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Searching for the (Dark) Forces Behind Protection*

Hadi Salehi Esfahani
University of Illinois at Urbana-Champaign

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Abstract

This paper re-examines the determinants of trade policy. It modifies the Grossman-Helpman model of trade policy to take account of factors besides lobby contributions that may lead politicians to value rents differently across industries. The idea is motivated by the puzzling results of the recent empirical work on the Grossman-Helpman model. The empirical work in the paper based on U.S. data confirms that lobby contributions do not play obvious roles in trade policy. Rather, trade policies seem to be placing higher weights on the earnings of industries where lower skill workers and smaller, less capital intensive firms are more prevalent. It is argued that this can be explained by the credit and insurance constraints that such agents tend to face. The weakness of lobby contributions in predicting protectionism across industries may be due to the variety of alternative goals that lobbies pursue and the diversity of interests within each industry. Also, the industries with well-organized and well-funded lobbies may have easier access to more efficient fiscal and financial transfers. The approach adopted in this paper paves the way for examining a variety of determinants of trade policy in a broader framework. The regularities observed here have far-reaching implications for the pattern and evolution of trade policies.

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Please address all correspondence concerning this paper to:

Hadi Salehi Esfahani
Department of Economics
University of Illinois
Urbana, IL 61801, USA
Phone: (217) 333-2681; Fax (217) 333-1398; E-mail: Esfahani@uiuc.edu

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1. Introduction

This paper re-examines the determinants of trade policy. It starts with the seminal model of Grossman and Helpman (1994), henceforth GH, and makes an attempt to take account of factors besides lobby contributions that may lead politicians to value rents differently across industries. The exploration is motivated by the recent empirical finding that the premia that politicians place on lobby contributions appear to be too small to explain much of the variation in protection rates. This paper argues that other factors, such as differences in the severity of credit and insurance constraints, may cause marginal earnings to have different values in different industries, thus acting as forces that interact with lobbying. The model developed here incorporates such effects and provides a framework for testing them against the pure "protection for sale" hypothesis. Estimation of the extended model with cross-industry data from the United States provides support for the role of credit and insurance constraints and other effects. The findings have far-reaching implications for the pattern and evolution of trade policies.

The findings of the recent empirical work on the GH model are quite intriguing.[1] While the published estimates of the model's parameters have the predicted signs with statistical significance, the magnitudes of the estimates are puzzling. The politicians' premium on a dollar of political contributions turns out to be at most two percent of the value that they attach to a dollar of aggregate welfare. This premium is too small to be a major explanation for the observed protection. Such a low premium should also dissuade most industries from spending resources to organize and to lobby for protection. But, surprisingly, the same studies find that the share of population organized by lobbies must be very large, typically well over 80 percent of the population. This is the case even though based on the indicators used in these studies the range of this share must be much lower.[2]

These findings make one wonder whether the main motivation for protection may lie elsewhere. Indeed, earlier studies have examined a variety of other factors and have found several of them to be empirically relevant for trade policy.[3] Although the theoretical foundations of those studies may not be as

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[1] These studies include Goldberg and Maggi (1999), Gawande and Bandyopadhyay (2000), McCalman (Forthcoming), Mitra, Thomakos and Ulubasoglu (2002), and Eicher and Osang (2002).

[2] In the recent studies, the share of population covered by industry lobbies is derived from the estimated parameters of the model. Using any estimate of the share of organized population implicit in the data often does not produce meaningful results for the other parameters. Eicher and Osang's (2002) study is an exception in that it finds the share of organized population to be about 26 percent, which has a chance at being consistent with the lobby indicator used in the estimation.

[3] Prominent examples of empirical work on trade policy include: Caves (1976), Ray (1981a, 1981b), Finger, Hall, and Nelson (1982), Marvel and Ray (1983, 1985), Baldwin (1985), Anderson and Baldwin (1987), Leamer (1990), Trefler (1993), Pack (1994), and Lee and Swagel, (1997). Grossman and Eaton (1985) and Staiger and Tabellini (1987) are among the theoretical contributions that point to factors other than lobbying that could cause divergence

strong as the one provided by GH, the old regularities and the new puzzles uncovered by recent studies compel one to revisit the earlier ideas more systematically and test them against the "protection for sale" hypothesis. Indeed, the empirical studies of the GH model make an attempt to incorporate additional variables in their regressions. But, they do not do so in a systematic manner because such variables have no explicit role in the theoretical model that guides their econometric work. [See, for example, the two pioneering studies by Goldberg and Maggi (1999) and Gawande and Bandyopadhyay (2000), henceforth GM and GB, respectively.] As a result, despite the fact that some of the additional factors turn out to be statistically significant, the findings do not lend themselves to any meaningful interpretation. Moreover, the existing studies use many industry characteristics as instruments for their lobby indicator to deal with its endogeneity problem. Since some of these characteristics may have separate effects of their own on the politicians' valuation of industry rents, this may be biasing the results. In fact, it may be giving all the chance to the lobby indicator to prove significant even though it may not be an appropriate measure, or in reality lobby contributions may not be very important for trade policy, when compared to other factors.[4]

I address the above issues by incorporating protection motives besides lobby contributions in the GH framework. The ideas for these additional motives can be found in earlier literature, both theoretical and empirical. On the theoretical side, asset specificity in industries and incomplete contracting have emerged as the corner stones of most models of trade policy. Specific assets explain why most interest groups focus their political activities on policies related to the inputs and outputs of their own industries. Incomplete contracting appears particularly in the form of imperfections in the credit and insurance markets, which prepare the ground for the divergence of marginal utility of income among owners of specific assets across industries. Among the various contributions to this literature, two must be noted. The first is that of Grossman and Eaton (1985), who explore the incomplete contracting idea systematically and highlight the role of protection as insurance against terms of trade shocks. Second is Staiger and Tabellini (1987), who develop the idea further and argue that if the government cannot pre-commit to more efficient redistribution mechanisms, then protection may emerge as the solution to the game between the government and the industries.

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in the valuation of incomes across industries and, thus, motivate protection. For surveys of the trade policy literature, see Hillman (1989), Marks and McArthur (1990), Ray (1990), Magee (1994), Helpman (1997), and Rodrik (1995).

[4] More recently, Eicher and Osang (2002) have gone further and have compared the GH model with two others that link political contributions and industry rents to trade policy. But, they instrument the indicators that determine the link with variables that are likely to be correlated with the protection rate. In any case, the alternative hypotheses that they examine find little support in the data and although the GH model emerges as the winner of test, the puzzle about the explanatory power of lobby contributions remains unresolved.

The empirical background for the protection motives considered here can be pieced together from a host of papers such as Finger, Hall, and Nelson (1982), Marvel and Ray (1983), Pack (1994), Trefler (1993), and Lee and Swagel (1997). These studies suggest that protection is directed towards industries with low-skill/low-wage workers and smaller firms with low capital intensity, though each study examines only some of these variables. These findings have been puzzling because the agents being protected seem to be those that tend to face relatively higher costs of political organization compared to big business.[5] However, as I argue in this paper, combining this empirical picture with the theoretical arguments for protection based on incomplete contracting seems to provide a plausible explanation for the puzzle and for a great deal more. The basic point is as follows.

The agents identified in the earlier literature as protected seem to be exactly the ones that are commonly believed to suffer from high transaction costs and serious constraints in the credit and insurance markets. Small firms, especially those with little capital, often lack access to sufficient funds that they need to withstand shocks or to invest (Whited, 1992, Hubbard, 1998, Hu and Schiantarelli, 1998).[6] Also, workers often face limitations in accessing credit or insuring themselves against job and income losses, and the problem is typically more severe for workers with lower incomes and skills (Manski and Straub, 1999, Hanes 2000, Attanasio et al., 2000, Gross and Souleles, 2001, Hoynes, 2001). These agents often encounter high costs of moving between industries and locations compared to their incomes. They are, thus, more vulnerable to domestic and international shocks. Governments try to deal with these problems through their social insurance and tax/subsidy policies. However, the same incomplete contracting problems that impede credit and insurance provision through markets also limit the governments' ability to provide relief through direct transfers.[7] As a result, an extra dollar of earnings

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[5] Some scholars have suggested that firm size and capital intensity reflect barriers to entry, which may reduce the need for protection (see, e.g., Trefler, 1993). But, this view overlooks the fact that protection from foreign competition may be even more valuable to the existing firms in an industry if they do not have to worry about rent erosion due to domestic entry. For the reason why low skill workers are protected, the explanation in the case of the US has been that unskilled labor is the scarce factor and faces highest import competition. But, it is difficult to see why protecting the scarce factor in a country has a greater payoff to the politicians than other factors, particularly because low-skill workers have high cost of organizing. Moreover, the same pattern is observed in other countries where low-skill workers are abundant (Pack, 1994, Lee and Swagel, 1997).

[6] This view is also supported by the abundant evidence that retained earnings are the marginal source of finance for investment and that the return on investment is higher than the cost of capital (Auerbach and Hassett, Fama, 2000, Fama and French, 1998).

[7] See Hoynes (2001) for clear evidence that less skilled workers face higher employment and income risks even after taking account of all transfers, including those coming from the government.

induced by trade policy may be quite valuable to the agents facing such constraints because it can enhance the stability and growth opportunities of the firms and provide their workers with greater security. The credit constraint may prevent these groups from making political contributions commensurate with their gains from protection, but their votes and direct political support are likely to matter for the politicians well beyond financial contributions.

