Unions and the political economy of immigration

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PRELIMINARY VERSION

Abstract

This paper studies the determinants of immigration policy in an economy with entrepreneurs and workers where a trade union has monopoly power over wages. The presence of the union leads a benevolent planner to implement a high level of immigration and induces a welfare loss not only from an aggregate point of view, but even from the point of view of workers. In the politico-economic equilibrium where interest groups lobby for immigration, we show the condition under which workers are no longer hurt by the presence of the union.

1 Introduction

The number of immigrants entering OECD countries labor markets has been increasing impressively in recent years. Between 1965 and 2000 the migrant stock as a percentage of the local population more than doubled in North America, rising from 6 to 13 per cent, and almost tripled in Western Europe, rising from 3.6 to 10.3 per cent (Hatton and Williamson [11]).

Large migrants inflows put immigration at the center of the political debate in many countries and arouse concern in the general public. In the 1997 Eurobarometer survey, migration turns out to be one of the three most significant issues. According to a 1995 international survey (O' Rourke and Sinnott [13]), answers to the question whether immigration should be decreased ranged between "reduce a little" and "reduce a lot" in Germany, Britain and the US, three big immigration countries.

Economic reasons play an important role in determining attitudes toward immigration. As the educational level of immigrants is typically lower than in the local population, hostility towards immigrants is generally stronger among the unskilled worker who fear negative effects in terms of lower wages and/or higher unemployment. Instead, skilled workers and capital owners tend to support migration as they expect larger returns to human and physical capital.

Immigration policy reflects these conflicting interests as the outcome of a political process involving the government, social parties, activists and political parties.

Political scientists (see Freeman [8]) argue that an important mode of immigration politics in Western democracies is *client politics* in which policymakers interact intensively out of public view with groups who have a well-defined stake in migration (e.g. employers), while main political parties seek to avoid open conflict over migration issues. This tends to generate expansionary migration policy as those who benefit from migration prevail over less organized or less intense opposition.

When those who oppose migration (e.g. unskilled workers) gain additional voice, *interest groups politics* prevails where organized social groups with well-defined and conflicting interests over migration struggle to influence the policymaker in their favor[1]. Finally, when the policymaker

[1]Another cathegory proposed by Freeman is *populism* which is described as a situation where entrepreneurial

is relatively insulated from pressures by social groups, immigration can be seen as a *regulatory* sphere with the government implementing policies in the national interest[2].

Although it is widely recognized that immigration policy is the result of the political composition of different interests, there are surpringly few theoretical models which investigate the political determination of immigration (at our knowledge, only Amegashie [1] and Epstein and Nitzan [6]). In this paper we try to fill this gap. We use a political economy approach to study the determination of migration policy and its welfare and distributional consequences in an economy where agents have conflicting interests over migration and the labor market is not competitive due to the presence of a trade union.

As the union pushes wages above the competitive level, unemployment occurs in equilibrium. A lobby of entrepreneurs (skilled workers) supports migration as this reduces wages and increases employment and profits while a lobby of (unskilled) workers would rather restrict immigrants inflows.

Following the above discussion, we see policy choices over migration as determined by the influence of these two lobbies and government responsiveness to their pressures. Our analysis identifies the presence of the trade union as a decisive factor in determining the outcome of the political process and the properties of the politico-economic equilibrium.

We first investigate the situation where the level of immigration is determined by a benevolent social planner to maximize natives' welfare (*regulatory politics*). The presence of the union in wage determination leads the planner to implement a level of immigration *higher* than the one which would arise with a competitive labor market. This is due to the fact that, anticipating that the union will generate an efficiency loss by pushing wages above the competitive level, the government increases the immigration level, in order to reduce wages and increase employment.

politicians (e.g. Le Pen in France, Buchanan in the US, Bossi in Italy) engage in the mobilization of resentment among groups whose members believe that they are adversely affected by immigration as well as of nationalist sentiments and xenophobia. If succesful, populism may represent a transitional mode from client to interest group politics as opponents of immigration gain additional voice. Otherwise it will be a transitory phenomenon with limited impact on immigration policies.

[2] The autonomy of policymakers from pressure groups depends on several institutional features such as the locus of decision making (administration, cabinet, parliament) and the license of courts to repeal government decisions.

