Delta\ Tariff_i$ with its predicted value $P\Delta\ Tariff_i$, yields the final estimation equation

$$\begin{aligned}(3) \qquad NTB_i = {} & \alpha_0 + \gamma_0 (P\Delta\ Tariff_i) + \gamma_1 (P\Delta\ Tariff_i \cdot E_D) + \gamma_2 (P\Delta\ Tariff_i \cdot GR) \\ & + \gamma_3 (P\Delta\ Tariff_i \cdot TECH) + \gamma_4 (P\Delta\ Tariff_i \cdot VIM) + \gamma_5 (P\Delta\ Tariff_i \cdot E_S) \\ & + \gamma_6 (P\Delta\ Tariff_i \cdot PK) + \gamma_7 (P\Delta\ Tariff_i \cdot HK) + \gamma_8 (P\Delta\ Tariff_i \cdot CR) + \varepsilon_i.\end{aligned}$$

Table 1 summarizes each of the interactive variables' predicted signing, as explained in the text below.

Regression Results

The second–stage probit regressions for equation (3) are reported in Table 3. The results are strongly consistent with the hypothesis that post–Kennedy managed trade policies reflected occurrences of rational cheating against tariff liberalization. Because α_{1i} assumes the value γ_0 when all interactive variables are zero in equation (3), γ_0 should be negative under the maintained hypothesis. In each of the five specifications, γ_0 does enter negatively and the coefficient always is significant at the 1% level or lower. Therefore, the data indicate that non–tariff barriers partially substituted for lost tariff protection.

The regression findings cannot be explained away by arguing that the Kennedy Round's proposed across–the–board tariff cuts eliminated trade regulators' discretion, and forced them to switch instead to non–tariff barriers. United States trade regulators negotiated partial exemptions to the tariff cuts for more than 40% of imports (by value), which indicates that they were not confined in their choice of protectionist instruments.[15] Deardorff (1987) casts further doubt on the hypothesis that institutional constraints on tariffs forced trade regulators to substitute non–tariff for tariff protection.[16] Instead, as further regression evidence below supports, substitution patterns appear to reflect rational cheating against negotiated tariff cuts.

Table 3's findings contrast with the general conclusion from earlier studies that tariffs and non–tariff barriers acted as complements during the Kennedy Round (Marvel and Ray, 1983; Baldwin, 1985). Complementarity usually was explained in those studies by arguing that an industry's ability to earn tariff exemptions should offer the best predictor of its success in acquiring non–tariff protection. However, upon closer inspection, this hypothesis was validated only for textiles and agriculturally–based manufactures, which were among the most politically influential during the Kennedy Round era (Evans, 1971). Ray and Marvel (1984, p. 454) found that isolating these two sectors reversed earlier results and eliminated all traces of complementarity in other industries. By allowing the relationship between tariff cuts and non–tariff barriers to vary systematically across all industries, Table 3 extends the logic of Ray and Marvel's (1984) conclusion and finds that, on average, the two protectionist instruments acted as substitutes.

In light of the apparent importance of industry differences, I examine next how the degree of substitution between tariff and non–tariff barriers varied with the industry characteristics from equation (2). Characteristics that strengthened substitutability should enter negatively in equation (3) to steepen the regression line estimated for the industry in $(NTB_i, P\,\Delta\ Tariff_i)$ space. I find that seven of the eight industry characteristics from

equation (2) significantly affected the substitutability between tariff and non-tariff rates in the direction predicted by a rational cheating theory of protection.

Elasticity of Import Demand (E_D). Trade regulators should have been more likely to introduce non-tariff barriers in industries whose import demand was price responsive. A given-sized tariff cut will generate a larger rise in imports the higher is the industry's elasticity of import demand. Maximization of conservative social welfare, trade tax revenues, or political support each imply that higher import penetration will raise the short-run return to granting special protection. For example, to dampen the drop in import-competing industries' real incomes, non-tariff barriers will be substituted where import penetration has risen most sharply. Potential revenues from optimal trade taxes also will be greatest in industries with the sharpest increases in import demand. And the largest redistributions of industry rents, inspired by political support maximization, will occur in industries whose elastic import demand causes tariff reductions to generate the largest losses in producer rents and the largest windfalls in consumer surplus. Together, these incentives imply that cheating should have been more prevalent in industries with higher import demand elasticities, which implies that $\gamma_1 < 0$ in equation (3).