The econometric work in this paper confirms that industry characteristics affect the valuation of industry earnings in trade policy according to the above pattern. In addition, it shows that the premia on lobby contributions becomes less significant once one adds other relevant industry characteristics to the model. The estimates also show that the industry characteristics associated with higher protection are generally unrelated or, in some cases, negatively related to campaign contributions. This suggests that the loss of significance by the lobby indicators is not a simple multicollinearity problem. More importantly, the weak and negative association of contributions with the presence of low skill workers and less capital intensive firms provides further evidence in favor of the credit constraint hypothesis. This is because in the absence of such a constraint, the higher marginal utilities of earnings by such groups should have given rise to larger contributions. Interestingly, these results are in line with the findings of Baldwin and Magee (2000), who study voting over the NAFTA and GATT bills in the U.S. Congress. They observe that while political contributions may have influenced the voting outcomes, the effect had not been dominant. Indeed, lobbying against free trade had come mainly in the form of political pressure through less educated labor groups.

The above results do not mean that lobby contributions are irrelevant in the formation of economic policy in general. Rather, they reaffirm two important points observed by Baldwin and Magee (2000): First, factors other than contributions, especially concerns over incomplete contracting problems, may also be at work. Second, contributions may not have a simple relationship with protection because some lobbies have complex interests.

The perspective that emerges from the analysis in this paper has important implications. To begin with, it sheds some light on the age-old puzzle of why governments use inefficient protection rather than cash transfers to bring about redistribution or market correction. It seems that they do use more direct transfers whenever they can. But, in some industries direct transfers are difficult and, as a result, protection is used as the next-best alternative. Another important implication is that the increased trade liberalization around the world over the past half century is closely connected to the developments in financial and insurance markets and in social insurance institutions. This point ties in well with the link between openness and the size of government found by Rodrik (1998). Rodrik's empirical analysis demonstrates that as economies open up, government expenditures rise to provide relief to the population at risk. The observations in this paper complement that result by showing that across industries also protection is lower when the risk and credit problems are less acute and direct transfers are easier. The findings also confirm the policy significance of globalization risks that Rodrik (1997) has highlighted. Finally, along the lines argued by Rodrik (1997), the findings of this paper imply that the continued move toward openness may require progress in domestic and international institutions (especially fiscal and regulatory systems) that help improve capital markets and ensure greater economic security.

The rest of this paper is organized as follows. Section 2 presents a modified version of the GH model that takes some potential non-lobby factors into account. Section 3 describes the empirical specification of the model and the dataset and section 4 discusses the econometric results. Section 5 examines further extensions of the model. Section 6 concludes.

2. The Extended Grossman-Helpman Model of Trade Policy

In the GH model, there are $n + 1$ traded goods—indexed by $i = 0,\ldots, n$—with exogenous world prices, p_i^*, $i = 0,\ldots, n$. The government sets specific trade taxes (including non-tariff barriers) on each good, totaling t_i and rendering the domestic price $p_i = p_i^* + t_i$ for good i.[8] Good 0 is the numeraire, with $p_0 = p_0^* = 1$, and its production uses only a general and mobile form of labor with an input-output coefficient of 1. The production of all other goods requires an industry-specific asset as well as the general form of labor. The assets can, of course, take the form of industry- or firm-specific skills owned by workers.

There is a continuum of individuals—with a population size normalized to one—who own the factors of production and generate domestic demand for the goods. Individuals have identical preferences over the consumption of goods. If c_i is an individual's consumption of good i, his/her utility is defined as:

(2.1) $$U = c_0 + \sum_{i=1}^{n} u_i(c_i)\,,$$

where each u_i is an increasing and concave function. The implied demand for good i by an individual with income y can be found by maximizing U with respect to c_i subject to the budget constraint,

(2.2) $$c_0 + \sum_{i=1}^{n} p_i c_i = y.$$

This optimization implies $u_i'(c_i) = p_i$. for $i = 1,\ldots, n$. Then, the demand of the individual for good $i = 1,\ldots, n$, denoted by $d_i(p_i)$, will be the inverse of $u_i'(.)$. For good 0, the demand is determined as a residual: $d_0 = y$

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[8] t_i can be negative or positive. For imported goods, a negative t_i represents a subsidy. For exported goods, a positive t_i is a subsidy and a negative t_i is a tax.

$-\sum_{i=1}^{n} p_i d_i(p_i)$. The indirect utility function of the individual can be derived as $V = y + \sum_{i=1}^{n} s_i(p_i)$, where $s_i(p_i) = u_i(d_i(p_i)) - p_i d_i(p_i)$ is the consumer surplus of the individual from purchasing good i.

Total labor supply is normalized to one and its ownership is uniform across the population. The supply of labor is assumed to be sufficiently large such that in a competitive equilibrium the output of the numeraire good is positive. This ensures that the wage rate ends up being equal to 1. The size of each specific asset i is also normalized to one, but its ownership is assumed to be distributed equally among a subset of individuals whose share in population is $\alpha_i < 1$. Each individual can own at most one type of specific asset, with the ownership rights being nontradable. The specific asset owned by each individual is managed by a firm. The firms in each industry i, $i = 1,\ldots, n$, are identical and possess a constant returns to scale production function that produces $\underline{x}_i(\ell_i)$ unit of good i per unit of specific asset i, where ℓ_i is the labor input per unit of specific asset i and $\underline{x}_i' > 0$ and $\underline{x}_i'' < 0$.

Based on the above setup, GH go on to specify the political structure, the government's preferences, and the equilibrium conditions. I follow the same steps and adopt all of the above features. But, before proceeding, I introduce an additional feature into the model to allow for the marginal value of industry earnings to vary for reasons besides lobby contributions. Such effects can be incorporated into the model in different ways. A simple and empirically relevant way is to assume that firms have opportunities to invest and earn more in a second period, but they face credit constraint to varying degrees due to their characteristics. The credit market can be viewed as an international one with a given interest rate, but with different degrees of transaction costs for different industries. Then, in industries that face higher costs of accessing credit markets, the marginal value of a dollar of earnings will tend to be higher.[9] The model can be kept simple by avoiding an explicit specification of the second period in detail and by letting a variable, τ_i, which varies with industry characteristics, represent the marginal value of a dollar of earning for the firms in industry i. In the equation to be estimated, τ_i can then be expressed as a function of observable factors that affect the cost of borrowing. In particular, when lending has a fixed cost and requires collateral, firms with small sizes and little capital are more likely to be credit constrained (Hubbard, 1998). As a result, industries dominated by such firms should tend to have higher τ_i's. For analytical convenience, it is useful to assume that each firm's credit constraint includes limitations on borrowing or receiving cash from its shareholders. Allowing for such transfers raises the opportunity cost of consumption for the owners and complicates the model, but does not change the thrust of the results.

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[9] For recent evidence regarding the high value of retained earnings see Auerbach and Hassett, Fama (2000) and Fama and French (1998), among others.

Credit constraint is not the only factor that can cause differential valuation of earnings across industries, although it seems a plausible and important one. Among other possible factors is insurance market failure. For example, when firms face random shocks but have insufficient access to credit and insurance to avoid costly shutdowns or inefficient bankruptcy, each additional dollar of earnings induced by policy can help raise their chances of survival and reduce inefficiencies associated with insurance failures. Naturally, a dollar of earnings would be more valuable in industries that have less access to insurance/credit markets and find it more difficult to ride out adverse shocks. This again implies that τ_i should be higher in industries where small and less endowed firms are prevalent. Another related effect is the benefits that the stability of firms brings to the workers who may be facing insurance market problems. A firm that has higher earnings and can act as a more reliable employer will be more attractive to risk-averse workers who lack access to insurance. As a result, protection-induced rents may help generate additional surplus for an industry by mitigating the insurance problems of its firms and workers. Naturally, industries that rely more extensively on less skilled workers—who have more limited access to insurance markets and have fewer means to self-insure—are likely to value rents much more than industries with high skill/high income workers.[10] In other words, industries with those characteristics must have higher τ_i's. One can, of course, model and derive such effects in detail. But, the purpose here is to capture the essential role of industry characteristics in an empirical trade policy equation. The τ_i's provide a convenient shortcut for the task. Some other sources of differential cross-industry valuation of earnings will be discussed below in section 5.

Given the above specification, a firm in industry i with a labor-asset ratio of ℓ_i perceives the value of its profits per unit of the specific asset to be $(p_i \underline{x}_i(\ell_i) - \ell_i)\tau_i$. Let $\pi_i(p_i) = \max_{\ell_i} [p_i \underline{x}_i(\ell_i) - \ell_i]$. Then the maximized payoff of firm owners in industry i is $\tau_i \pi_i(p_i)$. Using Hotelling's lemma, it is easy to see that the supply function of the industry is $x_i(p_i) = \pi_i'(p_i)$. Given the domestic demand for good i, imports are $m_i(p_i) = d_i(p_i) - x_i(p_i)$, with $m_i(p_i) < 0$ indicating that the industry exports good i.

For the rest of the model in this section, I follow the steps mapped out by GH. They assume that the proceeds of trade taxes, $\sum_{j=1}^{n} t_j m_j$, are distributed equally and in a lump-sum fashion among all

[10] See Hoynes (2001). Hanes (2000) also finds that across industries, worker compensation stability during major recessions has been associated with high earnings, capital intensity, and product-market concentration. Survey data further confirm that perceptions of job insecurity tend to decrease with schooling (Manski and Straub, 1999). Note that these facts and the arguments in the text indicate how industry rents could be connected to worker needs and may help solve problems faced by the workers. This does not necessarily rule out other factors that might cause cleavage between the interests of workers and the industries in which they work.

individuals. I adopt the same assumption here, though in section 5 I reexamine this issue because the manner in which trade taxes are redistributed has interesting implications.

