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LOBBYING COMPETITION OVER TRADE POLICY*

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Competition between opposing lobbies is an important factor in the endogenous determination of trade policy. This article investigates the consequences of lobbying competition between upstream and downstream producers. The theoretical structure underlying the empirical analysis is the well-known Grossman–Helpman model of trade policy determination, modified to account for the cross-sectoral use of inputs (itself a quantitatively significant phenomenon, with around 50% of manufacturing output being used by other sectors rather than in final consumption). Our empirical results validate the theoretical predictions. Importantly, accounting for lobbying competition also alters substantially estimates of the "welfare-mindedness" of governments in setting trade policy.

1. INTRODUCTION

Interest group theories of endogenous trade policy determination describe trade policy outcomes as resulting from the interaction between governments and special interest lobbies. As lobbies representing different economic interests may each seek to move policy in a different direction, theoretical predictions regarding policy outcomes remain sensitive to the nature and extent of competition between lobbies. Consider, for instance, policy determination in the textbook, partial-equilibrium model of the market for final-good importables. Since trade barriers against imports raise profits of domestic suppliers, these suppliers have an incentive to lobby the government for such barriers to be imposed in their respective sectors; the more susceptible government policy is to special interest lobbying, the greater the predicted departures from free trade.[2] Alternately, in a more general context, where producers are linked across sectors by their use of each others' outputs as intermediates in their own production, the pattern of lobbying and equilibrium protection can be expected to be more complex. In particular, manufacturers would have an incentive to lobby for lower tariffs on goods they use as inputs—in direct opposition to suppliers of these inputs, who would favor high barriers instead.[3] Since these competing lobbies may cancel each other out, free trade may emerge as an equilibrium even

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[2] Although consumers are hurt by these barriers and may be expected to lobby against them as well, the analysis usually makes the (empirically compelling) assumption that consumers are not well organized into pro-trade lobbies. See Olson (1965) for potential explanations.

[3] A recent example is the lobbying for the removal of protection on steel imports by automobile manufacturers in the United States. As reported by the *Wall Street Journal* (on December 16, 2006), "The steel antidumping duties in the United States were brought down partly by a coalition of otherwise rival firms. The case against the steel duties brought together rival U.S. and Japanese auto makers—General Motors Corp., Ford, and Daimler-Chrysler AG joined forces with Toyota Motor Corp., Honda Motor Co., and Nissan Motor Co." We should note that our analysis does not focus in particular on the steel sector, and the determinants of import barriers in this sector may very well include other important factors such as the location of steel production in the United States, as explored in the "swing-state" theory of trade protection by Muuls and Petropolou (2007).

in settings where governments are highly amenable to lobbying. Thus, the degree of lobbying competition matters crucially, and studying its scope and extent is important for understanding the determinants of the policies we observe.

It is the goal of this article to examine empirically the political economy of trade policy determination in the presence of lobbying competition—where the competition over policy is assumed to arise out of the opposing interests of upstream and downstream producers of goods. The approach we take here is a structural one. As a theoretical platform for our empirical analysis, we use the well-known interest group model of endogenous trade policy determination provided by Grossman and Helpman (1994)—henceforth GH—who model governments as trading away economic welfare for political contributions by lobbies. In GH, protection is thus sold to lobbies, and the level of protection provided to any industry is derived as a function of certain industry characteristics (such as the presence of lobbies, the import demand elasticity, and the import-penetration ratio) and importantly, the rate at which the government trades off welfare for political contributions. Our empirical analysis is based on a simple modification of this framework that takes into explicit account the extent of cross-sectoral use of intermediates in production (the input–output matrix),[4] itself a quantitatively significant phenomenon, with around 50% of a sector's output being used by other sectors rather than in final consumption.

In addition to our intrinsic interest in the extent and consequence of lobbying competition,[5] many empirical examinations of interest group theory of trade policy determination using U.S. data (Goldberg and Maggi, 1999; Gawande and Bandyopadhyay, 2000) have found evidence, supporting the idea that trade protection is indeed for sale. However, all of these studies report very high estimates of the "welfare-mindedness" of governments (measured as the inverse of the rate at which the government trades off aggregate welfare for lobbying contributions). That is, the government appears to be close to welfare-maximizing in its behavior—demanding very high political contributions in exchange for a small amount of distortionary protection. This finding sits poorly with casual observations on the extent of lobbying and regulatory capture that appears to be taking place in most countries around the world and with specific findings in other studies (albeit not related to trade policy) that, if anything, policy distortions are being sold very cheaply. However, our earlier discussion suggests that lobbying competition modifies the picture in important ways. Specifically, imagine that competition between lobbies leads to free trade as an equilibrium outcome with a government that is willing to sell policy distortions cheaply. Observing the free trade outcome, but ignoring the extent of lobbying competition, may lead an analyst to conclude—incorrectly—that policy is being set by a welfare-maximizing government. Accounting for lobbying competition is thus important for the evaluation of the welfare-mindedness of governments in setting trade policy.[6]

Two previous examinations of the Grossman–Helpman model, Gawande and Bandopadhyay (2000) and McCalman (2004), have featured intermediates inputs. The primary motivation for including the use of intermediates in the Gawande–Bandyopodhyay and McCalman papers is to study the links between final goods tariffs and the tariffs on intermediate goods used in their production. In particular, these papers show that the higher the tariff on the output of the

[4] We should note that in GH, owners of capital in a given sector are able to lobby for lower protection on final goods that they consume. Although this serves as a reasonable theoretical proxy for intermediates use in production, from an empirical standpoint, this framework suffers from at least the deficiency that consumption preferences of producers are assumed identical across sectors, whereas intermediates use in different industries is clearly considerably heterogeneous in practice.

[5] As is well known, treating trade policy as endogenously determined has important implications for empirical analysis of the impact of trade policy changes as well. Thus, for instance, Karacaovali (2011) develops a model of the productivity effects of trade reform within a political economy framework and shows that treating reform as endogenous makes its estimated impact on productivity higher than estimates found in the previous literature.

[6] Other recent extensions of the theory have also improved the empirical fit of the model. See, for instance, Matschke and Sherlund (2006), who introduce labor market factors into the analysis, Freund and Ozden (2008) and Tovar (2009), who consider the implications for trade policy of "loss aversion" behavior on the part of lobbyists, Bombardini (2008), who considers empirically the implications of endogenous lobby formation as in the important model of Mitra (1999), and Facchini et al. (2006), who introduce imperfect rent capturing.

intermediate good, the greater is the tariff on its user. This is essentially a demonstration of the pass-through argument that has been well documented (outside the political economy context) in the literatures on tariff escalation and effective protection. Our motivation, instead, is to advance a theory of lobbying competition by users of intermediates in order to formally model the natural opposition to tariffs on intermediates (say, steel) by users of those intermediates (say, automobiles). Furthermore, in contrast to these earlier papers that feature a single intermediates goods sector, our theoretical structure allows for as many intermediate-good-producing sectors as required. This is important from an empirical perspective: A brief look at the U.S. input–output tables clearly indicates that the output of any single manufacturing sector is used as an intermediate input to production in a wide-ranging group of other sectors (including itself)—as is to be expected given the extent of complexity and specialization manifest in today's manufacturing technology. Overall, our framework is different from both these earlier papers in its motivation, its execution, and finally, as will become clear, in its predictions.