To measure (absolute) import demand elasticities E_D, I use Shiells, Stern and Deardorff's (1986) industry estimates.[17] Table 3 indicates that the import demand elasticity always enters negatively and highly significantly. Consistent with the rational cheating theory, following a given-sized tariff cut, non-tariff cheating was more prevalent in industries with higher import demand elasticities.

Industry Growth (GR). Trade regulators should have been more likely to introduce non-tariff barriers in slowly-growing industries. Political influence models predict that trade regulators will require consumers to share some of their surplus windfall from tariff reductions with firms that lost rents during liberalization. Because slowly growing

industries face higher displacement costs from import competition and earn greater rents from protection, theory predicts that part of consumers' surplus windfall will be redistributed to these industries by raising non–tariff barriers to offset their diminished tariff protection. Forward–looking tariff bargaining models reinforce the prediction that non–tariff cheating will be more prevalent among depressed industries. First, foreign retaliation is less costly among slowly–growing industries. Future rent streams tend to be smaller, and firms' exporting horizons tend to be shorter, and both of these work to reduce the expected value of the penalty that trading partners can impose for non–tariff cheating. Second, in declining industries, a constant quota, price floor or equivalent non–tariff barrier corresponds to a falling explicit tariff. To maintain a given level of protection, regulators therefore must supply higher non–tariff barriers. The prediction that non–tariff barriers should have been used to partially offset tariff cuts in slowly–growing industries implies that $\gamma_2 > 0$.

I measure industry growth GR by the average annual growth rate in real industry shipments (GRSHIP in columns 1, 4 and 5) or real value added (GRVA in columns 2 and 3) over the five years immediately prior to the start of the Kennedy negotiations, 1958 to 1963. Both measures of industry growth enter positively and highly significantly in Table 3. Consistent with the maintained hypothesis, following a given–sized tariff cut, non–tariff cheating was more pronounced in less–rapidly growing industries. Regressions that included the industry's export growth rate or export to sales ratio yielded qualitatively similar results to the total shipments growth variable, providing further confidence in the results' interpretation.

Technology Intensity (TECH). Technology–intensive industries should have experienced higher rates of non–tariff cheating. Technological change works to shorten firms' expected horizons in the export market by raising the likelihood that existing suppliers eventually will be displaced. When firms' horizons grow shorter, the threat of future

retaliation imposes a smaller expected long–run penalty against a cheating industry. The short–run return from non–tariff barriers also will vary with industries' technology intensity. The United States' comparative advantage lay in technology–intensive industries during the Kennedy Round era. Whether motivated by political support or conservative social welfare goals, theory predicts that the short–run return to protecting technology–intensive industries would have been smaller. For two reasons, however, long–run considerations should dominate. First, the industry growth variables (GRSHIP and GRVA) already should capture most of the variation in short–run returns caused by comparative advantage differences, because domestic industries with the largest relative cost advantage will exhibit the fastest growth rates. Controlling for this variation leaves just the effect of technology intensity on the industry's horizon, which is a long–run effect. Second, changes in the short–run gain from non–tariff barriers will affect only first period returns, while changes in the cost of retaliation will affect returns in all subsequent periods. Cheating incentives therefore will weight relatively more heavily the long–run changes. Because high technology intensity lowers the long–run cost of retaliation, therefore, cheating should predominate in technology–intensive industries, which implies that $\gamma_3 < 0$.

I measure an industry's technology intensity TECH by the percentage of its total employment represented by scientists and engineers. This variable enters with the anticipated negative sign and always is significant at the 1% level or lower.[18] Consistent with the hypothesized ranking, tariff and non–tariff barriers were stronger substitutes in industries with high technology intensity.

