Comments Welcome

Political Support or Contributions: An Empirical Investigation of US Trade Policy

Theo Eicher*

Thomas Osang #

June 28 2002

Abstract

Contribution Driven models of tariff formation have recently gained prominence due to the strong support derived from US tariff and contribution data. The empirical tests must, however, specify alternative hypothesis to judge the quality of the Contribution Driven approach. In this paper we examine the empirical relevance of the Contribution Driven model relative to the Political Support model. Is protection for sale, or do altruistic policy makers worry about political support? We find strong evidence that protection is indeed "for sale." Similar to Eicher and Osang (2002), who tested the Contribution Driven approach against the Tariff Function models, we use a single, unified theoretical framework in order to take strict interpretations of the two opposing theoretical models to the data. We use J tests to compare the power of the two models directly, to find that we cannot reject the null hypothesis of correct specification of the Contribution Driven model while we uncover significant evidence of misspecification in the Political Support approach.

Keywords: Endogenous Protection, Lobbying, Political Economy of Tariffs
JEL Classification: F13, D72, P16

---

* Corresponding author, Department of Economics, University of Washington, Seattle, WA 98195; te@u.washington.edu.

Department of Economics, Southern Methodist University, Dallas, TX 75275; Tel: (214) 768-4398, e-mail: tosang@mail.smu.edu.

We thank Kishore Gawande, Francois Laisney, Myong-jee Lee, Essie Maasoumi, Ravi Yatawara as well as seminar participants at SMU and Texas Camp Econometrics for helpful comments and suggestions. Kirhore Gawande and Daniel Treffler kindly provided their datasets. During part of this project, Osang was visiting the University of Washington, while Eicher was visiting Nuffield College and the University of Tübingen. Both thank their respective host universities for their hospitality. Financial support for Eicher was provided by the von Humboldt Foundation.

1 Introduction

The trade literature offers a variety of competing explanations for the prevailing trade policies. In contrast to the traditional commercial policy models that analyze trade policy in terms of economic efficiency, the lion's share of the recent literature is based on distributional considerations. In these endogenous protection models, self-interested politicians use trade policy to transfer income to particular interest groups. Given that contributions from lobbies and Political Action Committees figure prominently in the political landscape where tariffs, quotas, and voluntary export restraints exist in spite of their large social costs, this recent literature seems to provide particularly intuitive explanations for the observed pattern of protection.

Since the early 1980's, several alternative political economy approaches to endogenous protection have been advanced. Previous empirical studies of the political economy determinants of trade protection are numerous; however, a large share of these studies relies on reduced forms (see Rodrik, 1995, for an excellent survey). The reduced form approach introduces ambiguity as to which model is actually tested, and as to the choice of independent variables.[1] With the exception of Eicher and Osang (2002), the distinct differences in the theoretical structures of the models have to date not permitted a comprehensive assessment as to exactly which approach to endogenous protection is empirically the most relevant.[2]

The lack of comparative empirical tests can be attributed to the absence of a unified theory. In a recent paper, however, Helpman (1997) developed a comprehensive framework that was utilized in Eicher and Osang (2002) to derive an empirical model that allows for the juxtaposition of the Contribution Driven Model with the Tariff Function Model. In this paper we extend the unified framework to test the tariff formulas that are predicted by the political equilibria of the Influence Driven (Grossman and Helpman,

[1] For the most extensive comparison of endogenous tariff formation models within this traditional framework see Gawande (1998). Aside from significance, his measure of validity is "that at least some subset of variables representing [any one] theory is shown to have the correct sign."

[2] For example, Goldberg and Maggi (1999) and Gawande and Bandyopadhyay (2000) develop excellent tests of the "Influence Driven Contributions" approach popularized by Grossman and Helpman (1994). The pattern of protection in the data seems to be consistent with the model's predictions. No matter how significant the results of one model may be, there still remains interest in ascertaining its predictive power

1994) and the Political Support Function (Hillman, 1982) approaches. This allows us to extend the tests of the Influence Driven model by Goldberg and Maggi (1999) (G-M from hereout) and Gawande and Bandyopadhyay (2000) (G-B from hereout) and Eicher and Osang (2002) to compare the performance and significance of the two approaches.

Helpman's (1997) theoretical framework holds clear implications for empirical testing: the sectoral import elasticities and the levels of import penetration are crucial variables for both models. Depending on the nature of the specific approach, these variables are augmented with additional explanatory variables suggested by the theory. This allows us to estimate key parameters, and to test the models' respective significance for endogenous protection. In the Political Support Model we introduce measures of sectoral profits and welfare to estimate the marginal rate of substitution between the two in the government's political support function. In contrast, for the Influence Driven model we follow the results of Eicher and Osang (2002) who utilize a measure of organization to test whether contributions or the existence of a lobby matter and to estimate the model's key parameters.

Our estimation takes into account the possible endogeneity of independent variables. Using a Tobit, instrumental variable approach and a GMM minimum distance estimator (MDE), the empirical results yield little ambiguity. The Political Support model disappoints on multiple levels, which may be due to imperfect data proxies (especially profit measures). Alternatively, the weakness of the Political Support model may be a function of the model's inability to account for the extensive lobbying that is observed in the US. The one interesting aspect about the estimation of the Political Support model is that the weight that the government places on welfare, relative to profits, is large and of similar magnitude as the one we estimate for the Influence Driven approach. Following the methodology of Eicher and Osang (2002) the Influence Driven model is strongly confirmed, with all coefficients exhibiting the correct sign and strong statistical significance.

