UC San Diego
Recent Work

Title
Jobs, Jobs, Jobs: A New Perspective on Protectionism

Permalink
https://escholarship.org/uc/item/1bt8n04n

Author
Costenot, Arnaud

Publication Date
2006-07-01

eScholarship.org Powered by the California Digital Library
University of California

2006-05

UNIVERSITY OF CALIFORNIA, SAN DIEGO

DEPARTMENT OF ECONOMICS

JOBS, JOBS, JOBS: A NEW PERSPECTIVE ON PROTECTIONISM

By

Arnaud Costenot
University of California, San Diego

DISCUSSION PAPER 2006-05
July 2006

Jobs, Jobs, Jobs: A New Perspective on Protectionism

Arnaud Costinot[1]
Department of Economics
University of California, San Diego

July 2006

Abstract

This paper analyzes the determinants of protectionism in a small open economy with search frictions à la PISSARIDES [2000]. In equilibrium, jobs generate rents in each sector. Like in the Ricardo-Viner model, the magnitude of those rents may depend on the level of trade protection. The distinct feature of our model is that trade protection may also affect the access to those rents. By raising the domestic price of a given good, a government may attract more firms in a given industry. This raises the probability that a worker will find a job in this sector, and in turn, will benefit from the associated rents. Though simple, our model may help explain a variety of stylized facts regarding the structure of trade protection and individual trade-policy preferences.

Keywords: search frictions, trade protection, trade-policy preferences

J.E.L. Classification: F130, F160

[1] costinot@ucsd.edu. Address: Department of Economics, 9500 Gilman Drive, La Jolla, CA 92093-0508. I thank Eli Berman, Gordon Hanson, Nir Jaimovich, Navin Kartik, Giovanni Maggi, Marc Muendler, Gary Ramey and Jim Rauch as well as seminar participants at UCSD and UCSC for helpful comments.

According to the Chicago Council on Foreign Relations, 78% of Americans state that "protecting the jobs of American workers" should be a "very important goal" of U.S. foreign policy. This makes it the highest-ranked priority in front of: "preventing the spread of nuclear weapons", 73%, and "combating international terrorism", 71%.[2]

1 Introduction

One very robust finding of the empirical literature on trade protection is the positive correlation between the level of trade barriers and the rate of unemployment. The same pattern can be observed across industries, among countries, and over time; see e.g. TREFLER [1993], MANSFIELD and BUSCH [1993], and BOHARA and KAEMPFER [1991], respectively. These findings are echoed by recent empirical studies of individual trade-policy preferences emphasizing the prevalence of labor market concerns; see e.g. SCHEVE and SLAUGHTER [2004].

Though well-documented empirically, such findings are hard to rationalize theoretically. By construction, none of the standard trade models, either Ricardo-Viner or Heckscher-Ohlin, even allows the possibility of unemployment. The main objective of our paper is to build a simple theory that is consistent with the previous evidence and to show how it may shed a new light on the traditional determinants of protectionism across countries, industries, and individuals.

Section 2 describes our model. We consider a small open economy with multiple sectors, each of them subject to search frictions à la PISSARIDES [2000]. There is a continuum of workers, each endowed with one unit of human capital that is either general or sector-specific. Workers endowed with general human capital may produce in all industries; those with specific human capital may only produce in one of them. There is a continuum of firms, each free to choose the sector in which they want to post a vacancy. Workers and firms come together randomly. Once a worker and a firm are matched, wages are determined by Nash bargaining.

In equilibrium, jobs generate rents in each sector. Like in the Ricardo-Viner model, the *magnitude* of those rents may depend on the level of trade protection. The distinct feature of our model is that trade protection may also affect the *access* to those rents. By raising the domestic price of a given good, a government may attract more firms in a given

[2] http://www.ccfr.org/globalviews2004/sub/pdf/Global_Views_2004_US.pdf

industry. This raises the probability that a worker will find a job in this sector, and in turn, will benefit from the associated rents.

In our model, search frictions create a rationale for trade protection: improving labor market conditions. This rationale appears because the economy is not, in general, on its efficient production possibility curve. The chance of a worker to find a job in a given industry depends on the total number of vacant firms and unemployed workers present in this industry, which creates trading externalities. There is a priori no reason why wages, determined by Nash bargaining, would internalize these externalities.

Of course, we are not trying to suggest that trade protection should be used to correct this distortion. BHAGWATI's [1971] classical argument still applies to our environment; the optimal policy intervention should involve a tax-cum-subsidy addressed directly to offsetting the source of the distortion. Instead, we adopt a purely *positive* perspective. Conditional on the existence of search frictions, we analyze how their *cross-sectoral* and *cross-country* variations affect protectionist incentives.

Section 3 characterizes the structure of trade protection. We assume that governments aim to maximize aggregate social welfare, but restrict the set of available policy instruments to specific trade taxes. Our model predicts that in a cross-section of industries or countries, those parameters which are positively correlated with the unemployment rate—workers' bargaining power and turnover rate— should also be positively correlated with trade taxes. The converse is true for those parameters which are negatively correlated with unemployment—world price and workers' productivity. Intuitively, sectors or countries with more unemployment operate further away from their efficient possibility curves. In turn, the marginal benefits from raising trade taxes, and so creating jobs, are higher.

Our prediction regarding workers' productivity, in particular, is consistent with various empirical studies reviewed by RODRIK [1995]. In line with our theory, trade barriers tend to be higher: in labor-intensive, low-skill, low-wage industries; in periods of recession; and of course, in poor countries. Despite this evidence, it is worth emphasizing that our prediction is not a standard one. In the GROSSMAN and HELPMAN [1994] model, which has become the workhorse of the profession, the level of protection for organized sectors increases with the level of domestic output. Alternative political economy approaches, e.g. FINDLAY and WELLIZ [1982] and HILLMAN [1982], lead to the same prediction.

By focusing on the access to protection rents—the *extensive* margin—rather than their magnitude—the *intensive* margin—our theory is able to generate the opposite result.[3]

Section 4 analyzes the determinants of trade-policy preferences across workers. We extend our model by allowing workers to vary by skills. We assume that workers' skills are perfectly observable by firms and that firms may only search for one type of workers. Since skilled workers generate larger amounts of output, a larger number of firms search for them, which increases their chance of finding a job. We consider a hypothetical episode of trade liberalization where trade taxes are uniformly decreased across sectors. Whether or not an individual should favor this policy change depends on the trade-off between the benefits from freer trade—higher consumer surplus—and the associated costs—destruction of existing jobs and difficulty of finding new jobs once unemployed.

Our model predicts that workers with general human capital are less likely to be protectionist. This may help explain, for example, the negative impact of age on attitudes towards free trade; see e.g. O'Rourke and Sinott [2001] and Mayda and Rodrik [2005]. If workers' discount factors are large, our model also predicts that more productive workers are less likely to be protectionist. In this situation, the main determinant of workers' trade-policy preferences is the probability of losing their jobs. As a result, more productive workers—who are less likely to become unemployed—also are less likely to be protectionist. This result may help explain why: (i) high-skilled workers tend to be less protectionist than low-skilled workers, irrespectively of their countries of origin; and (ii) why workers in more developed countries tend to be less protectionist, irrespectively of their skill level; see e.g. Beaulieu et al. [2001], O'Rourke and Sinott [2001], Scheve and Slaughter [2004] and Mayda and Rodrik [2005].

Again, these predictions, while intuitive in a model with unemployment, stand in sharp contrast to those of standard trade models. For example, the $2 \times 2 \times 2$ Heckscher-Ohlin model predicts that unskilled workers in a less developed country—who win more or at least lose less from free trade—should tend to be less protectionist than their counterparts in a more developed country. Yet, this is not what we observe in practice.

[3] Regarding the countercyclical nature of trade protection, Bagwell and Staiger [2003] offer an alternative theoretical explanation. Instead of focusing on labor market imperfections, they emphasize the role of self-enforcement in trade agreements.