Import Variability (VIM). Rational cheating should be less common in industries whose import demand is normally highly variable. Adopting a simple linear demand curve, Bagwell and Staiger (1990) show that welfare is a quadratic function of the industry's normal import volume. When normal import demand is highly variable, quadratic

welfare implies a large future welfare loss from foreign tariff retaliation. Cheating therefore is more costly under these conditions. The political influence literature yields a similar prediction. Becker (1985) derives the principle that regulators seeking political support will minimize the deadweight loss created by protection. Again assuming a quadratic welfare function, the deadweight loss from non–tariff barriers will increase with the variability of industry import demand. Both tariff bargaining and political influence considerations therefore predict that tariff and non–tariff barriers should have been weaker substitutes in industries with highly variable (pre–Kennedy Round) import demand, implying $\gamma_4 > 0$.

I measure an industry's import variability VIM by the coefficient of variation in its real imports over the five years immediately preceding the Kennedy negotiations, 1958–63. VIM enters positively throughout Table 3 and always is significant at between the 1% and 5% levels. Results for this fourth variable offer further support for the hypothesis that non–tariff barriers undermined unsustainable tariff reductions.

Elasticity of Import Supply (E_S). A rational cheating model predicts that tariffs and non–tariff barriers will be stronger substitutes in industries with a more elastic import supply. If political support motivates governments' trade policy responses, then under a set of fairly mild assumptions, industry rents from protection will vary positively with import supply elasticities.[19] Trade regulators' short–run political support return from supplying non–tariff barriers therefore should tend to be larger the more elastic is the product's import supply schedule. If conservative social welfare motivates trade policy, then the same prediction emerges. Non–tariff barriers will more effectively slow declines in import–competing industries' real incomes the more responsive foreign suppliers are to price changes induced by trade restrictions. Under both hypotheses, therefore, $\gamma_5 < 0$.[20]

I use two proxies for the import supply elasticity E_S. The first (SHARE) is the inverse of the United States' share of world imports (columns 1 through 3). SHARE is

the most direct proxy for the import supply elasticity, and it enters negatively as predicted and almost always is statistically significant. The second proxy (ESCALE) is a measure of production economies of scale (columns 4 and 5).[21] Its appropriateness as a measure of foreign firms' supply responsiveness assumes that production technologies are similar in the importing and exporting countries. ESCALE fails to enter significantly in either regression, which suggests that the direct proxy SHARE more accurately captures the predicted impact of import supply elasticities on non–tariff cheating.

Physical and Human Capital Intensity (PK and HK). Non–tariff cheating should vary with industries' factor intensities. Retaliation threatens the loss of future returns on firms' sunk capital investments, which lowers a country's incentive to raise an industry's non–tariff protection unilaterally (Klein and Leffler, 1981). By raising the penalty for cheating, sunk investments in physical and human capital can assist governments in committing to abide by implicit trade liberalization agreements. If these commitments were credible, then non–tariff barriers should have been less commonly awarded in industries that intensively used physical and human capital in their production.

The short–run return from protection also will vary with industries' factor intensities. Non–tariff barriers will generate greater rents for scarce factors in industries where they are used intensively. In the United States during the Kennedy Round, scarce factors were unskilled labor and physical capital, judging by the composition of products imported. Industries that used these factors of production intensively would have benefited most from non–tariff protection. Combining the long–run and short–run effects, tariff and non–tariff barriers should have been stronger substitutes in industries with low human capital intensity, which implies $\gamma_7 > 0$. The coefficient on physical capital intensity, γ_6, also will be positive provided that the long–run cost of retaliation offsets the short–run rent from cheating in industries that are intensive users of physical capital.

I measure an industry's physical capital intensity PK by the ratio of its physical capital stock to value added (KINT, in columns 3 and 5) or its capital to labor ratio (KL, in columns 1, 2 and 4). Physical capital intensity enters negatively but it is only significant using the second measure. This suggests that sunk investments in physical capital provided little commitment value for tariff enforcement. The results for human capital intensity are more conclusive. I measure human capital intensity HK by the percentage of employees in professional, managerial, administrative or skilled craft positions. Human capital intensity always enters positively as expected and it is consistently significant at the 1% level or lower.[22] Thus, tariff and non–tariff barriers acted as stronger substitutes in industries with small sunk investments in human capital, where the opportunity cost of cheating would have been smaller. This result provides additional support for a rational cheating interpretation of managed trade.