In our empirical implementation, we use data from more than 40 countries, spanning a wide per capita income range. This is in contrast with most of the recent empirical studies on the endogenous determination of trade policy, which have focused on the United States. Our use of data from a wider range of countries enables a more robust evaluation of the role of lobbying competition. We study the determinants of trade policy considering each country separately and exploit the cross-sectional variation across industries within any country to obtain estimates of the welfare-mindedness of governments. Our findings are as follows. First, lobbying competition between upstream and downstream producers appears to be a statistically and quantitatively significant determinant of trade policy. This is a robust finding extending through nearly our entire sample of countries. Second, with lobbying competition taken into account, our country-specific estimate of the welfare-mindedness of governments is lowered significantly in virtually every country in our sample (just as we have anticipated in our theoretical discussion in the preceding paragraph). These findings attest to the importance of lobbying competition in the endogenous determination of trade policy.

The rest of the article is organized as follows. In Section 2, we describe briefly the theoretical framework of endogenous protection with cross-sectoral linkages in production and lobbying competition. The data and econometric methodology used to estimate the theory's prediction regarding the cross-industry pattern of trade policy in the presence of lobbying competition is discussed in Section 3. Section 4 discusses results, and Section 5 concludes.

2. THEORY

This section presents the basic theoretical framework that guides our empirical analysis. We begin by describing endowments, preferences, and production technology in a small, open economy. Our framework is standard and borrows significantly from older contributions in the literature, most notably GH. As in GH, trade policy in this economy is assumed to be determined by the interaction between the government and organized interest groups—with the important modification that vertical linkages in production are taken into account to explore the role of lobbying competition. In studying these linkages, our analysis draws on the earlier formulation of Cadot et al. (2003), who investigate trade policy determination with import duty drawbacks offered on foreign intermediates, and Duttagupta and Panagariya (2007), who analyze how, in the presence of intermediate goods, the choice of rules of origin alters the political feasibility of free trade agreements.[7]

Consider a small, open economy with $n + 1$ tradable sectors. Individuals in this economy are assumed to have identical preferences over consumption of these goods represented by the

[7] See also Gawande and Bandhyopadhyay (2000) and McCalman (2004) for analysis of tariff determination with a single intermediate good.

utility function:

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

where c_0 represents the consumption of the numeraire good (good 0) and c_i represents the consumption of the nonnumeraire goods $i = 1, \ldots, n$.

Goods in all nonnumeraire industries (sectors) are produced perfectly competitivly using sector-specific capital k_i, mobile labor l_i, and intermediates goods produced in (potentially) all other industries. Specifically, in all nonnumeraire sectors, $i = 1, ..., n$, output, y_i, is assumed to be created using the following Leontief technology:[8]

$$y_i = \min \left\{ f_i(k_i, l_i) , \frac{x_{0i}}{\Omega_{0i}}, \ldots, \frac{x_{ni}}{\Omega_{ni}} \right\}, \quad i = 1, \ldots, n \tag{2}$$

where f_i denotes the value-added produced using sector-specific capital and mobile labor, Ω_{ji} denotes the amount of good j necessary to produce one unit of good i, and x_{ji} denotes sector i's use of good j as an intermediate input. Finally, the numeraire good is produced under constant returns to scale using only labor so that the wage rate w is fixed (and normalized to one).

Let p_i^* be good i's world price and t_i denote the ad valorem import tax (or subsidy if it is negative) on this good. Good i's domestic price is thus given by $p_i = p_i^*(1 + t_i)$. Let $\mathbf{p}$ denote the n-dimensional domestic price vector.

We can now write down sector i's profits—given by revenues less costs of production as

$$\pi_i = p_i y_i - l_i - \sum_{j=1}^{n} p_j \Omega_{ji} y_i. \tag{3}$$

Surplus derived by consumers in this economy from the consumption of the nonnumeraire goods is given by

$$S(\mathbf{p}) = \sum_{i=1}^{n} (u(c_i) - p_i c_i). \tag{4}$$

Furthermore, imports are given by

$$m_i = c_i - y_i + \sum_{j=1}^{n} a_{ij} y_j. \tag{5}$$

Finally, tariff revenues are given by

$$T(\mathbf{p}) = \sum_{i=1}^{n} m_i (p_i - p_i^*). \tag{6}$$

We make one additional assumption that simplifies the theory considerably, while retaining its essential elements. Specifically, we assume that the proportion of the population of a country that is represented by organized lobbies is small.[9] The primary consequence of this assumption

[8] Since k_i is fixed with each sector, it will henceforth be omitted as an argument of the production function.

[9] In our framework, this is equivalent to assuming that ownership of specific factors used in production is highly concentrated in all sectors.

is that owners of specific factors do not care about prices of goods other than those that they produce or use as intermediate inputs to their production. They do not care about the prices of any goods they consume as final goods consumers or about the tariff revenue that is generated by the government. The surplus accruing to owners of capital in sector i, $v_i(\mathbf{p})$, is simply the profit they earn from production:

$$v_i(\mathbf{p}) = \pi_i(\mathbf{p}), \tag{7}$$

where $\pi_i(\mathbf{p})$ denotes profits. Thus, the only purpose for which sector i lobbies is to increase its profits. This allows for a clear and explicit consideration of counterlobbying through intermediates use.

Note that the free trade level of utility derived by owners of capital in the various sectors can be obtained by evaluating Equation (7) at $p_i = p_i^* \ \forall i$. Furthermore, trade interventions that move the domestic price vector $\mathbf{p}$ away from free trade vector of prices may bring higher utility levels to owners of capital in these sectors—giving rise to an incentive to lobby the government to implement such interventions.

2.1. *Lobbying and Endogenous Policy Determination.* As in Grossman and Helpman (1994), the government is assumed to care about both the political contributions that it receives from organized lobbies and about aggregate welfare; contributions are valued because of their use in financing campaign spending or in the direct benefits they provide to office holders; and social welfare is of concern to the government due to the higher likelihood of voters reelecting a government that has delivered a high standard of living. A linear objective function is assumed to represent these preferences:

$$G(\mathbf{p}) = \sum_i C_i(\mathbf{p}) + aW(\mathbf{p}), \tag{8}$$

where $G(\mathbf{p})$ is the objective function of the government, $C_i(\mathbf{p})$ is the contribution schedule of the ith industry, $W(\mathbf{p})$ is gross social welfare, and a is the weight the government attaches to social welfare relative to political contributions. Clearly, the higher is a, the higher its concern for social welfare relative to its affinity for political contributions.