Noting that the total incomes of individuals consist of the redistributed trade taxes and the returns to their labor and specific assets, the aggregate welfare—or the total indirect utility of all individuals—can be written as:

$$(2.3) \qquad W = \sum_{j=1}^{n} \tau_j \pi_j + \sum_{j=1}^{n} t_j m_j + 1 + \sum_{j=1}^{n} s_j(p_j) .$$

For the political structure, which shapes the game between the government and various segments of the population, assume that in a subset, L, of industries the specific asset owners have become organized in industry-specific lobbies. Each lobby offers political contributions to the policymakers in exchange for the formation of trade policy in favor of the industry that it represents. In each industry i, the objective of the lobby is to maximize the welfare of its members, W_i, net of political contributions, C_i; that is, the lobby's objective function is $W_i - C_i$.[11] The joint gross welfare of the owners of industry i is:

$$(2.4) \qquad W_i = \tau_i \pi_i + \alpha_i \left[\sum_{j=1}^{n} t_j m_j + 1 + \sum_{j=1}^{n} s_j(p_j) \right] .$$

The policymakers are a small set of individuals (politicians) who control the government and set the policies. They owe their position to support from the public, which may replace them with another set of individuals if the aggregate welfare is too low. The incumbent politicians value their position because of the personal benefits from the contributions that they receive, though they may use part of the contributions for election campaigns. For simplicity, assume that none of those eligible to become policymakers owns specific assets. Given that the politicians' interests, their objective function can be written as a weighted average of aggregate welfare and lobby contributions. Normalizing the unit of the politicians' utility to one dollar of aggregate welfare and denoting the premium that they assign to a dollar of political contributions as β, the government's objective function can be expressed as:

$$(2.5) \qquad G = W + \beta \sum_{j \in L} C_j .$$

[11] This specification assumes that the owners, not the firms, pay the contributions. If the contributions come directly from firm resources, then their marginal cost to the industry would be τ_i and the lobby's objective function becomes $W_i - \tau_i C_i$. In the final equations derived below, this only affects the terms that are constant across industries, which has little consequence for the empirical analysis.

The politicians' effort to maximize G and the interest of each lobby in maximizing its net welfare results in a game that determines all t_i's and C_i's. GH specify this game as a "menu auction" à la Bernheim and Whinston (1986). While the level of lobby contributions is sensitive to the details of player interactions, the equilibrium trade taxes—which are the main concern here—are invariant to those details (as long as one can assume that the contributions are differentiable in t_i's). This is because, as GM argue, in the bargaining games that arise in this model, equilibrium t_i's ultimately maximize the joint surplus of the government and the lobbies. This problem amounts to selecting t_i's that maximize

$$(2.6) \qquad W + \beta \sum_{j \in L} W_j = \sum_{j=1}^{n} (1+\beta I_j)\tau_j \pi_j + (1+\beta\alpha_L)\left[\sum_{j=1}^{n} t_j m_j + 1 + \sum_{j=1}^{n} s_j(p_j)\right],$$

where I_i is a lobby indicator ($I_i = 1$ when there is a lobby in industry i and $I_i = 0$ otherwise) and $\alpha_L = \sum_{i \in L} \alpha_i$ is the share of population that is organized by all lobbies.

The first-order condition for the maximization of (2.6) with respect to t_i is:

$$(2.7) \qquad (1+\beta I_i)\tau_i x_i + (1+\beta\alpha_L)[\frac{\partial m_i}{\partial p_i} t_i + m_i - d_i(p_i)] = 0, \quad i = 1,\ldots, n.$$

When (2.7) has a solution, for industries with $m_i \neq 0$ it can be rewritten as:

$$(2.8) \qquad \mu_i \frac{t_i}{p_i^*} = \left[\frac{(1+\beta I_i)\tau_i}{1+\beta\alpha_L} - 1\right]\left(\frac{x_i}{m_i}\right),$$

where $\mu_i = -(p_i^*/m_i)(\partial m_i / \partial p_i^*)$ is the absolute elasticity of import demand with respect to the world price. Note that this derivation takes advantage of the fact that $\partial m_i / \partial p_i = \partial m_i / \partial p_i^*$. Also, it should be noted that GH specify the import elasticity with respect to the domestic price and, as a result, express the left-hand side of the equation in terms of t_i/p_i rather than t_i/p_i^*. I define elasticity with respect to the foreign price because this is what empirical studies of import demand typically measure.

Applying the GH assumption that $\tau_i = 1$ for all i to (2.8) produces their original result,

$$(2.9) \qquad \mu_i \frac{t_i}{p_i^*} = \frac{I_i - \alpha_L}{\alpha_L + 1/\beta}\left(\frac{x_i}{m_i}\right).$$

Both models (2.8) and (2.9) suggest that lobby presence and lower price elasticity of imports should be associated with higher protection of an industry. The models also appear to imply that protection is positively correlated with the output-import ratio, as many observers have pointed out (Rodrik, 1995; Maggi and Rodríguez-Clare, 1999). But, it should be noted that this is only true among the organized industries where $I_i = 1$. For other industries where $I_i = 0$, the opposite may be true, especially in the GH model. The extended model implies that the relationship is also conditioned on industry characteristics represented in τ_i. This effect enters both directly (e.g., reflecting the consequence of welfare gain from alleviation of market imperfections through induced rents) and indirectly (due to the increased incentive of organized industries having higher τ_is to lobby more intensely). Thus, the new effects considered here can coexist and interact with the lobby contribution effect, which is the focus of the GH model.

While recent empirical studies have shown that equation (2.9) is consistent with the data and that $\beta > 0$, the estimated value of β is quite small (in the 0.0003-0.02 range), while the estimated α_L is often quite large (typically over 0.8). The estimated relationships also explain very little of the variation in protection rates. The new feature included in equation (2.8) promises to explain the pattern of protection better and to shed light on the difficulties encountered in the earlier estimations of (2.9). In particular, the potential variability of τ_i implies that the earlier estimates for β and α_L may be incorrect because τ_i acts as a multiplier for the ratio from which these parameters are derived. Moreover, those studies use the determinants of τ_i as instruments for I_i, which can obviously bias β when τ_i is restricted to one.

In the following two sections, the main concern is to investigate the variability of τ_i across industries. For this purpose, I focus on the role of credit and insurance market imperfections discussed above. Therefore, the hypothesis that we test is whether τ_i rises with factors that increase the severity of credit and insurance constraints in an industry. If indeed τ_i behaves as hypothesized, then it should help explain a larger part of the variation in protection than the lobby indicator alone.

3. Empirical Specification of the Extended Model and the Dataset

There are two ways to specify the dependent variable in an empirical version of equation (2.8). One way is to solve for t_i/p_i^* and try to come up with instruments for μ_i. Another way is to treat $\mu_i t_i/p_i^*$ as the dependent variable. I use the latter approach because this keeps the right hand-side simpler and obviates the need to deal with the endogeneity and measurement error of μ_i.[12] On the right-hand side of (2.8), using a first-order approximation, I assume that τ_i is a linear function of a k-vector of industry characteristics, $\mathbf{z}_i$, that may affect the marginal value of profits in an industry. Because in this equation τ_i is divided by $1+\beta\alpha_L$, its parameters and α_L cannot be separately identified. It may be possible to come up with a direct estimate of α_L and, thus, completely identify the parameters of τ_i. But, that is not necessary

[12] To see the ways in which μ_i may be endogenous, note that $\mu_i = (p_i^*/p_i)[(1+ x_i/m_i)\varepsilon_d + (x_i/m_i)\varepsilon_x]$, where ε_d and ε_x are, respectively, the absolute elasticities of demand and supply with respect to the domestic price. Obviously, p_i and x_i/m_i are both endogenous. The same may be true for ε_d and ε_x as well.

for the purposes at hand because the main concern is whether τ_i varies with industry characteristics, which one can address by identifying τ_i up to a constant multiplier without knowing α_L. Therefore, I let $\frac{\tau_i}{1+\beta\alpha_L} = \boldsymbol{\eta}'\mathbf{z}_i$, where $\boldsymbol{\eta}$ is a vector of parameters, η_0, η_1, …, η_k, with η_j corresponding to z_{ij}, the measure of industry characteristic j in $\mathbf{z}_i$. Let $z_{i0} = 1$ so that η_0 acts as an intercept for $\boldsymbol{\eta}'\mathbf{z}_i$ expression. Thus, the equation to be estimated becomes:

$$(3.1) \qquad \mu_i \frac{t_i}{p_i^*} = \left[(1+\beta I_i)(\boldsymbol{\eta}'\mathbf{z}_i) - 1\right]\left(\frac{x_i}{m_i}\right).$$

Estimation of (3.1) allows the extended model to be tested against the basic GH model. The main hypotheses are $\eta_j = 0$ vs. $\eta_j \neq 0$ for $j = 1, …, k$. Of course, the case for the claim that credit and insurance constraints are important determinants of τ_i further requires η_j to have the predicted signs (i.e., positive η_j when z_{ij} indicates more severe credit and insurance problems in industry i, and vice versa).