Since the difference in the performance of the two models is so dramatic, the question arises a) how the power of the models compare to each other and b) if a

---

relative to alternative models of endogenous protection. Eicher and Osang (2002) juxtapose the Influence Driven model only with the Tariff Function model.

combination of the two models improves the estimation of either models, or if one of the variables holds relatively more explanatory power. We find that the key variable of the Influence Driven model (an indicator variable that identifies the existence of an organized lobby) is significantly more powerful than any political support, profit or welfare measure. To formally juxtapose both models we employ J-Tests. We cannot reject the null hypothesis of correct specification of the Influence Driven model, but find evidence of significant misspecification in the Political Support Function approach. The results provide additional evidence as to the strength and robustness of the Influence Driven model and to the weakness of the political support model.

Our tests of the strict theories add to the voluminous empirical literature on protection that focussed on heuristic or general factor endowment approaches, such as Ray (1981), Baldwin (1985), or Trefler (1993). Especially interesting is the comparison of our results to the findings of previous reduced form juxtapositions of endogenous tariff formation models in Gawande (1998). He finds, similar to our results, that the political-self-interest/special-interest model performs best against alternative models, while the public-interest/political-altruism type model associated with Hillman (1982) evidence is at best weak.

The remainder of the paper is organized as follows. The theoretical framework of endogenous protection is reviewed in section 2. We discuss the empirical methodology used to estimate the three models in Section 3. Data issues and empirical results are discussed in sections 4 and 5, respectively. Section 6 concludes the paper. All tables are relegated to the appendix.

2 Theoretical Approaches to Endogenous Protection

We commence by outlining the common theoretical framework that serves as the basis for our empirical analysis. This framework was used in the comparison of the Influence Driven Model and the Tariff Formation Model in Eicher and Osang (2002). The analysis is a succinct representation of Helpman (1997), who discusses both the motivations and derivations in detail. The critical advantage of Helpman's (1997) model is that the derived equations for endogenous protection are sufficiently similar to allow for comparative testing of the various approaches. In addition, the model nicely highlights the common fundamental structure that the models share.

Consider a continuum of individuals, *j*, populate an economy whose population size is normalized to unity. Each individual possesses a utility function

$$u(c) = c_o + \sum_{i=1}^{n} u_i(c_i) \qquad (1)$$

where c_i is consumption of product i. A numeraire good, indexed 0, is produced using only one unit of labor per unit output. All other products are produced with labor and a sector-specific input.

An individual owns l^j of the aggregate labor supply, and γ_i^j of the sectors' specific input. The wage rate then equals one, and the return to a sector specific input, $\Pi_i(p_i)$, is an increasing function of the producer price, p_i. Let aggregate imports be denoted by M_i, and normalize all foreign prices to unity, which implies $p_i = \tau_i$, and $\tau_i > 1$ for positive rates of protection. Finally, suppose that the government redistributes tariff revenue lump-sum, and uniformly to all individuals. The reduced form of the indirect utility function can then be written as an additive composite of the incomes derived from labor, transfer and the specific factor incomes, plus the consumer surplus, S_i:

$$\hat{v}(\tau, \gamma^j) = l^j + \sum_{i=1}^{n}(\tau_i - 1)M_i(\tau_i) + \sum_{i=1}^{n}\gamma_i^j \Pi_i(\tau_i) + \sum_{i=1}^{n} S_i(\tau_i)\,, \qquad (2)$$

By integrating over all individuals (2), the aggregate welfare is given by

$$W(\tau) = 1 + \sum_{i=1}^{n}(\tau_i - 1)M_i(\tau_i) + \sum_{i=1}^{n}\Pi_i(\tau_i) + \sum_{i=1}^{n} S_i(\tau_i)\,. \qquad (3)$$

From these general definitions of the indirect utility and welfare we can derive three distinct models of endogenous protection based on different specifications of the political economy process.

2.1 The *Political Support Function* Approach

The Political Support Function approach was developed by Hillman (1982) and generalized by Van Long and Vousden (1991). In this approach the government trades off political support from consumers against higher industry profits. The support for the government from the industry increases in industry's profits, while consumers raise their support when product prices decline. The exact mechanics by which either group provides support are not specified. Much like in Staiger and Tabellini (1987), the government does not have a self-interested motive, other than to redistribute in order to minimize the loss to either constituency. It is thus possible to interpret the model as one in which an altruistic government chooses a tariff to maximize aggregate support from its constituents.