Industry Concentration (CR). Non–tariff cheating may be less common in concentrated industries. The long–run penalty from retaliation which restricts access to foreign markets will tend to be costlier in industries where firms earn a rent over their costs of production. The empirical correlation between producer concentration and profit rates therefore implies that retaliation concerns will weigh heavily in concentrated industries. The short–run political support return from protecting industries, however, may vary in either direction with industry concentration. On the one hand, free–riding may be less severe, and therefore it may be less costly to lobby for protection in highly–concentrated industries. On the other hand, highly–concentrated industries also tend to be geographically centralized, which narrows their base of political support. Hillman (1991) notes also that more heavily concentrated industries will not necessarily devote greater expenditures to lobbying for non–tariff protection, because with lobbying as an example of private provision of a public good, total Nash distributions can be independent of individual firms' market shares. The net result is that the coefficient on concentration

may enter positively, if the long–run effect dominates, but in general the signing will be ambiguous.

I measure industry concentration CR by the standard four–firm measure. The variable enters positively and always is significant at between the 1% and 5% levels. Its signing implies that, for a given cut in baseline tariffs, non–tariff cheating was less common in highly concentrated industries.

4. Conclusion

This paper sought to explain the industry–level dynamics of trade protection following the Kennedy GATT Round. The Kennedy Round negotiations cut manufacturing tariffs by an average of one–third and spurred import growth exceeding ten percent per annum. Trade regulators responded to these events by introducing special, non–tariff protection into one–quarter of the liberalized industries to partially offset the effects of tariff reductions. I interpreted this chain of events as 'rational cheating' against an implicit trade liberalization agreement that proved to be unsustainable in selective industries.

Integrating the tariff bargaining and political influence literatures, I drew testable implications about the industries where non–tariff cheating was more likely to break out. These implications relied upon a rational, forward–looking government that compared the short–run returns and long–run penalties from levying non–tariff protection. These returns and penalties were allowed to reflect a combination of social welfare, trade tax revenue and political support objectives, and they were linked to a series of observable industry characteristics for empirical evaluation. Consistent with the theory's predictions, industries that received the largest Kennedy Round tariff cuts, and thus which would have experienced the strongest short–run cheating incentives, were significantly more likely to be awarded special, non–tariff protection. Furthermore, the rate of substitution between tariffs and non–tariff barriers was stronger in industries

where implicit trade cooperation was more susceptible to being undermined by rising import penetration.

Finally, an important feature of the Kennedy Round era, which was embedded in the empirical model's implementation, was the tendency for retaliation to be directed narrowly at a cheating industry. Beginning in the early 1980s, the United States has strategically employed threats of retaliation against one industry to extract trade concessions in another. The GATT's successor, the World Trade Organization, also widens countries' scope to link goods markets in retaliatory actions. Linkages have important implications for the sustainability of international trade agreements. By pooling incentive constraints, market linkages relax the requirement that the gains from cooperation must exceed the gains from cheating in *each* industry in order for an agreement to be self–enforcing in *all* industries. In a self–enforcing tariff agreement, therefore, efforts to link markets should tend to lower the average sustainable level of protection.

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Endnotes

[1] U.S. General Accounting Office (1993) summarizes NAFTA's liberalization provisions and industry–specific exemptions.

[2] The GATT's negotiating authority was replaced by the World Trade Organization following the Uruguay GATT Round.

[3] Hillman and Moser (1995, p. 1) describe North Atlantic trade in the post–war era as "a liberal trading environment compromised only by occasional trade conflicts regarding sensitive industries." In the United States, the substitution of special industry protection for formal tariffs has been particularly pronounced. While the average tariff on dutiable imports fell from 53.5% in 1933 to 5.2% in 1982, the proportion of imports covered by orderly marketing agreements, voluntary export restraints, safeguards and other forms of administered protection rose during the second half of this period from 5% to over 20% (U.S. Trade Representative, 1984 p. 187; Hufbauer, Berliner and Elliot, 1986, p. 21).

[4] Evans (1971, pp. 299–300) notes that efforts to undermine tariff cuts began even as the Kennedy Round negotiations were concluding.

[5] With the exception of theoretical analyses by Mayer (1984), who introduced lobbying into a tariff bargaining model, and Hillman and Moser (1995), who explored market access negotiations between politically–motivated governments, these two branches have largely remained distinct in the endogenous protection literature.