It is worth noting that in Equation (8), we assume that all industries are politically organized. This assumption is made here for several practical reasons. First, the level of industry aggregation we will consider in the empirical section is the three-digit International Standard Industrial Classification (ISIC) level, implying 29 manufacturing sectors. At this level of aggregation, industry associations and other forms of political organization are pervasive across all industries and countries. For instance, in U.S. data, significant contributions to the political process are reported by all three-digit industries (and indeed industries at much finer levels of disaggregation). Furthermore, the United States is exceptional, even among the most developed nations, in the explicit reporting requirement of political contributions by firms and industries. Since political contributions, although pervasive, are simply not publicly disclosed in any of the other countries that we consider in our analysis, this assumption relieves us from the burden of using ad hoc methods of determining the political organization of industries (as have sometimes been used in studies involving U.S. trade policy, where such data on political contributions are indeed available as we have indicated).[10]

Lobby welfare net of contributions is given by $v_i(\mathbf{p}) - C_i(\mathbf{p})$. Efficiency of interaction between the government and organized lobbies dictates that the policy outcome is one that maximizes

[10] Nevertheless, for the United States, we have conducted a parallel analysis of the effects of counterlobbying allowing for variations in the extent of political organization of sectors, using detailed data on political contributions obtained from the Federal Election Commission and have found results that are very similar to those that we report in this article. These results are available from us upon request.

their joint surplus:

$$G(\mathbf{p}) + \sum_i (v_i(\mathbf{p}) - C_i(\mathbf{p})) = \sum_i \pi_i(\mathbf{p}) + aW(\mathbf{p}). \tag{9}$$

The tariffs that maximize the joint surplus must satisfy the following first-order conditions:

$$\sum_i^n \frac{\partial \pi_i}{\partial p_i} + a\frac{\partial W}{\partial p_i} = 0 \qquad \forall i. \tag{10}$$

By using Equations (1)–(10) above and recognizing that $\partial\pi_i/\partial p_i = y_i(1 - \Omega_{ii})\ \forall i$ and $\partial\pi_i/\partial p_j = -\Omega_{ji}y_i\ \forall j \neq i$, we have equilibrium ad valorem tariff protection in industry i, $t_i = p_i/p_i^* - 1$, with t_i given by

$$\frac{t_i}{1+t_i} = \frac{1}{a}\left[\frac{1}{m_i \cdot |e_i|}\left(y_i - \sum_{j=1}^n \Omega_{ij} y_j\right)\right], \tag{11}$$

where $|\epsilon_i|$ denotes the absolute value of the import demand elasticity in sector i.

Equation (11) is the final theoretical prediction that emerges regarding trade protection in the presence of lobbying competition. The interpretation of terms appearing in Equation (11) is straightforward. Lobbying competition between upstream and downstream users to raise production profits is captured by the term in square brackets on right-hand side of the equation. Lobbying by downstream users ($\sum_{j=1}^n \Omega_{ij} y_j \neq 0$) lowers the level of protection predicted. Equation (11) indicates that tariffs are lower, the greater is a, the relative value that the government places on aggregate welfare, and the greater is the import demand elasticity (for the usual Ramsey-pricing reasons).[11]

To summarize, we develop our cross-sectional prediction on trade protection (Equation (11)) using theoretical building blocks that are standard in the literature. Equation (11) allows for estimation of the country-specific parameter a, measuring the welfare-mindedness of governments, taking into suitable account the extent of cross-sectoral lobbying competition in the economy. The following sections discuss the data we use to conduct this estimation analysis and also our empirical methodology and results.

3. DATA

The econometric analysis that follows is based on the theoretically derived expression (11), which describes the cross-sectional variation in trade policy with counterlobbying. For this, we use data from 42 different countries. The countries in our sample are Argentina, Australia, Bangladesh, Chile, China, Cameroon, Colombia, Costa Rica, Denmark, Ecuador, Finland, France, Germany, Greece, Guatemala, Hungary, Indonesia, Ireland, Italy, Japan, Kenya, Mauritius, Mexico, Malaysia, Netherlands, Norway, Pakistan, Peru, Philippines, Romania, Singapore, South Africa, South Korea, Sri Lanka, Spain, Sweden, Thailand, Taiwan, Uruguay, United Kingdom, United States, and Venezuela. The countries included

[11] We should discuss, in closing, the robustness of our theoretical structure, in which final goods producers oppose increases in their input prices. As such, this effect clearly obtains in settings where producers lack market power. Even with imperfect competition, when firms' strategies are strategic substitutes (as is the case with quantity competition) or when firms hold consistent conjectures, the same result is easily obtained. However, when firms' strategies are strategic complements (as would be the case with price competition), it is possible (when some further restrictions on demand are satisfied) to have outcomes in which an increase in input prices results in an increase in firm profits. Although we do not consider this explicitly theoretically, our econometric exercises do not impose any prior restrictions on this effect. We simply allow the data to guide us on this point.

in the analysis were essentially those for which we were able to gather the requisite tariff, output, imports, and intermediates use data at the ISIC level.

For each of our sample countries, we have tariff data across 28 three-digit ISIC industries over the 1988–2000 period. The tariff data are the applied most-favored-nation (MFN) rates from United Nations Conference on Trade and Development's TRAINS database. Import-weighted averages of the six-digit Harmonized-System-level tariff data available in the TRAINS database were taken to obtain average tariffs at the three-digit ISIC level, using the concordance between the two systems that is available at the World Bank Web site on trade data (www.worldbank.org/trade). Where necessary and possible, those data are augmented by World Trade Organization (WTO) applied rates, constructed from the WTO's Integrated Database and WTO's Trade Policy Reviews. The correlation between the two tariff series is greater than 0.93. Furthermore, the direct and reverse regression coefficients are above 0.9, indicating that the errors in variables problem from mixing the two data sources are not a concern. Across our sample of countries and industries, tariff data are available for an average of 7.2 years (minimum 2 and maximum 13). Data are nearly complete for the higher income countries with lower middle- and low-income countries sufficiently broadly covered to permit credible inferences about the model parameters.

Industry level output and trade data are from the World Bank's Trade and Production database. Output data are taken from the United Nations Industrial Development Organization's INDSTAT three-digit ISIC rev. 2 database. Import demand elasticities are estimated for each country at the six-digit HS level using a revenue function approach by Kee et al. (2008). Since the standard errors of the elasticity estimates are known, they are treated as variables with measurement error and adjusted using a Fuller correction (Fuller, 1986; see also Gawande and Bandyopadhyay, 2000).