For variables to be included in $\mathbf{z}_i$, ideally one would want to have direct indicators of the constraints and external effects that may cause variation in the valuation of industry earnings. But, the available data limits the choice of variables. I use Trefler's (1993) 4-digit SIC dataset for 1983, which he has kindly made available. This is the most extensive trade policy dataset in terms of scope and scale and has been the basis of most recent studies. In addition to the average protection rates for 322 industries, it offers data on cost shares of five labor categories (unskilled, semi-skilled, skilled, while collar, and engineers and scientists) and eight other factors (physical capital, inventories, cropland, pasture, forest, coal, petroleum, and minerals). It also includes export share, capital stock-sales ratio, employment, shares of labor force in the five occupational categories, average tenure, unionization rate, geographic concentration of production relative to population, share of industry sales supplied by the median plant (or "scale," as dubbed by Trefler), the number of buyers and sellers per dollar of sales, and four-firm concentration ratios of sellers and buyers.

The discussion of the determinants of τ_i in section 2 suggests that $\mathbf{z}_i$ must include firm size (for which I use "scale" and, alternatively, the average sales per firm), capital-sales ratio, and the shares of workers with different skill levels in total employment. I include firm size and capital-sales ratio in log form [log(1+scale) in the case of "scale"] to take account of possible diminishing effects. The expected sign of the coefficients of both variables is negative. Because capital and insurance market problems may be much more acute for firms that are both small and low in capital stock, I include the interaction of these two terms in $\mathbf{z}_i$ as well and expect its coefficient to be negative as well. For worker shares, again I use logs [to be specific, the log of one plus the share to avoid giving too much weight to very low shares].

I set the share of employees with the highest skill (engineers and scientists) as the benchmark and include the shares of the other four categories (unskilled, semi-skilled, skilled, and while collar) in $\mathbf{z}_i$. The coefficients of these four variables should all be positive because, on average, engineers and scientists are the best-paid employees and are likely to have the least job security concerns. However, within the skill categories included, the estimated coefficients should decline with the skill level.

For the lobby indicator, I_i, I follow GM and GB and set $I_i = 1$ if the contribution of an industry's political action committee (PAC) is above a given threshold and $I_i = 0$ otherwise. Those studies have experimented with thresholds defined both in absolute dollar terms and relative to value added of the industry and have shown that the results are not very sensitive to the particular thresholds one selects. To avoid a repetition of those findings, in the presentation here I focus on the results based on a contribution threshold of $2.5 million per 4-digit industry, which implies that about half (53.4%) of industries are organized. This proportion is in the middle range of the threshold that GM and GB examine. I also report some of the results with a relative contribution threshold to show that they are not very different from the absolute threshold results. The data for the contributions were kindly provided by Kishore Gawande.

As in other studies of the US trade policy, for the estimates of import price elasticity, μ_i, I draw on Shiells et al. (1986). I use their short run elasticity estimates, which are more appropriate for the task at hand because those estimates conform better to the model's assumption of fixed specific factors.[13] I follow GB in replicating the 3-digit SIC level estimates of Shiells et al. (1986) at the 4-digit level. This is different from GM's approach who aggregate the data to the 3-digit level to match the elasticity estimates. The elasticity estimates are noisy anyway and it does not seem worthwhile to lose the details about other variables in order to avoid the added noise of assigning the 3-digit level estimates of μ_i to the finer industry classifications. In any event, the mapping of elasticity estimates into the 4-digit industries included in Trefler's data set produces 301 observations, with the elasticity estimates having an incorrect sign in 42 of them. I dealt with the incorrect signs in two different ways: first, I set μ_i equal to 0.0001 whenever its sign was incorrect and, second, I dropped such observations. The results proved quite robust to these alternative specifications. Most of the results reported below rely on the larger sample.

For the output-import ratio, I use the values of 1983 shipments and imports from the NBER Trade Database (Feenstra, 1996). For cases where $m_i = 0$, x_i/m_i is not defined and, following other recent studies

[13] Even if long run adjustments in specific assets are taken into account, the appropriate import price elasticity for the determination of tariffs is likely to be the short-run one. This is certainly the case if the government has some control over asset formation through industrial policy and tries to optimize its objective function by setting both tariffs and asset sizes (Esfahani and Mahmud, 2000). This result easily follows from the envelope theorem.

such observations are dropped. Since a number of these cases correspond to the industries that lack elasticity estimates, this procedure eliminates only 2 additional observations and brings the size of the larger sample to 299 and smaller sample to 257.

Finally, for the rate of protection, I follow most other studies of the US trade policy and use the data on the coverage ratio of non-tariff barriers (NTB), which is defined as the share of an industry's competing imports subject to non-tariff barriers. As Trefler (1993) and many others have argued, in the developed countries non-tariff barriers constitute a more important component of protection than tariffs. Such barriers are also typically set non-cooperatively across countries, as the GH model assumes. Moreover, tariffs and NTBs are correlated with each other and tend to generate similar results. Of course, NTBs are imperfect measures of protection. In particular, the restriction of their range to [0,1] implies censoring. These problems can be partly addressed through Tobit estimation, which is the technique that Trefler (1993) and GM use. However, the non-linearity of the right-hand side of (3.1) in variables that need instruments makes Tobit estimation very difficult, especially when $\boldsymbol{\eta}'\mathbf{z}_i$ is included in the model. For this reason, I adopt the approach of GB and use the suggestion by Kelejian (1971) to estimate (3.1) with 2SLS. I also experimented with Tobit estimation by adding the residuals of the reduced form regressions for the endogenous right-hand-side variables to equation (3.1) rather than instrumenting. The residual was included both in linear as well as interactive forms. As suggested by Smith and Blundell (1986), this procedure ensures consistency of the estimates. Like GB, I found that the results are qualitatively similar to the 2SLS estimates. In the next section, I focus on the 2SLS estimates.

The main sources of simultaneity on the right-hand side of (3.1) are x_i/m_i and I_i. For x_i/m_i, the common practice is to invoke the theory of comparative advantage and assume that the output-import ratio is a function of the protection rate as well as factor cost shares, which the literature considers as reasonably independent. Also, as in other recent studies, I take the lobby indicator, I_i, to be a function of industry characteristics that may affect the costs of organizing and overcoming the free-rider problem within each industry. In particular, industries with fewer employees and fewer but larger, more concentrated, and more unionized firms are likely to be more effective in organizing. Since some of these variables may themselves be endogenous, I experimented with different subsets of them. Again, the results were not sensitive to the particular instruments used.

For the first-stage reduced form of the regressions, the instruments for x_i/m_i and I_i, and the components of $\mathbf{z}_i$ must be interacted. Since x_i/m_i and I_i have numerous potential instruments and $\mathbf{z}_i$ has many components, their interactions can be quite large. To avoid over-determination, for each of x_i/m_i and I_i I select only one instrument that can be considered as independent and is well correlated with it. For most of the regressions reported below, the instruments for x_i/m_i and I_i are the share of capital in total cost and seller concentration, respectively.[14] In diagnostic regressions, I used alternative independent variables for this purpose to ensure that the results are not driven by the choice of instruments. Below, I report the results of experiments with the degree of unionization and the shares of cropland and of engineers and scientists in total cost as alternative instruments for I_i and x_i/m_i.

To form the full array of regressors for the first stage, I first interact and square the two instruments for I_i and x_i/m_i and a constant. This produces an array of six independent variables. I then interact each of these six with the variables included in $\mathbf{z}_i$, or their instruments. I use the shares of worker categories in total employment directly as independent variables, but instrument for capital-sales ratio and firm size. The reason for instrumenting for the latter two variables is their potential endogeneity due to the use of sales figures in their measurements. The choice of the instruments is again based on independence and correlation criteria. As in the case of other variables, I ran experiments with alternative instruments and report some of them below.

4. The Main Empirical Results

Tables 1a and 1b show the summary statistics and correlations of the variables used in the regressions. Table 2 presents the main results. A notable preliminary point is that all regressions in Table 2 include a constant on the right-hand side even though equations (2.8) and (2.9) imply a zero intercept. This is because the zero intercept constraint is rejected by the estimates, as the *p*-values of the constant terms in the first row show. This rejection is not a cause for concern because, as I argue below, there are reasonable modifications in the model that result in a positive intercept. In any case, the inclusion of the intercept has little consequence for the comparison between (2.8) and (2.9), which is the key issue here.

The first column of Table 2 is the estimate of the basic GH model. For this regression, I use the same set of instruments that applies to the full model to ensure that it is not disadvantaged by inadequate instrumentation. Indeed, using fewer instruments reduces the statistical significance of β and strengthens

[14] The use of capital share as the instrument for output import ratio is motivated by the factor endowment theory of comparative advantage. Harrigan and Zakrajsek (2000) have recently provided new empirical support for the theory. In particular, they show that physical capital is one the most important determinants of the degree of specialization across industries. They also find important roles for human capital and land, which are the alternative instruments used for x_i/m_i in this paper.

the case for the importance of other industry characteristics. The instruments, however, have little impact on the magnitude of β, which is in the range of estimates found earlier and poses the same puzzles.[15]

A point of contrast between the estimate in this paper and those in other studies is the value of α_L. The estimate of η_0 in the first column of Table 2 implies that α_L must be about 0.08 (with a standard error of 0.06). This is far below the figures found in most other studies. Eicher and Osang (2002), who also find a relatively low value for α_L (0.26) attribute the finding to their method of estimation. In the regressions based on the dataset that I use, the estimated value of α_L is very sensitive to the measure of lobby indicator and to the instruments used. In particular, when the lobby indicator is defined on a relative basis (e.g., PAC contribution relative to the industry value added), α_L turns out to be quite high and close to 1. This instability in the estimates of α_L may be due to the misspecification caused by assuming $\tau_i = 1$, which is rejected by the data as we will see below.

