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Trade, Turnover, and Tithing

by

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Abstract

This paper develops a political economy model to test the proposition that the effect of international trade on the distribution of income is systematically related to the extent of labor-market turnover. The model reveals that trade benefits the abundant factor and hurts the scarce factor regardless of where those factors are employed if turnover is high, but benefits factors in exporting industries and harms those in import-competing industries when turnover is low. We test these predictions using data on campaign contributions given by industry-specific political action committees to congressional representatives who subsequently voted for or against trade-liberalizing legislation. We find empirical evidence in favor of the model's predictions.

JEL classification: F1, D720, J6

Outline

Non-Technical Summary

One of the main themes of international economics is that trade relationships have implications for the distribution of income. While there is no question that trade policy creates winners and losers, the identity of the winners and losers depends on the degree to which factors of production can move between sectors. The polar extremes are embodied in the in the Heckscher-Ohlin-Samuelson (HOS) model, where factors are assumed to be perfectly mobile, and the Ricardo-Viner model where some factors are assumed to be completely immobile. One of the fundamental results of the HOS model is the Stolper-Samuelson theorem, which demonstrates that the economy's abundant factor benefits from trade liberalization, even if employed in the declining import-competing sector, and the economy's scarce factor is harmed by trade liberalization, even if employed in the expanding export sector. By contrast, analysis of the Ricardo-Viner model reveals that factors trapped in the import-competing sector are harmed by trade reform regardless of relative abundance, while factors tied to the export sector benefit.

One of the problems with the HOS and RV models is that the labor market experience of many workers bears little resemblance to what is modeled in either framework. For example, low-wage workers typically cycle between employment and unemployment and often find it difficult to find new jobs quickly. Yet, the HO and RV models both assume that all factors are fully employed at all times. In a recent paper, Davidson, Martin, and Matusz (JIE 1999) extended the HOS model to allow for unemployment and examined how the model's traditional results were altered. In doing so, they derived a new theory linking trade and the distribution of income.

Their theory is a hybrid of the other two in that they show that when unemployment is present, the impact of trade liberalization on factor rewards is made up of a combination of Stolper-Samuelson and Ricardo-Viner forces. They demonstrate that in sectors with high labor market turnover it is the Stolper-Samuelson forces that dominate while the Ricardo-Viner forces dominate in markets with low turnover. Intuitively, if turnover is low, then a worker's attachment to that sector will be strong and the worker will be reluctant to quit. In this case, the difficulty of finding reemployment and the durability of current employment creates an attachment that makes workers act as if they have sector specific skills. On the other hand, if turnover is high, the worker's attachment to that sector will be weak. In this case, the return to those workers will vary with trade policy as if they were perfectly mobile across sectors.

In this paper, we test the link between turnover and trade preferences. We combine data on PAC contributions with the Davis, Haltiwanger, and Schuh (1996) data on job turnover in US manufacturing industries to examine how the pattern of campaign contributions varies across industries and factors of production. Consistent with the theory, the empirical work suggests that turnover plays an important role in the determination of lobbying activity aimed at influencing trade policy.

1. Introduction

One of the main themes of international economics is that trade relationships have profound implications for the domestic distribution of income. While there is no question that changes in trade policy create winners and losers, the identity of the winners and losers largely depends on the degree to which factors of production can move between sectors. The two polar extremes are embodied in the in the Heckscher-Ohlin-Samuelson (HOS) model, where factors are assumed to be perfectly mobile between sectors, and the Ricardo-Viner model (a.k.a. Specific Factors model) where some factors of production are assumed to be completely immobile. One of the fundamental results of the HOS model is the Stolper-Samuelson theorem, which demonstrates that the economy's abundant factor benefits from trade liberalization, even if employed in the declining import-competing sector, and the economy's scarce factor is harmed by trade liberalization, even if employed in the expanding export sector. By contrast, analysis of the Ricardo-Viner model reveals that factors that are trapped in the import-competing sector are harmed by trade reform regardless of relative abundance, while factors fortunate enough to be tied to the export sector benefit.[1]

Attempts to test these two theories have met with limited success. Magee (1980) tested their predictions by exploiting the fact that they have different implications for lobbying activity in the United States. The Stolper-Samuelson theorem predicts that capital, an abundant factor in the U.S., should gain from liberalization while low-skilled labor, a scarce factor in the U.S., should lose. Consequently, low-skilled labor and capital should have polar opposite views with regard to trade policy even when both are

employed in the same industry. On the other hand, if capital and labor are both tied to their sector, then the Ricardo-Viner model predicts that capital and labor groups within each industry should share the same view on trade policy issues. Magee showed that lobbying behavior on the 1973 Trade Reform Act was consistent with the Stolper-Samuelson theorem in only 2 of 21 industries. The Ricardo-Viner model fared much better. In 19 industries labor and capital lobbied for the same type of trade policy. Irwin (1996) also found evidence favoring the predictions of the specific factors model in the 1923 British election for Parliament, where the main issue was whether or not to adopt tariff protection. He concluded that the main determinants of voting behavior in each district were the industry and occupational characteristic of the county.

Other research has tended to support the Stolper-Samuelson theorem. For example, Rogowski (1987) argues that the theorem can be used to explain the lobbying coalitions that have formed in many developed countries since 1850. Beaulieu (1998, 2001) and Balistreri (1997) find support for HOS in the voting preferences of Canadians with respect to NAFTA, GATT, and the Canadian-US Free Trade Agreement of 1989. Scheve and Slaughter (1998) offer similar evidence based on the view of trade policy held by Americans. Finally, Beaulieu and Magee (2001) find that both the industry and the factor that PACs represented influenced the pattern of their contributions to supporters of NAFTA and GATT in the US. The factor that the group represents appears to be more important than the industry, however, particularly for capital. [2]

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[1] The welfare impact of trade reform on mobile factors is ambiguous, depending on their preferences.
[2] Beaulieu and Magee (2001) argue that since the Magee (1980) and Irwin (1996) studies focus on votes that could have been overturned within a decade, what they are picking up is the voters' short-term concerns. In contrast, the other studies focus more broadly on overall views of trade policy that are likely to be governed by long-run concerns. They conclude, as do Leamer and Levinsohn (1995) that this group of results taken as a whole indicates that the HO model does a good job explaining the link between trade and factor rewards in the long-run while the Ricardo-Viner model is more appropriate for the short-run.

The fact that the evidence is so mixed should not be too surprising. These two models embody the two most extreme assumptions that can be made about factor mobility. In reality, factors are quasi-fixed, moving between sectors in response to changes in factor rewards. Recognizing this, a number of authors in the 1970s, most notably Mayer (1974), Mussa (1974, 1978), and Neary (1978), developed models with imperfect factor mobility in which both short-run specific factors and long-run Heckscher-Ohlin labor markets are relevant for worker preferences concerning trade policy. Lobbying behavior then depends on factors that determine which time horizon is most important to each factor in each industry (e.g., time preference and age profile).

Casual observation also suggests that the two models should have difficulty explaining the movement of wages, particularly those of low-wage workers, whose labor market experience bears little resemblance to that modeled in the HOS or RV settings. These workers typically cycle between periods of employment and unemployment, often finding it difficult to obtain new jobs quickly. Moreover, these workers frequently encounter significant adjustment costs when switching sectors due to search costs, the costs of retraining and the non-trivial amount of time they may spend unemployed. This experience contrasts with a fundamental assumption embodied in the HOS and RV models that factors are fully employed at all times. The models developed by Mayer, Mussa, and Neary also maintain the assumption of full employment and ignore the adjustment costs that come hand-in-hand with resource allocation.[3] Since recent papers by Jacobson, LaLonde and Sullivan (1993a, 1993b), Trefler (2001), Kletzer (2001) and Davidson and Matusz (2001b) suggest that these adjustment costs may be significant, it is

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[3] An exception is Mussa (1978) in which adjustment costs associated with changing the stock of capital in a given sector are taken into account. Labor faces no adjustment costs when switching sectors.

important to take them into account when assessing the link between trade and the distribution of income.

Building on the tradition established by Mayer, Mussa, and Neary; Davidson, Martin, and Matusz (1999) recently extended the HOS model to allow for labor market turnover and showed that many of the model's canonical results were altered. In their model, labor and capital are treated as quasi-fixed in the sense that displaced factors must search for new production opportunities once a job dissolves. Thus factors face employment risk and the rate at which jobs are created and destroyed plays a role in determining the allocation of resources. In such a setting, any change in trade patterns creates unemployment and generates adjustment costs. The result is a more nuanced view of the link between trade and the distribution of income.