Following Hillman (1982), the government's generic political support function

$$\Theta[\tau] = \Theta[\Pi[\tau], W[\tau]],$$

contains domestic welfare and industry profits, both as functions of the tariff. Higher support from the industry and from the general population is forthcoming if profits and welfare increase, $\Theta_\Pi, \Theta_W > 0$. However, profits increase with tariffs, while welfare decreases. The government maximizes the political support by choosing a tariff that maximizes the political support function, or

$$\frac{d\Theta}{d\tau} = \frac{d\Pi}{d\tau}\frac{\partial\Theta}{\partial\Pi} + \frac{dW}{d\tau}\frac{\partial\Theta}{\partial W} = 0, \tag{4}$$

which implies

$$-\frac{d\Pi}{dW} = \frac{\partial\Theta}{\partial W}\Big/\frac{\partial\Theta}{\partial\Pi} \equiv \delta_P .$$

Helpman (1997) defines δ_P as the marginal rate of substitution between aggregate welfare and profits of special interests in the government's political support function. The greater δ_p, the more likely is the government to give up industry profits to increase aggregate welfare. Extending Hillman (1982) to many sectors, i, and using a specific functional form, Helpman (1997) rewrites the political support function as

$$\hat{\Theta}[\tau] = \sum_{i=1}^{n}\frac{1}{\delta_i}\left(\Pi_i[\tau_i] - \Pi_i[1]\right) + \left(W[\tau] - W[1,1,...,1]\right). \tag{5}$$

Using (3) and (5), the government chooses the optimal tariff to maximize its political support, which implies the tariff rate[3]

$$\tau_i - 1 = \frac{\partial\Theta/\partial\Pi}{\partial\Theta/\partial W}\frac{X_i}{(-M_i')} = \sigma_{W,\Pi_i}\frac{W}{\Pi_i}\frac{X_i}{(-M_i')}, \tag{6}$$

where $\sigma_{W,\Pi_i} \equiv -\left(dW/d\Pi_i\right)\left(\Pi_i/W\right) > 0$ is the support function's elasticity of substitution between profits and aggregate welfare in sector i. From the definition of δ_p, we know

[3] The derivation uses the properties of the utility that $M = -[S' + \Pi']$ and that $X = \Pi'$.

that σ_{W,Π_i} also equals the ratio of the profit and welfare elasticities in the political support function, or

$$\sigma_{W,\Pi_i} = (\partial\Theta/\partial\Pi_i * \Pi_i/\Theta)/(\partial\Theta/\partial W * W/\Theta). \qquad (7)$$

Hence σ_{W,Π_i} can be loosely interpreted as the weight the government places on profits, relative to aggregate welfare.

The tariff increases in the sector's output level, X_i, because the larger the domestic output, the greater the benefits to domestic producers when the domestic price increases. The tariff decreases in the elasticity of the import demand function, since the welfare loss increases and the government is less willing to impose excess burden on society. In addition, the more likely the government is to trade off sectoral profits for national welfare, the lower the tariff in that sector.

While the theory does not provide insights into the determinants of the elasticity of substitution between aggregate welfare and special interest profits, we can utilize the data to obtain an estimate. Using proxies for wealth, as well as for industry profits, we can derive estimates for σ_{W,Π_i}. How relevant this estimate is will depend on the power of equation (6) to predict endogenous protection.

2.2 The *Influence-Driven Contributions* Approach

The Political Contributions approach, developed by Grossman and Helpman (1994), and tested formally against the tariff function approach in Eicher and Osang (2002). In this approach to tariff formation interest groups that maximize benefits to their members offer politicians campaign contributions to influence their policy stance. Accordingly, politicians seek to maximize a political objective function that depends on contributions and on the well being of the general public. Knowing how contributions from constituents depend on the selected policies, politicians choose their policy stance.

Suppose the political objective function that the policy maker maximizes is $(1-\beta)C + \beta W$, where $C = \sum_i C_i$ stands for the sum of campaign contributions from all sectors, W represents aggregate welfare, and β is a parameter that represents the weight the government places on welfare considerations. If a sector does not contribute to the campaign, the policy maker disregards that sector's special interest concerns.

Suppose that in some subset of the sectors, $L \subset \{1,2,...,n\}$, the owners of the sector-specific inputs form lobbies. The aggregate welfare of the interest group is then given by

$$W_i(\tau) = l_i + \Pi_i(\tau_i) + \alpha_i \sum_{j=1}^{n} [(\tau_j - 1) M_j(\tau_j) + S_j(\tau_j)], \qquad (8)$$

which again includes labor and specific factor incomes as well as the tariff rebates and consumer surplus. The lobby maximizes $W_i(\tau) - C_i$ and takes the contribution functions of all the other interest groups $j \neq i$, $C_j(\tau)$, as given. If lobby i wants to generate a tariff, it must offer a contribution. The size of the contribution is determined by the condition that the lobby must contribute sufficiently to raise the policy maker's welfare above $G_{-i} = \max_\tau [(1-\beta)\Sigma_{j \neq i} C_j(\tau) + \beta W(\tau)]$, which is the level generated in the absence of lobby i's contribution. In short, the standard participation constraint in principal-agent problems requires that in equilibrium contributions equal

$$C_i(\tau) = G_{-i} - [(1-\beta) \sum_{j \neq i} C_j(\tau) + \beta W(\tau)]. \qquad (9)$$

This implies that interest groups lobby not only for their own cause, but also for an entire tariff policy vector, that maximizes each lobby's objective function $W_i(\tau) - C_i$

$$\tau^i \in \arg\max_\tau W_i(\tau) + \left[(1-\beta) \sum_{j \neq i} C_j(\tau) + \beta W(\tau) \right].$$

When politicians maximize their welfare function, subject to L interest groups' optimal policy vectors, the resulting tariff formula is

$$\tau_j - 1 = \frac{I_j - \alpha_L}{\frac{\beta}{(1-\beta)} + \alpha_L} \frac{X_j}{-(M'_j)}, \qquad (10)$$

where $\alpha_L = \sum_{j \in L} \alpha_j$ stands for the fraction of people that own sector specific inputs and I_j is a dummy that takes the value of one if $i \in L$, that is, if the sector is organized, and zero otherwise.