The (country-specific) input–output tables are taken from the Global Trade Analysis Project database. They are the basis for measuring the Ω_{ij}s required to adjust the output-to-import ratios in the models with counterlobbying by users. These tables indicate the percentage of the output of a source sector that is consumed by a "using" sector (including itself). Our measure of downstream use is simply the percentage of the source sector's output that is used by all other sectors as an intermediates input. Table 1 presents a summary description of the magnitude of intermediates use in our sample countries. The numbers are unweighted averages (across manufacturing sectors) of the proportion of sectoral output that is used as an intermediate input to production in all sectors (including the source sector itself). The using sectors are not just the manufacturing sectors. Services and agriculture are included as well. As is clear from the numbers, the extent of intermediates use of manufacturing output is significant, averaging nearly 50% in our sample countries. Table 1 also indicates descriptive statistics for the other key variables used in the analysis—(simple) average tariffs, shipments, imports, and import demand elasticities. As shown in Table 1, there is wide variability across countries in their (simple) average applied tariff rate in manufacturing. Singapore has a near-zero tariff that is later reflected in the country's welfare stance, whereas at the other end of the spectrum, Bangladesh has an average tariff of 0.38. The United States is the largest country in terms of value of shipments (average \$146.7 mn), whereas Cameroon (\$0.06) is the smallest. Japan has the largest shipments-to-imports ratio (13.90), whereas Singapore has the smallest (0.50), indicating that relative to size, the latter is more dependent on imports than the former. Finally, the absolute import demand elasticities, after the Fuller correction noted above, are around 1 for most countries.

Section 4 discusses the results with alternate measures of intermediate use involving, alternately, intermediate use in production in just manufacturing sectors and intermediate use in production and investment (in all sectors) taken together.

TABLE 1
SUMMARY STATISTICS

Country	$\frac{\sum_j a_{ij} y_j}{y_i}$	t	y	m	ϵ	Country	$\frac{\sum_j a_{ij} y_j}{y_i}$	t	y	m	ϵ
Argentina	0.48	0.12	2.12	0.80	1.31	Korea	0.60	0.11	12.01	3.11	1.11
Australia	0.54	0.06	3.66	1.81	1.11	Malaysia	0.38	0.12	1.50	2.09	1.07
Bangladesh	0.49	0.38	0.16	0.18	1.27	Mauritius	0.60	0.27	0.38	0.26	1.09
Cameroon	0.50	0.18	0.06	0.03	1.27	Mexico	0.41	0.15	3.29	4.04	1.25
Chile	0.46	0.09	1.42	0.46	1.19	Netherlands	0.43	0.07	4.33	4.52	1.04
China	0.59	0.21	14.08	4.92	1.16	Norway	0.43	0.04	1.38	1.10	1.07
Colombia	0.53	0.11	1.15	0.38	1.14	Pakistan	0.50	0.34	0.30	0.34	1.14
Costa Rica	0.44	0.09	0.15	0.15	1.14	Peru	0.43	0.13	0.82	0.27	1.21
Denmark	0.89	0.07	2.39	1.18	1.09	Philippines	0.44	0.16	0.95	0.69	1.09
Ecuador	0.48	0.12	0.33	0.13	1.16	Romania	0.46	0.16	1.31	0.31	1.04
Finland	0.43	0.07	2.01	0.79	1.06	Singapore	0.26	0.00	1.95	3.92	1.07
France	0.43	0.06	18.91	8.57	1.05	South Africa	0.53	0.11	2.12	1.29	1.15
Germany	0.49	0.07	37.11	11.68	1.07	Spain	0.43	0.07	7.71	3.16	1.07
Greece	0.43	0.07	0.95	0.73	1.04	Sri Lanka	0.39	0.20	0.13	0.14	1.11
Guatemala	0.45	0.09	0.07	0.12	1.11	Sweden	0.39	0.07	3.61	1.99	1.07
Hungary	0.44	0.10	0.78	0.70	1.06	Taiwan	0.50	0.08	4.42	3.13	1.14
Indonesia	0.46	0.14	1.83	0.92	1.23	Thailand	0.38	0.24	2.76	1.57	1.14
Ireland	0.42	0.07	2.44	1.11	1.05	United Kingdom	0.47	0.07	18.58	8.63	1.07
Italy	0.43	0.06	16.50	6.23	1.06	United States	0.58	0.06	146.68	23.21	1.16
Japan	0.61	0.05	84.64	6.09	1.22	Uruguay	0.44	0.12	0.28	0.10	1.09
Kenya	0.53	0.20	0.11	0.08	1.13	Venezuela	0.44	0.13	1.52	0.46	1.26

NOTES: $\sum_j a_{ij} y_j / y_i$ indicates the unweighted average (across manufacturing sectors) of the proportion of sectoral output that is used by all sectors (including the source sector) as an intermediate input in production, t denotes the mean tariff level, y denotes the mean output (shipments in $ mn), m denotes the imports in $ mn, and ϵ denotes the absolute import demand elasticity.

4. ESTIMATION METHODOLOGY AND RESULTS

Taking observables in Equation (11) to the left-hand side, we can express the tariff equation as

$$\frac{t_i}{1+t_i} \cdot \left[\frac{m_i}{y_i - \sum_{j=1}^{n} \Omega_{ij} y_j} \right] \cdot |e_i| = \frac{1}{a}. \tag{12}$$

The single parameter a is estimated from a stochastic version of the tariff equation (12), obtained by introducing an additive error term u_i that is assumed to be i.i.d. and normal:

$$\frac{t_i}{1+t_i} \cdot \left[\frac{m_i}{y_i - \sum_{j=1}^{n} \Omega_{ij} y_j} \right] \cdot |e_i| = \beta_c + u_i. \tag{13}$$

Note that in Equation (13), estimates of the parameter β_c (with the subscript c denoting counterlobbying) may be obtained simply as the sample averages of the expression on the left-hand side, and β_c may then be inverted to yield an estimate of the parameter a.[12] Importantly, since we only have a constant on the right-hand side of Equation (13), estimates of the coefficient β_c are not subject to any endogeneity bias. Specifically, although output and imports are both potentially endogenous to trade policy, they do not appear on the right-hand side and, hence, are not problematic (see also Mitra et al., 2006, for a similar formulation). It is worth noting that Equation (13) stands in contrast to earlier specifications in the literature that have all had to deal with the problem of endogenous regressors.

As we have discussed in Section 1, we are interested in comparing estimates of a obtained from the estimation of Equation (13) with estimates that may be obtained from a more basic specification that does not take into account intermediate-use-based counterlobbying. In the absence of such lobbying competition, Equation (13) reduces to

$$\frac{t_i}{1+t_i} \cdot \left[\frac{m_i}{y_i} \right] \cdot |e_i| = \beta_{nc} + u_i, \tag{14}$$

where, as indicated by the subscript nc, β_{nc} is the inverse of the parameter a in Equation (12), when lobbying competition is not taken into account.

Note that in Equations (13) and (14), the estimated coefficients β_c and β_{nc} are simply the sample averages of the respective dependent variables. Moreover, given positive intermediates usage, we know that the estimate of β_c obtained from Equation (13) can be expected to be higher than the corresponding estimate of β_{nc} from Equation (14). That is, we know that the estimate of welfare-mindedness with lobbying competition taken into account will be lower than when it is not—just as we have anticipated in our earlier discussion. This should not, however, diminish the value of either the theoretical exercise or the estimation analysis that follows. The particular variables capturing lobbying competition and the form in which they appear in Equations (13) and (14) can only be determined by a full derivation of the tariff prediction equation. Importantly, the quantitative relevance of lobbying competition can only be determined by analysis of the data. We should also note here that Equations (13) and (14) have been derived under the assumption that producer contributions (and thus profits) from upstream or downstream producers are weighted equally by the government. This theoretical equality restriction will be relaxed later, enabling a more direct test of the lobbying competition structure we have assumed here.