The impact of labor market imperfections on trade has been the focus of a series of papers by Carl Davidson and Steven Matusz; see DAVIDSON and MATUSZ [2004]. Among these papers, DAVIDSON et al. [1999] is most closely related to ours. They consider an economy with search frictions and two factors, capital and labor. They demonstrate how the turnover rate of an industry may affect preferences towards trade liberalization across factors of production. In sectors where turnover is large, capital-owners and workers should have opposite preferences, as in the Heckscher-Ohlin model. While in sectors where turnover is low, they should have similar preferences, as in the Ricardo-Viner model. Using data on campaign contributions, MAGEE et al. [2005] find strong support for these two predictions.

More recently, MATSCHKE and SHERLUND [2006] have extended the GROSSMAN and HELPMAN [1994] model to allow for labor market considerations. They introduce collective bargaining, imperfect labor mobility, and trade-union lobbying. Compared to the original, their model predicts that the level of trade protection should be higher if the trade-union lobbies, but capital owners do not; and conversely, that the level of trade protection should be lower if capital owners lobby, but the trade-union does not. Using data from U.S. manufacturing industries, they find strong support for their labor-augmented model.

Our paper contributes to the previous literature in two ways. First, it isolates a new determinant of protectionism, the access to protection rents. Second, and perhaps more importantly, it shows how this channel may systematically affect trade taxes and trade-policy preferences in a way that is both consistent with a large body of empirical work and distinct from the predictions of standard trade models.

2 The Economy

We consider a small open economy with $i = 0, ..., n$ sectors, each of them subject to search frictions à la PISSARIDES [2000].

2.1 Workers

There is a mass 1 of workers. Each worker is endowed with 1 unit of human capital that is either general or sector-specific.[4] There are

[4]On the theoretical side, GROSSMAN and SHAPIRO [1982] offer microanalaytic foundations for the existence of both general and sector-specific human capital. On the empirical side, NEAL [1995] presents evidence from the Displaced Workers Surveys pointing to the importance of sector-specific human capital. For tractability purposes, we ignore, however, firm-specific human capital; see e.g. WASMER [2006].

no other factors of production. Workers endowed with general human capital may produce in all industries; those with specific human capital may only produce in one of them. We denote by α_i^s the proportion of workers with human capital specific to sector i; and by $\alpha^g = 1 - \sum_{i=0}^{n} \alpha_i^s$ the proportion of workers with general human capital.

Except for human capital differences, workers are identical. Each worker is in 1 of 2 states: employed or unemployed. Unemployed workers search for jobs in the industry that maximizes their expected lifetime utility

$$E \int_0^{+\infty} e^{-rt} \left[c_0^t + \sum\nolimits_{i=1}^{n} \phi_i(c_i^t) \right] dt \tag{1}$$

where r is the discount rate, c_0^t is the consumption of good 0 at time t, and c_i^t is the consumption of good $i = 1, ..., n$. We assume that the sub-utility functions $\phi_i(\cdot)$ satisfy the following regularity conditions: $\phi_i' > 0$, $\phi_i'' < 0$ and $\phi_i''' \leq 0$. The first two inequalities are standard; the last one guarantees that the structure of trade protection does not depend on demand differences across industries.

Good 0 is used as the numeraire good with world and domestic price equal to one. We call p_i^* the exogenous world price of good i, and p_i its domestic price. The demand for good i is denoted by $d_i(p_i) \equiv (\phi_i')^{-1}(p_i)$. In turn, the indirect utility of a worker is given by

$$E \int_0^{+\infty} e^{-rt} \left[x^t + s(\mathbf{p}) \right] dt \tag{2}$$

where x^t is the worker's income at date t, $\mathbf{p} = (p_1, ..., p_n)$ is the vector of domestic prices, and $s(\mathbf{p}) = \sum_{i=1}^{n} \phi_i \left[d_i(p_i) \right] - \sum_{i=1}^{n} p_i d_i(p_i)$ is the surplus derived from the consumption of these goods. We assume that $x^t = w_i + \tau + \omega$ if the worker is employed in sector i at date t, and $x^t = \tau + \omega$ if she is unemployed. w_i corresponds to the wages paid by firms in sector i; $\tau + \omega$ corresponds to the income that each worker, employed or not, derives from government transfers τ and firms' dividends ω.

2.2 Firms

There is a large mass of firms. Each firm can employ at most 1 worker[5] and is in 1 of 3 states: inactive, unfilled vacancy, and filled job. A firm with a filled job in sector i generates revenues equal to $p_i a_i$ per unit of

[5] As long as firms use the same constant returns to scale technology—like in the Ricardo-Viner or Heckscher-Ohlin models—this assumption is without any loss of generality.

time. The parameter a_i measures output per worker in sector i.[6] A firm with an unfilled vacancy does not generate any revenues and must pay recruiting costs k per unit of time. An inactive firm obtains a pay-off of zero.

Each firm chooses in which industry to post a vacancy (if any) in order to maximize its expected discounted profits

$$E\int_0^{+\infty} e^{-rt}\left(\pi^t - kn^t\right)dt \tag{3}$$

where π^t are the firm's net revenues at date t and $n^t \in \{0,1\}$ is the number of its unfilled vacancies. By definition, $\pi^t = p_i a_i - w_i$ if the firm employs a worker in sector i, and zero otherwise.

2.3 Labor market

We denote by l_i the size of sector i, that is the mass of workers either employed or searching for a job in sector i. Firms and workers come together randomly. The number of matches taking place per unit of time is given by

$$m(l_i v_i, l_i u_i) = \min\left(l_i v_i, l_i u_i\right) \tag{4}$$

where v_i and u_i are the vacancy and unemployment rates in sector i, respectively. Throughout this paper, we assume that $v_i < u_i$ for all i.[7] Hence, firms with unfilled vacancies find workers with probability one, while unemployed workers "wait at the gate" and find jobs with probability $\theta_i = \frac{v_i}{u_i}$. We further discuss this assumption and its implications in the next section.

When a firm and a worker are matched, wages are determined by Nash bargaining

$$w_i = \arg\max (W_i - U_i)^{\beta_i}\left(J_i - V_i\right)^{1-\beta_i} \tag{5}$$

where U_i and W_i are the expected lifetime utility of, respectively, an unemployed and an employed worker in sector i; V_i and J_i are the expected discounted profits of, respectively, a firm with an unfilled vacancy and a filled job; and $\beta_i \in (0,1)$ is workers' bargaining power in sector i.

Finally, existing jobs are randomly destroyed following a Poisson process. During a small interval dt, each worker has a probability $\lambda_i dt$

[6] Here, a_i measures labor productivity in sector i. One could extend our model to include physical capital; see PISSARIDES [2000]. As long as there exists a perfect second-hand market for capital goods, this extension would leave our results unchanged (although a_i would also measure the capital intensity of sector i).

[7] This inequality is satisfied if, for example, the recruiting costs k are large enough.

of moving from employment to unemployment. We refer to λ_i as the turnover rate in sector i.

2.4 Steady-state equilibrium

We focus on the steady-state equilibrium in each industry. This equilibrium includes the 4 value functions (U_i,W_i,V_i,J_i), the wage w_i, the unemployment rate u_i, the vacancy rate v_i, and the sector size l_i. The 4 value functions satisfy the 4 Bellman equations

$$rU_i = \tau + \omega + s(\mathbf{p}) + \theta_i \left(W_i - U_i\right) \tag{6}$$

$$rW_i = w_i + \tau + \omega + s(\mathbf{p}) + \lambda_i \left(U_i - W_i\right) \tag{7}$$

$$rV_i = -k + \left(J_i - V_i\right) \tag{8}$$

$$rJ_i = \pi_i + \lambda_i \left(V_i - J_i\right) \tag{9}$$

Nash bargaining implies

$$W_i - U_i = \beta_i \Omega_i \tag{10}$$

where $\Omega_i = W_i + J_i - U_i - V_i$ is the total surplus generated by a job. Free entry of firms further implies

$$V_i = 0 \tag{11}$$

Finally, the unemployment rate in a steady-state satisfies

$$u_i = \frac{\lambda_i}{\lambda_i + \theta_i} \tag{12}$$

Note that the sector size l_i does not appear in any of the previous equations. Thus, we have a system of seven equations with seven unknowns. Following ROGERSON et al. [2005], we directly solve for the equilibrium values of Ω_i and θ_i. We find

$$\Omega_i = \frac{k}{1 - \beta_i} \tag{13}$$

$$\theta_i = \frac{p_i a_i (1 - \beta_i) - k(r + \lambda_i)}{k \beta_i} \tag{14}$$

Equations (13) and (14) completely characterize the equilibrium. U_i, W_i, V_i, J_i, w_i, u_i, and v_i can be computed by simple substitutions. Once U_i has been computed for all i, the sector size l_i is given by:

$$\begin{cases} l_i = \alpha_i^s & \text{if } U_i < \max_{0 \leq i' \leq n} U_{i'} \\ \alpha^g + \alpha_i^s \geq l_i \geq \alpha_i^s & \text{if } U_i = \max_{0 \leq i' \leq n} U_{i'} \end{cases} \tag{15}$$

Workers with human capital specific to sector i always search for a job in this sector; those with general human capital search for a job in the sector that gives them the highest lifetime expected utility. In the knife-edge case where multiple sectors give these workers the same expected utility, this implies, of course, multiple equilibria.