The picture that emerges from the DMM model has features that derive from both the HOS and RV models. In particular, when labor market turnover is modeled, the impact of trade liberalization on factor rewards is made up of a convex combination of Stolper-Samuelson and Ricardo-Viner forces. Stolper-Samuelson forces dominate in sectors with high labor market turnover, while the Ricardo-Viner forces dominate in sectors that are characterized by low turnover. Intuitively, if jobs are difficult to find but durable once obtained (that is, if turnover is low), then a worker's attachment to the sector will be strong. In this case, the difficulty of finding reemployment and the durability of current employment creates an attachment that makes workers act as if they have sector specific skills. On the other hand, if a sector is characterized by high turnover in the sense that jobs are easy to find or do not last long once secured, then the worker's attachment to that sector will be weak. In this case, the return to those workers will vary

with trade policy as if they were perfectly mobile across sectors. One of the main conclusions of the DMM model is that the link between trade and the distribution of income should be dependent on job turnover, which varies widely across industries.[4]

In this paper, we test the link between industry turnover and trade preferences.[5] Toward that end, we first develop a simple model of trade with factor market turnover in the spirit of the DMM model. In contrast to DMM, who focus on the steady-state properties of their model, we examine the time path of factor rewards along the adjustment path that takes the economy from its original short-run equilibrium to its new steady state. We then add on a model of the political process in which lobbying coalitions provide contributions to candidates in order to influence election outcomes and trade policy decisions made by representatives.[6] In our empirical work, we combine data on PAC contributions with the Davis, Haltiwanger, and Schuh (1996) data on job creation and job destruction in US manufacturing industries to examine how the pattern of campaign contributions varies across industries and factors of production. We use the data to undertake both non-parametric and parametric tests of propositions that are suggested by our model. Both the model and the empirical work suggest that labor

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[4] One possible way to view this result is that when the Mayer, Mussa, and Neary approach is extended to allow for employment risk the difference between the short-run and long run is blurred and the link between trade and the distribution of income becomes more complex.

[5] Recent empirical work by Goldberg and Maggi (1999) estimates Grossman and Helpman's (1994) theoretical model relating industry characteristics to the cross-industry structure of tariffs. In that analysis, lobbying is an intermediate step in the chain of causation. Our focus is more narrow, using observed lobbying activity to infer preferences over trade policies that are held by interest groups.

[6] Davidson, Martin, and Matusz (1999) make no attempt to examine the interaction between trade-policy preferences and political institutions in order to predict lobbying behavior. As Mayer (1984) and others have shown, however, different political institutions can lead to very different political behavior for a given set of trade-policy preferences. Thus, as Rodrik (1995) emphasizes, political behavior is the endogenous outcome of the interaction between underlying trade-policy preferences and existing political institutions.

market turnover plays an important role in the determination of lobbying activity aimed at influencing trade policy.

The remainder of the paper divides into four sections. In the next section, we provide a general equilibrium model of trade with labor market turnover in which interest groups donate funds in order to influence trade policy. Section 3 describes the data, and the empirical tests are presented in section 4. We conclude the paper in section 5.

2. The Model

In this section we modify the standard two-sector, two-factor general equilibrium model to incorporate factor-market turnover and show how the link between changes in output prices and changes in factor prices depends on turnover. In particular, the effect of a price change on the welfare of each factor will resemble a weighted average of Stolper-Samuelson effects and Ricardo-Viner effects, with the weights depending on the industry's turnover rates. We then provide a model of interest group lobbying to complete the link between labor market structure, trade preferences and political outcomes. The underlying trade model is a simplified version of the one presented in Davidson, Martin, and Matusz (1999). The model of interest group lobbying builds on earlier work by Magee, Brock, and Young (1989) and Grossman and Helpman (1994).

A. Trade, Turnover and Income

We assume that there are two goods, an exportable (X) and an import-competing good (M). Both goods are produced according to a constant-returns-to-scale technology

using capital (K) and labor (L). Both capital and labor are infinitely lived. Each factor earns the value of its marginal product when employed and nothing when unemployed.[7]

Factor markets are dynamic in the sense that capital and labor cycle through periods of employment and unemployment. We assume that jobs are created and destroyed according to Poisson processes, where b_i is the job break-up rate and λ_i is the job acquisition rate in sector i. To keep the analysis simple, we assume that the break-up and job acquisition rates within a sector are the same for both capital and labor.[8]

We begin by describing the environment that confronts workers. Let $w_i(t)$ be the wage paid in sector i at time t. Consider an unemployed worker who is searching for a job in this sector and assume that the economy is in a steady state so that $w_i(t) = \overline{w}_i$ for all t. Let ρ represent the subjective discount rate. The dynamic programming solution reveals that the searcher's expected income discounted over the infinite future, defined as $V_{LS}^i(\overline{w}_i)$, is proportional to a weighted average of the wage earned when employed and zero, the income earned when unemployed:

(1)
$$V_{LS}^i(\overline{w}_i) = \frac{1}{\rho} \frac{\lambda_i}{\rho + \lambda_i + b_i} \overline{w}_i .$$

Similarly, the expected lifetime income of a worker who is employed in sector i, defined as $V_{LE}^i(\overline{w}_i)$, is proportional to a weighted average of the current wage and the income earned upon separation (zero). In this case,

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[7] For ease of exposition, we refer to capital as well as labor as either being employed or unemployed, rather than rates of capacity utilization, idle capital, and so on. We also use the word "job" to refer to a unit of employed capital as well as to a unit of employed labor.

[8] In our empirical analysis, we capture turnover by the use of job destruction rates. Since we do not have data on capital turnover, we assume that the job destruction rate associated with a given sector applies to both the capital and labor used within that sector.

(2) $$V_{LE}^i(\overline{w}_i) = \frac{1}{\rho}\frac{\rho+\lambda_i}{\rho+\lambda_i+b_i}\overline{w}_i.$$

The difference between (1) and (2) is that because of discounting, the worker places more weight on the income that is currently being earned and less weight on the future.

Unemployed workers search in the sector that offers the highest value of discounted income. Diversified production, where unemployed workers search in both sectors, can only be sustained in a steady-state if $V_{LS}^X(w_X) = V_{LS}^M(w_M)$. In order to use analytic devices familiar from the standard general equilibrium production model, we assume that $\lambda_i = \lambda$ and $b_i = b$ for $i = X, M$.[9] The value functions are then the same in both sectors, so we can simplify notation by suppressing the superscripts. Diversified production then requires that $\overline{w}_X = \overline{w}_M$ in a steady state.[10]

By symmetry, similar relationships hold for capital. Letting $\overline{r}_i$ represent the steady-state return to capital in sector i, the values of discounted income for searching and employed capital are given in (3) and (4):

(3) $$V_{KS}(\overline{r}_i) = \frac{1}{\rho}\frac{\lambda}{\rho+\lambda+b}\overline{r}_i$$

(4) $$V_{KE}(\overline{r}_i) = \frac{1}{\rho}\frac{\rho+\lambda}{\rho+\lambda+b}\overline{r}_i$$

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[9] None of our qualitative results depend upon this assumption.
[10] More generally, each unemployed factor considers three aspects when deciding upon where to search for a job. The most obvious aspect is, of course, the wage (or rental rate) that will be received when employed. The two remaining aspects are the expected duration of time searching before finding a job and the expected length of the spell of employment once the job is secured. Given our assumption that turnover is characterized by a Poisson process, the expected duration of search before successfully finding employment is $1/\lambda_i$, and the expected duration of a job is $1/b_i$. All other things equal, unemployed factors will be drawn to search in the sector with the lower expected duration of unemployment, the higher expected duration of a job, and the higher wage (return to capital). Assuming that turnover rates are the same across sectors neutralizes these latter two considerations.

Integrating the zero-profit conditions with the above discussion allows us to solve for the steady-state wage and rental rates in the usual way. Figure 1, drawn under the assumption that the export sector is relatively capital intensive, illustrates the unique solution for $\bar{w}_0$ and $\bar{r}_0$.

When trade is liberalized, as shown in Figure 2, there is a reduction in the domestic price of the import-competing good. Eventually the economy settles at a new steady state characterized by factor prices $\bar{w}_T$ and $\bar{r}_T$. Due to liberalization, the steady-state value of the wage rate falls relative to both product prices, and the steady-state value of the return to capital increases relative to both product prices. This result is, of course, the magnification effect identified by Stolper and Samuelson. Factor markets are sluggish, however, and adjustment to the new steady state does not occur instantly.

Initially, both w_M and r_M fall by the same proportion as the reduction in the price of the import-competing good, and all labor and capital that had been searching for work in the import-competing sector moves to the export sector. Because the import-competing sector is labor intensive compared with the export sector, the pool of searchers in the export sector becomes more labor intensive, implying that employment in that sector will also begin to become more labor intensive. As it does so, the wage in the export sector begins to fall while the return to capital increases. In figure 2, the transition path is shown as a movement down along the zero-profit curve for the export sector. If the reduction in factor prices is not too large, capital and labor employed in the import-competing sector at the time of liberalization wait until there is an exogenous separation before moving to the export sector to search. Since we have assumed that the break up rate is the same for capital and labor, the employment of both shrinks proportionately, so

that the capital intensity of this sector remains unchanged. With unchanged capital intensity, w_M and r_M also remain unchanged.