[12] Readers familiar with the GH model will note that allowing for ownership of sector-specific capital to be less than fully concentrated will give a slightly modified expression, $(1 - \alpha)/(a + \alpha)$, where α denotes the fraction of the population that owns sector-specific capital, on the right-hand side of Equation (12). However, this modification will change the estimated value of a by only a small amount since α can generally be expected to be quite small in practice.

Also, note that Equations (13) and (14) do not contain any endogenous regressors. We can therefore obtain unbiased estimates of β_c and β_{nc} using the method of ordinary least squares (OLS), pooling data for each country across industries and over time. For efficiency, we stack the data across 42 countries and estimate their β parameters as coefficients on the country dummies.

Since the theoretical structure assumes a common parameter "a" across industries within a country, allowing for industry fixed effects in the estimation is not really consistent with the theory. This said, within estimates (allowing for industry and/or time fixed effects) as well as the between estimates of β_c and β_{nc} should, in principle, yield exactly the same point estimate as those obtained with pooled OLS. This is true for the following reason. Intuitively, with panel fixed effects in place, welfare-mindedness should be measured as the overall average of the industry effects across time. It is easy to see that this corresponds to the average of the left-hand-side variable in Equation (13) (and Equation (14) in the no counterlobbying case) and is thus the same as the estimate obtained from pooled OLS.[13] Separately, the between estimates of the coefficient also remain the same in the presence of a balanced panel, as the between transformation simply implies by taking the mean of each industry across time before estimating Equation (13) or (14). In our case, the panel is slightly unbalanced due to some instances of missing data, but the point estimates are generally very close to the ones obtained using pooled OLS and are available from us on request.

Table 2 presents OLS country-specific estimates of the parameters β_{nc} and β_c. As noted above, data from over 40 different countries were used to obtain country-specific estimates of these parameters. As the numbers in Table 2 suggest, the estimates are highly significant for all countries. This is true for estimates from the benchmark model (Equation (13)) as well as estimates obtained when accounting for intermediates use. The implied values of a are presented as well.

The cross-country variation in the estimates is worth noting. Parameter estimates for Korea, Japan, Singapore, and the United States are relatively low (i.e., the implied estimates of a are relatively high). On the other hand, for Bangladesh, Cameroon, Mexico, Pakistan, Thailand, and Sri Lanka, we obtain much higher parameter estimates (low implied values of a). The difference in these estimates across countries is clearly substantial. Leaving aside Singapore, which is nearly characterized by free trade, the ratio of implied as in Japan and Korea is about 30–50 times that of countries on the lower end. The cross-country variations in the implied values of a accord well with our priors regarding the welfare-mindedness of governments in relation to trade policy making, thus increasing our confidence in the data and methodology used to obtain our estimates.[14] Importantly, accounting for lobbying competition changes the implied values of a systematically. In all of the sample countries, estimates of a are lowered once intermediates use is taken into account. The magnitude of the reduction in the estimated value of a is noteworthy. For over 30 countries in the sample, the estimate of a is lowered to less than half its original value once intermediates use is taken into account.

We have previously discussed how ignoring lobbying competition may lead to incorrect estimates of the welfare-mindedness of governments. Specifically, imagine that competition between lobbies leads to free trade as an equilibrium outcome with a government that is willing to sell policy distortions cheaply. Observing the free trade outcome, but ignoring the extent of lobbying competition, may lead an analyst to conclude—incorrectly—that policy is being set by a welfare-maximizing government instead. The estimates presented in Table 2 confirm that

[13] Note that this corresponds exactly to the estimation routines in the statistical software STATA in which the sum of the fixed effects is set to zero so that the constant term in the within regression is measured as the overall or the grand mean (when there are no additional right-hand-side variables). See "Interpreting the Intercept in the Fixed Effects Model" at http://www.stata.com/support/faqs/stat/xtreg2.html.

[14] We may note that the correlation between our estimates of a and the estimates of the degree of corruption in each country according to the Transparency International index in 2005 is 0.43. Note that not all lobbying activities are illegal and, therefore, should not be classified as "corrupt" activities.

TABLE 2
COUNTERLOBBYING AND ENDOGENOUS TRADE POLICY (COUNTRIES: A–Z)

	No Counterlobbying			Counterlobbying			
Country	β_{nc}	Implied a	Rank	β_c	Implied a	Rank	N
Argentina	0.079	12.63	19	0.186	5.37	22	241
	(5.17)			(7.98)			
Australia	0.044	22.75	11	0.141	7.08	17	162
	(2.35)			(4.96)			
Bangladesh	0.571	1.75	41	0.993	1.01	41	74
	(20.68)			(22.43)			
Cameroon	0.317	3.16	38	0.685	1.46	39	59
	(10.23)			(14.15)			
Chile	0.089	11.25	21	0.187	5.36	23	270
	(6.14)			(8.46)			
China	0.055	18.29	14	0.174	5.76	20	243
	(3.59)			(7.48)			
Colombia	0.055	18.12	15	0.134	7.46	15	269
	(3.81)			(6.01)			
Costa Rica	0.148	6.77	32	0.256	3.90	30	205
	(8.91)			(9.93)			
Denmark	0.052	19.36	13	0.339	2.95	34	291
	(3.71)			(14.05)			
Ecuador	0.184	5.43	34	0.318	3.14	33	184
	(10.52)			(11.46)			
Finland	0.042	24.08	10	0.068	14.78	8	53
	(1.27)			(1.36)			
France	0.041	24.57	9	0.068	14.63	9	162
	(2.18)			(2.40)			
Germany	0.034	29.28	7	0.064	15.53	7	324
	(2.59)			(3.20)			
Greece	0.079	12.69	18	0.109	9.16	11	294
	(5.68)			(5.11)			
Guatemala	0.149	6.73	33	0.265	3.78	31	140
	(7.40)			(8.58)			
Hungary	0.102	9.80	25	0.195	5.12	25	215
	(6.30)			(7.89)			
Indonesia	0.092	10.86	22	0.144	6.94	18	238
	(5.98)			(6.06)			
Ireland	0.085	11.75	20	0.123	8.15	13	202
	(5.09)			(4.79)			
Italy	0.037	27.11	8	0.058	17.12	6	162
	(1.98)			(2.05)			
Japan	0.011	92.47	2	0.023	42.76	2	324
	(0.82)			(1.16)			
Kenya	0.205	4.88	35	0.529	1.89	38	68
	(7.12)			(11.87)			
Korea	0.027	36.65	4	0.120	8.32	12	297
	(1.98)			(5.72)			
Malaysia	0.129	7.73	29	0.235	4.26	28	204
	(7.78)			(9.25)			
Mauritius	0.293	3.41	36	0.769	1.30	40	108
	(12.83)			(21.66)			
Mexico	0.324	3.08	39	0.492	2.03	36	186
	(18.62)			(18.52)			
Netherlands	0.127	7.87	28	0.180	5.55	21	215
	(7.85)			(7.28)			