Equation (13) implies that the domestic price of good i has no effect on the surplus generated by a job in sector i. This feature of the model comes from the particular form of our matching function. Under any other matching function with constant returns to scale, one can show that p_i increases Ω_i. In other words, trade protection raises, in general, the magnitude of the rents of the factors employed in a given industry. While this effect is likely to be important in practice, there is nothing new about it. It is already present in the Ricardo-Viner model, absent of any search frictions. Assuming (rather crudely) that workers wait at the gate allows us to shut down this alternative incentive for trade protection and to shed light on the new features of the model.

From equation (14), we see that the domestic price of good i affects the tightness of the labor market in industry i. As p_i goes up, more firms enter industry i, which raises the probability θ_i that a worker finds a job in this industry.[8] This channel generates a rationale for trade protection: improving labor market conditions.

3 The Structure of Protection

The previous section describes the equilibrium of the economy, taking domestic prices as given. We now analyze how the government's trade taxes endogenously determine these prices.

3.1 The government's maximization program

We assume that the government aims to maximize aggregate social welfare

$$G = \sum\nolimits_{i=0}^{n} G_i \tag{16}$$

where $G_i = l_i u_i U_i + l_i (1 - u_i) W_i$ is the social welfare associated with the workers of sector i. Following Grossman and Helpman [1994], we restrict the set of policy instruments available to the government to

[8] The actual mechanism through which p_i increases θ_i is slightly more subtle. Because of free entry, the value of a vacant firm must be zero. Since firms find workers with probability one, the value of a firm with a filled job is in turn determined by recruiting costs alone. Hence, any increase in p_i must be offset by an equal increase in w_i, which can only be consistent with Nash-Bargaining if θ_i—and hence workers' outside option—goes up.

specific trade taxes: $t_i = p_i - p_i^*$ for $i = 1, ..., n$. If good i is imported, t_i represents a specific import tariff; if good i is exported, it represents an export subsidy. All trade revenues are redistributed uniformly to workers. Hence, the net lump-sum transfer to each worker is given by

$$\tau = \sum\nolimits_{i=1}^{n} t_i m_i(p_i) \tag{17}$$

where $m_i(p_i) = d_i(p_i) - y_i(p_i)$ is the net imports of good i; and $y_i(p_i) = l_i(1 - u_i)a_i$ is the domestic output of good i. The income that each worker derives from firms' dividends is given by

$$\omega = r \sum\nolimits_{i=0}^{n} \left[l_i u_i V_i + (1 - u_i) l_i J_i \right] \tag{18}$$

Using (6), (10), (11) and (18), equation (16) can be rearranged as

$$rG = \tau + s(\mathbf{p}) + \sum\nolimits_{i=0}^{n} l_i \Omega_i \left[\beta_i \theta_i + r \left(1 - u_i \right) \right] \tag{19}$$

We are now ready to describe the equilibrium policies.

3.2 Equilibrium policies

We first consider the marginal effect on G of an increase in sector i's trade tax. If G is differentiable, which is generically true,[9] then equation (19) implies

$$r \frac{\partial G}{\partial t_i} = \left(\frac{\partial \tau}{\partial t_i} + \frac{\partial s}{\partial t_i} \right) + l_i \Omega_i \left(\beta_i \frac{\partial \theta_i}{\partial t_i} - r \frac{\partial u_i}{\partial t_i} \right) \tag{20}$$

The first term is standard; $\frac{\partial \tau}{\partial t_i}$ and $\frac{\partial s}{\partial t_i}$ correspond to the marginal changes in trade revenues and consumer surplus, respectively. Our contribution to the previous literature lies in the second term. When there are search frictions, raising the level of trade protection in a given industry improves labor market conditions. It raises welfare in sector i by: (i) increasing the number of jobs generating rents, $\frac{\partial u_i}{\partial t_i} = -\frac{\lambda_i}{(\lambda_i + \theta_i)^2} \frac{\partial \theta_i}{\partial t_i} < 0$; and (ii) increasing the chances of unemployed workers to benefit from these rents in the future, $\frac{\partial \theta_i}{\partial t_i} > 0$.

In the rest of this paper, we restrict our attention to interior equilibria. The equilibrium policy t_i^o in each industry is implicitly defined by the first-order condition:

$$\left(\frac{\partial G}{\partial t_i} \right)_{t_i^o} = 0 \tag{21}$$

[9] Formally, G is differentiable if: (i) there exists a unique i_0 such that $U_{i_0} > \max_{i \neq i_0} U_i$; or if: (ii) for any pair of sectors i_1 and i_2 such that $U_{i_1} = U_{i_2} = \max_{i \neq i_0} U_i$, we have $G_{i_1} = G_{i_2}$. In the former case, a marginal increase in the trade tax does not affect sector sizes; in the latter case, changes in sector sizes do not affect $\frac{\partial G}{\partial t_i}$. In any other knife-edge case, $\frac{\partial G}{\partial t_i} = +$ or $-\infty$ for at least 2 sectors.

Using equations (12), (13), (14), and the definition of $y_i(\cdot)$, equation (21) can be rearranged as

$$t_i^0 d_i' \left(p_i^* + t_i^0\right) + \frac{a_i \lambda_i}{\lambda_i + \theta_i} + \frac{r \lambda_i a_i}{\left(\lambda_i + \theta_i\right)^2 \beta_i} = 0 \tag{22}$$

Note that sector size l_i does not appear in equation (22). Thus, the equilibrium policy t_i^o is independent of l_i, and in turn, α_i^s. In our model, the proportion of workers with sector-specific human capital does not affect labor market conditions across industries. As a result, it does not affect the structure of trade protection either.

Note also that our theory predicts import tariffs or export subsidies in each industry. Since $d_i' < 0$, equation (22) implies $t_i^o > 0$ for all $i = 1, ..., n$. This result derives from the nature of the labor market imperfections in our economy. While unemployed workers exert negative search externalities on other unemployed workers, vacant firms do not exert any externality on other vacant firms (they always find workers with probability one). As a result, the unemployment rate is too high and an import tariff or export subsidy that raises the level of employment also raises social welfare.

As already mentioned in the introduction, we are not trying to make a normative case in favor of the use of trade taxes. In our economy, they are at most a second-best policy. Output subsidies at the rate t_i^o would achieve the same level of employment in sector i without distorting consumers' behavior; see e.g. KRUGMAN and HELPMAN [1989]. Instead, we follow a common practice in the trade literature and assume that—for reasons beyond the scope of our model—trade taxes are the only policy instruments available.[10] We then use this assumption to analyze the determinants of trade protection across countries and industries.

3.3 Cross-sectoral and cross-country variations

We now analyze the impact of 4 exogenous parameters of the model, $z_i \in \{a_i, \beta_i, \lambda_i, p_i^*\}$, on the equilibrium policy t_i^o. In order to gain intuition, we first investigate the effect of a hypothetical change in the tightness of the labor market θ_i, holding everything else constant. By the implicit function theorem, we have

$$\frac{\partial t_i^o}{\partial \theta_i} = -\left(\frac{\partial^2 G}{\partial \theta_i \partial t_i}\right)_{t_i^o} / \left(\frac{\partial^2 G}{\partial t_i^2}\right)_{t_i^o} \tag{23}$$

[10] Admittedly, this is an ad-hoc assumption. But as RODRIK [1995] already put it a decade ago: "A sufficiently general and convincing explanation for this phenomenon [the use of trade policy over more efficient instruments] has yet to be formulated".