The second column of Table 2 shows the results of letting τ_i vary with the capital-sales ratio and the median firm size, using the cost shares of semi-skilled workers and pastures as instruments. The key finding is that the coefficients of the two variables and their interaction are all negative with high levels of statistical significance (both individually and jointly). Moreover, the regression's explanatory power rises sharply relative to that in the first column. The estimate of β, on the other hand, declines and loses its significance. Adding the employment share variables (in the third column of Table 2) exacerbates this effect. This is confirmed not only by the individual significance levels of these variables, but also by a Wald test of their joint significance and by the rise in the adjusted R^2.

The sharp loss of significance of β following the introduction of industry characteristics in $\mathbf{z}_i$ is quite notable and arises for all lobby indicators that have been used in the literature. As an example, the last column of Table 2 shows the complete model estimated with the lobby indicator defined based on the ratio of PAC contribution to value added with a threshold of 0.0025, which is in the range of experiments carried out in other studies and identifies about half of the sample industries as organized. Clearly, there is no improvement in the estimate of β. Nor do changes in the threshold, even large ones, render a positive and significant β.

To examine whether the inadequacy of instruments can account for the insignificance of β in the complete model, I included additional instruments for I_i and interacted them with other independent

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[15] The estimate of β in Table 2 is lower than those found by GM and Eicher and Osang (2002) in the 0.02-0.04 range based on 3-digit SIC datasets. But, it is higher then 0.0003 that GB find based on a dataset similar to one used here.

variables to create an expanded array of regressors for the first stage. The first column of Table 3 reports the results of such an experiment with the unionization rate and the share of engineers and scientists in total cost as the additional instruments. While there is some improvement in the estimate, it does not reach any tangible level of significance. Having the lobby indicator as its own instrument or using the amount of political contributions in place of the lobby indicator does not help either. In fact, when the lobby indicator is treated as exogenous, β becomes indistinguishable form zero even in the original GH model. Further specification changes can even lead to a negative sign for β, as will be seen below in Table 5. These results show that the estimates of β generated by means of contributions-based lobby indicators are not very stable and easily lose their significance and even their sign as specifications change, especially when the constraint $\tau_i = 1$ is dropped.

What should one make of the above results? To conclude that lobby contributions don't matter for economic policy in general is simply implausible. One possible explanation is that it is difficult to decipher whether industries are organized or not from the size of their political contributions. This could be due to the fact that all industries make contributions and trade policy is only part of their agenda. Another explanation is that different assets in the same industry may have different degrees of mobility and their owners may have different preferences over trade policy.[16] As a result, the contributions coming from different interests in an industry may not be all working the same direction. For example, as Baldwin and Magee (2000) find, contributions from labor groups may be working against freer trade, while contributions from business groups may be doing the opposite.

A third possible explanation is that lobby payments may not be very important for trade policy, though they may be important for other policies. This can be the case because protection is an inefficient form of redistribution and many well-organized groups (such as concentrated industries with large, capital-intensive firms) are in a position to receive rents in more efficient ways (tax breaks, subsidies, and regulatory relief). For example, many strong agriculture lobbies in the U.S. have managed to receive direct payments from the government in the form of cash, subsidized credit, and free crop insurance.[17] Also, large oil companies have enjoyed lower than average effective tax rates (by about 20 percent of the tax rate) and other privileges such as accelerated depreciation and expensing of investment equipment, which in 1995 may have added up to well over $5 billion (Koplow and Martin. 1998). Although the

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[16] For example, while workers may want to protect their jobs in an industry, firms may find it preferable to outsource parts of their activities to other countries and import the products as inputs.

[17] Between 1999 and 2001, $64.2 billion was paid to farmers in direct subsidies (Reidl, 2002). Over 90 percent of this amount went to the producers of wheat, corn, cotton, soybeans, and rice.

government may adopt some measures of protection to supplement subsidies in these cases, it seems to use protection more intensively elsewhere, as the following analysis of the estimates of (3.1) suggests.

The regressions in last two columns of Table 2 imply that the prevalence of smaller, less capital intensive firms and lower skill workers in an industry is associated with higher values of τ_i. The firm scale and capital intensity effects are immediately visible from their negative coefficient estimates. The skill effects can be seen from the positive signs of labor share variables. It is also reflected in the fact that the coefficient of the share of "skilled workers," who are closest to the engineers and scientists, is the lowest among the four categories. In fact, the hypothesis that this coefficient is the same as those of the other labor categories can be easily rejected at the 5 percent level. The coefficients of the other three categories are similar to each other and cannot be statistically distinguished. The relatively high positive coefficient for white-collar workers may seem puzzling because that category includes executives and managers. However, the puzzle may be explained by noting that the category is also heavily populated by secretarial and clerical employees, whose conditions have similarities with those of semi-skilled workers.

The observed relationship between τ_i and industry characteristics may have a number of different explanations. A key issue that separates the possible political economy explanations is whether the industries with characteristics that raise τ_i are the same ones that make larger political contributions. If this is the case, then the estimates of the complete model could still be consistent with the "protection for sale" hypothesis and the decline in the statistical significance of β could be due to the inferiority of the measures used for I_i compared to the industry characteristics included in $\mathbf{z}_i$. To explore this issue, I regressed PAC contributions on the components of $\mathbf{z}_i$ and experimented with the regression by dropping subgroups of those components and by adding controls for seller and buyer concentration and industry size (or "stake," proxied by logs of employment and value added), all of which may affect contributions.[18] Four prominent examples of these experiments are shown in Table 4. For our purposes, the most notable fact that emerges from this exercise is that the components of $\mathbf{z}_i$ that prove statistically significant in such regressions—capital-sales ratio and shares of lower skilled workers—carry coefficients that imply a

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[18] The inclusion of these controls follows Gawande's (1998) empirical study of Stigler-Olson-type lobbying behavior proposed by Magee, Brock, and Young (1989). While Gawande had focused on the role of value added and seller concentration, it seems natural that other measures of size and concentration—such as employment size, buyer concentration—may also be influencing PAC contributions. The coefficient of seller concentration turns out to be negative, which is surprisingly different from Gawande's result. A key difference between his regressions and those in Table 4 is that he does not control for the industry characteristics included in Table 4. The coefficient of buyer concentration turns out to be positive suggesting that industries may have to pay more when they face buyers with larger stakes. It should be pointed out that using shipment as a measure of size, scaling the dependent variable by value added, or using the dollar amount of value added rather than its log do not change the main conclusions.

negative association between τ_i and PAC contributions.[19] This suggests that the higher values assigned by trade policy to the earnings of low skill workers and less capital intensive firms are unlikely to be due to the political contributions of these groups. If anything, these groups seem to contribute less than others! Thus, the priorities given by trade policy to such groups must be based on the political pressure that they can exert through their coordinated votes and other types of collective action, rather than contributions. Notably, this is also what Baldwin and Magee (2000) observe about the role of less educated workers in GATT and NAFTA bills.

Given the above observations, any explanation of the estimated τ_i expression must also explain the pattern of PAC contributions found in Table 4. Such an explanation must show why lower skill workers and smaller, less capital intensive firms seems to be relatively effective in exerting political pressure and why their pressure leads to benefits in the form of protection, rather than more direct transfers. Since organizing large numbers of low skill workers and small firms is likely to be costly, the motive for effective political pressure must come from high valuation of marginal earnings on their part. Such a valuation can coexist with low political contributions if these groups face credit and insurance market constraints. This is particularly plausible because the moral hazard and adverse selection problems that are the sources of those constraints can also impede the government's use of direct transfers because the presence of those problems means that it is costly to identify and target the eligible individuals and their exact needs.[20] Consequently, protection is used as a second-best policy that responds not so much to contributions than to the needs that are difficult to meet otherwise.

Could the pattern of protection found here have emerged simply because NTBs can exist only when an industry has a comparative disadvantage and faces import competition? Industries relying on less capital and less skilled workers do seem to be the ones with comparative disadvantage in the US economy. But, the same elements in the pattern of protection seem to prevail in other countries with very different resource endowments as well. For example, the protection of low-wage workers appears to be

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[19] The significance levels of the estimated coefficients of the components of $\mathbf{z}_i$ are generally low when employment size and concentration ratios are not included in the regression, as shown in the first column of Table 4. This suggests that multicollinearity between I_i and the components of $\mathbf{z}_i$ is unlikely to be the reason for the low significance of β in Tables 2 and 3.

[20] As the countries with direct benefit programs for small firms have discovered, the number of small firms quickly swells under such programs. Some firms that should be large, restructure themselves and many firms that are in effect large present themselves as small only to become eligible for the program benefits. Indian small firm policies are a prime example of such an effect. The inefficiencies that arise as a result of such programs can easily exceed the costs of protection. For detailed discussion of these issues see Little et al. (1987) and Kilby (1989).

universal (Pack, 1994; Lee and Swagel, 1997). Association of high protection with low-wage workers as well as small and less capital intensive firms has also been found in the case of Turkey, using a framework similar to present one (Esfahani and Leaphart, 2001).

For diagnostic purposes, I ran further regressions with alternative lists of independent variables. Table 3 shows examples of such experiments. The second column reports the consequences of replacing the cost share of capital with that of cropland as the instrument for the sales-import ratio, x_i/m_i. The third column shows the result of another change in the independent variables, namely, using the share of white-collar workers in total cost as the instrument for firm size. As these regressions show, while the selection of instruments naturally affects the magnitude of estimated coefficients to some extent, the basic conclusions are robust to such modifications.