Eventually, the wage in the export sector falls to the level of the wage in the import-competing sector, though the return to capital is still higher in the export sector than in the import-competing sector. Labor is now indifferent between searching for work in the import-competing sector or the export sector, but capital still prefers to search in the export sector. Upon separation, all capital but only some of the labor that had been employed in the import-competing sector moves to search in the export sector. Both sectors become more labor intensive, implying that the wage rate (now equal across sectors) continues to fall, while the return to capital increases in both sectors. In Figure 2, wages and rental rates move down along the zero profit curve in the import-competing sector in parallel to our slide down along the zero profit curve in the export sector, all the while maintaining equality between w_X and w_M. The economy reaches the new steady state (with wages and rental rates in both sectors of $\overline{w}_T$ and $\overline{r}_T$) at time T.

The time paths of real wages and the real returns to capital are illustrated in Figure 3, in which Π_{td} (Π_{ft}) represents the tariff-distorted (free trade) price index. The bold line represents the time path of real factor prices for a low turnover industry while the dashed line shows the transition path for a high turnover industry. Observe that the economy reaches the new steady state in finite time, with the higher turnover industry taking less time to reach this new long-run equilibrium.[11]

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[11] If the economy only asymptotically approached the new steady state, the return to capital would forever be higher in the export sector than in the import-competing sector, and therefore the export sector would absorb the entire stock of capital. Without any capital, the marginal product of capital in the import-competing sector would become infinite, thereby creating a logical inconsistency since the return to capital in the export sector is finite. The analytical solution for the transition path is available upon request.

Figure 3 reveals that labor initially employed in the import-competing sector (the upper left graph) is harmed by liberalization, while capital initially employed in the export sector (the lower right graph) clearly benefits. In contrast, the impact of liberalization on the real incomes of labor initially employed in the export sector and on capital originally employed in the import-competing sector is ambiguous. At first, labor employed in the export sector is better off since the real wage in this sector increases while losses do not occur until later. The situation is reversed for capital initially employed in the export sector, where the losses are up front and the gains are delayed.

Given a particular discount factor, the net impact on the real incomes of labor groups in exporting industries and capital groups in import-competing industries hinges on how fast the economy reaches the new steady state. Higher turnover rates speed the adjustment to the new steady state, shortening the time that labor initially employed in the export sector enjoys higher real incomes, and reducing the time that capital initially employed in the export sector suffers lower real incomes. Neither the initial nor the terminal steady state levels of real incomes depend on turnover rates. The standard HOS model is a special case (with a job acquisition rate that approaches infinity) of the more general formulation presented here. In this case, adjustment is immediate because individuals could always quit a job that pays a low wage and immediately find a job in the high-wage sector. Similarly, the model nests a specialized version of the specific factors model (where there are no mobile factors) as a special case when the job acquisition and job breakup rates are both zero.

With intermediate levels of turnover, it is clear from Figure 3 that labor groups in exporting industries will support trade liberalization only if the turnover rate for labor is

sufficiently low. In fact, there is a critical level of turnover below which exporting labor groups will support liberalization, and above which they will oppose liberalization. A similar critical value for turnover can be defined for interest groups representing import-competing capital owners such that the owners will support trade liberalization if the industry turnover rate is higher than the critical value and oppose liberalization if the turnover rate is lower than the critical value.

B. A Simple Model of Tithing

In order to examine how interest group trade preferences will be reflected in their lobbying behavior, we introduce a simple model of lobbying. Assume for the moment that candidates choose their policy positions prior to interest groups giving campaign contributions as in Magee, Brock, and Young (1989). Interest groups then donate funds to help their preferred candidates get elected.

For the sake of exposition, suppose that the trade issue in question is whether or NAFTA should be passed in the House. Suppose further that interest group i gets expected PDV of lifetime income V_{iN} if NAFTA passes and $V_{i(-N)}$ if it does not pass. The group's expected income net of lobbying expenditures is $R_i = \gamma V_{iN} + (1-\gamma)V_{i(-N)} - \sum_j c_{ij}$, where γ is the probability that NAFTA passes the House, and c_{ij} represents interest group i's contribution to candidate j. The group sets its contributions so as to maximize expected income, or it chooses c_{ij} so that

(5) $$\frac{\partial R_i}{\partial c_{ij}} = \frac{\partial \gamma}{\partial c_{ij}}(V_{iN} - V_{i(-N)}) - 1 = 0 \qquad \text{when } c_{ij} > 0,$$

and sets $c_{ij} = 0$ when $\dfrac{\partial R_i}{\partial c_{ij}} = \dfrac{\partial \gamma}{\partial c_{ij}}(V_{iN} - V_{i(-N)}) - 1 < 0$. Let θ be the probability that any

one vote in the House is decisive in determining the outcome of the bill approving

NAFTA. In that case, the effect of the interest group contribution on the likelihood that

NAFTA passes is: $\dfrac{\partial \gamma}{\partial c_{ij}} = \theta \dfrac{\partial p_j}{\partial c_{ij}}(N_j - N_{-j})$, where p_j is the probability candidate j wins

election, N_j is the probability candidate j votes for NAFTA, and N_{-j} is the probability

that candidate j's opponent would vote for NAFTA. Substitution into (5) reveals that an

interest group gives money to a candidate until:

(6) $$\theta \frac{\partial p_j}{\partial c_{ij}}(N_j - N_{-j})(V_{iN} - V_{i(-N)}) - 1 = 0 \qquad \text{when } c_{ij} > 0.$$

Rearranging (6) we have:

(7) $$(N_j - N_{-j})(V_{iN} - V_{i(-N)}) = \frac{1}{\theta \dfrac{\partial p_j}{\partial c_{ij}}}.$$

Since the right-hand-side of (7) is positive, the two terms in parentheses on the left-hand-

side must be the same sign. Equation (7) thus reveals that interest groups favoring

(opposing) NAFTA will tend to give money to candidates who are more likely to vote for

(against) NAFTA than their opponents. Furthermore, it is reasonable to assume, as

Magee, Brock, and Young (1989) do, that contributions received by a candidate have

diminishing marginal effects on the probability that the candidate wins election. Thus, as

c_{ij} rises, $\dfrac{\partial p_j}{\partial c_{ij}}$ falls, and the right-hand-side of (7) rises. With candidates' policy

positions predetermined, it must be the case that c_{ij} rises with $|V_{iN} - V_{i(-N)}|$. In other

words, interest groups that have a larger payoff from seeing NAFTA passed (defeated) will give more money to each candidate who supports (opposes) NAFTA.

In reality, interest groups may give campaign contributions with an eye toward influencing more than just the outcome of elections. Grossman and Helpman (1994), for instance, set up a model in which contributors take election outcomes as given and donate funds to influence the government's choice of trade policy. Interest groups may also give money to buy unobserved services (such as rewriting legislation and blocking unfavorable bills in committees) that representatives can provide for them. Hall and Wayman (1990) provide empirical evidence that campaign money encourages House committee members to spend more time and effort on policy issues that are important to the PAC. We now expand our lobbying model to include these considerations.

Consider a lobby group whose income net of contributions is

$$(8) \qquad R_i = \sum_j S_{ij} + \gamma V_{iN} + (1 - \gamma) V_{i(-N)} - \sum_j c_{ij} ,$$

where S_{ij} is the monetary value of services provided to PAC i by representative j. This term can be considered to include all non-trade considerations of an interest group in donating money. Assuming that campaign contributions influence both the likelihood that representative j wins election and the probability that she votes for NAFTA, the impact of contributions on the probability that NAFTA passes Congress is

$$(9) \qquad \frac{\partial \gamma}{\partial c_{ij}} = \theta \left(\frac{\partial p_j}{\partial c_{ij}} (N_j - N_{-j}) + p_j \frac{\partial N_j}{\partial c_{ij}} \right)$$

The right-hand-side of (9) includes two terms that correspond to what Grossman and Helpman (1996) refer to as the electoral and the influence motives for giving campaign contributions. The first term in brackets measures the effect of helping a favored

candidate win, while the last term represents the effect of influencing the policy choice of

a candidate likely to win ($\frac{\partial N_j}{\partial c_{ij}}$ is the effect of a dollar on the probability that candidate j

supports NAFTA). Differentiating (8) with respect to c_{ij} and substituting (9) into the

result reveals that a PAC will contribute money to candidate j until

(10) $\qquad \frac{\partial S_{ij}}{\partial c_{ij}} + \theta(\frac{\partial p_j}{\partial c_{ij}}(N_j - N_{-j}) + p_j \frac{\partial N_j}{\partial c_{ij}})(V_{iN} - V_{i(-N)}) = 1 \qquad$ when $c_{ij} > 0$

$\qquad \frac{\partial S_{ij}}{\partial c_{ij}} + \theta(\frac{\partial p_j}{\partial c_{ij}}(N_j - N_{-j}) + p_j \frac{\partial N_j}{\partial c_{ij}})(V_{iN} - V_{i(-N)}) < 1 \qquad$ for $c_{ij} = 0$.