Because of the second-order condition $\left(\frac{\partial^2 G}{\partial t_i^2}\right)_{t_i^o} < 0$, $\frac{\partial t_i^o}{\partial \theta_i}$ has the same sign as $\left(\frac{\partial^2 G}{\partial \theta_i \partial t_i}\right)_{t_i^o}$, which is negative by equation (22). Since the unemployment rate is a decreasing function of θ_i, our model further implies:

Proposition 1 *Ceteris paribus, there is more protection in sectors—or countries—with high unemployment rates.*

The intuition behind proposition 1 is simple. Increasing the probability of finding jobs θ_i creates more jobs if the unemployment rate is high. As a result, the marginal benefits from raising trade taxes are higher in sectors—or countries—with more unemployment. In equilibrium, higher marginal benefits lead to higher trade taxes.

Proposition 1 is consistent with numerous empirical studies. In the handbook of international economics, RODRIK [1995] mentions the work of: BOHARA and KAEMPFER [1991] who find that U.S. tariffs are Granger-caused by unemployment; MANSFIELD and BUSCH [1993] who find that non-tariff barriers are higher in countries that have higher unemployment rates; and TREFLER [1993] who finds that the degree of protection is greater in industries with more unemployment. After controlling for the GROSSMAN and HELPMAN [1994] determinants of trade protection, GOLDBERG and MAGGI [1999] reach the same conclusion: sectors with high unemployment rates tend to receive more protection.

Of course, the tightness of the labor market, itself, is not exogenous. Its value depends on a_i, β_i, λ_i, p_i^* and t_i according to equation (14). We now consider the impact of a given parameter $z_i \in \{a_i, \beta_i, \lambda_i, p_i^*\}$. Its marginal effect on the equilibrium policy can be computed similarly

$$\frac{\partial t_i^o}{\partial z_i} = -\left(\frac{\partial^2 G}{\partial z_i \partial t_i}\right)_{t_i^o} \Big/ \left(\frac{\partial^2 G}{\partial t_i^2}\right)_{t_i^o} \tag{24}$$

Table 1 reports the signs of $\frac{\partial t_i^o}{\partial z_i}$ and $\frac{\partial u_i}{\partial z_i}$ for $z_i \in \{a_i, \beta_i, \lambda_i, p_i^*\}$. The exact analytical expressions can be found in the appendix. Quite remarkably, we can sign the impact of our 4 exogenous parameters on the equilibrium trade policy. In a cross-section of industries or countries, our theory predicts that those parameters which are positively correlated with the unemployment rate—workers' bargaining power β_i and turnover rate λ_i—should also be positively correlated with trade taxes. The converse is true for those parameters which are negatively correlated with unemployment—output per worker a_i and world price p_i^*. Our findings are summarized in proposition 2.

	a_i	β_i	λ_i	p_i^*
t_i	-	+	+	-
u_i	-	+	+	-

Table 1: Comparative Statics

Proposition 2 *Ceteris paribus, there is more protection in sectors—or countries—where:*

(*i*) *output per worker is low*
(*ii*) *workers' bargaining power is high*
(*iii*) *the world price is low*
(*iv*) *job turnover is high*

Prediction (*i*) is consistent with a large number of empirical studies reviewed by RODRIK [1995]. In line with our theory, trade protection tends to be higher in labor-intensive, low-skill, low-wage industry; see CAVES [1976], SAUNDERS [1980], ANDERSON [1980], RAY [1981], MARVEL and RAY [1983], BALDWIN [1985], ANDERSON and BALDWIN [1987], RAY [1991], and FINGER and HARRISON [1994]. Similarly, trade protection tends to be higher in periods of recession; see RAY [1987], HANSEN [1990], and O'HALLORAN [1994]. Prediction (*i*) also is consistent with the well-known fact that rich countries tend to be less protectionist.[11]

Prediction (*ii*) is consistent with the recent findings of MATSCHKE and SHERLUND [2006]. After controlling for the GROSSMAN and HELPMAN [1994] determinants of trade protection, the authors find that the unionization rates of industries remain positively correlated with their level of protections. Finally, prediction (*iii*) also is consistent with RODRIK [1995]'s review of the stylized facts; trade protection tends to increase with the level of import-penetration in a given industry. We are not aware of any empirical study investigating the relationship between the cross-sectoral variations in job turnover and trade protection.

The introduction of search frictions à la PISSARIDES [2000] provides a *strong* rationalization of the stylized facts offered in the introduction. In

[11] Though we have no intention to delve into the empirical debate on country growth and openness to trade, see e.g. RODRIGUEZ and RODRIK [2000], our result highlights the potential importance of reverse causality when interpreting the evidence. In our model, when output per worker goes up, the government's incentives to be protectionist go down.

our model, *any* parameter which increases (resp. decreases) the unemployment rate also increases (resp. decreases) the equilibrium trade tax. Hence, declining industries which are heavily unionized and face tough competition from abroad accumulate reasons to receive more protection.

It is worth emphasizing again that our prediction regarding the relationship between output per worker and trade protection, although consistent with a large body of empirical work, is not a standard one. In the well-known "Protection for Sale" model of GROSSMAN and HELPMAN [1994], the level of protection for organized sectors increases with output per worker. Within their framework, specific-factor owners gain more from an increase in the domestic price when domestic output is large. By focusing on the access to protection rents rather than their magnitude, our theory generates the opposite result.

4 Trade-Policy Preferences

In sections 2 and 3, we have presented a simple economy with search frictions in the labor market and characterized the structure of trade protection in this environment. We now investigate the impact of search frictions on trade-policy preferences across workers $j \in [0,1]$. To this end, we extend our analysis by allowing workers' human capital to vary in terms of *level* and *specificity*.

4.1 Human capital and labor market outcomes

Throughout this section, we assume that workers are endowed with h^j units of human capital, out of which $\left(1-\delta^j\right)h^j$ are general and $\delta^j h^j$ are sector-specific. The parameters $h^j > 0$ and $1 \geq \delta^j \geq 0$ measures the level and specificity of worker j's human capital, respectively. Section 2 corresponds to the particular case where $h^j = 1$ and $\delta^j = 0$ or 1 for all $j \in [0,1]$.

We denote by $a_i^j = a_i h^j \left(1-\delta_i^j\right)$ the output (per unit of time) of worker j when matched with a firm in sector i. By definition, $\delta_i^j = 0$ if worker j has human capital specific to sector i, and $\delta_i^j = \delta^j$ otherwise. With a slight abuse of notations, a_i now represents the productivity of human capital in sector i. In the spirit of HALL and JONES [1999], one may interpret a_i as a measure of physical capital per worker and the quality of social infrastructure, which may vary across countries and industries. We refer to $h^j\left(1-\delta_i^j\right)$ as the skill level, or type, of worker j in sector i. In order to keep the model as simple as possible, we assume that workers' skill levels are perfectly observable and that firms can only search for one type of workers.

Under these assumptions, we can solve for the steady-state equilibrium as we did in section 2. Labor markets are segmented by skill levels. Free entry guarantees that firms are indifferent between searching for high- or low-skilled workers: $V_i^j = 0$ for all j. Irrespectively of sector size, the labor market equilibrium for each type of workers is determined by equations (6) to (12). In turn, the total surplus and the labor market tightness associated with each worker and industry are given by

$$\Omega_i^j = \frac{k}{1-\beta_i} \tag{25}$$

$$\theta_i^j = \frac{p_i a_i^j (1-\beta_i) - k(r+\lambda_i)}{k\beta_i} \tag{26}$$

Equation (25) implies that total surplus Ω_i^j is independent of worker j's skill level. Like in section 2, this feature of the equilibrium is an artifact of the particular matching function we are using. More importantly, equation (26) implies that the tightness of the labor market θ_i^j is increasing in worker j's skill level. *Ceteris paribus*, high-skilled workers generate higher surplus when matched with a firm, which increases the number of firms searching for them, and in turn, their probabilities of finding a job. This feature of our model captures in a stylized way the well-known fact that unemployment rates are higher for less-educated workers; see e.g. MINCER [1993].