There may be a concern that the noise in the dependent variable is somehow related to industry characteristics and may be causing a heteroskedasticity problem. The use of 2SLS in place of the Tobit procedure may also potentially exacerbate this problem. To deal with this issue, I used White's heteroskedasticity test with cross terms of independent variables included in the diagnostic regression. The test returned an F-statistic of 0.84 with a p-value of 0.75, easing any concern over heteroskedasticity.

Further diagnostic results are shown in Table 5. According to the first column of this table, eliminating the lobby indicator from the regression does not change the other results. Nor do the estimates change in any major way when the observations with the incorrect elasticity sign are dropped (see the second column). The third column shows that replacing "scale" by the average sales per firm as the measure of firm size also has little impact on the conclusions that one can draw regarding the determinants of τ_i, except that the estimate of β becomes significantly negative. This latter change makes it even clearer that contribution-based lobby indicators may not work well in the equation that determines protection rates.

A final issue to note is the importance of import price elasticity in the trade policy equation. Running the regressions without μ_i on the left-hand side shows that while the coefficients generally maintain their signs, their statistical significance levels diminish and the two sides of the equation do not fit together as well as the case where the elasticity is present (see the last column of Table 5). This is remarkable because the elasticity estimates are noisy and can have adverse effects on the fit of the regression. In fact, earlier studies had not found evidence of a discernible role for the import price elasticity other than the need to include it in the regression to ensure conformity with theory. The fact that despite the presumed noise, the estimates of μ_i help the elements of a larger story fit together so much better provides support for all political economy models of trade policy, which are unanimous on highlighting the role of the import price elasticity.

5. Further Extensions

In this section, we examine a number of possible extensions of the above model and their empirical implications. The motivation for the extensions discussed here is to demonstrate further empirical relevance of the approach, especially regarding issues already explored in the literature.

5.1. Alternative Redistribution Schemes for Trade Taxes

The equal distribution of trade taxes to all individuals is a convenient theoretical assumption in the GH model. But, its implication that no premium is attached to government revenues has empirical consequences that cannot be ignored. In particular, in the trade policy equation, it is responsible for the zero intercept, which is at odds with the estimation results.

To account for a premium on public funds, one simple way is to assume that there is a public good that the government finances through a costly tax.[21] Suppose that only T units of this good can be produced and that each unit costs one dollar and generates a utility v per unit of population. Let the cost of raising one dollar of taxes be θ dollars and assume that $v > 1+\theta$ so that the good is worth producing. The total net benefit of the good for the population would then be $vT - (1+\theta)T$. In this situation, instead of distributing revenues of trade taxes to the public, the government can use them to reduce the burden of other taxes. Then, assuming that the fund needed for the public good is larger than the proceeds of trade taxes, $T > \sum_{j=1}^{n} t_j m_j$, the marginal benefit of each dollar of trade tax would be 1+θ dollars. If we maintain the assumption of equal distribution of costs and benefits across individuals, the aggregate welfare would be:

$$(5.1) \qquad W = \sum_{j=1}^{n} \tau_j \pi_j + (1+\theta) \sum_{j=1}^{n} t_j m_j + 1 + \sum_{j=1}^{n} s_j(p_j) + (v - 1 - \theta)T,$$

and the utility of the owners of specific asset i becomes:

$$(5.2) \qquad W_i = \tau_i \pi_i + \alpha_i \left[(1+\theta)\sum_{j=1}^{n} t_j m_j + 1 + \sum_{j=1}^{n} s_j(p_j) + (v - 1 - \theta)T \right].$$

The tariff rates that maximize the joint surplus of the government and the lobbies in this case would be:

$$(5.3) \qquad \mu_i \frac{t_i}{p_i^*} = \frac{\theta}{1+\theta} + \frac{1}{1+\theta}\left[\frac{(1+\beta I_i)\tau_i}{1+\beta\alpha_L} - 1\right]\left(\frac{x_i}{m_i}\right).$$

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[21] Assuming that the good provided by the government is a private one does not change the end result because the key issue in the analysis that follows is that trade taxes are substitutes for other costly taxes.

Clearly, allowing for a premium on public funds results in an intercept in the tariff equation and has a scaling effect on the rest of the equation. Estimating (5.3) is equivalent to the estimation of (2.8) with an intercept, except that η_j's change slightly when one takes account of the $1/(1+\theta)$ multiplier in (5.3). The first column of Table 6 shows the result of estimating (5.3) with the full specification of $\boldsymbol{\eta}'\mathbf{z}_i$ but without the lobby indicator, which is insignificant anyway. Comparing the η_j's from this regression with those reported in the first column of Table 5 makes it clear that they do not change much when the premium on public funds is explicitly introduced into the model. The results of estimation further show that θ is approximately 0.14 and significantly different from zero. That is, if we ignore the deadweight losses caused by protection, an additional dollar of tariff revenue can save 14 cents by reducing the need for other costly taxes. This saving is, of course, balanced by the inefficiencies that protection entails.

The introduction of a publicly-provided good and costly taxation is only one way of arriving at an equation like (5.3), though it seems a plausible and relevant one. In the context of the model in section 2, one can generate a result similar to (5.3) by simply changing the redistribution scheme. For example, if trade taxes are distributed only to those associated with lobbies (say, in the form of reduction in other taxes), then assuming equal distribution among the recipients, the joint surplus can be expressed as

$$(5.4) \qquad W + \beta \sum_{j \in L} W_j = \sum_{j=1}^{n} (1 + \beta I_j) \tau_j \pi_j + (1+\beta) \sum_{j=1}^{n} t_j m_j \ (1+\beta\alpha_L) \left[1 + \sum_{j=1}^{n} s_j(p_j) \right].$$

Maximizing this function with respect to t_i's yields a version of (5.3) with $\theta = \beta(1-\alpha_L)/(1+\beta\alpha_L)$. The model can be further altered by assuming that the redistributions go to the firms in the organized industries and, as a result, receive different valuations in different industries. With equal distribution among the recipient firms, (5.3) can again be derived with θ representing:

$$(5.5) \qquad \theta = \beta \frac{\sum_{j=1}^{n} \alpha_j (\tau_j / \alpha_L - 1)}{1 + \beta \alpha_L}.$$

These are, of course, only a few examples of distribution schemes. By varying the details of the scheme one can obtain trade policy equations that are different in their parameterization details, but the structure of the solution generally resembles that of (5.3) with θ taking on different specifications. One may then be able to infer the values of the more detailed parameters from the estimates found for θ, or extend the model further and study the schemes through which tariffs and quota premia are redistributed.

5.2. Other Sources of Variation in the Valuation of Industry Rents

Our focus so far has been on market imperfections that may cause variation in the valuation of industry rents and may, thus, motivate different tariff rates across industries. But, there are other factors that can give rise to such variation as well and they can be generally handled using a similar approach. Here I examine one such factor: the concerns of import-competing industries that export a differentiated product and face the possibility of retaliation in other countries when they receive protection at home. This point has been made by a number of authors and has found support in linear regressions that show an inverse relationship between protection and export-orientation (Finger, Hall, and Nelson, 1982; Lee and Swagel, 1997; Trefler, 1993). From our perspective, the question is how this effect should be incorporated into the GH framework and whether there is empirical support for it in that context.

To model this effect, suppose that besides producing the goods that compete with imports, each industry produces a differentiated good that is sold only in foreign markets. For simplicity, assume that industry i produces its export variety at a fixed quantity, e_i, from its specific asset at no additional cost. Therefore, if the price of the export good in other countries is q_i and the foreign tariff is r_i, industry i will enjoy $e_i(q_i - r_i)$ dollars in additional profits. Adding these to the profits already accounted for in equations (5.1) and (5.2), the joint surplus for the government and the lobbies becomes:

$$(5.6) \qquad W + \beta \sum_{j \in L} W_j = \sum_{j=1}^{n} (1+\beta I_j)\tau_j[\pi_j + e_j(q_j - r_j)] + (1+\beta\alpha_L)\left[\sum_{j=1}^{n} t_j m_j + 1 + \sum_{j=1}^{n} s_j(p_j) + (v - 1 - \theta)T\right],$$

Now, assume that foreign countries retaliate against the tariff t_i in the home country by setting their tariff equal to $r_i = \varphi\, t_i$, where φ is a positive parameter. Then, the equilibrium tariff rates can be derived from:

$$(5.7) \qquad \mu_i \frac{t_i}{p_i^*} = \frac{\theta}{1+\theta} + \frac{1}{1+\theta}\left[\frac{(1+\beta I_i)\tau_i}{1+\beta\alpha_L}\left(1 - \varphi\frac{e_i}{x_i}\right) - 1\right]\left(\frac{x_i}{m_i}\right).$$

This equation shows that under our assumptions, the export-output ratio enters the trade policy equation as an interactive term that diminishes the roles of I_i and τ_i. The more an industry exports and the stronger the reaction of foreign countries to protection in the home country, the smaller is the benefit of protection to the industry and the lower would be the equilibrium trade barrier. Changing the specification of the model does not change the basic structure of equation (5.7) much, though it may affect the interpretation of its parameters, especially φ. For example, making e_i responsive to the foreign price renders φ as a function of the elasticity of export supply, which is a refinement of (5.7) but maintains its basic structure.