Quite surprisingly, it turns out that the presence of the union induces a welfare loss not only from an aggregate point of view, but even from the point of view of workers, who would be better off in the absence of the union. This happens as the government's response to union behavior (that is, to increase the level of immigration) generates a wage rate which is *lower* than the one which would prevail in a competitive labor market.

These results would inevitably question workers' support for the union. However, when the analysis is extended to allow for the direct influence of interest groups the outcome may be radically different.

Although several political actors may represent workers' stances in immigration policy[3], we take it as a fact that the effectiveness of workers' voice in the political process is strongly enhanced by the presence of a powerful trade union. Thus, if interest groups pressures have sufficiently high weight in government decisions, workers are no longer necessarily hurt by union behavior and may benefit from the presence of the union (*interest groups politics*). Intuitively, this has to do with the fact that, without the union, the government would respond excessively to political pressures of entrepreneurs and set a high immigration level, thereby triggering a large decline in wages (*client politics*).

To formalize the lobbying process we use the common agency framework pioneered by Bernheim and Whinston [4], and applied to different economic problems by authors such as Bellettini and Ottaviano [2], Dixit, Grossman and Helpman [5], Grossman and Helpman [9], Persson [14]. Solving for the Truthful Perfect Equilibrium of the lobbying game between the government, the lobby of entrepreneurs and the lobby of workers, we characterize the equilibrium level of immigration chosen by the government and the equilibrium contributions of the two lobbies.

This analysis allows us to derive our welfare results by focusing on a key parameter, which is the relative weight of social welfare relative to lobbies' contribution in the objective function of the government. In particular, we show that there exists a threshold level of this parameter, such that, for any level below this threshold, workers benefit from the presence of the union.

As we wrote above, this paper is related to the few existing studies (see Amegashie [1] and

[3] As discussed above the affirmation of populist movements may increase the voice of those who oppose migration, including unskilled workers.

Epstein and Nitzan [6]) which analyze a model of the political economy of immigration based on the conflicting interests of different groups. In these papers, however, no attention is paid to the role of the union in the process of wage determination and to the interaction between the labor market equilibrium and the political choice of immigration.

The remaining of the paper is organized as follows. Section 2 introduces the economic model. Section 3 compares the level of immigration chosen by a benevolent social planner when the labor market is unionized with the level of immigration chosen by the social planner when the labor market is competitive. Section 4 studies the politico-economic equilibrium with lobbies and Section 5 provides a numerical example. Section 6 concludes.

2 The economic model

Consider a one-good economy where agents differ with respect to their source of income and their country of birth. In particular, we assume that there are H domestic entrepreneurs, N domestic workers, and I immigrant workers. Each entrepreneur owns a firm. The firm is endowed with technology:

$$y = l^{\alpha} \tag{1}$$

where l represents employment, y is output and where standard concavity assumptions apply.

Agents derive utility from consumption which is equal to profit income π for entrepreneurs and wage income w for workers. Preferences are represented by a CES utility function:

$$U(c) = \frac{c^{1-\delta}}{1-\delta} \tag{2}$$

where c represents consumption and $\delta > 1$ is the inverse of the elasticity of substitution.[4]

The labor market is non-competitive. The wage rate is set by a monopolistic union to solve the following problem:

$$\max \left(w - w^{c}\right)^{\theta} \left[Hl(w)\right]^{1-\theta} \tag{3}$$

[4]As we will see in the next section, $\delta > 1$ is necessary and sufficient for the second order condition of the maximization problem of the government to be satisfied.

where $w^c = \alpha \left(\frac{N+I}{H}\right)^{\alpha-1}$ is the competitive wage. Employment is determined by firms according to labor demand. The union seeks to raise the wage above the competitive level taking into account the ensuing employment loss. The parameter θ denotes the weight of the wage gap relative to employment.[5]

The maximization problem of the union yields:

$$w = \Delta w^c \tag{4}$$

where $\Delta \equiv \frac{(1-\theta)\sigma}{(1-\theta)\sigma-\theta}$ with $\sigma \equiv (1-\alpha)^{-1}$. Employment is thus equal to:

$$l = \Delta^{-\sigma}\left(\frac{N+I}{H}\right) \tag{5}$$

Notice that since $\Delta > 1$, the union raises the wage above the competitive level and creates unemployment. We will assume that the unemployed can attain a consumption level equal to $b \leq w$.