[6] While the GATT represented a legal obligation, its rules were not directly enforceable in most of its member countries. In practice, the GATT's own dispute settlement procedures also usually did not provide timely or effective recourse for disputants. The GATT's successor, the World Trade Organization, offers some additional enforcement authority but ultimately it too relies on the voluntary actions of members countries to punish violations.

[7] Evans (1971, p. 109) notes that during the 1960s, the Treasury Department narrowly construed the anti–dumping and countervailing duty laws, with the result that unfair trade cases averaged only one per year. Simpson (1987, p. 147) notes that the Trade Expansion Act of 1962 also significantly raised the standards for obtaining temporary Escape Clause protection, with the result that over the entire decade the United States launched only three Escape Clause investigations.

[8] Hillman (1982) demonstrated that protection granted to declining industries will be transient and terminal. A government motivated by conservative social welfare, in contrast, will attempt to slow down or arrest industry decline.

[9] Empirically, trade tax revenues are likely to be the weakest of the three motives. Systematic terms–of–trade power is unlikely to characterize a majority of the import–competing industries in the sample. Regression results in Section III.C support this conjecture.

[10] A further complication in identifying government objectives precisely is the fact that political interest groups may shroud their demands for special protection in public interest terminology.

[11] Non–tariff barriers included in the index are bilateral and global quotas, price floors, import embargoes, state trading, assorted licensing requirements, voluntary export restraints, and domestic content requirements. U.S. Tariff Commission (1974, pp. 160–72) provides additional detail on the non–tariff barrier index's construction.

[12] The probit's superior results may reflect the fact that the NTB dummy is not influenced by the U.S. International Trade Commission's somewhat arbitrary weighting of individual non–tariff barriers.

[13] I am grateful to Arye Hillman for suggesting this desciption.

[14] Tariff rates at the 4–digit industry level were calculated by weighting the tariffs for less aggregated components by their import shares within that industry.

[15] Data are taken from Preeg (1970, p. 208) and Lavergne (1983, p. 126).

[16] Deardorff (1987, p. 195) cites the GATT's conscious decision to regulate tariffs more tightly than non–tariff barriers, and argues that "member countries were willing to submit to the discipline of the GATT regarding tariffs precisely because tariffs were not the policies that they wished to use."

[17] Only elasticity estimates that were significant at the 5% level or lower were used. For the remaining industries, the null hypothesis could not be rejected and thus E_D was set to zero. Shiells, Stern and Deardorff (1986) derive import demand elasticity estimates at the 3–digit industry level, and I repeat these for 4–digit sub–industries.

[18] Regressions that defined technology–intensity instead as the percentage of an industry's scientists and engineers directly engaged in research yielded qualitatively identical (although slightly less significant) coefficients.

[19] Ray (1981, p. 107) derives this conclusion under the joint assumptions that protection is less than prohibitive, that foreign supply depends only on the foreign price, and that the domestic market–clearing price rises with the tariff rate.

[20] Only if non–tariff cheating was motivated overwhelmingly by tariff revenue objectives will this prediction be reversed. The short–run return from exploiting temporary terms–of–trade power varies inversely with an industry's elasticity of import supply. Under this alternative hypothesis, non–tariff barriers should have increased by less in industries facing more elastic import supply schedules (i.e., $\gamma_5 > 0$).

[21] The variable was defined as the value of the exponent α in the regression equation $V = KN^{\alpha}$, where V is the ratio of value added in plants with N employees to average value added for the industry, and K is a constant. ESCALE was estimated using establishment–level data for four–digit United States industries in 1970.

[22] In regressions not reported here, an alternative measure of human capital measure also entered positively and highly significantly. This measure was calculated as the

capitalized value of the difference between the industry's average wage and the average manufacturing wage for employees with less than eight years' education, scaled by the ratio of industry employment to value added.