The electoral motive for giving money suggests that PACs favoring NAFTA will

give money to those candidates most likely to vote for the bill's approval, while the

influence motive encourages such PACs to give the largest contributions to candidates

with a 50% probability of voting for NAFTA, since the marginal impact of a dollar of

contributions is maximized in this situation. With both motivations being considered, a

PAC will give the most money to candidates with a greater than 50% chance of voting in

the PAC's favored manner on the trade bill. Thus, on average, each PAC's pattern of

contributions across all candidates will reveal its preference on the trade bill. Equation

(10) also reveals that other considerations play a role in PAC contribution decisions, such

as the ability of the politician to provide valuable services to the interest group, and the

likelihood that the candidate wins election. Based on (10), we can rewrite the

contribution decision as

(11) $\qquad c_{ij} = F(N_j - N_{-j}, \frac{\partial N_j}{\partial c_{ij}}, \frac{\partial S_{ij}}{\partial c_{ij}}, p_j),$

where F is a function that solves (10). This function depends on the interest group's preference on NAFTA ($V_{iN} - V_{i(-N)}$ in 10). The Grossman and Helpman (1994) model, estimated by Goldberg and Maggi (1999), is a special case of (11) where elections and non-trade services provided to PACs are assumed away.

C. Estimation Issues

In empirically estimating (11), we face the problem that the underlying probability a candidate is elected and his ability to provide services to the PAC are unobserved. We take two approaches to solving this problem. In the first approach, we assume that a representative's position on liberalization is unrelated to his ability to provide a PAC with services and to his chance of winning election. We can think of a large number of candidates for office, some of whom support NAFTA, others do not. If the NAFTA proponents and opponents are equally capable of providing services to the PAC, there is no reason why the PAC would buy services from the NAFTA supporters more often than it bought services from NAFTA opponents. In that case, the share of PAC j's total campaign contributions that are given to NAFTA supporters do not depend on the last two terms in (11). On average, PACs who support NAFTA should give a larger share of their contributions to legislators who are in favor of NAFTA compared with PACs who oppose NAFTA. This prediction will be true as long as electoral motives play any role in PAC contribution decisions. If the electoral motive plays no role, the two groups of PACs would each give their money to the same group of undecided legislators.

Let $V_i = V_{iN} - V_{i(-N)}$ be the interest group's net gain from NAFTA (positive for supporters of the agreement and negative for opponents), and let T_i denote the turnover in industries represented by the group. Suppose that the interest group's net gain from NAFTA depends on the factor of production it represents, its industry's net export position, and industry turnover in the following manner:

(12) $\qquad V_i = A_1 K_i + A_2 X_i + A_3 T_i + A_4 K_i T_i + A_5 X_i T_i + A_6 UL_i$.

The variable $K_i = 1$ if PAC i represents the interests of capital and $K_i = 0$ otherwise, $X_i = 1$ if PAC i represents exporting industries on average and $X_i = 0$ for import-competing industries, and UL_i measures the extent of unskilled labor in the industries represented by PAC i. The Stolper-Samuelson theorem suggests that capital groups in the U.S. will benefit from NAFTA on average ($A_1 > 0$). The specific factors model predicts that exporting industries will benefit from trade liberalization ($A_2 > 0$). The new insight of our model is that Stolper-Samuelson effects will be stronger in high turnover industries ($A_4 > 0$) while the industry's net export position will matter more in low turnover industries ($A_5 < 0$).[12]

We do not observe the interest group's net gain or loss from NAFTA, V_i, but the lobbying model reveals that electoral considerations push PACs to give more money, on average, to politicians who are likely to vote in their favored manner on liberalization.

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[12] As a referee pointed out to us in an earlier version of this paper, skilled workers might have different trade preferences than unskilled labor (with skilled labor having the same preferences as capital), and sector-specific turnover rates might be correlated with the skill composition of the sector. If high turnover industries are intensive in the use of unskilled labor, then we would see labor and capital opposed to each other in high turnover industries but not in low turnover industries. This would lead to our observed correlations, but the mechanism would be different. We account for this possibility by incorporating the fraction of the workforce classified as unskilled or semi-skilled as a control variable in our regressions.

Thus, we estimate (12) using the share of contributions going to NAFTA supporters as a proxy for the interest group's net gain from the trade deal. Since the underlying preferences are linear functions of the parameters but the dependent variable is limited to the range [0, 1], we estimate (12) as a linear regression with censoring above and below.

The second method of dealing with unobserved services and probabilities of election is to estimate (11) directly with proxies for the unobserved variables. We use representatives' membership on important committees, their positions of power within congress, and their party as proxies for a legislator's ability to provide services to interest groups, and we use terms in office as a proxy for the probability a candidate will win re-election. The predicted probability that legislator j votes for NAFTA is employed as a proxy for the first two terms in (11).

In order to facilitate the estimation of (11), we assume a particular functional form for F. Let contributions from PAC i to candidate j be determined by

$$(13) \qquad c_{ij} = \mathbf{A'Y}_j + \mathbf{B'Z}_i + N_j(\mathbf{C'Z}_i),$$

where $\mathbf{Y}_j$ is a vector of the candidate characteristics described above that measure the legislator's ability to win election and to provide services to the PAC. The terms $\mathbf{B'Z}_i$ and $\mathbf{C'Z}_i$ include characteristics of the interest group that determine its preferences on NAFTA. As in equation (12), we assume that these terms take the following form:

$$(14) \qquad \mathbf{B'Z}_i = B_1 K_i + B_2 X_i + B_3 T_i + B_4 K_i T_i + B_5 X_i T_i + B_6 UL_i$$

$$(15) \qquad \mathbf{C'Z}_i = C_1 K_i + C_2 X_i + C_3 T_i + C_4 K_i T_i + C_5 X_i T_i + C_6 UL_i.$$

When combined with our lobbying model, the Stolper-Samuelson theorem suggests that capital groups in the US will give more money to supporters of NAFTA on

average ($C_1 > 0$) than to NAFTA opponents. The specific factors model predicts that exporting industries will contribute more heavily to supporters of trade liberalization than to opponents ($C_2 > 0$). Our model predicts that we should observe larger Stolper-Samuelson effects in high turnover industries ($C_4 > 0$) and larger specific factors effects in low turnover industries ($C_5 < 0$).

There are two complications in estimating (13). First, the dependent variable is censored from below at zero because $c_{ij} = 0$ when the left hand side of (10) is less than one. Thus, estimating (13) requires a Tobit specification. Second, the trade vote measure is endogenous since it may be affected by the campaign contributions that a candidate receives from interest groups. In order to deal with this endogeneity, we use an instrumental variables technique. First, we estimate an equation predicting how representatives will vote on NAFTA based on the model in Baldwin and Magee (2000). Then we use the predicted probability that candidate i will vote for the trade bill in place of N_j in (13). In order to check the robustness of the results, we use three different trade liberalization measures: the NAFTA, the GATT Uruguay Round Agreement, and both bills jointly. The next section describes the data used in the empirical tests.

3. Data

Table 1 presents the definitions, sources, and means of the variables used in the empirical tests performed in section 4. The measure of industry turnover used in this study was compiled by Davis and Haltiwanger (1992), and Davis, Haltiwanger, and Schuh (1996). These authors calculated the change in the number of jobs lost in

shrinking establishments (for job destruction) and the change in the number of jobs gained in growing establishments (job creation) relative to the employment base within the industry. The job destruction measure for sector s in time period t is

$$(16) \qquad JD_{st} = \sum_{\substack{e \in E_{st} \\ y_{et} < y_{et-1}}} | \frac{y_{et} - y_{et-1}}{\frac{Y_{st} + Y_{st-1}}{2}} |,$$

where y_{et} is employment in establishment e, Y_{st} is total employment in sector s, and E_{st} is the set of establishments in sector s at time t.[13]

While these data are referenced in the literature as measuring gross job flows, they are in fact measures of the net change in establishment size over one year. Davis and Haltiwanger (1992) discuss several different measures of job turnover based on their data on changes in establishment size. This paper uses the average job destruction rate as defined in (16) between 1988 and 1992 as the measure of industry turnover since the job destruction rate is closely tied to the notion of job security in our model, though we experiment with alternative specifications of turnover discussed in Davis and Haltiwanger (1992) in order to explore the robustness of our results.

In order to link political action committees to the industry they represent, we use a data set from the Center for Responsive Politics (CRP) that places 217 manufacturing PACs into groups of 4-digit SIC industries. Using descriptions of each company and union available on the internet, we are able to identify the 2, 3, and 4-digit SIC industry affiliations of 202 other corporate and labor PACs that gave money to House members who voted on the bills enacting the NAFTA or Uruguay Round agreements. These political action committees are identified as representing either capital or labor interests

based on the Federal Election Commission classification of each PAC as a corporate or labor group. In total, the data set consists of 42 labor and 377 corporate PACs.