In the extreme case, when all sectors have organized pressure groups and every individual has a stake in some sector, there is free trade. From (10) we find that the rate of protection in sector i increases in the concentration of the ownership in that sector's specific factor, since the greater the concentration, the less the lobby cares about dead weight loss. The tariff also increases in the weight the policy maker places on contributions relative to welfare, since it becomes "cheaper" to influence the policy maker with contributions. The effects of output and of the slope of the import demand function are the same as in the formulas that derived for both the Political Support Function approach, and the Tariff Function approach. However there is an added twist to the model. For protected sectors, $I = 1$, the tariff rate should decrease in the import penetration ratio. This is because the larger the domestic output, the more owners of specific factors gain from an increase in the domestic price, while the economy as a whole incurs fewer inefficiency losses when the volume of imports is low, *ceteris paribus*. For unprotected sectors, the relationship between tariffs and import penetration is positive.

In comparing the Influence Driven approach with the previous ones, we observe several similarities. The effect of the degree of concentration of ownership is similar to the Tariff Function approach, while the role of the marginal rate of substitution between welfare and contributions plays a similar role to the marginal rate of substitution between welfare and profits in the Political Support Function approach.

3 Empirical Methodology

To allow for the estimation of the three competing approaches contained in equations (6), and (10), we must introduce several simplifying assumptions. First, for each model we follow the procedure of G-M and Eicher and Osang (2002) and move the import elasticities to the left-hand side, to counter measurement errors.[4] Measurement errors in the dependent variable cause a loss of efficiency, while measurement errors in the exogenous variables cause biased and inconsistent coefficient estimates. Second, we assume that the elasticities in (6) are constant across sectors. We use the Wald Test to check the validity of this assumption, and it can already be said that parameter instability will be rejected in either model.

Therefore, the two empirical models that will be tested are given by

[4] G-B improved the estimation procedure by utilizing the standard errors on the elasticities. We maintain the G-M methodology for comparison purposes.

Political Support Function $$\frac{\tau_i^*}{\tau_i^*+1} e_i = a_1 \frac{W}{\Pi_i} \frac{1}{z_i} + \varepsilon_{1i}, \qquad (6a)$$

Influence Driven Contributions $$\frac{\tau_i^*}{\tau_i^*+1} e_i = a_4 I_i \frac{1}{z_i} + a_5 \frac{1}{z_i} + \varepsilon_{3i}, \qquad (10a)$$

where $\tau_i^* = \tau_i - 1$, e_i is the import demand elasticity, and $z_i = \frac{M_i}{X_i}$ is the import penetration ratio. Since we employ stochastic versions of (6) and (10) in the econometric analysis, a disturbance term, ε_{ji}, was added. A Tobit estimation is necessary for (6a) and (10a) due to the censoring of the dependent variable at zero.

There are both theoretical and empirical reasons to question the exogeneity of the independent variables in (6a) and (10a) (see Trefler, 1993, and G-M, for a discussion). To correct for the possible bias in the estimates caused by the endogeneity of the explanatory variables, we use the same set of exogenous (instrumental) variables as in G-M, which allows us to directly compare our results to the results reported in G-M.

In contrast to the maximum likelihood estimator (MLE) used in G-M, we apply a minimum distance estimator (MDE). The MDE approach is useful in estimating simultaneous equations (see Lee, 1996, chapter 5 and 9) and can be easily extended to models with censored and/or binary dependent variables. The main problem the MDE answers is how to optimally impose the overidentifying restrictions. The MDE is a two-step estimator. In the first step, the relationship between each of the K endogenous variables and the set of exogenous variables is estimated. In the second step, the parameter vector of interest, *a*, is consistently estimated with feasible GLS using only the first-step coefficient estimates. The reason why we can apply GLS to a data set with only K "observations" is that the error term in the second step estimation has a degenerate distribution converging to 0. Finally, in the case that the reduced form estimator is MLE and the overidentifying restrictions are linear, MLE applied directly to the estimation of *a* and the two-step MDE are identical.

4. Data[5]

[5] See the appendix for an overview.