Table 1

Data Summary

(Data are for 1970, unless otherwise indicated)

Variable Name	Predicted Sign[a]	Mean[b]	Standard Deviation[b]	Data Source
NTB		0.39	0.49	U.S. International Trade Commission (1975b)
$Tariff_{1965}$		13.33	7.30	U.S. International Trade Commission (1975b)
$Tariff_{1970}$		10.72	7.44	U.S. International Trade Commission (1975b)
Δ Tariff	–	–2.61	3.69	U.S. International Trade Commission (1975b)
E_D	–	1.15	2.32	Shiells, Stern and Deardorff (1986)
GR (GRSHIP)	+	4.54	5.89	National Bureau of Economic Research (1989)
GR (GRVA)	+	5.32	6.27	National Bureau of Economic Research (1989)
TECH	–	0.03	0.03	U.S. International Trade Commission (1975a)
VIM	+	35.05	33.87	U.S. International Trade Commission (1975a)
E_S (SHARE)	–	21.98	51.22	U.S. International Trade Commission (1975a)
E_S (SCALE)	–	0.01	0.12	U.S. International Trade Commission (1975a)
PK (KINT)	+	1.02	1.21	U.S. International Trade Commission (1975a)
PK (KL)	+	18.37	19.55	U.S. International Trade Commission (1975a)
HK	+	0.31	0.11	U.S. International Trade Commission (1975a)
CR	+/?	40.75	21.16	U.S. International Trade Commission (1975a)
CONS		0.25	0.31	U.S. Department of Commerce (1974)
UNION		46.44	18.43	Freeman and Medoff (1979)

[a] Predicted signs refer to interactive variables in second–stage estimation based on equation (3).
[b] Summary statistics always pertain to raw data, not to interactive regressors.

Table 2
First–Stage Tariff Determination

Variable	Coefficient
Constant	1.612 (1.55)
$Tariff_{1965}$	0.824*** (23.57)
CR	–0.93 E–2 (–0.76)
GRSHIP	–0.069* (–1.67)
TECH	–24.879** (–2.55)
CONS	–0.019 (–1.45)
UNION	1.879** (2.27)
Adjusted R^2	0.786

Notes: 1. Dependent variable is $Tariff_{1970}$
2. Sample size: 216 industries
3. Ordinary least squares estimation
4. T–statistics reported in parentheses below
5. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level

Table 3
Second-Stage Non-Tariff Determination

Variable	(1)	(2)	(3)	(4)	(5)
Constant	0.118 (0.55)	0.153 (0.71)	0.158 (0.74)	0.171 (0.79)	0.166 (0.77)
P Δ Tariff	−1.256** (−5.30)	−1.258** (−5.40)	−1.139** (−5.13)	−1.230** (−5.17)	−1.054** (−4.75)
Interactive variables					
E_D	−0.080** (−3.12)	−0.083** (−3.24)	−0.077** (−3.04)	−0.078** (−3.10)	−0.074** (−2.95)
GRSHIP	0.031** (3.11)	. . .	. . .	0.034** (3.34)	0.032** (3.37)
GRVA	. . .	0.029** (3.02)	0.030** (3.26)	. . .	. . .
TECH	−13.337** (−4.98)	−13.807** (−5.19)	−13.129** (−5.12)	−13.009** (−4.85)	−11.815** (−4.62)
VIM	0.58 E−2** (2.81)	0.59 E−2** (2.85)	0.77 E−2** (3.87)	0.49 E−2* (2.56)	0.65 E−2** (3.50)
SHARE	−2.757 (−1.94)	−2.986* (−2.13)	−2.934* (−2.17)	. . .	. . .
ESCALE	. . .	. . .	. . .	−0.016 (−0.04)	0.349 (0.99)
KINT	. . .	. . .	−0.035 (−0.93)	. . .	−0.028 (−0.74)
KL	−0.88 E−5** (−2.93)	−0.86 E−5** (−2.82)	. . .	−0.87 E−5** (−2.91)	. . .
HK	5.095** (5.55)	5.217** (5.82)	4.289** (5.43)	4.977** (5.43)	3.944** (4.96)
CR	0.72 E−2** (3.08)	0.70 E−2** (3.07)	0.57 E−2** (2.71)	0.68 E−2** (2.75)	0.46 E−2* (2.09)
Log-likelihood	−90.156	−90.687	−95.937	−92.173	−97.396
Maddala R-Square	0.40	0.39	0.36	0.38	0.36

Notes: 1. Dependent variable is NTB
2. Sample size: 216 industries
3. Probit estimation
4. Asymptotic t-statistics reported in parentheses below
5. ** denotes significance at the 1% level and * at the 5% level