It is also possible that the foreign reaction parameter, φ, may vary according to industry characteristics. This can again be incorporated in (5.7) by expressing φ as a function of the relevant variables.[22]

To examine the empirical relevance of the new feature in (5.7), I experimented with the specification where φ is assumed to be constant across industries and where all exports of import competing industries included in the sample can be treated as differentiated goods. To measure e_i/x_i, I formed the ratio of exports to domestic shipments for each industry. Like other variables formed based on sales, this one also needs instruments, for which I used the cost shares of white-collar workers and engineers and scientists. Following the same first-stage procedures as before, I estimated (5.7). The second column of Table 6 shows the results with the lobby indicator and its instruments dropped from the regression for the sake of parsimony. As expected, φ turns out to be positive and statistically significant at the 5 percent level, though its magnitude is quite low. The other results remain largely intact, except that the share of skilled workers in the τ_i expression loses significance and the coefficient for the unskilled workers rises relative to those of semi-skilled and white collar workers. This coefficient reordering is interesting because it better conforms to the prediction that the coefficients of these terms should decline with the skill level.

6. Conclusion

Our search for the forces behind protection has led not so much to the dark hands of the lobbies than to the stark handicaps of imperfect markets. This is not to say that political contributions are irrelevant. Rather, it seems that there are other factors that also influence trade policy and interact with contributions. Lobby contributions are important because they make the policy-induced rents in an industry valuable to the politicians and compensate them for the welfare losses they impose on others as a result of protecting the industry. The GH model captures the essence of such effects and shows that industries that organize themselves more effectively and make more contributions to the politicians should receive more protection. But, the value of industry rents may vary due to factors other than political contributions as well. This idea is particularly important because the empirical investigation of the basic GH model has posed difficult dilemmas. Thinking about alternative causes of variation in the valuation of industry rents seems to be a way out.

The new empirical results found in this paper are remarkable in that they point to the presence of major effects that are distinct from the pure "protection-for-sale" effect. They link protection to less

[22] One can also consider the reaction of foreign countries to the entire set of tariffs in the home country. That would certainly complicate the model and introduce new effects as the literature on trade talks and trade wars has

skilled workers and smaller and less capital intensive firms, which are not commonly viewed as the most organized and politically influential groups. These groups seem to receive more protection because they demand relief from the tight capital and insurance constraints that they face and alternative (budgetary and regulatory) channels of supporting them are difficult to use. Industries with better organizations and greater political influence are typically more concentrated with larger firms, which are in a better position to benefit from fiscal and financial policies. Such industries may be receiving a lot of rents, but largely through more efficient transfers than through inefficient trade restrictions. It is in the case of more dispersed and hard-to-reach groups that the politicians have to resort to the inferior protection policies, hence an explanation why lobby contributions do not show up as significant in the trade policy equation. The case for the role of credit constraint is strengthened by the further finding that lower skill workers and less capital intensive firms tend to make less political contributions. They do seem to demand government intervention and receive more protection, but they have difficulty offering cash and rely mostly on coordinated votes and other political mechanisms for making their demands count.

There are, of course, other potential factors besides credit and insurance constraints that may induce differential valuation of industry rents and, thus, cause variation in protection rates across industries. For example, when import-competing industries export a differentiated product, the degree of vulnerability to foreign retaliation could be different among industries, influencing their motivation to seek protection. Modification of the GH framework to account for this effect and the empirical support that it finds suggest that further work and more thorough modeling in this respect could be rewarding.

The perspective that emerges from the present study has important implications for the on-going process of globalization. On the one hand, as Rodrik (1997) argues, globalization has enhanced the mobility of capital and skilled labor, which may have reduced the income security of less skilled workers and small local firms. This seems to have fueled opposition to further globalization and has increased the demand for government support programs. On the other hand, globalization has been accompanied by advancements in financial and insurance markets and in institutions of social insurance, which can work in the opposite direction and diminish the risk concerns of a wider range of workers and firms. The balance depends on the relative strengths of the two effects. Of course, this does not diminish the importance of conscious efforts at the national and multilateral levels to implement policies that help alleviate the risks of globalization and ensure the realization of its benefits.

Further work on the subject of this paper requires deriving the variation in industry rents from basic principles. Also, it is important to consider trade policy together with industrial and fiscal policies to

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demonstrated (see Grossman and Helpman, 1995).

examine the role of lobbying and other influences on public policy more comprehensively. This line of research is important because the implications for economic policy and reform programs could be enormous. Already the results of this paper highlight the significant role that fiscal and financial systems and social safety nets may play in ensuring greater and more sustainable openness in the world economy.

Table 1a

Summary Statistics of Variables Used in Regressions

Number of Observations: 299

Variable	Mean	Minimum	Maximum	Standard Deviation
NTB Coverage Ratio (proxy for t_i/p_i^*)	0.1116	0.0000	1.0000	0.2372
Short Run import price elasticity (μ_i)	0.9448	0.0001	6.6303	0.9545
Dependent Variable: $\mu_i t_i/p_i^*$	0.1074	0.0000	2.9314	0.3488
Ratio of Domestic Shipments to Imports (x_i/m_i)	86.022	0.2670	7019.8	436.9
Log(1+Scale or Share of Median Plant in Sales)	0.02889	0.0003	0.5293	0.0515
Log(Capital-Sales Ratio)	–1.2266	–3.0336	0.4258	0.5756
Log(Sales per Firm in Billions of Dollars)	–4.8690	–7.7759	–0.4383	1.3058
Log(1+Share of Unskilled Workers)	0.0774	0.0000	0.4140	0.0566
Log(1+Share of Semi-Skilled Workers)	0.3286	0.1431	0.5557	0.0847
Log(1+Share of Skilled Workers)	0.1799	0.0000	0.3977	0.0624
Log(1+ Share of While Collar Workers)	0.2473	0.0829	0.5244	0.0721
Percent of Workers Unionized	0.3449	0.0630	0.7540	0.1296
Four-Firm Seller Concentration	0.3797	0.0500	0.9400	0.1870
Ratio of Exports to Domestic Shipments	0.1098	0.0000	0.9847	0.1489
Share of Physical Capital in Total Cost	0.1105	0.0162	0.2849	0.0335
Share of Unskilled Labor in Total Cost	0.0377	0.0035	0.2190	0.0276
Share of Semi-Skilled Labor in Total Cost	0.1165	0.0193	0.2525	0.0396
Share of Skilled Labor in Total Cost	0.1008	0.0133	0.2439	0.0399
Share of Engineers & Scientists in Total Cost	0.0309	0.0023	0.1397	0.0212
Share of White Collar Labor in Total Cost	0.1560	0.0257	0.3288	0.0403
Share of Pasture in Total Cost	0.0076	0.0001	0.2504	0.0265
Share of Cropland in Total Cost	0.0224	0.0002	0.4798	0.0593

Table 1b. Correlation Matrix of Explanatory and Explained Variables

Variable	Political Organization Indicator (I_i)	NTB Coverage Ratio (proxy for t_i/p_i^*)	Short Run import price elasticity (μ_i)	Dependent Variable: $\mu_i t_i/p_i^*$	Ratio of Domestic Shipments to Imports (x_i/m_i)	Log(1+Scale, or Share of Median Plant in Sales)	Log(Capital-Sales Ratio)	Log($B Sales per Firm)	Log(1+Share of Unskilled Workers)	Log(1+Share of Semi-Skilled Workers)	Log(1+Share of Skilled Workers)	Log(1+ Share of While Collar Workers)
Political Organization Indicator (I_i)	1.000	-0.076	-0.143	0.061	-0.035	0.126	0.068	0.268	-0.204	-0.334	0.181	0.351
NTB Coverage Ratio (proxy for t_i/p_i^*)	-0.076	1.000	0.008	0.697	0.027	-0.059	-0.125	0.186	0.170	0.130	-0.158	-0.111
Short Run import price elasticity (μ_i)	-0.143	0.008	1.000	0.283	0.026	-0.100	-0.109	-0.031	0.099	0.121	-0.041	-0.111
Dependent Variable: $\mu_i t_i/p_i^*$	0.061	0.697	0.283	1.000	0.129	-0.038	-0.170	0.178	0.135	0.068	-0.129	-0.025
Ratio of Domestic Shipments to Imports (x_i/m_i)	-0.035	0.027	0.026	0.129	1.000	-0.057	0.006	-0.062	0.108	0.009	-0.049	0.005
Log(1+Scale)	0.126	-0.059	-0.100	-0.038	-0.057	1.000	0.052	0.257	0.028	0.007	-0.036	-0.067
Log(Capital-Sales Ratio)	0.068	-0.125	-0.109	-0.170	0.006	0.052	1.000	0.202	0.043	-0.128	0.134	-0.012
Log($B Sales per Firm)	0.268	0.186	-0.031	0.178	-0.062	0.257	0.202	1.000	0.055	-0.300	0.097	0.137
Log(1+Share of Unskilled Workers)	-0.204	0.170	0.099	0.135	0.108	0.028	0.043	0.055	1.000	0.111	-0.304	-0.445
Log(1+Share of Semi-Skilled Workers)	-0.334	0.130	0.121	0.068	0.009	0.007	-0.128	-0.300	0.111	1.000	-0.526	-0.677
Log(1+Share of Skilled Workers)	0.181	-0.158	-0.041	-0.129	-0.049	-0.036	0.134	0.097	-0.304	-0.526	1.000	0.019
Log(1+ Share of While Collar Workers)	0.351	-0.111	-0.111	-0.025	0.005	-0.067	-0.012	0.137	-0.445	-0.677	0.019	1.000

Table 2
Explaining $\mu_i t_i / p_i^*$: 2SLS Estimation Results for Equations (2.8) and (2.9)
(*p-Values Given in Italics Below Each Coefficient Estimate*)