Each interest group is classified as representing import-competing or exporting interests based on the net trade position of the PAC's industries of origin. The PAC net export position equals one if the industries' total exports were greater than imports over the period 1988-1992, and it equals zero otherwise.[14] Under this definition, the data set includes 226 import-competing interest groups and 193 exporting PACs. The trade flow data used to make these calculations are taken from the NBER US imports and exports data sets (www.nber.org) that are described in Feenstra (1996, 1997).

Because skilled labor and unskilled labor may differ in their support for liberalization, we include a measure of the skill level of workers in each industry, taken from the Current Population Survey (CPS), in estimating the PAC contribution equations. The CPS divides workers into five categories: engineers/scientists, white collar workers, skilled labor, unskilled labor, and semiskilled labor.   The skill level of workers represented by a PAC is measured by the fraction of workers (over the period 1988-92) that are classified as unskilled or semiskilled in the industries linked to the PAC.

The Federal Election Commission provides information on the contributions each PAC gives to every candidate in the House of Representatives. In this paper, we examine three different measures of whether the contributions were given primarily to supporters of trade liberalization. These measures are the share of contributions that were given in 1992 to representatives who voted for NAFTA (mean=0.60), the share given to

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[13] The job destruction rate has a value of -2 for plant deaths. Plant births are not incorporated in this measure because it is a measure of job loss, not job gains.
[14] Using an alternative measure, industry net exports as a share of domestic consumption, in the empirical estimation does not alter the basic results.

candidates voting to approve the GATT Uruguay Round (mean=0.73), and the share given to supporters of both NAFTA and the GATT bills (mean=0.51). About 54% of representatives voted for NAFTA, 67% voted for the GATT bill, and 46% voted for both trade bills. This paper also examines the factors that affect PAC j's contributions to candidate i. The mean contribution was over $1300 when an interest group gave money to a representative. Because the typical PAC gave money to only 7% of all candidates, however, the average contribution from a PAC to a representative is $95 in our data set. *Politics in America: 1994*, edited by Duncan (1994) provides information on other factors that may influence the amount of PAC money candidates receive: membership on key committees, positions of leadership in the party and in committees, terms in office, and party affiliation.

4. Empirical Tests

Table 2 provides non-parametric tests of two predictions from the model in section 2. In high turnover industries, we should observe a large difference between capital and labor groups in the fraction of contributions given to NAFTA supporters. Low turnover industries should not exhibit this large difference as the Stolper-Samuelson effects are less important. Low turnover industries, unlike high turnover industries however, should reveal a large difference between import-competing and exporting PACs in the fraction of contributions given to NAFTA supporters. Table 2 presents the fraction of PAC contributions given to congressional representatives who voted for NAFTA, for GATT, and for both bills. Lobby groups representing the interests of capital owners in

low turnover industries, for example, gave almost 61 percent of their contributions to representatives who ultimately voted in favor of NAFTA.

The results in Table 2 provide strong support for the model's predictions. As one would expect, labor groups gave a smaller share of contributions to representatives who voted in favor of free trade than did corporate interest groups in every case examined. Consistent with the model presented in this paper, labor groups in high turnover industries revealed much greater opposition to free trade in their contribution patterns than did labor groups in low turnover industries. Meanwhile, the contribution patterns of capital groups show that capital PACs in high turnover industries are more supportive of free trade than capital PACs in low turnover industries. The important result for the model in this paper is that in high turnover industries, capital groups gave a significantly larger fraction of their contributions to NAFTA supporters, to GATT supporters, and to supporters of both trade bills, than did labor groups. In low turnover industries, however, capital groups did not give significantly larger fractions of their campaign donations to supporters of trade liberalization than labor groups did.

The lower half of Table 2 examines the model's prediction that the industry net export position will be important in determining interest group support for trade liberalization only in low turnover industries. The table shows that in low turnover industries, PACs representing exporting industries gave a significantly greater portion of their contributions to supporters of trade liberalization than did import-competing PACs. In high turnover industries, however, the difference between import-competing and exporting PACs in their contribution patterns was negligible, as the model predicts.

Table 3 presents the estimates of (12) using the PAC's share of total contributions going to NAFTA supporters (column 1), the share going to GATT supporters (column 2), and the share going to representative who voted for both bills (column 3) as measures of PAC preferences on liberalization. An observation represents a single political action committee. The bottom half of the table includes industry fixed effects for each 2-digit SIC manufacturing industry in order to control for unobserved industry characteristics that might influence the degree of factor specificity and therefore affect the PAC's contribution decisions.

Our model predicts that the factor represented by the PAC should affect its contribution patterns in high-turnover industries (where capital would be supportive of free trade while labor would not be), but not in low-turnover industries. Note that the marginal effect of the capital variable on the interest group's trade preference in (12) is

$$(17) \qquad \frac{\partial V_i}{\partial K_i} = A_1 + A_4 T_i .$$

The theory predicts that $A_1 = 0$ and $A_4 > 0$. Furthermore, there should be a critical value of turnover (call it $\overline{T}_K$) such that

$$(18) \qquad \frac{\partial V_i}{\partial K_i} \begin{cases} = 0 & if \quad T_i \leq \overline{T}_K \\ \\ > 0 & if \quad T_i > \overline{T}_K \end{cases} .$$

Table 3 provides strong support for these predictions. The estimates of A_1 are small and insignificantly different from zero, while the estimates of A_4 (the coefficient on the interaction term between turnover and capital) are positive in all specifications of the model, both with and without industry fixed effects. The coefficient estimates of A_4 are

also statistically significant (with and without fixed effects) using NAFTA and both trade bills as measures of the PAC's support for trade liberalization.

Figure 4 illustrates the estimated effect (and 95% confidence interval) from (17) of the PAC's factor of production on the share of its contributions going to representatives who voted for both the NAFTA and GATT bills.[15] As the theory predicts, the factor of production has a significant effect on support for liberalization only for PACs in industries with sufficiently high turnover levels. The estimated critical value beyond which the factor of production influences trade preferences is $\overline{T}_K = 7.0$. About 72% of the PACs in our sample have turnover levels higher than this critical value.

As noted above, we used the job destruction rate as defined in (16) as our measure of job turnover. This measure is conceptually a better fit to our theoretical model than some of the alternative measures suggested by Davis and Haltiwanger (1992), such as the sum or the minimum of job creation and job destruction. We checked for the robustness of these results by re-estimating our equations using these alternative measures of turnover and found that our results were strongly robust to alternative specifications.

Our model also predicts that the industry's net export position should have an impact on interest-group behavior only for low turnover industries, and that impact should diminish as turnover rises. From (12), the marginal impact of the industry's net export position on the share of contributions given to free trade supporters is

(19) $$\frac{\partial V_i}{\partial X_i} = A_2 + A_5 T_i.$$

The model's prediction, then, is that $A_2 > 0$, $A_5 < 0$, and that there exists a critical value

of turnover (call it $\overline{T}_X$) such that

$$(20) \qquad \frac{\partial V_i}{\partial X_i} \begin{cases} > 0 & if \quad T_i \leq \overline{T}_X \\ = 0 & if \quad T_i > \overline{T}_K \end{cases}.$$

The results in Table 3 are generally consistent with this prediction. As the model

predicts, the estimates of A_5, the coefficient on the interaction term between turnover and

the industry net export position, are negative in all six specifications of the models. The

coefficient estimate is also statistically significant using the GATT Uruguay Round bill

as the measure of support for trade liberalization. When industry fixed effects are added

to the estimation, the coefficient estimates do not change very much, although the larger

standard errors push the p-value of the estimate of A_5 above the 10% level in the GATT

estimation ($p = 0.16$). Using net exports as a share of domestic consumption in place of

the variable X in Table 3 provides qualitatively similar results.

Figure 5 illustrates the estimated effect from (19) of the industry's net export

position on the share of contributions given to GATT supporters. Among low turnover

industries, the industry's net export position has a significantly positive effect on the

share of a PAC's contributions going to representatives voting for GATT. For turnover

levels beyond the critical value of $\overline{T}_X = 9.1$, however, industry net exports do not

influence a PAC's support for trade liberalization. Roughly 39% of PACs in our data set

fall into this category.

The conclusion that the prediction in (20) is supported by the evidence in Table 3

is tentative in two respects. While the coefficients have the correct sign in all six

regressions, the estimate of A_5 is statistically significant in only one of the specifications of the model. Second, unlike our estimates based on (18), the significance of the estimate of A_5 in the GATT regression is sensitive to our use of the job destruction rate as the measure of turnover. Using the sum of job creation and job destruction or the minimum of those variables, means that the coefficient estimate in the GATT equation is no longer statistically significant at the 10% level. The signs of the coefficient estimates remain correctly predicted by the model using all of the different measures of turnover.