We follow G-M in the construction of the key data, Political Action Committee contributions, non-tariff barriers, import penetration ratios and import elasticities. We thus use U.S. data for 106 manufacturing industries at the three-digit SIC level for 1983. Estimates of import demand elasticities are not available at the four-digit SIC level, hence we base this study on three-digit level data. The data on non-tariff barriers (NTBs), τ_i, import penetration ratio, *z*, and the instrumental variables used in the Tobit IV estimates are taken from Trefler (1993), but aggregated to the three-digit level using as weights the share in value of shipment. TOTALSALES_i denotes the value of shipments per industry, obtained from the 1996 NBER productivity database, and TOTALSALES is the value of shipment aggregated over all industries and scaled by 10,000. Import demand elasticities, e_i, are taken from Sheills, Stern, and Deardorff (1986).[6] Political Action Committee contributions by firms and unions in each sector were obtained from Gawande (for details on how these data were constructed, see the appendix in G-B). The data, covering contributions over four Congressional election cycles 1977-78, 1979-80, 1981-82, and 1983-84, measure spending per firm and union divided by value added. Multiplying by value added as well as by the number of contributing firms and unions, we obtain total contributions by firms and unions per industry. $\text{TOTALCONTRIBUTIONS}_i$ represents the sum of firm and union contributions in a sector, while TOTALCONTRIBUTIONS is measured as the sum of all sector-specific contributions by firms and unions. For the organization dummy, ORGANIZED, in the Influence Driven approach we use a contribution threshold level similar to the one used in G-M.

Our data set deviates from G-M since we have to construct additional variables to test the alternative endogenous protection approaches. We construct two different profit measures. The first profit variable, PROFITS1, is based on the latest version of the 1996 NBER productivity database, from which we derive profits per industry as value-added minus total labor cost. The second profit measure, PROFITS2, was obtained from pre-tax income for 1983 as derived from the IRS source book, after converting the IRS data from SOI classification to three-digit SIC level. Both measures are imperfect. PROFITS2 is a direct profit measure, while PROFITS1 is an indirect measure that includes the

[6] There is a small number of industries with positive import demand elasticities in our sample. Following G-M, we set these elasticities to zero.

regular return to capital as well as true industry profits. While PROFITS1 is a precise three-digit SIC industry measure, PROFITS2 contains the usual conversion error. The correlation between profit measures is 0.4, which confirms substantial differences between the two proxies. However, if we were to remove one outlier (industry 291; Petroleum Refining), the correlation coefficient increases to 0.7.

5. Empirical Results

5.1 Political Support Function

The first round of estimates of the theoretical models is provided in Table 1. In the Political Support Function model, we estimate the elasticity of substitution between profits and aggregate welfare in the political support function. We attempted several specifications of welfare for the political support function. None worked as well as TOTALSALES and still the results are not satisfactory.[7] Test results using either profit measure ($PROFITS1_i$ or $PROFITS2_i$) disappoint, the coefficient estimates are statistically insignificant. In addition, only the direct profit measure, $PROFITS2_i$ exhibits the expected positive sign.

Despite the insignificant estimates, we venture to remark that the elasticity of substitution between aggregate welfare and profits is extremely low in either regression, indicating that the policy makers' political support function places significantly larger weight on aggregate welfare than on profits. Using a Cobb Douglas Support Function with constant returns akin to the functional form used in Grossman and Helpman, the value of 0.028 implies an elasticity of the support function with respect to welfare of about 0.97. This value of the implied weight on welfare is strikingly similar to the one we derive in the Influence Driven model below.

The fact that these regressions also exhibit the lowest log-likelihood ratio values may serve as additional evidence that the model is either misspecified or missing key elements. We will discuss this issue further when we compare the models in section 6. Alternatively one could argue that governments do not in fact maximize their political support (because of bounded rationality, or imperfect information).

5.3 Influence Driven

[7] Any welfare measure is only going to affect the scale but not the qualitative results.

The influence driven estimates are from Eicher and Osang (2002) and summarized here for comparison purposes. As the theory predicts, the estimates show that in addition to the positive effect of import penetration on the dependent variable, there is a negative effect of import penetration on non-tariff barriers for organized industries (i.e. for industries with firm contributions above a certain, exogenously determined threshold). The Grossman and Helpman (1994) propositions are thus confirmed at the 1 percent significance level that whether or not a sector is organized plays a crucial role in explaining the relationship between import penetration and protection.

Based on the coefficient estimates, the implied value for the government weight on welfare, β, is 0.96, while the fraction of the population that owns sector specific inputs, α_L, is 0.26. Using a slightly improved estimation technique, compared to GM , Eicher and Osang improved the efficiency of the estimation to be able to prove that $a_5 + a_4 > 0$ is significant at the 1 percent significance level.

The goodness of fit of the Influence Driven model is certainly better than that of the Political Support Model. This adds empirical evidence to the discussion of the effect of import penetration on endogenous protection.

5.4 Parameter Stability

To test for structural change of the estimated coefficients, we separate the samples and perform a Wald test for each approach to endogenous protection. The Wald statistic,

$$\Lambda_1 = (\hat{\theta}_1 - \hat{\theta}_2)'(V_1 + V_2)^{-1}(\hat{\theta}_1 - \hat{\theta}_2),$$

has a chi-squared distribution with k degrees of freedom where k=1 in (6a), k=2 in (7a) and (10a), and k=4 in (11). To estimate Λ_1, we replace V_1 and V_2 by their estimated values, a procedure that is valid in large samples. The test statistics and the corresponding p-values for each model are provided in the last row of Table 1.

We cannot reject the null hypothesis of parameter stability at the one percent significance level for either model. Since the Wald test for parameter stability has the property in small and medium-sized samples that the probability of type I error is larger than the chosen critical value, a larger critical value is appropriate to correct for this problem. We therefore conclude that parameter instability is not a problem in the Political Support or Influence Driven models.