Using equations (10), (25), (26), and (6), we can express the expected lifetime utility of worker j when unemployed in sector i

$$U_i^j = \frac{1}{r}\left[\tau + \omega + s(\mathbf{p}) + p_i a_i^j - \frac{k(r+\lambda_i)}{1-\beta_i}\right] \tag{27}$$

and her expected lifetime utility when employed in sector i

$$W_i^j = \frac{1}{r}\left[\tau + \omega + s(\mathbf{p}) + p_i a_i^j - \frac{k(r(1-\beta_i)+\lambda_i)}{1-\beta_i}\right] \tag{28}$$

4.2 Why are some people (and countries) more protectionist than others?[12]

In order to answer this question, we consider a hypothetical episode of trade liberalization, $\Delta t_1 = ... = \Delta t_n = \Delta t < 0$. We then compare the expected lifetime utility of a worker j employed in sector i in the 2 steady states: *before* and *after* trade liberalization.[13]

[12] The title of this section is borrowed from MAYDA and RODRIK [2005].

[13] Though we always refer to "trade liberalization", it should be clear that our analysis equally applies to foreign productivity gains, $\Delta p_1^* = ... = \Delta p_n^* = \Delta t$.

We denote by $\widehat{W}_i^j$ (resp. $\widehat{U}_i^j$) the expected lifetime utility of worker j when employed (resp. unemployed) in sector i after trade liberalization. In order to avoid a taxonomic exercise, we restrict our attention to equilibria where: (i) workers never quit their jobs after trade liberalization, $\widehat{W}_i^j > \max_{0\leq i'\leq n} \widehat{U}_{i'}^j = \widehat{U}^j$ for all $i = 1, ..., n$ and $j \in [0, 1]$; and (ii) workers always work in sectors where they have sector-specific human capital before trade liberalization.[14]

The change in the expected lifetime utility of a worker j employed in sector i is given by

$$\Delta W_i^j = \left(\frac{\Delta u_i^j}{1-u_i^j}\right)\left(\widehat{U}^j - W_i^j\right) + \left(1 - \frac{\Delta u_i^j}{1-u_i^j}\right)\left(\widehat{W}_i^j - W_i^j\right) \qquad (29)$$

where $\Delta u_i^j = -\frac{a_i^j(1-\beta_i)\lambda_i\Delta t}{k\beta_i\left(\lambda_i+\theta_i^j\right)^2} > 0$ is the change in the unemployment rate induced by trade liberalization. If worker j loses her job, which occurs with probability $\frac{\Delta u_i^j}{1-u_i^j}$, the change in her expected lifetime utility is equal to $\widehat{U}^j - W_i^j$. If she keeps her job, it is equal to $\widehat{W}_i^j - W_i^j$ instead. According to our theory, a worker j employed in sector i should declare herself in favor of trade liberalization if and only if $\Delta W_i^j \geq 0$.

The next proposition describes the impact of human capital specificity on workers' trade-policy preferences.

Proposition 3 *Ceteris paribus, workers are more likely to be protectionist if the specificity of their human capital δ^j is high.*

Proof. Consider 2 workers, j_1 and j_2, employed in sector i before trade liberalization such that $a_i^{j_1} = a_i^{j_2}$ and $\delta^{j_1} \geq \delta^{j_2}$. $a_i^{j_1} = a_i^{j_2}$ implies: $u_i^{j_1} = u_i^{j_2}$; $\Delta u_i^{j_1} = \Delta u_i^{j_2}$; and $W_i^{j_1} = W_i^{j_2}$. Moreover, $\delta^{j_1} \geq \delta^{j_2}$ implies: $\widehat{U}_{i'}^{j_1} \leq \widehat{U}_{i'}^{j_2}$ for all $i' = 0, ..., n$, and so $\widehat{U}^{j_1} \leq \widehat{U}^{j_2}$. Combining these results with equation (29), we get: $\Delta W_i^{j_1} \leq \Delta W_i^{j_2}$. QED. ■

The proof of proposition 3 is almost trivial. By definition, workers with more general human capital lose less when switching sectors. This implies better outside options once unemployed, which reduces their incentives to be protectionist. Though simple, this idea may help explain, for example, the negative impact of age on attitudes towards free trade; see e.g. O'Rourke and Sinott [2001] and Mayda and Rodrik [2005].

[14] Assumption (i) guarantees that changes in unemployement rates are the main determinants of trade-policy preferences; it requires employment rents $\Omega_i^j = \frac{k}{1-\beta_i}$ to be large enough. Assumption (ii) merely is a normalization of δ_i^j.

Over time, human capital becomes more specific. As a result, workers become less mobile across sectors, and so more likely to oppose trade liberalization.

Note that the Ricardo-Viner model, absent of any search frictions, leads to a similar prediction. Namely, the owners of the specific factors should be more protectionist than the owners of the mobile factor. However, the insights of our theory are more subtle. In our model, the specificity of human capital *only* matters if the decrease in the trade tax is large enough to trigger a reallocation of workers across sectors. This suggests that the impact of specificity on trade-policy preferences should be stronger in industries where trade liberalization leads to a larger decline in domestic prices.

If we reinterpret the specificity of workers' human capital in terms of "mobility", this prediction accords well with the results of Scheve and Slaughter [2001]. Using data from the 1992 National Election Studies survey, the authors find a positive correlation between home ownership in counties with a manufacturing mix concentrated in comparative-disadvantage industries and the support for trade barriers. They interpret this result as evidence of the impact of asset values, in addition to current factor incomes, on trade-policy preferences. An alternative interpretation offered by our theory is that: (i) workers in these counties are more likely to lose their jobs; and that: (ii) once unemployed, home ownership increases the costs of moving to another sector.

Using equations (12), (26), and (28), we can rearrange equation (29) into

$$r\Delta W_i^j = \Delta\left[\tau + \omega + s(\mathbf{p})\right] + \Delta t\left[a_i^j + \frac{r\lambda_i a_i^j\left(1-\beta_i\right)\left(\widehat{W}_i^j - \widehat{U}^j\right)}{k\beta_i\theta_i^j\left(\lambda_i+\theta_i^j\right)}\right] \quad (30)$$

The first term captures the gains from trade liberalization: higher consumer surplus, $\Delta\left[\tau+\omega+s(\mathbf{p})\right]$. The second term captures the losses: difficulty of finding new jobs once unemployed, $a_i^j\Delta t$; and destruction of existing jobs, $\frac{r\lambda_i a_i^j\left(\widehat{W}_i^j-\widehat{U}^j\right)\Delta t}{\theta_i^j\left(\lambda_i+\theta_i^j\right)}$. Our next prediction on the determinants of trade-policy preferences can be stated as follows:

Proposition 4 *If r is large enough, then workers are less likely to be protectionist if their productivity a_i^j is high.*

Proof. See Appendix. ■

	Country	
Education	*High Income*	*Rest of the World*
Upper	50%	63%
Middle	63%	69%
Lower	70%	76%

Figure 1: Proportion of protectionist opinions
Source: World Values Survey 1994-1999

If r is large enough, workers mostly care about their current incomes. Whether they have general or sector-specific human capital, the main determinant of their trade-policy preferences is the probability of losing their jobs. As a result, more productive workers—who are less likely to become unemployed[15]—also are less likely to be protectionist. Proposition 4 directly implies:

Corollary 1 *If r is large enough, then the prevalence of protectionism among workers decreases with:*
(i) countries' level of development a_i;
(ii) workers' level of human capital h^j.

These two predictions are broadly consistent with the recent empirical studies by Beaulieu et al. [2001], O'Rourke and Sinott [2001], Scheve and Slaughter [2004] and Mayda and Rodrik [2005]. Using data from the 1995-1997 World Values Surveys and the 1995 International Social Survey Programme, they find that: (i) workers in more developed countries tend to be less protectionist, irrespectively of their skill level; and that: (ii) high-skilled workers tend to be less protectionist than low-skilled workers, irrespectively of their countries of origin (though less so in less developed countries). This can easily be seen in figure 1 which is constructed from the World Values Survey 1994-1999; see appendix for details.