Tables 4A and 4B present the results of estimating (13), (14), and (15), which determine how contributions from PAC i to representative j vary with the legislator's votes on trade bills. Table 4A uses the representative's actual votes on the NAFTA (columns 1 and 2) and GATT bills (columns 3 and 4) as measures of his or her preference on liberalization. Table 4B uses the predicted probabilities that the representative voted for NAFTA and GATT, based on the empirical model in Baldwin and Magee (2000), to account for the endogeneity of legislators' voting decisions. To control for unobserved industry, representative, and PAC variables that affect the contribution choices, fixed effects are included in each regression. Columns 1 and 3 include industry and candidate fixed effects while columns 2 and 4 control for industry and PAC fixed effects.[16] The unit of observation is a PAC-representative combination.

The results in Table 4 reveal that, as our model predicts, Stolper-Samuelson considerations are much stronger for high turnover industries than for low turnover industries. While capital groups tend to favor supporters of trade liberalization, the estimates of C_4 reveal that the preference of capital groups for NAFTA and GATT

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[16] Some PACs represent multiple industries. Because of the large number of dummy variables required, it was not possible to estimate the model controlling for all the different fixed effects simultaneously.

supporters is much weaker in low turnover industries than in high turnover industries. The estimates of C_4 are positive in all eight specifications of the model (and statistically significant in seven of the specifications). Column 2 of Table 4A provides a typical comparison from among the regressions. A capital PAC with the lowest level of turnover in our data gives $1218 more to a NAFTA supporter than to a NAFTA opponent. An identical capital PAC with the highest level of turnover in our data set donates $2781 more to NAFTA supporters than to NAFTA opponents. Thus, the estimates in Table 4 present strong evidence in favor of the prediction that the Stolper-Samuelson effects of liberalization on interest groups will be stronger among high turnover industries.

Our model's other prediction, that the industry net export position is more important in determining a PAC's trade policy stance in low turnover industries, is also consistent with the evidence in Table 4. The estimates of C_2 are positive in seven of eight specifications, suggesting that exporting industry PACs in low turnover industries tend to give larger contributions to supporters of trade liberalization than to opponents. The exporting industry revealed preference for trade liberalization declines as turnover increases, however, as the negative estimates of C_5 reveal. The empirical estimates in Table 4 reveal that $C_5 < 0$ in all eight specifications of the model, and significantly so in five of them. The four specifications using the GATT vote as a measure of trade preferences show coefficient estimates of C_5 that are significant at the 1% level. As the model predicts, the higher the turnover is in a PAC's industry, the smaller the effect of the industry's net export position on its contributions to NAFTA and GATT supporters.

5. Conclusion

Earlier work by Davidson, Martin, and Matusz (1999) provided a theoretical basis for linking industry turnover and international trade. This paper develops the model more fully to reveal that industry turnover can be used to divide interest groups into those whose trade preferences should be determined by their factor of production and those whose preferences depend on the industry's net export position. While it is perhaps not terribly surprising that both short-run specific factors and long-run Heckscher-Ohlin considerations will affect interest group trade preferences, one of the contributions of this paper is to show that industry turnover influences the relative importance of these considerations.

The paper then introduces a political economy model of lobbying showing that contribution patterns across representatives reveal the interest groups' preferences about trade liberalization. The model predicts that PACs from high turnover industries will be split along factor lines, with capital groups giving a larger share of contributions to NAFTA and GATT supporters than labor groups. Political action committees from low turnover industries should be split based on industry net export position, with exporting industry PACs favoring free traders and import-competing PACs favoring protectionists.

We test these predictions using data on campaign contributions to supporters and opponents of NAFTA and GATT in the U.S. House of Representatives. The empirical results generally support the predictions of the model. There is strong and robust evidence that the factor (either capital or labor) a PAC represents exerts a very large effect on the share of its contributions flowing to free trade supporters for high turnover industries but has a negligible impact for low turnover industries. The critical value at

which the factor begins to exert a significant influence on contribution patterns, in fact, lies near the middle of the range of turnover levels in many different specifications of the model. There is also evidence in favor of the model's prediction that the industry net trade position has a large impact on lobbying behavior only in low turnover industries. While the evidence concerning the model's prediction regarding net exports is slightly weaker than that supporting the factor prediction, the empirical results leave little doubt that interest group trade preferences and industry turnover are inextricably linked.

We conclude by noting that Goldberg and Maggi's (1999) estimation of the Grossman and Helpman (1994) model of the cross-industry structure of protection suggests that "factors linked to unemployment may affect protection through channels different than the ones suggested by the G-H theory." Goldberg and Maggi go on to speculate that it would be empirically rewarding to incorporate sector-specific unemployment rates (which Davidson, Martin and Matusz 1999 show are increasing functions of sector-specific job breakup rates) into the Grossman-Helpman framework. The theoretical and empirical results developed in this paper can be viewed as a first exploratory step in fully incorporating a model of labor market turnover, unemployment, and lobbying with the Grossman and Helpman model of protection.

Table 1: Definitions and summary statistics

Variable	Definition	Source	Mean
PAC Contributions (tables 2, 3)	Share of PAC's total 1991-92 contributions given to NAFTA supporters in HoR	Federal Election Commission	0.61
PAC Contributions (tables 2, 3)	Share of PAC's total 1991-92 contributions given to GATT supporters in HoR	Federal Election Commission	0.73
PAC Contributions (tables 2, 3)	Share of PAC's total 1991-92 contributions given to supporters of both NAFTA and GATT in HoR	Federal Election Commission	0.52
PAC Contributions (table 4)	PAC contributions to individual representative 1991-92	Federal Election Commission	93.33
Turnover	Average job destruction rate in industry, 1988-92	Davis, Haltiwanger, and Schuh (1996)	9.63
Capital	=1 if interest group defined to be corporate, =0 if labor	Federal Election Commission	0.90
Export industry	=1 if PAC industry exports > imports over the period 1988-92	NBER Trade Databases	0.37
Unskilled Labor	Fraction of industry labor classified as unskilled or semi-skilled	Current Population Survey calculations	0.41
NAFTA supporter	=1 if representative voted for NAFTA	*Congressional Quarterly Almanac*	0.54
GATT supporter	=1 if representative voted for GATT	*Congressional Quarterly Almanac*	0.67
Both trade bills supporter	=1 if representative voted for both NAFTA and GATT	*Congressional Quarterly Almanac*	0.46
Ways & Means	=1 if representative was a member of the Ways & Means Committee 1993-94	*Politics in America: 1994*	0.09
Labor Committee	=1 if representative was a member of the labor committee 1993-94	*Politics in America: 1994*	0.09
Terms	Terms in office including 1993-94	*Politics in America: 1994*	5.08
Democrat	=1 if representative is a Democrat	*Politics in America: 1994*	0.60
Committee Chair	=1 if representative was chair or ranking member of a committee in 1993-94	*Politics in America: 1994*	0.12

Table 2

Fraction of total PAC contributions given to free trade proponents

	Capital	Labor	T-statistic
Low turnover			
NAFTA	0.609	0.531	1.188
GATT	0.728	0.672	1.021
Both	0.515	0.456	0.929
High Turnover			
NAFTA	0.628	0.307	5.644 ***
GATT	0.746	0.635	2.294 **
Both	0.534	0.265	4.955 ***

	Export Industry	Import Industry	T-statistic
Low turnover			
NAFTA	0.624	0.577	1.286 *
GATT	0.748	0.692	1.867 **
Both	0.531	0.484	1.339 *
High Turnover			
NAFTA	0.586	0.602	-0.381
GATT	0.759	0.718	1.248
Both	0.516	0.506	0.259

*, **, *** Indicate that the means are significantly different at the 10%, 5%, and 1% levels (respectively) in one-sided t-tests.