6. Model Comparisons

Eicher and Osang have shown that the Influence Driven model outperforms the Tariff Function, the above presents additional evidence of the Influence driven model, as the Political Support estimates disappoint. The fully compare the models formally, however requires non-nested hypothesis testing in form of J tests, which we provide in Section 6.2. A second question to ask leads us away from strict theory and concerns the explanatory power of each individual exogenous variable in the two models. It is natural to inquire if the fit and the explanatory power of the regression can be improved by combining variables from both approaches in one regression. This question is not entirely devoid of theory. In a sense the generic Political Support model is augmented in the Influence Driven model by contributions and by the influence of lobbies. This question is tackled in Section 6.1.

6.1 General Models

We can compare the power of the variables suggested by the strict theoretical models in a "General" model that combines all variables in one regression.

General1(a & b)

$$\frac{\tau_i^*}{\tau_i^*+1} e_i = a_6 \frac{W}{\Pi_i} \frac{1}{z_i} + a_7 \frac{C_i^S}{C_i^O} \frac{1}{z_i} + a_8 I_i \frac{1}{z_i} + a_9 \frac{1}{z_i} + \varepsilon_{4i}. \qquad (11)$$

Where the relative contributions of supporters and opponents (C^S, C^O) are included as an alternative to the step function generated by the indicator variables, *I*. The results from the Tobit MDE estimation of General1a and General1b (using our two profit measures) are reported in the first column of Table 2. The results show that little explanatory power is derived from either profit measure, PROFITS1 or PROFITS2. In General1a the relative contribution variable from the Tariff Function model is significant (at the 10 percent level), all other variables are statistically insignificant. The alternative profit measure in General1b yields a highly significant organization variable and an excellent fit, but no other significant variables. Since either contributions or organization were significant, but never the profit measures, we proceed by excluding profit measures and basically combine the Tariff Function and the Influence Driven approach in

General2 $$\frac{\tau_i^*}{\tau_i^*+1}e_i = a_{10}\frac{C_i^S}{C_i^O}\frac{1}{z_i} + a_{11}I_i\frac{1}{z_i} + a_{12}\frac{1}{z_i} + \varepsilon_{5i}. \quad (12)$$

General2 generates by far the best fit of all regressions, including the strict theoretical approaches in Table 1. As expected, in the absence of contributions or organization, import penetration is positively related to tariffs, and statistically significant at the 1 percent level. However, only the Influence Driven and not the contribution variable from the Tariff Function model is significant at the 1 percent level. The lack of significance of the estimate of the contribution variable suggests that organization is indeed more important than outright contributions. In summary, we find that the political support model's weakness is confirmed in the general model approach. New information, however, is that relative contributions of supporters and opponents of tariffs hold weaker explanatory power than the organization indicator function.

6.2 Non-Nested Hypothesis Testing

In keeping with the objective of the paper, we return to the models that were suggested by the theory. Section 6.1 provides heuristic evidence that political support variables hold little explanatory power compared to the Influence Driven variables. In this section we seek to further evaluate the relative strength of each exact theoretical model in explaining endogenous protection, by performing a series of non-nested tests. Our methodology is to test the relative strength of each model against each of the two competing alternatives. We follow the test procedure for non-nested J tests developed by Davidson and MacKinnon (1981, 1993).[8] An insignificant coefficient estimate in Table 3 implies that the null hypothesis can be rejected, implying that the alternative does not add significant estimation power to the null hypothesis.[9]

Table 3 reports the J test statistics, and the results of the first four rows provide further strong evidence in favor of the Influence Driven model and against the Political

[8] The intuition of the J tests is the following. Suppose the truth (the null hypothesis) we wish to test is $H_0 = y_i = f_i(\lambda_i, a) + \varepsilon_{0i}$ where a is a vector of parameters to be estimated and λ_i is a vector of observations on exogenous variables. Suppose theory suggests an alternative hypothesis $H_1 = y'_i = g_i(\lambda_i', a') + \varepsilon_{1i}$ where a' and λ_i' are different vectors of parameters and observations. The J test tests for κ = 0 in $y_i = \kappa f_i(\lambda_i, a) + (1-\kappa)g_i(\lambda_i', \hat{a}') + \varepsilon_i$ where $\hat{a}'$ is the ML estimate of a'. See Davidson and MacKinnon (1981) for details.

[9] For this class of tests, the non-nested alternative hypothesis need not be true. Nor does a rejected null hypothesis imply that the alternative is accepted.

support model. In rows one the J test rejects the null hypothesis that the Political Support Model (with PROFITS1) is the true model. It is shown that the addition of the Influence Driven model's variables - specifically the information whether a sector is organized or not - adds significant information in estimating endogenous protection. The second row repeats the experiment in reverse, where the J test report that the Political Support model does not add relevant information to the Influence Driven model in estimating endogenous protection. The null hypothesis of the Influence Driven model being the "true" model cannot be rejected. Both test statistics are at an astonishing 1 percent significance level. The interpretations of the J test results are in line with the results in Table 1 and Table 2. The Influence Driven model had the best fit in Table 1 and survived as the only significant estimate in Table 2. Hence it is not surprising that it "beat" the Political Support Model in the J test.