(*Continued*)

TABLE 2
CONTINUED

Country	No Counterlobbying			Counterlobbying			
	β_{nc}	Implied a	Rank	β_c	Implied a	Rank	N
Norway	0.132	7.59	30	0.216	4.62	27	104
	(5.66)			(6.09)			
Pakistan	0.581	1.72	42	1.121	0.89	42	52
	(17.64)			(21.88)			
Peru	0.101	9.95	24	0.191	5.24	24	117
	(4.58)			(5.65)			
Philippines	0.145	6.89	31	0.285	3.50	32	346
	(11.36)			(14.61)			
Romaina	0.050	20.18	12	0.102	9.80	10	81
	(1.88)			(2.54)			
Singapore	0.001	948.68	1	0.001	771.96	1	190
	(0.06)			(0.05)			
South Africa	0.097	10.29	23	0.211	4.75	26	243
	(6.37)			(8.99)			
Spain	0.030	33.82	5	0.050	20.04	4	297
	(2.14)			(2.37)			
Sri Lanka	0.296	3.38	37	0.504	1.99	37	130
	(14.21)			(15.30)			
Sweden	0.104	9.60	26	0.153	6.55	19	27
	(2.28)			(2.19)			
Taiwan	0.058	17.25	16	0.133	7.51	14	187
	(3.34)			(5.02)			
Thailand	0.356	2.81	40	0.457	2.19	35	181
	(20.15)			(16.64)			
United Kingdom	0.032	31.69	6	0.058	17.18	5	189
	(1.83)			(2.21)			
United States	0.019	54.03	3	0.047	21.10	3	212
	(1.13)			(1.90)			
Uruguay	0.126	7.91	27	0.250	4.00	29	203
	(7.58)			(9.78)			
Venezuela	0.079	12.70	17	0.138	7.26	16	213
	(4.83)			(5.55)			

NOTES: N denotes the number of observations. Rank denotes the ranking of the country according to our estimate of the welfare-mindedness (a) of its government. Numbers in parentheses are t-statistics corresponding to the null hypothesis that the government is "welfare-maximizing," i.e., $1/a = 0$.

introducing lobbying competition into the analysis does indeed lower the estimate of welfare-mindedness of governments and it does so significantly.

The preceding analysis suggests that the role of lobbying competition is important in understanding trade policy determination. Thus far, this conclusion has been reached by comparing estimates of the government's welfare-mindedness in setting trade policy with and without counterlobbying being taken into account. Now, with some slight modifications, we examine the role of lobbying competition more directly. Specifically, moving the terms concerning intermediate use in production to the right-hand side, Equation (11) may be rewritten as

$$\frac{t_i}{1+t_i} \cdot \frac{m_i}{y_i} \cdot |e_i| = \frac{1}{a}\left(1 - \frac{\sum_{j=1}^{n} \Omega_{ij} y_j}{y_i}\right). \tag{15}$$

Separating out the terms corresponding to the upstream and downstream components of Equation (15), we can write down the following econometric model:

$$\frac{t_i}{1+t_i}\cdot\frac{m_i}{y_i}\cdot|e_i| = \beta_u + \beta_d\frac{\sum_{j=1}^{n}\Omega_{ij}y_j}{y_i} + u_i, \tag{16}$$

where u_i is an i.i.d. normal error term, $\beta_u > 0$ denotes the parameter associated with upstream import-competing producers, and $\beta_d < 0$ denotes the parameter associated with the intermediate input usage terms. Note that an estimate of a can be recovered separately from either of the two parameters in Equation (16): β_u (giving us a_u) and β_d (giving us a_d). With $a_u = a_d$, upstream and downstream producers are equally weighted. Equation (16) allows us to test the validity of this theoretical restriction.

We first estimate the parameters β_u and β_d in Equation (16) using pooled OLS. As we have indicated earlier, since the theoretical structure assumes a common parameter "a" across industries, allowing for industry fixed effects in the estimation is not really consistent with the theory. Estimates of the parameters β_u and β_d in Equation (16) and the implied values of a are reported in Table 3. β_u is estimated to be greater than zero and statistically significant in nearly all our sample countries. β_d, the coefficient on the term capturing intermediates use in Equation (16), is negative and significant in the majority of countries, directly affirming the role of lobbying competition in trade policy determination. In some countries (Bangladesh, Cameroon, Costa Rica, Hungary, Indonesia, Kenya, Mauritius, Pakistan, Peru, Romania, and Sweden), the direct evidence on counterlobbying is statistically weaker, but even for these countries, the point estimates are in the theoretically correct direction. Note that values of a may be inferred from either estimated coefficient. In general, the magnitudes of the absolute values of β_u and β_d are very close to each other so that the implied values of a_u and a_d are not much different from each other. Table 3 reports statistics from the χ^2 test of the restriction $a_u = a_d$ (with critical value at 5% = 3.84). As shown in Table 3, this restriction cannot be rejected for the vast majority (31 of the 42) countries in our sample. Furthermore, for several countries, this restriction can only be rejected because of the high level of precision of the estimates themselves. For instance, although the implied magnitudes of a_u and a_d are quite close to each other in the case of the United States (18.34 and 16.04, respectively), their equality is nevertheless rejected because the corresponding values of β_u and β_d are very precisely estimated. We report the values of a estimated under the constraint that $\beta_u = \beta_d$. As Table 3 indicates, once again we have high values of a for Singapore, Japan, Korea, and the United States and low values for Bangladesh, Pakistan, and Mexico. As with the results reported in Table 2, the estimates sit fairly well with our priors regarding the welfare-mindedness of these respective countries. Moreover, the implied values of a in Table 3 correlate highly and are close in magnitude with those reported in Table 2.

4.1. *Regressor Endogeneity*. The variable on the right-hand side of Equation (16), $\sum_{j=1}^{n}\Omega_{ij}y_j/y_i$, is the proportion of sector i's output that is used as an intermediate input by other sectors. Importantly, unlike sectoral output, which is arguably directly endogenous to sectoral trade policy, this *ratio* may be argued to be determined by the technological structure of the economy and by consumption preferences, both of which are largely exogenous. Nevertheless, we now allow for the possibility that $\sum_{j=1}^{n}\Omega_{ij}y_j/y_i$ is endogenously determined with trade policy and estimate the parameters of Equation (16) using a two-stage least-squares (2SLS) approach. Two variables serve as instruments. First, we use the sectoral capital–labor ratio. The sectoral labor–capital ratio then serves a suitable instrument for the United States if we assume that shocks to the U.S. manufacturing tariffs are not accompanied by technological changes that alter this ratio, which is a maintained assumption in much of the literature. The U.S. sectoral labor–capital ratio also serves as an instrument for countries other than the United States, since

TABLE 3
COUNTERLOBBYING AND ENDOGENOUS TRADE POLICY (COUNTRIES: A–Z)