This second finding has been interpreted as evidence in favor of the Heckscher-Ohlin model by O'Rourke and Sinott [2001], Scheve and Slaughter [2004], and Mayda and Rodrik [2005]; and as evidence against it by Beaulieu et al. [2001]. The latter focus on the first part—skilled workers are less protectionists almost everywhere—and the former on the second part—less so in less developed countries—while arguing that the least developed countries, for which unskilled workers tend to

[15] This crucial feature of our model is consistent with the evidence that less educated workers are much more likely to be displaced in practice; see e.g. Kletzer [1998].

be less protectionist, are not in the sample. We have nothing to add to this debate.

To us, the first finding is the most problematic for the Heckscher-Ohlin model: Why would unskilled workers in a less developed country—who win more, or at least lose less, from free trade according to this theory—ever be more protectionist than their counterparts in a more developed country? We believe that our model provides a simple and intuitive answer to this question.

5 Concluding Remarks

This paper analyzes the determinants of protectionism in a small open economy with search frictions à la PISSARIDES [2000]. Regarding the structure of trade protection, our model predicts that in a cross-section of industries or countries, those parameters which are positively correlated with the unemployment rate—workers' bargaining power and turnover rate— should also be positively correlated with trade taxes. The converse is true for those parameters which are negatively correlated with unemployment—world price and workers' productivity. Regarding individual trade-policy preferences, our model predicts that workers with more general human capital are less likely to be protectionist. It also predicts that if workers' discount factors are large, then more productive workers are less likely to be protectionist, irrespectively of the countries and industries where they are located. Though distinct from the predictions of standard trade models, these findings accord well with a large body of empirical work. To us, this illustrates a key idea: the *extensive* margin of trade protection—whether or not workers keep their jobs and their associated rents—may matter as much in practice as the *intensive* margin—by how much these rents vary.

6 Appendix A: Proofs

Proof of Proposition 2. The second-order condition $\left(\frac{\partial^2 G}{\partial t_i^2}\right)_{t_i^o} < 0$ implies that $\frac{\partial t_i^o}{\partial z_i}$ has the same sign as $\left(\frac{\partial^2 G}{\partial z_i \partial t_i}\right)_{t_i^o}$ for $z_i \in \{a_i, \beta_i, \lambda_i, p_i^*\}$. We now compute the sign of each of these cross-derivatives.

Claim (i): $\left(\frac{\partial^2 G}{\partial a_i \partial t_i}\right)_{t_i^o} < 0$

Proof: As mentioned in the main text, we have

$$\frac{r}{l_i}\frac{\partial G}{\partial t_i} = t_i d_i'(p_i) + \frac{a_i \lambda_i}{\lambda_i + \theta_i} + \frac{r \lambda_i a_i}{(\lambda_i + \theta_i)^2 \beta_i} \tag{31}$$

Since the first term does not depend on a_i, we only need to show that the last two terms are decreasing in a_i. By equation (14), we have

$$\begin{aligned}\frac{a_i}{(\lambda_i + \theta_i)^2} &= \frac{a_i}{\left(\frac{p_i a_i (1-\beta_i)}{k\beta_i} - \frac{r}{\beta_i} - \left(\frac{1-\beta_i}{\beta_i}\right)\lambda_i\right)^2} \\ &= \frac{1}{a_i\left(\frac{p_i (1-\beta_i)}{k\beta_i} - \frac{r}{a_i\beta_i} - \left(\frac{1-\beta_i}{a_i\beta_i}\right)\lambda_i\right)^2}\end{aligned}$$

which, by inspection, is decreasing in a_i. Similarly, we have

$$\frac{a_i}{\lambda_i + \theta_i} = \frac{1}{\frac{p_i (1-\beta_i)}{k\beta_i} - \frac{r}{a_i\beta_i} - \left(\frac{1-\beta_i}{a_i\beta_i}\right)\lambda_i}$$

which is decreasing in a_i as well. QED.

Claim (ii): $\left(\frac{\partial^2 G}{\partial \beta_i \partial t_i}\right)_{t_i^0} > 0$

Proof: Let us start from equation (31). All we need to show is that: $\frac{1}{(\lambda_i+\theta_i)^2\beta_i}$ and $\frac{1}{\lambda_i+\theta_i}$ are increasing functions of β_i. By equation (14), we have

$$\frac{1}{(\lambda_i + \theta_i)^2 \beta_i} = \frac{1}{\frac{(1-\beta_i)^2}{\beta_i}\left(\frac{p_i a_i}{k} - \frac{r}{(1-\beta_i)} - \lambda_i\right)^2}$$

which, by inspection, is increasing in β_i. Similarly, we have

$$\frac{1}{\lambda_i + \theta_i} = \frac{1}{\left(\frac{1-\beta_i}{\beta_i}\right)\left(\frac{p_i a_i}{k} - \frac{r}{(1-\beta_i)} - \lambda_i\right)}$$

which is increasing in β_i as well. QED.

Claim (iii): $\left(\frac{\partial^2 G}{\partial \lambda_i \partial t_i}\right)_{t_i^0} > 0$

Proof: Again, we start from equation (31). All we need to show is that: $\frac{\lambda_i}{(\lambda_i+\theta_i)^2}$ and $\frac{\lambda_i}{\lambda_i+\theta_i}$ are increasing functions of λ_i. By equation (14), we have

$$\frac{\lambda_i}{(\lambda_i+\theta_i)^2} = \frac{\lambda_i}{\left(\frac{p_i a_i(1-\beta_i)}{k\beta_i} - \frac{r}{\beta_i} - \left(\frac{1-\beta_i}{\beta_i}\right)\lambda_i\right)^2}$$

which, by inspection, is increasing in λ_i. Similarly, we have

$$\frac{\lambda_i}{\lambda_i+\theta_i} = \frac{\lambda_i}{\frac{p_i a_i(1-\beta_i)}{k\beta_i} - \frac{r}{\beta_i} - \left(\frac{1-\beta_i}{\beta_i}\right)\lambda_i}$$

which is increasing in λ_i as well. QED.

Claim (iv): $\left(\frac{\partial^2 G}{\partial p_i^* \partial t_i}\right)_{t_i^0} < 0$

Proof: Again, we start from equation (31). Since θ_i is increasing in p_i^* by equation (14), $\frac{1}{(\lambda_i+\theta_i)^2}$ and $\frac{1}{\lambda_i+\theta_i}$ are decreasing in p_i^*. Thus, all we need to show is that $d_i'(p_i)$ is decreasing in p_i^* as well (recall that equation (22) implies $t_i^0 > 0$). We know that $d_i'(p_i) = \frac{1}{\phi_i'' \circ (\phi_i')^{-1}(p_i)}$, which further implies

$$d_i''(p_i) = -\frac{\phi_i''' \circ (\phi_i')^{-1}(p_i)}{\phi_i'' \circ (\phi_i')^{-1}(p_i)\left[\phi_i'' \circ (\phi_i')^{-1}(p_i)\right]^2} < 0$$

where the last inequality comes from $\phi_i'' < 0$ and $\phi_i''' \leq 0$. QED. ■

Proof of proposition 4. We first introduce some additional notations. We define $f(a_i^j)$ as

$$f(a_i^j) \equiv a_i^j + \frac{\lambda_i a_i^j (1-\beta_i)}{k\beta_i \theta_i^j \left(\lambda_i + \theta_i^j\right)} \cdot \left(\frac{rk\beta_{i(j)}}{1-\beta_{i(j)}} - \widehat{p}_{i(j)} a_{i(j)}^j + \widehat{p}_i a_i^j - \frac{k\lambda_i}{1-\beta_i} + \frac{k\lambda_{i(j)}}{1-\beta_{i(j)}}\right)$$

where $i(j) = \arg\max_{0\leq i\leq n} U_i^j$, and $\widehat{p}_i$ and $\widehat{p}_{i(j)}$ are the domestic prices of goods i and $i(j)$ after trade liberalization, respectively. Using equation (26), we express the derivative of f with respect to a_i^j as

$$\frac{\partial f}{\partial a_i^j} = 1 - g_1(a_j^i, r)\left[\widehat{p}_{i(j)}\frac{a_{i(j)}^j}{a_i^j} - \widehat{p}_i + g_2(a_j^i, r)\left(\frac{rk\beta_{i(j)}}{1-\beta_{i(j)}} + g_3(a_j^i)\right)\right]$$

where the 3 functions g_1, g_2, and g_3 are given by

$$\begin{cases} g_1(a_i^j, r) = \frac{\lambda_i(1-\beta_i)a_i^j k\beta_i}{\left[p_i a_i^j(1-\beta_i) - k(r+\lambda_i)\right]\left[p_i a_i^j(1-\beta_i) - k(r+\lambda_i(1-\beta_i))\right]} > 0 \\ g_2(a_i^j, r) = \frac{p_i(1-\beta_i)}{p_i a_i^j(1-\beta_i) - k(r+\lambda_i)} + \frac{p_i(1-\beta_i)}{p_i a_i^j(1-\beta_i) - k(r+\lambda_i(1-\beta_i))} - \frac{1}{a_i^j} > 0 \\ g_3(a_i^j) = \widehat{p}_i a_i^j - \widehat{p}_{i(j)} a_{i(j)}^j + \frac{k\lambda_{i(j)}}{1-\beta_{i(j)}} - \frac{k\lambda_i}{1-\beta_i} \end{cases}$$