7 Summary and Conclusions

The contribution of this paper is the exact empirical investigation of two prominent endogenous protection models. In the absence of reduced forms and extraneous variables to the regression we find that the simple testable implications of the models yield powerful results. There exists a profit measure for which the estimated coefficients in the Political Support Function model have the correct sign. The Influence Driven model exhibits the best overall fit among the models, however. Further evidence for the superiority of the Influence Driven model comes from non-nested misspecification tests that indicate that the Influence Driven model, when tested against the Political Support Model, cannot be rejected.

Overall the Political Support Function approach disappoints. This may be because of shortcomings in the data. Profit data are notoriously noisy, and even using two alternative measures does not help the results. The results give rise to the strong impression that the Political Support Function approach suffers from its exclusion of the explicit modeling of the incentives of agents to lobby or contribute, as it focuses exclusively on the political interests.

Appendix: Description of Variables

TOTALSALES$_i$, value of shipments per industry**,** 1996 NBER productivity database.

TOTALSALES, is the aggregation over all industries' value of shipments.

Import demand elasticities, e_i, are taken from Sheills, Stern, and Deardorff (1986). Following G-M, the small number of industries with positive import demand elasticities are set to zero.

Non-tariff barriers (NTBs), τ_i, (Trefler 1993), aggregated to the three-digit level using as weights the value of shipments.

Import penetration ratio, *z*, (Trefler 1993), aggregated to the three-digit level using as weights the value of shipments

Instrumental variables, (Trefler 1993), aggregated to the three-digit level using as weights the value of shipments. The list of instrumental variables is identical to the one used by G-M: Physical capital, inventories, engineers and scientists, white-collar, skill, semiskilled, cropland, pasture, forest, coal, petroleum, minerals, seller concentration, buyer concentration, seller number of firms, buyer number of firms, scale, capital stock, unionization, geographic concentration, tenure.

Political Action Committee contributions, total firm and union contributions by industry obtained for the 1983-84 congressional elections (Gawande, 1998); firm and union spending is multiplied by the number of firms and unions to obtain totals.

TOTALCONTRIBUTIONS$_i$, the sum of firm and union contributions per industry.

ORGANIZED, firm contribution dummy, set to zero if industry-level contribution is smaller than 10 million and 1 if it is larger.[10]

PROFITS1, value-added minus total labor cost, 1996 NBER productivity database.

PROFITS2, 1983 pre-tax income from IRS source book, converted from SOI classification to three-digit SIC level.

---

[10] We use GM's 10 million threshold. They do, however, report their threshold as 100 million, which is a typo (there is not one sector that contributed 100 million)

Table 1:

Strictly Theory Based Tests of Endogenous protection Models

IV Tobit estimations

Dependent Variable $\frac{\tau_i^*}{1+\tau_i^*}e_i$	**Political Support 1**	**Political Support 2**	**Influence Driven**
$\frac{1}{\text{Import Penetration}\,(z_i)}$			-.0098*** (4.3073)
$\frac{\text{TOTALSALES}(W)}{\text{PROFITS1}_i\,(\Pi_i)}\frac{1}{\text{Import Penetration}\,(z_i)}$	-.008 (.693)		
$\frac{\text{TOTALSALES}(W)}{\text{PROFITS2}_i\,(\Pi_i)}\frac{1}{\text{Import Penetration}\,(z_i)}$		.028 (.536)	
$\text{ORGANIZED}(I)*\frac{1}{\text{Import Penetration}\,(z_i)}$			.0374*** (7.265)
Log-Likelihood	-54.82	-55.78	-51.66
Wald Test, Λ (p-value)	5.2867 (.0215)	5.9576 (.0147)	7.7385 (.0209)

***/**/*: 1 percent/ 5 percent/ 10 percent significance level, t-statistics in parentheses

Table 2:

"General" Endogenous protection Models

IV Tobit estimations

Dependent Variable $\frac{\tau_i^*}{1+\tau_i^*} e_i$	**General 1a**	**General 1b**	**General 2**
$\frac{1}{\text{Import Penetration}\,(z_i)}$	-.0032 (1.02)	-.008 (1.63)	-.007*** (2.09)
$\frac{\text{TOTALSALES}(W)}{\text{PROFITS1}_i\,(\Pi_i)} \frac{1}{\text{Import Penetration}\,(z_i)}$	-.030 (1.56)		
$\frac{\text{TOTALSALES}(W)}{\text{PROFITS2}_i\,(\Pi_i)} \frac{1}{\text{Import Penetration}\,(z_i)}$		.026 (.18)	
$\frac{\text{TOTALCONTRIBUTIONS}_i\,(C_i^S)}{\text{TOTALCONTRIBUTIONS}(C_i^O)} \frac{1}{\text{Import Penetration}\,(z_i)}$	1.91* (1.89)	-.97 (.96)	-.98 (1.00)
$\text{ORGANIZED}(I) * \frac{1}{\text{Import Penetration}\,(z_i)}$	.003 (.15)	.055*** (2.68)	.055*** (2.79)
Log-Likelihood	-53.90	-50.58	-50.58

***/**/*: 1 percent/ 5 percent/ 10 percent significance level, t-statistics in parentheses

Table 3

Non-Nested Hypothesis Testing

Null Hypothesis	**Alternative Hypothesis**	**J-Test Statistic**	**Interpretation**
Political Support 1	**Influence Driven**	.148	Reject null hypothesis
Influence Driven	Political Support 1	7.89***	Cannot reject null hypothesis

***/**/*: 1 percent/ 5 percent/ 10 percent significance level, t-statistics in parentheses

Not being able to reject the null hypothesis implies that the model associated with the null hypothesis is the "correct model" in the sense that information added by the alternative hypothesis does not improve the estimation of the dependent variable.