Table 3

Contribution Patterns across PACs

Variable	Coefficient	NAFTA	GATT	Both
A. No Industry Fixed Effects				
Constant	A_0	0.869 ***	0.541 ***	0.681 ***
K (Capital)	A_1	-0.244	0.067	-0.205
X (Export industry)	A_2	0.183	0.253 **	0.179
T (Turnover)	A_3	-0.049 **	0.004	-0.041 **
$K \times T$	A_4	0.055 ***	0.004	0.046 **
$X \times T$	A_5	-0.024	-0.024 *	-0.020
Unskilled labor	A_6	-0.086	0.143	0.012
Sigma		0.320	0.268	0.298
Observations		419	419	419
Log likelihood		-193	-130	-162
B. With Industry Fixed Effects (not reported)				
Constant	A_0	0.654 ***	0.532 ***	0.472 **
K (Capital)	A_1	-0.212	-0.020	-0.187
X (Export industry)	A_2	0.279	0.286 *	0.252
T (Turnover)	A_3	-0.045 *	-0.013	-0.041 *
$K \times T$	A_4	0.053 **	0.015	0.044 **
$X \times T$	A_5	-0.030	-0.022	-0.022
Unskilled labor	A_6	0.182	0.554 ***	0.375 *
Sigma		0.313	0.258	0.288
Observations		419	419	419
Log likelihood		-185	-117	-149

*, **, *** Indicate that the coefficient is statistically significant at the 10%, 5%, 1% levels in two-tailed tests

Unit of observation = PAC

Table 4A

PAC Contributions to Individual Representatives

Variable	Coefficient	N = NAFTA vote		N = GATT vote	
		Industry & candidate fixed effects	Industry & PAC fixed effects	Industry & candidate fixed effects	Industry & PAC fixed effects
K	B_1	-61.0	-2942.9 ***	452.9 *	-2400.0 ***
X	B_2	-373.8	-370.7	-871.6 ***	-523.1
T	B_3	187.0 ***	222.1 ***	145.9 ***	197.2 ***
$K \times T$	B_4	-251.7 ***	-72.7	-240.3 ***	-81.8
$X \times T$	B_5	67.6 ***	-192.1 ***	109.5 ***	-185.9 ***
UL	B_6	166.5	-4241.6 ***	-290.9	-4750.3 ***
$N \times K$	C_1	286.0	933.8 ***	-327.1	193.6
$N \times X$	C_2	51.7	139.5	751.8 ***	854.0 ***
$N \times T$	C_3	-206.3 ***	-145.7 ***	-69.5 **	-19.3
$N \times K \times T$	C_4	178.1 ***	118.4 ***	87.1 **	36.6 **
$N \times X \times T$	C_5	-31.4	-20.5	-86.1 ***	-89.3 ***
$N \times UL$	C_6	-1566.8 ***	-461.6 **	-680.7 ***	-175.0
$Ways \& Means$		327.4	-183.5	-1228.7 ***	-387.5 ***
$K \times (Ways \& Means)$		531.8 ***	520.1 ***	741.4 ***	728.3 ***
$Labor\ Committee$		825.0 *	-531.9 ***	-276.1	-537.7 ***
$(1-K) \times Labor\ Committee$		956.4 ***	1061.3 ***	1084.3 ***	1163.8 ***
$Democrat$		-706.0 **	-216.4 ***	27.4	-289.3 ***
$Terms\ in\ Office$		-43.5 *	56.3 ***	-63.4 **	59.8 ***
$Committee\ Chair$		-53.9	102.8 **	887.3 **	139.7 ***
Sigma		2953.1	2590.9	2987.3	2622.7
Observations		180,170	180,170	178,913	178,913
Log likelihood		-145,487	-140,549	-145,055	-140,071
Pseudo-R^2		0.042	0.075	0.040	0.073

Unit of observation = PAC-representative combination
Fixed effects are included in the regressions but are not reported.

Table 4B

PAC Contributions to Individual Representatives

Variable	Coefficient	$\hat{N}$ = predicted NAFTA vote		$\hat{N}$ = predicted GATT vote	
		Industry & candidate fixed effects	Industry & PAC fixed effects	Industry & candidate fixed effects	Industry & PAC fixed effects
K	B_1	-130.4***	-3849.0***	340.2	-2777.4***
X	B_2	42.7*	-207.2	-1797.6***	-1530.1**
T	B_3	38.6***	268.8***	165.9***	181.5**
$K \times T$	B_4	-35.3***	-80.8	-274.9***	-78.0
$X \times T$	B_5	1.6	-202.5***	200.0***	-98.1
UL	B_6	224.5***	-4172.6***	771.5**	-4129.7***
$\hat{N} \times K$	C_1	141.8***	2418.7***	-187.8	760.8***
$\hat{N} \times X$	C_2	-40.0	510.7	2103.5***	2358.2***
$\hat{N} \times T$	C_3	-43.9***	-236.0***	-103.8*	6.6
$\hat{N} \times K \times T$	C_4	33.5***	135.0***	141.7**	30.5
$\hat{N} \times X \times T$	C_5	-0.5	-80.2*	-218.0***	-222.9***
$\hat{N} \times UL$	C_6	-182.1***	-1201.1***	-2231.6***	-1186.0***
Ways & Means		-149.5***	-429.0***	-2284.4***	-423.2***
$K \times (Ways\,\&\,Means)$		80.9***	809.1***	798.8***	799.9***
Labor Committee		-42.3	-459.1***	-1971.4***	-537.5***
$(1-K) \times Labor\,Committee$		129.6***	791.0***	1112.0***	1183.0***
Democrat		-23.4	-97.2***	335.6	-280.2***
Terms in Office		-1.6	62.3***	-58.1*	61.6***
Committee Chair		143.3***	100.1**	1790.9***	91.7**
Sigma		ψ	2583.1	2988.7	2622.7
Observations		178,076	178,076	178,076	178,076
Log likelihood		ψ	-138,610	-143,996	-139,017
Pseudo-R^2		0.060	0.076	0.040	0.073

Unit of observation = PAC-representative combination

ψ The maximum likelihood estimation for this tobit regression failed to achieve convergence, so the equation was estimated as a linear regression

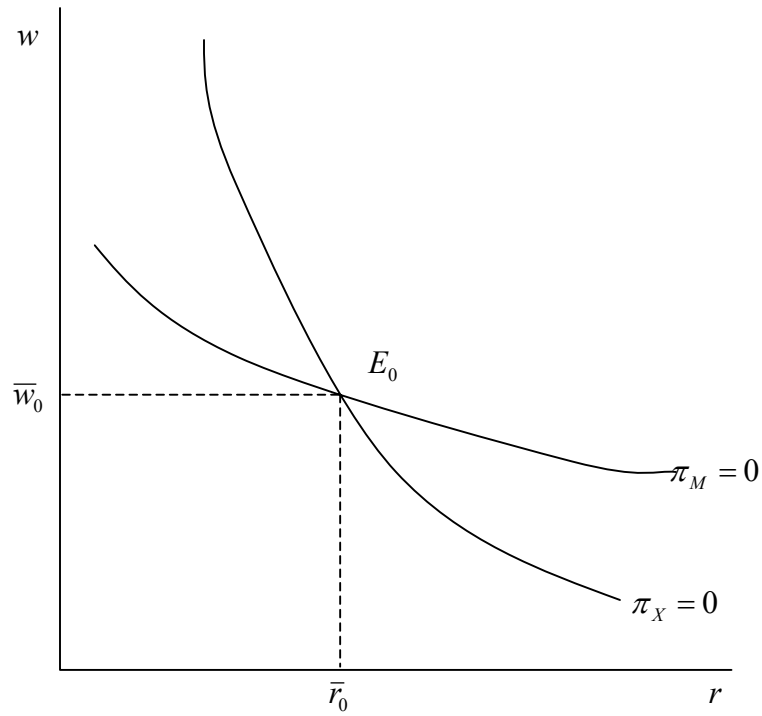Figure 1: Initial Steady State Equilibrium

$$\overline{w}_0$$
$$E_0$$
$$\pi_M = 0$$
$$\pi_X = 0$$
$$\overline{r}_0$$

Figure 2: The impact of trade liberalization

$$\overline{w}_0$$
$$E_0$$
$$w_t$$
$$\overline{w}_T$$
$$\pi_M = 0$$
$$\pi_X = 0$$
$$r_t \quad \overline{r}_0 \quad \overline{r}_T$$
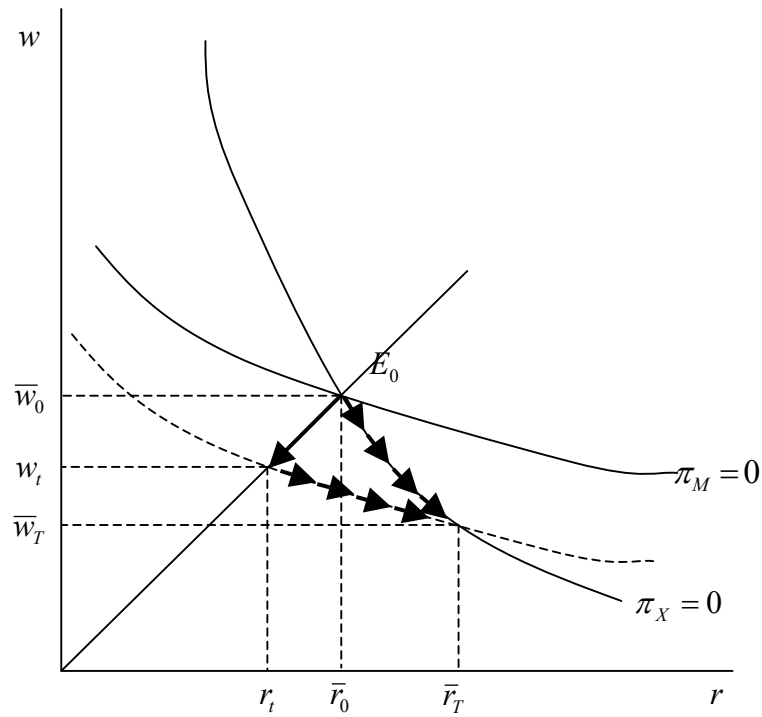
Figure 3: Transition paths of real factor prices in response to trade liberalization