Country	β_u	β_d	Implied a	Rank	N	χ^2 Test ($a_u = a_d$)
Argentina	0.13	−0.10	6.93	16	241	2.07
	(6.48)	−(3.81)				
Australia	0.07	−0.05	11.74	11	162	1.75
	(6.22)	−(3.24)				
Bangladesh	1.45	−1.24	0.65	42	77	0.12
	(2.23)	−(1.27)				
Cameroon	0.40	−0.07	1.67	36	60	2.10
	(1.98)	−(0.25)				
Chile	0.14	−0.12	6.31	19	270	3.17
	(6.38)	−(4.14)				
China	0.08	−0.05	9.53	14	243	0.05
	(6.95)	−(3.09)				
Colombia	0.07	−0.03	10.00	13	269	1.32
	(6.85)	−(1.68)				
Costa Rica	0.20	−0.04	3.48	31	214	0.11
	(4.81)	−(0.40)				
Denmark	0.32	−0.30	2.47	32	291	41.52
	(4.64)	−(4.05)				
Ecuador	0.40	−0.37	2.35	33	187	1.74
	(3.46)	−(2.04)				
Finland	0.10	−0.14	12.70	9	53	0.15
	(4.27)	−(3.26)				
France	0.09	−0.11	13.39	8	162	11.32
	(6.38)	−(4.50)				
Germany	0.08	−0.09	13.95	7	324	24.39
	(7.13)	−(5.41)				
Greece	0.14	−0.12	6.78	18	297	43.50
	(7.90)	−(5.15)				
Guatemala	0.45	−0.42	2.12	34	157	0.84
	(4.96)	−(2.97)				
Hungary	0.12	−0.03	6.09	20	215	1.08
	(7.46)	−(1.06)				
Indonesia	0.14	−0.04	5.11	24	241	0.19
	(4.68)	−(1.40)				
Ireland	0.17	−0.15	5.37	22	208	0.63
	(4.57)	−(1.82)				
Italy	0.11	−0.15	11.34	12	163	1.14
	(3.58)	−(3.09)				
Japan	0.03	−0.04	31.92	2	324	0.10
	(8.72)	−(7.92)				
Kenya	0.53	−0.33	1.48	40	72	10.69
	(2.07)	−(0.93)				
Korea	0.04	−0.02	19.19	4	297	109.20
	(7.12)	−(2.47)				
Malaysia	0.18	−0.14	5.04	25	204	0.24
	(9.88)	−(3.60)				
Mauritius	0.38	−0.14	1.64	37	108	2.65
	(3.27)	−(0.91)				
Mexico	0.70	−0.90	1.61	38	187	0.32
	(6.79)	−(5.04)				
Netherlands	0.44	−0.70	3.58	29	216	0.40
	(5.13)	−(4.52)				
Norway	0.34	−0.48	3.80	28	104	85.40
	(3.33)	−(2.72)				

(*Continued*)

TABLE 3
CONTINUED

Country	β_u	β_d	Implied a	Rank	N	χ^2 Test ($a_u = a_d$)
Pakistan	0.59	−0.03	1.17	41	52	1.22
	(2.09)	−(0.05)				
Peru	0.14	−0.09	6.06	21	117	41.86
	(3.85)	−(1.36)				
Philippines	0.30	−0.32	3.48	30	351	27.63
	(8.94)	−(5.93)				
Romania	0.06	−0.02	12.11	10	81	0.00
	(3.19)	−(0.52)				
Singapore	0.00	0.00	713.42	1	197	0.34
	(2.03)	−(1.82)				
South Africa	0.20	−0.19	4.85	27	243	1.32
	(2.71)	−(1.74)				
Spain	0.06	−0.07	18.80	5	297	0.15
	(8.11)	−(5.56)				
Sri Lanka	0.63	−0.51	1.49	39	133	1.06
	(3.30)	−(1.76)				
Sweden	0.26	−0.40	5.20	23	27	5.75
	(1.70)	−(1.42)				
Taiwan	0.11	−0.10	8.94	15	187	0.26
	(7.44)	−(5.04)				
Thailand	0.52	−0.43	1.80	35	181	0.87
	(4.90)	−(2.08)				
United Kingdom	0.06	−0.07	16.66	6	189	1.61
	(9.77)	−(6.02)				
United States	0.05	−0.06	20.57	3	212	36.80
	(5.67)	−(4.93)				
Uruguay	0.16	−0.07	4.98	26	203	19.56
	(6.84)	−(2.08)				
Venezuela	0.17	−0.19	6.86	17	213	0.03
	(8.43)	−(6.00)				

NOTES: N denotes the number of observations. Rank denotes the ranking of the country according to our estimate of the welfare-mindedness (a) of its government. Numbers in parentheses are t-statistics corresponding to the null hypothesis that the corresponding coefficient is zero.

shocks to their protection levels are unlikely to be correlated with the U.S. labor–capital ratios. As our second instrument, we use the values of $\sum_{j=1}^{n} \Omega_{ij} y_j / y_i$ calculated for U.S. sectors.

Estimates of the parameters β_u and β_d in Equation (16) obtained using 2SLS are reported in Table 4. Once again, β_u is estimated to be greater than zero and statistically significant in nearly all our sample countries. β_d, the coefficient on the term capturing intermediates use in Equation (16), is negative and significant in the majority of countries, again affirming the role of lobbying competition in trade policy determination. In general, the magnitudes of the absolute values of β_u and β_d are very close to each other so that the implied value of a does not vary substantially with the coefficient used. Table 4 reports statistics from the χ_1^2 test of the restriction $a_u = a_d$ (with critical value at 5% = 3.84). As shown in Table 4, this restriction cannot be rejected for the majority of countries in our sample. We report values of a estimated under the constraint that $\beta_u = \beta_d$. The implied values of a in Table 4 correlate highly and are close in magnitude with those reported in Table 3 (the Spearman correlation coefficient is estimated to be over 0.9). As Table 4 indicates, our instruments satisfy the overidentification (Hansen) test in 31 out of 42 cases (the exceptions being Australia, Colombia, Germany, Denmark, Japan, Korea, Mexico, Netherlands, Norway, Taiwan, and the United States). Furthermore, the Durbin–Wu–Hausman test indicates exogeneity of regressors in a significant majority of the cases where we have valid instruments (the exceptions being Argentina, Chile, China, France, United Kingdom,

TABLE 4
COUNTERLOBBYING AND ENDOGENOUS TRADE POLICY-IV ESTIMATES (COUNTRIES: A–Z)