Model	GH Model ($\tau_i = 1$) [*Equation (2.9)*]	Capital Stock and Firm Size Effects Included in $\mathbf{z}_i$ [*Equation (2.8)*]	Complete Model [*Equation (2.8)*]	Lobby Indicator Based on Relative Contribution [*Equation (2.8)*]
Parameters				
Constant	0.0520 *0.0201*	0.0700 *0.0009*	0.1176 *0.0000*	0.1248 *0.0000*
β [Lobby Indicator]	0.0016 *0.0000*	0.0004 *0.4342*	0.0000 *0.9738*	0.0000 *0.9339*
η_0 [Constant]	0.9998 *0.0000*	0.9993 *0.0000*	0.9689 *0.0000*	0.9693 *0.0000*
η_1 [Log(1+Scale)]		–0.0815 *0.0005*	–0.0559 *0.0033*	–0.0638 *0.0004*
η_2 [Log(Capital/Sales)]		–0.0009 *0.0249*	–0.0011 *0.0007*	–0.0010 *0.0000*
η_3 [Log(1+Scale) ×Log(Capital/Sales)]		–0.0499 *0.0004*	–0.0376 *0.0014*	–0.0432 *0.0006*
η_4 [Log(1+Share of Unskilled)]			0.0339 *0.0014*	0.0354 *0.0004*
η_5 [Log(1+Share of Semi-Skilled)]			0.0393 *0.0002*	0.0391 *0.0005*
η_6 [Log(1+Share of Skilled)]			0.0250 *0.0195*	0.0220 *0.0514*
η_7 [Log(1+Share of White Collar)]			0.0357 *0.0036*	0.0355 *0.0038*
R^2	0.061	0.297	0.336	0.334
Adjusted R^2	0.055	0.285	0.315	0.313
Number of Observations	299	299	299	299

Table 3

Explaining $\mu_i t_i / p_i^*$: Some Diagnostics of the Estimates of Equation (2.8)

(*p-Values Given in Italics Below Each Coefficient Estimate*)

Model	Using Additional Instruments for the Lobby Indicator [a]	Alternative Instrument for Sales-Import Ratio [b]	Alternative Instruments for Firm Size and Capital/Sales [c]
Parameters			
Constant	0.0964	0.1073	0.1028
	0.0000	*0.0001*	*0.0000*
β [Lobby Indicator]	0.0004	0.0004	0.0002
	0.1947	*0.4073*	*0.6394*
η_0 [Constant]	0.9808	0.9732	0.9745
	0.0000	*0.0000*	*0.0000*
η_1 [Log(1+Scale)]	–0.0474	–0.0541	–0.0375
	0.0011	*0.0065*	*0.0518*
η_2 [Log(Capital/Sales)]	–0.0010	–0.0009	–0.0012
	0.0000	*0.0031*	*0.0000*
η_3 [Log(1+Scale)	–0.0281	–0.0359	–0.0231
×Log(Capital/Sales)]	*0.0016*	*0.0029*	*0.0630*
η_4 [Log(1+Share of Unskilled)]	0.0198	0.0301	0.0279
	0.0233	*0.0077*	*0.0063*
η_5 [Log(1+Share of Semi-Skilled)]	0.0259	0.0337	0.0323
	0.0032	*0.0022*	*0.0012*
η_6 [Log(1+Share of Skilled)]	0.0130	0.0207	0.0193
	0.1357	*0.0570*	*0.0532*
η_7 [Log(1+Share of White Collar)]	0.0206	0.0307	0.0287
	0.0385	*0.0159*	*0.0129*
R^2	0.394	0.381	0.369
Adjusted R^2	0.375	0.361	0.349
Number of Observations	299	299	299

[a] The unionization and the share of engineers and scientists in total cost used as additional instruments.
[b] The shares of cropland in total cost used as the instrument.
[c] The shares of white-collar workers and cropland in total cost used as the instruments.

Table 4
Association of PAC Contributions with Industry Characteristics:
Dependant Variable: PAC Contributions in Millions of US Dollars
(*p-Values Given in Italics Below Each Coefficient Estimate*)

Model	**(1)**	**(2)**	**(3)**	**(4)**
Right-Hand Side Variables				
Constant	4.0922 *0.4822*	–0.3433 *0.9553*	–10.6561 *0.0016*	–1.2584 *0.8341*
Log(1+Scale)	–6.1049 *0.5695*	–5.5262 *0.6100*	–3.5352 *0.7580*	
Log(Capital/Sales)	0.6596 *0.0953*	0.7776 *0.0473*	0.8282 *0.0483*	
Log(1+Scale)×Log(Capital/Sales)	–12.0342 *0.1234*	–13.3525 *0.0828*	–11.3732 *0.1656*	
Log(1+Share of Unskilled)	–6.1663 *0.3121*	–14.6160 *0.0231*		–14.6883 *0.0211*
Log(1+Share of Semi-Skilled)	–7.9105 *0.2356*	–12.2819 *0.0662*		–12.5384 *0.0575*
Log(1+Share of Skilled)	4.9030 *0.4620*	–1.5956 *0.8135*		–1.1341 *0.8651*
Log(1+Share of White Collar)	10.5278 *0.1516*	2.8152 *0.7077*		2.1329 *0.7736*
Log(Number of Employees)		–0.9380 *0.0069*	–1.1907 *0.0006*	–0.8969 *0.0104*
Log(Value Added in Millions of $)	–0.0130 *0.9383*	0.7061 *0.0328*	1.3529 *0.0000*	0.6540 *0.0498*
Four-Firm Seller Concentration (Market share of four biggest sellers)		–2.8820 *0.0249*	–2.1383 *0.1187*	–0.9047 *0.4081*
Four-Firm Buyer Concentration (Market share of four biggest buyers)		6.1507 *0.0196*	5.9350 *0.0330*	6.6509 *0.0125*
R^2	0.215	0.251	0.102	0.224
Adjusted R^2	0.195	0.224	0.082	0.204
Number of Observations	299	299	299	299

Table 5

Explaining $\mu_i t_i/p_i^*$: More Diagnostics of the Estimates of Equation (2.8)

(*p-Values Given in Italics Below Each Coefficient Estimate*)

Model	Lobby Indicator Dropped	Observations Dropped When Elasticity Has Incorrect Sign	Using Log(Sales Per Firm) as Firm Size	t_i/p_i^* as Dependent Variable (μ_i Dropped)
Parameters				
Constant	0.1240	0.1403	0.1220	0.1316
	0.0000	*0.0000*	*0.0000*	*0.0000*
β [Lobby Indicator]		–0.0001	–0.0012	0.0000
		0.9097	*0.0304*	*0.8655*
η_0 [Constant]	0.9691	0.9609	0.9713	0.9877
	0.0000	*0.0000*	*0.0000*	*0.0000*
η_1 [Log(Firm Size)][a]	–0.0636	–0.0608	–0.0008	–0.0211
	0.0004	*0.0221*	*0.0058*	*0.1127*
η_2 [Log(Capital/Sales)]	–0.0010	–0.0012	–0.0058	–0.0004
	0.0000	*0.0085*	*0.0000*	*0.0921*
η_3 [Log(Firm Size) ×Log(Capital/Sales)][a]	–0.0429	–0.0403	–0.0009	–0.0116
	0.0003	*0.0110*	*0.0014*	*0.1603*
η_4 [Log(1+Share of Unskilled)]	0.0355	0.0444	0.0214	0.0160
	0.0003	*0.0010*	*0.0260*	*0.0324*
η_5 [Log(1+Share of Semi-Skilled)]	0.0394	0.0491	0.0314	0.0168
	0.0002	*0.0029*	*0.0018*	*0.0279*
η_6 [Log(1+Share of Skilled)]	0.0224	0.0304	0.0207	0.0069
	0.0339	*0.0200*	*0.0278*	*0.3683*
η_7 [Log(1+Share of White Collar)]	0.0358	0.0455	0.0288	0.0131
	0.0020	*0.0082*	*0.0078*	*0.1223*
R^2	0.337	0.327	0.309	0.088
Adjusted R^2	0.319	0.302	0.287	0.061
Number of Observations	299	257	299	299

[a] Firm size is measured by 1+ scale, except in the third column where it is average sales per firm.

Table 6

Explaining $\mu_i t_i/p_i^*$: The Role of Public Fund Premia and Retaliation on Differentiated-Good Exports

(*p-Values Given in Italics Below Each Coefficient Estimate*)

Model	**Allowing for a Premium on Public Funds** [*Equation (5.3)*]	**Adding the Foreign Retaliation Effect on Differentiated-Good Exports** [*Equation (5.7)*]
Parameters		
θ (Premium on Public Funds)	0.1415 *0.0000*	0.1223 *0.0000*
φ [Share of Exports in Sales]		0.0044 *0.0380*
η_0 [Constant]	0.9647 *0.0000*	0.9831 *0.0000*
η_1 [Log(1+Scale)]	–0.0726 *0.0005*	–0.0349 *0.0175*
η_2 [Log(Capital/Sales)]	–0.0012 *0.0000*	–0.0011 *0.0000*
η_3 [Log(1+Scale) ×Log(Capital/Sales)]	–0.0489 *0.0004*	–0.0249 *0.0080*
η_4 [Log(1+Share of Unskilled)]	0.0405 *0.0007*	0.0231 *0.0085*
η_5 [Log(1+Share of Semi-Skilled)]	0.0450 *0.0004*	0.0190 *0.0514*
η_6 [Log(1+Share of Skilled)]	0.0255 *0.0396*	0.0120 *0.1741*
η_7 [Log(1+Share of White Collar)]	0.0408 *0.0033*	0.0195 *0.0656*
R^2	0.337	0.405
Adjusted R^2	0.319	0.386
Number of Observations	299	299

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