Finally, we define

$$\begin{cases} \underline{g}_1 = \min\limits_{i,j} \frac{\lambda_i(1-\beta_i)a_i^j k\beta_i}{\left[p_i a_i^j(1-\beta_i)-k\lambda_i\right]\left[p_i a_i^j(1-\beta_i)-k\lambda_i(1-\beta_i)\right]} > 0 \\ \underline{g}_2 = \min\limits_{i,j} \left[\frac{p_i(1-\beta_i)}{p_i a_i^j(1-\beta_i)-k\lambda_i} + \frac{p_i(1-\beta_i)}{p_i a_i^j(1-\beta_i)-k\lambda_i(1-\beta_i)} - \frac{1}{a_i^j}\right] > 0 \\ \underline{g}_3 = \min\limits_{i,j} \widehat{p}_i a_i^j - \max\limits_{i,j} \widehat{p}_i a_i^j + \min\limits_{i} \frac{k\lambda_i}{1-\beta_i} - \max\limits_{i} \frac{k\lambda_i}{1-\beta_i} < 0 \end{cases}$$

and

$$\underline{r} = \max_i \left(\frac{1-\beta_i}{\beta_i}\right) \cdot \left[\left(\frac{1}{\underline{g}_1} + \max_i \widehat{p}_i\right)\frac{1}{\underline{g}_2} - \underline{g}_3\right] > 0 \tag{32}$$

Claim 1: If f is decreasing in a_i^j, then ΔW_i^j is increasing in a_i^j
Proof: The change in expected lifetime utility of a worker j employed in sector i is equal to

$$r\Delta W_i^j = \Delta\left[\tau + \omega + s(\mathbf{p})\right] + a_i^j \Delta t + \frac{r\lambda_i a_i^j (1-\beta_i)\Delta t}{k\beta_i \theta_i^j \left(\lambda_i + \theta_i^j\right)}\left(\widehat{W}_i^j - \widehat{U}^j\right) \tag{33}$$

Using equations (27) and (28), we can express $\widehat{W}_i^j - \widehat{U}^j$ as

$$\widehat{W}_i^j - \widehat{U}^j = \frac{1}{r}\left(\frac{rk\beta_{i(j)}}{1-\beta_{i(j)}} - \widehat{p}_{i(j)} a_{i(j)}^j + \widehat{p}_i a_i^j - \frac{k\lambda_i}{1-\beta_i} + \frac{k\lambda_{i(j)}}{1-\beta_{i(j)}}\right) \tag{34}$$

Combining equations (33) and (34), we get

$$\begin{aligned} r\Delta W_i^j = \Delta\left[\tau + \omega + s(\mathbf{p})\right] + \Delta t \cdot \Bigg[& a_i^j + \frac{\lambda_i a_i^j (1-\beta_i)}{k\beta_i \theta_i^j \left(\lambda_i + \theta_i^j\right)} \cdot \\ & \left(\frac{rk\beta_{i(j)}}{1-\beta_{i(j)}} - \widehat{p}_{i(j)} a_{i(j)}^j + \widehat{p}_i a_i^j - \frac{k\lambda_i}{1-\beta_i} + \frac{k\lambda_{i(j)}}{1-\beta_{i(j)}}\right)\Bigg] \end{aligned}$$

Since $\Delta\left[\tau + \omega + s(\mathbf{p})\right]$ does not depend on a_i^j and $\Delta t < 0$, f decreasing in a_i^j implies ΔW_i^j increasing in a_i^j. QED.
Claim 2: If $r \geq \underline{r}$, then $\frac{\partial f}{\partial a_i^j} \leq 0$ for all a_i^j
Proof: Equation (32) implies

$$\underline{g}_1 \left\{-\max_i \widehat{p}_i + \underline{g}_2 \left[\underline{r} \min_i \left(\frac{\beta_i}{1-\beta_i}\right) + \underline{g}_3\right]\right\} = 1 \tag{35}$$

By construction, we have: $\underline{g}_1 > 0$, $\underline{g}_2 > 0$ and $g_3(a_j^i) \geq \underline{g}_3$. Hence, equation (35) further implies

$$\underline{g}_1 \left\{\widehat{p}_{i(j)}\left(1-\delta_{ij}\right) - \widehat{p}_i + \underline{g}_2 \left[\frac{\underline{r}k\beta_{i(j)}}{1-\beta_{i(j)}} + g_3(a_j^i)\right]\right\} \geq 1, \text{ for all } a_i^j$$

where $\left(\widehat{W}_i^j - \widehat{U}^j\right) > 0$ implies $\frac{\underline{r}k\beta_{i(j)}}{1-\beta_{i(j)}} + g_3(a_j^i) > 0$. Note that g_1 and g_2 are increasing in r. As a result, we have

$$\begin{cases} g_1(a_i^j, r) \geq \frac{\lambda_i(1-\beta_i)a_i^j k\beta_i}{\left[p_i a_i^j(1-\beta_i)-k\lambda_i\right]\left[p_i a_i^j(1-\beta_i)-k\lambda_i(1-\beta_i)\right]} \geq \underline{g}_1 \\ g_2(a_i^j, r) \geq \frac{p_i(1-\beta_i)}{p_i a_i^j(1-\beta_i)-k(r+\lambda_i)} + \frac{p_i(1-\beta_i)}{p_i a_i^j(1-\beta_i)-k(r+\lambda_i(1-\beta_i))} - \frac{1}{a_i^j} \geq \underline{g}_2 \end{cases}$$

Combining the last series of inequalities, we get

$$g_1(a_j^i, \underline{r}) \left\{ \widehat{p}_{i(j)} (1-\delta_{ij}) - \widehat{p}_i + g_2(a_j^i, \underline{r}) \left[\frac{\underline{r}k\beta_{i(j)}}{1-\beta_{i(j)}} + g_3(a_j^i) \right] \right\} \geq 1, \text{ for all } a_i^j$$

If $r \geq \overline{r}$, we obtain in turn

$$g_1(a_j^i, r) \left\{ \widehat{p}_{i(j)} (1-\delta_{ij}) - \widehat{p}_i + g_2(a_j^i, r) \left[\frac{rk\beta_{i(j)}}{1-\beta_{i(j)}} + g_3(a_j^i) \right] \right\} \geq 1, \text{ for all } a_i^j$$

By definition of $\frac{\partial f}{\partial a_i^j}$, this further implies $\frac{\partial f}{\partial a_i^j} \leq 0$ for all a_i^j. QED.

Claims 1 and 2 together imply that if r is large enough, then workers are less likely to be protectionist if their productivity a_i^j is high. ■

7 Appendix B: Figure 1

All data are from the World Values Survey 1994-1999. "High income" countries include: Australia, Finland, West Germany, New Zealand, Norway, Puerto Rico, Republic of Korea, Spain, Sweden, Switzerland, Taiwan, United States. "Rest of the world" include: Albania, Argentina, Bangladesh, Bosnia and Herzegovina, Brazil, Bulgaria, Chile, China, Colombia, Czech Republic, Dominican Republic, Hungary, India, Macedonia, Mexico, Nigeria, Pakistan, Peru, Philippines, Romania, Serbia and Montenegro, Slovakia, Slovenia, South Africa, Turkey, Uruguay, Venezuela. All Former Soviet Republics—Armenia, Azerbaijan, Belarus, Estonia, Latvia, Lithuania, Russian Federation, and Ukraine—have been omitted from the sample. These countries were in the middle of their transition programs at the time of the surveys; what may have determined their trade-policy preferences lies beyond the scope of our paper.