Country	β_u	β_d	Implied a	Rank	N	H	DWH	χ^2 Test ($a_u = a_d$)
Argentina	0.087	−0.014	7.28	16	232	2.39	21.57	0.24
	(5.08)	−(0.57)						
Australia	0.067	−0.048	12.27	9	156	12.39	0.02	0.80
	(4.69)	−(2.19)						
Bangladesh	0.420	0.966	0.69	42	74	0.01	4.61	6.48
	(1.54)	(2.33)						
Cameroon	0.553	−0.331	1.41	40	57	0.99	0.07	0.13
	(1.80)	−(0.69)						
Chile	0.109	−0.037	6.37	20	260	2.73	7.80	0.91
	(6.36)	−(1.36)						
China	0.060	−0.005	9.46	13	234	0.29	18.15	0.22
	(8.52)	−(0.51)						
Colombia	0.057	0.000	9.23	14	259	16.74	4.12	0.00
	(4.51)	−(0.03)						
Costa Rica	0.176	−0.005	3.46	31	206	0.30	0.05	0.00
	(4.07)	−(0.06)						
Denmark	0.627	−0.647	1.98	34	281	17.48	3.07	12.31
	(5.44)	−(5.09)						
Ecuador	0.160	0.161	2.49	32	180	3.42	5.74	25.51
	(3.56)	(2.07)						
Finland	0.150	−0.253	12.16	10	51	0.09	5.98	24.34
	(3.97)	−(3.33)						
France	0.120	−0.183	12.99	8	156	0.09	12.49	93.11
	(5.19)	−(4.01)						
Germany	0.108	−0.157	13.88	7	312	16.24	4.31	87.66
	(5.87)	−(4.86)						
Greece	0.120	−0.076	6.69	19	286	2.29	5.97	1.75
	(9.45)	−(3.11)						
Guatemala	0.420	−0.326	2.07	33	151	0.29	10.29	0.41
	(3.89)	−(1.85)						
Hungary	0.150	−0.101	5.45	23	207	1.89	3.26	1.02
	(6.36)	−(2.35)						
Indonesia	0.147	−0.041	4.56	26	232	0.21	1.61	0.37
	(4.21)	−(0.81)						
Ireland	0.067	0.045	7.06	17	200	4.87	5.18	0.66
	(1.59)	(0.41)						
Italy	0.211	−0.371	9.69	12	157	2.51	5.04	9.99
	(2.81)	−(2.57)						
Japan	0.036	−0.044	34.10	2	312	22.96	23.86	75.46
	(8.85)	−(8.22)						
Kenya	0.395	−0.031	1.44	39	69	4.38	1.38	0.01
	(2.16)	−(0.13)						
Korea	0.025	0.005	19.50	4	286	7.70	25.83	1.18
	(6.40)	(0.88)						
Malaysia	0.105	0.047	5.44	24	196	1.85	12.30	2.32
	(5.27)	(0.97)						
Mauritius	−0.006	0.513	1.50	38	104	0.13	9.18	0.00
	−(0.05)	(2.27)						
Mexico	0.625	−0.666	1.66	36	180	11.63	12.91	0.14
	(4.80)	−(2.58)						
Netherlands	0.539	−0.950	3.83	30	208	11.56	0.30	20.03
	(3.78)	−(3.36)						
Norway	0.474	−0.824	4.05	28	100	6.85	0.00	10.70
	(2.74)	−(2.40)						
Pakistan	0.009	1.150	1.09	41	50	1.24	8.15	0.00
	(0.04)	(1.96)						

(*Continued*)

TABLE 4
CONTINUED

Country	β_u	β_d	Implied a	Rank	N	H	DW	χ^2 Test ($a_u = a_d$)
Peru	0.061	0.096	5.97	21	111	1.64	7.15	45.56
	(2.94)	(1.89)						
Philippines	0.163	0.000	3.89	29	338	6.14	37.20	0.00
	(6.83)	−(0.01)						
Romania	0.077	−0.055	10.83	11	78	2.00	2.97	0.21
	(3.14)	−(1.19)						
Singapore	0.003	−0.008	633.75	1	189	1.55	0.70	3.18
	(1.67)	−(1.48)						
South Africa	0.345	−0.450	4.17	27	234	0.22	14.75	57.47
	(2.49)	−(2.00)						
Spain	0.071	−0.094	17.84	5	286	1.11	0.45	45.48
	(6.12)	−(4.11)						
Sri Lanka	0.323	0.323	1.60	37	128	0.87	8.04	23.43
	(3.72)	(2.55)						
Sweden	0.294	−0.514	5.85	22	26	1.28	0.99	3.51
	(1.63)	−(1.45)						
Taiwan	0.095	−0.069	8.83	15	180	16.86	4.80	1.37
	(6.38)	−(2.98)						
Thailand	0.182	0.482	1.89	35	174	4.96	15.66	21.21
	(2.44)	(2.33)						
United Kingdom	0.070	−0.086	17.27	6	182	6.07	10.14	30.32
	(8.60)	−(5.83)						
United States	0.037	−0.043	31.31	3	204	19.40	2.09	21.66
	(5.42)	−(4.32)						
Uruguay	0.140	−0.032	4.92	25	195	0.81	0.00	0.11
	(3.02)	−(0.42)						
Venezuela	0.128	−0.106	6.96	18	205	2.80	7.48	0.53
	(6.09)	−(2.77)						

NOTES: N denotes the number of observations. Estimates reported for "Implied a" were obtained under the constraint that $\beta_u = -\beta_d$. H denotes the Hansen's overidentification (J) statistic. DWH denotes the Durbin–Wu–Hausman χ^2 statistic for testing regressor exogeneity. Numbers in parentheses are t-statistics corresponding to the null hypothesis that the corresponding coefficient is zero.

Guatemala, Japan, Korea, Sri Lanka, Morocco, Mexico, Malaysia, Peru, Philippines, Thailand, Venezuela, and South Africa).

4.2. *Alternate Measures of Intermediates Use*. The robustness of our empirical findings was evaluated in a number of ways. First, we conducted the entire analysis using additional measures of intermediates use: the percentage of a source sector's output that is used in the manufacturing sectors of the economy and, separately, the percentage of a source sector's output that is used as intermediate input by all producing sectors in the economy plus what is used in final investment spending. The former is a less comprehensive and the latter a more comprehensive measure than those used in obtaining the results presented in Tables 2 and 3, resulting in somewhat larger and smaller estimates of a, respectively. This is as expected since these measures introduce, in turn, counterlobbying by fewer and more users, respectively. Otherwise there is little qualitative change in the results with the use of these alternate measures of intermediates use. The range of estimates is close to the results we report, as is the ranking of countries by a. These results are available from us on request.

5. CONCLUSIONS

Competition between opposing lobbies is a potentially important factor in the endogenous determination of trade policy. This article has investigated the consequences of such lobbying

competition for trade policy. The theoretical framework we have used for our empirical analysis is the well-known Grossman–Helpman model of trade policy determination suitably modified to account for the cross-sectoral use of inputs in production (the input–output matrix). Our empirical results, using trade and protection data from over 40 high, middle-, and low-income countries, validate the predictions of the theoretical model with lobbying competition. First, lobbying competition between upstream and downstream producers appears to be a statistically and quantitatively significant determinant of trade policy. This is a robust finding extending through nearly our entire sample of countries. Second, with lobbying competition taken into account, our country-specific estimate of the welfare-mindedness of governments is lowered significantly in virtually every country in our sample. These findings attest to the importance of lobbying competition in the endogenous determination of trade policy.

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