Import-competing labor

$$\frac{w_M(0)}{\Pi_{td}}$$

$$\frac{w_M(T)}{\Pi_{ft}}$$

T' T t

Exporting labor

$$\frac{w_X(0)}{\Pi_{td}}$$

$$\frac{w_X(T)}{\Pi_{ft}}$$

T' T t

Import-competing capital

$$\frac{r_M(T)}{\Pi_{ft}}$$

$$\frac{r_M(0)}{\Pi_{td}}$$

T' T t

Exporting capital

$$\frac{r_X(T)}{\Pi_{ft}}$$

$$\frac{r_X(0)}{\Pi_{td}}$$

T' T t
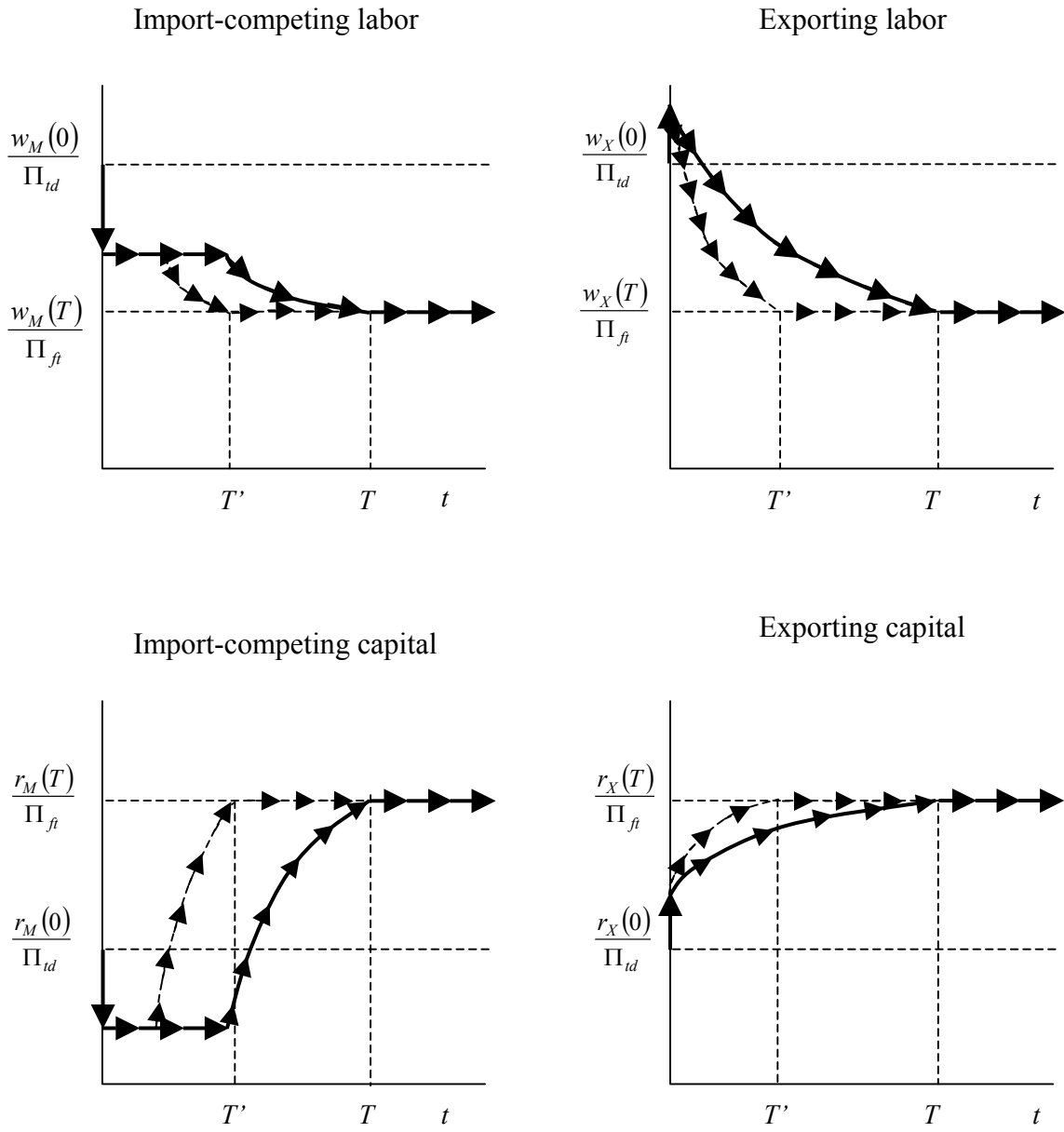
Figure 4: Estimated marginal effect of capital on share of contributions to supporters of both NAFTA and GATT

$\frac{\partial V_i}{\partial K_i}$

Turnover
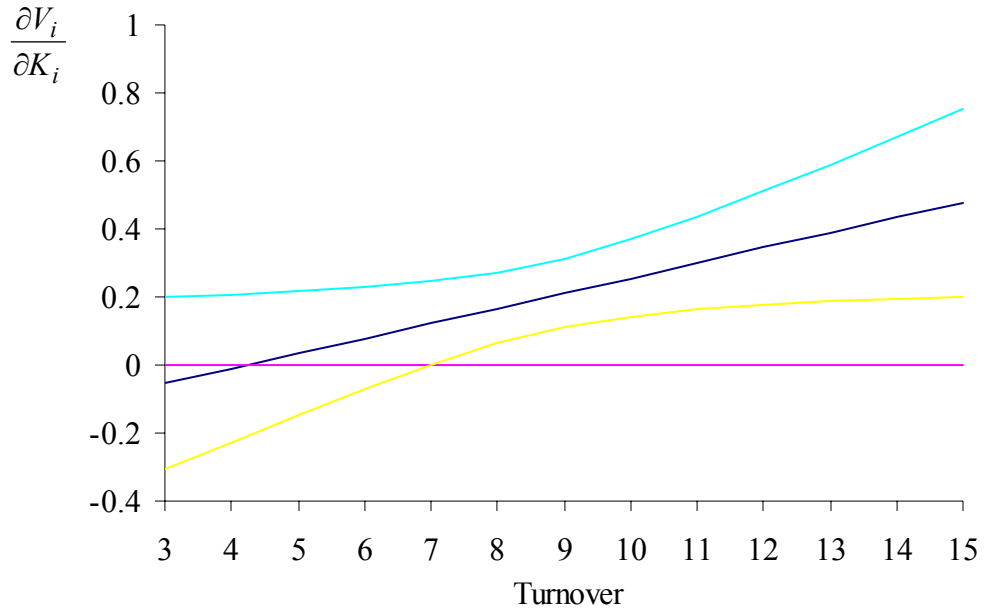
Figure 5: Estimated marginal effect of export industry on share of contributions to GATT supporters

$\frac{\partial V_i}{\partial X_i}$

Turnover
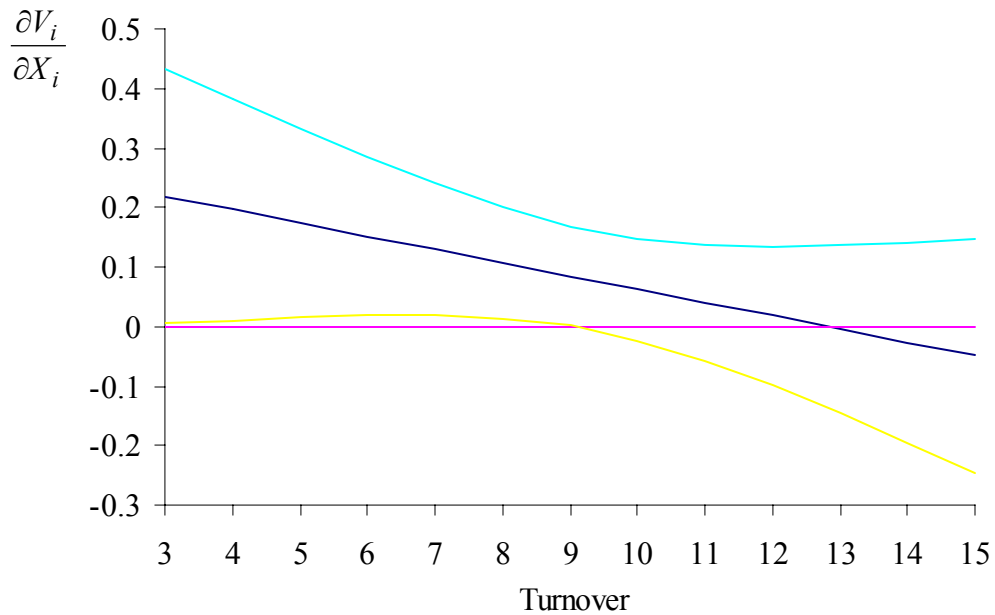
The confidence intervals shown in figures 4 and 5 are 95% confidence intervals.

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