"Upper" levels of education include: some university without degree/ higher education-lower-level tertiary certificate; and university with degree/ higher education-upper-level tertiary certificate. "Middle" levels of education include: complete secondary school: technical/ vocational type/ secondary, intermediate vocational qualification; incomplete secondary: university-preparatory type/ secondary, intermediate general qualification; and complete secondary: university-preparatory type/ full secondary, maturity level certificate. "Lower" levels of education include: inadequately completed elementary education; completed (compulsory) elementary education; and incomplete secondary school: technical/ vocational type/ (compulsory) elementary education.

We consider the following question of the World Values Survey: "Do you think it is better if goods made in other countries can be imported and sold here if people want to buy them, or that there should be stricter limits on selling foreign goods here, to protect the jobs of people in this country?" The proportion of protectionist opinions is computed cell by cell as the number of employed respondents who think that "there should be stricter limits on selling foreign goods" divided by the total number of employed respondents.

References

[1] Anderson, K. [1980], "The Political Market for Government Assistance to Australian Manufacturing Industries", *The Economic Record*, **56**, pp. 132-144.

[2] Anderson, K. and R. Baldwin [1987], "The Political Market for Protection in Industrial Countries", in A.M. El-Agraa, ed., Protection, Cooperation, Integration and Development, Macmillan New York.

[3] Bagwell, K. and R. Staiger [2003], "Protection and the Business Cycle", *Advances in Economic Analysis and Policy*, **3-1**.

[4] Baldwin , R. [1985], *The Political Economy of U.S. Import Policy*, Cambridge MA: MIT Press.

[5] Beaulieu, E., Benarroch, M. and J. Gaisford [2001], "Intra-Industry Trade Liberalization: Why Skilled Workers in Most Countries Resist Protectionism", mimeo University of Calgary.

[6] Bhagwati, J. [1971], "The Generalized Theory of Distortions and Welfare," in *Trade, Balance of Payments, and Growth: Papers in International Economics in Honor of Charles P. Kindleberger*, J. Bhagwati, R. Jones, R. Mundell, J. Vanek, eds, North-Holland Publishing Company.

[7] Bohara, A. and W. Kaempfer [1991], "A Test of Tariff Endogeneity in the United States," *American Economic Review*, **81**, pp. 952-960.

[8] Caves, R. [1976], "Economic Models of Political Choice: Canada's Tariff Structure", *Canadian Journal of Economics*, **9**, pp. 278-300.

[9] Davidson, C., Martin, L. and S. Matusz [1999], "Trade and Search Generated Unemployment," *Journal of International Economics*, **48**, pp. 271-299.

[10] Davidson, C. and S. Matusz [2004], *International Trade and Labor Markets: Theory, Evidence, and Policy Implications*, W.E. Upjohn Institute.

[11] Findlay, R. and S. Welliz [1982], "Endogenous Tariffs, the Political Economy of Trade Restrictions, and Welfare", in *Import Competition and Response*, J. Bhagwati ed, University of Chicago Press, Chicago.

[12] Finger, M. and A. Harrison [1994], "The MFA Paradox: More Protection and More Trade?", unpublished paper, the World Bank.

[13] Goldberg, P. and G. Maggi [1999], "Protection for Sale: An Empirical Investigation," *American Economic Review*, **89-5**, pp. 1135-1155.

[14] Grossman, G. and E. Helpman [1994], "Protection for Sale," *American Economic Review*, **84-3**, pp. 833-850.

[15] Grossman, G. and C. Shapiro [1982], "A Theory of Factor Mobility", *Journal of Political Economy*, **90-5**, pp. 1054-1069.
[16] Hall, R. and C. Jones [1999], "Why do some countries produce so much more output per worker than others?", *The Quarterly Journal of Economics*, **114-1**, pp. 83-116.
[17] Hansen, J. [1990], "Taxation and the Political Economy of the Tariff", *International Organization*, **44**, pp. 527-552.
[18] Helpman, E. and P. Krugman [1989], *Trade Policy and Market Structure*, Cambridge MA: MIT Press.
[19] Hillman, A. [1982], "Declining Industries and Political-Support Protectionist Motives", *American Economic Review*, **72**, pp. 1180-1187.
[20] Kletzer, L. [1998], "Job Displacement", *The Journal of Economic Perspectives*, **12-1**, pp. 115-136.
[21] Magee, C., Davidson, C. and S. Matusz [2005], "Trade, Turnover, and Tithing," *Journal of International Economics*, **66-1**, pp. 157-176.
[22] Mansfield, E. and M. Busch [1995], "The Political Economy of Nontariff Barriers: A Cross-National Analysis," *International Organization*, 49-4, pp. 723-49.
[23] Marvel, H. and E. Ray [1983], "The Kennedy Round: Evidence on the Regulation of Trade in the U.S.", *American Economic Review*, **73**, pp. 190-197.
[24] Matschke, X. and M. Sherlund [2006], "Do Labor Issues Matter in the Determination of U.S. Trade Policy? An Empirical Reevaluation", *American Economic Review*, **96-1**, pp. 405-421.
[25] Mayda, A. and D. Rodrik [2005], "Why Are Some People (and Countries) More Protectionist than Others?," *European Economic Review*, **49-6**, pp. 1393-1430.
[26] Mincer, J. [1993], "Education and Unemployment", in *Studies in Human Capital*, Jacob Mincer ed, Edward Elgar Publishing.
[27] Neal, D. [1995], "Industry Specific Human Capital: Evidence from Displaced Workers", *Journal of Labor Economics*, **13-4**, pp. 653-677.
[28] O'Halloran, S. [1994], *Politics, Process, and American Trade Policy*, University of Michigan Press.
[29] O'Rourke, K. and R. Sinott [2001], "The Determinants of Individual Trade Policy Preferences: International Survey Evidence", in *Brookings Trade Forum: 2001*, Collins, S. and Rodrik, D. (eds). Washington, D.C.: Brookings.
[30] Pissarides, C. [2000], *Equilibrium Unemployment Theory*, second edition, Cambridge MA: MIT Press.

[31] RAY, E. [1981], "The Determinants of Tariffs and Non-Tariffs Restrictions in the United States", *Journal of Political Economy*, **89**, pp. 105-121.

[32] RAY, E. [1991], "Protection of Manufactures in the United States", in *Global Protectionism: Is the U.S. Playing on a Level Field?*, D. Greenaway ed., Macmillan London.

[33] RODRIGUEZ, F. and D. RODRIK [1999], *Trade Policy and Economic Growth: a Skeptic's Guide to the Cross-Country Evidence*, NBER working paper.

[34] RODRIK, D. [1995], "Political Economy of Trade Policy", in *Handbook of International Economics*, Vol. 3, G. Grossman and K. Rogoff, eds., North-Holland Publishing Company.

[35] ROGERSON, R., SHIMER, R. and R. WRIGHT [2005], ""Search-Theoretic Models of the Labor Market: A Survey", *Journal of Economic Literature*, 63, pp. 959-988.

[36] SAUNDERS, R. [1980], "The Political Economy of Effective Protection in Canada's Manufacturing Sector", *Canadian Journal of Economics*, **13**, pp. 340-348.

[37] SCHEVE, K. and M. SLAUGHTER [2001], "What Determines Individual Trade-policy Preferences?", *Journal of International Economics*, **54**, pp. 267-292.

[38] SCHEVE, K. and M. SLAUGHTER [2004], "Public Opinion, International Economic Integration, and the Welfare State", mimeo Yale University.

[39] TREFLER, D. [1993], "Trade Liberalization and the Theory of Endogenous Protection," *Journal of Political Economy*, **101-1**, pp. 138-160.

[40] WASMER, E. [2006], "General versus Specific Skills in Labor Markets with Search Frictions and Firing Costs", *American Economic Review*, forthcoming.