References

Baldwin, Robert and Christopher Magee, (1998), Is Trade Policy for Sale? Congressional Voting on Recent Trade Bills, NBER Working Paper 6376.

Baldwin, Robert, (1985), *The Political Economy of U.S. Import Policy*, Cambridge: MIT Press)

Davidson, Russel, and MacKinnon, James G., (1981), Several Tests for Model Specification in the Presence of Alternative Hypothesis, *Econometrica*, 49:781-793.

Davidson, Russel, and MacKinnon, James G., (1993), *Estimation and Inference in Econometrics*, Oxford: Oxford University Press.

Eicher, Theo S. and Thomas Osang, (2002), Protection for Sale: An Empirical Investigation, Comment *American Economic Review*, forthcoming.

Feenstra, Robert and Jagdish Bhagwati, (1982), Tariff Seeking and the Efficient Tariff, in J. Bhagwati, ed., *Import Competition and Response*, Chicago: University of Chicago Press.

Finger,J. Michael and Ann Harrison, (1996), The MFA Paradox: More Protection and More Trade?, in Anne O. Krueger, ed, *The Political Economy of American Trade Policy*. NBER Project Report Series. Chicago: University of Chicago Press.

Findlay, Ronald, and Wellisz, Stanislaw, (1982), Endogenous Tariffs, the Political Economy of Trade Restrictions, and Welfare, in Jagdish Bhagwati (ed.), *Import Competition and Response*, Chicago: University of Chicago Press.

Gawande, Kishore (1998), Comparing Theories of Endogenous Protection: Model Comparisons Using Gibbs Sampling Output, *Review of Economics and Statistics,* 80: 128-40.

Gawande, Kishore, and Bandyopadhyay, Usree, (2000), Is Protection for Sale? Evidence on the Grossman-Helpman Theory of Endogenous Protection, *Review of Economics and Statistics* 82:139-52.

Goldberg, Pinelopi K. and Maggi, Giovanni, (1999), Protection for Sale: An Empirical Investigation, *American Economic Review*, 89(5): 1135-1155.

Greene, William H., (1997), *Econometric Analysis*, Third Ed., New York: Prentice Hall.

Grossman, Gene, and Helpman, Elhanan, (1994), Protection for Sale, *American Economic Review*, 84: 833-850.

Grossman, Gene and Helpman, Elhanan, (1996), Electoral Competition and Special Interest Politics, *Review of Economics Studies*, 63:265-86

Helpman, Elhanan, (1997), Politics and Trade Policy, in *Advances in Economics and Econometrics: Theory and Application*, David Kreps and Kenneth Wallis eds., Cambridge: Cambridge University Press.

Hillman, Arye L., (1982), Declining Industries and Political-Support Protectionist Motives, *American Economic Review*, 72(5): 1180-1187.

Hufbauer, Gary, Diane Berliner and Kimberly Elliot, (1986), *Trade and Protection in the US: 31 Case Studies* (Washington DC: Institute for International Economics)

Lee, Jong Wha and Phillip Swagel, (1997), Trade Barriers and Trade Flows across Countries and Industries, *Review of Economics and Statistics*; 79:372-82.

Lee, Myoung-jee, (1996), *Methods of Moments and Semiparametric Econometrics for Limited Dependent Variable Models*, New York: Springer Verlag.

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

Maggi, G and A. Rodriguez-Clare, 2000, Import Penetration and Politics of Trade Protection, *Journal of International Economics,* 51, 2:287-305

Mayer, Wolfgang, (1984), Endogenous Tariff Formation, *American Economic Review,* 74:970-85

Ray, E.J., (1981), The Determinants of Tariff and Non-Tariff Trade Restrictions in the United States, *Journal of Political Economy,* 89:105-121.

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

Staiger, Robert and Guido Tabellini, (1987), Discretionary Trade Policy and Excessive Protection, *American Economic Review* 77:340-348.

Stern P.M., (1988), *The Best Congress Money can Buy (*New York: Pantheon)

Shiells, Clinton R., Stern, Robert M., and Deardorff, Alan V., (1986), Estimates of the Elasticities of Substitution between Imports and Home Goods for the United States, *Weltwirtschaftliches Archiv*, 122: 497-519.

Trefler, Daniel, (1993), Trade Liberalization and the Theory of Endogenous Protection: An Econometric Study of U.S. Import Policy, *Journal of Political Economy*, 101(1):138-160.

Van Long N. and N. Vousden, (1991), Protectionist Responses and Declining Industries, *Journal of International Economics* 30:87-103