3 The optimal level of immigration

Let us analyze what would be the level of immigration chosen by a social planner in order to maximize the welfare of natives.

We consider a utilitarian social welfare function:

$$W = \frac{N}{1-\delta}\left[\frac{Hl(w)}{N+I}w^{1-\delta} + \frac{N+I-Hl(w)}{N+I}b^{1-\delta}\right] + \frac{H}{1-\delta}\pi^{1-\delta} \tag{6}$$

where $\frac{Hl(w)}{N+I}$ is the probability that a worker (domestic or foreign) is employed.

Substituting equations (4) and (5) in (6) and maximizing with respect to I yields:

$$I^{SP} = \left[N\left(\frac{1-\alpha}{\Delta^{\sigma}\alpha H}\right)^{\delta}\right]^{\frac{1}{1-\delta}} - N \tag{7}$$

where we used $\pi = (1-\alpha)\, l^{\alpha}$. Note that the second order condition for a maximum is satisfied if and only if $\delta > 1$.

When considering an increase in I, the social planner trades the welfare loss of native workers (due to the decrease of w) with the gain of entrepreneurs (due to higher π). The larger is the wage

[5] Our objective function of the union is used in a different context by Irmen and Wigger [12]. Alternative specifications of union's objective functions are discussed, among others, by Booth [3] and Farber [7].

gap Δ, the higher is I^{SP} as the social planner mitigates the presence of the union by redistributing income to entrepreneurs. Similarly, the higher is α, the higher is w relative to π and the higher is I^{SP}. Finally, a larger N and/or a lower H imply a lower I^{SP} as w decreases and the weight of workers in the utilitarian welfare function increases.

It is worthwhile to compare the social planner's solution in the presence of the union with the optimal solution when the labor market is competitive (in the absence of the union). In this case, the level of immigration is chosen to maximize eq. (6) with $w = w^c$ and $l = \frac{N+I}{H}$, yielding:

$$I^C = \left[N\left(\frac{1-\alpha}{\alpha H}\right)^{\delta}\right]^{\frac{1}{1-\delta}} - N \tag{8}$$

Notice that $I^C < I^{SP}$, so that in the competitive case the social planner chooses a level of immigration which is lower than in the non-competitive case. The presence of the union induces the social planner to redistribute income in favor of the owners of the firms, thereby increasing immigration.

With regard to welfare, we can state the main result of this section:

Proposition 1 *Aggregate welfare and the expected utility of workers are lower when immigration is chosen by a social planner in the presence of the union than in the competitive case with no union. On the contrary, entrepreneurs are better off with the union.*

Proof. Plugging equations (7) and (8) in (6) and letting $b = w$, we get:

$$W(I^{SP}) < W(I^C) \Leftrightarrow \alpha\,(\Delta - 1) > (1-\alpha)\,(1 - \Delta^{-\alpha\sigma}) \tag{9}$$

which is always satisfied as the left-hand side reaches its minimum for $\Delta = 1$ and the right-hand side reaches its maximum for $\Delta = 1$. Obviously, for any $b < w$, $W(I^{SP}) < W(I^C)$ is a fortiori satisfied. Plugging equations (7) and (8) in w and w^c it is immediate to verify that $w < w^c \Leftrightarrow \Delta^{\frac{1}{\delta-1}} > 1$ which is true as $\Delta > 1$. Thus, workers are necessarily worse off with the union. Finally, notice that $\pi(I^C) = (1-\alpha)\left[\frac{N}{H}\left(\frac{1-\alpha}{\alpha}\right)^{\delta}\right]^{\frac{1}{1-\delta}}$ and $\pi(I^{SP}) = (1-\alpha)\left[\frac{N}{H\Delta^{\sigma}}\left(\frac{1-\alpha}{\alpha}\right)^{\delta}\right]^{\frac{1}{1-\delta}}$ so that $\pi(I^{SP}) > \pi(I^C)$.
■

Surprisingly, when immigration is optimally set by the social planner, the presence of the union benefits the entrepreneurs at the expense of the workers. As we have already discussed, when the union sets the level of wages, the social planner reacts by increasing immigration. In equilibrium, this reduces wages *below* the competitive level so that workers are necessarily hurt. On the contrary, entrepreneurs benefit from increased overall employment, and the net effect on social welfare is negative.

Our findings highlight the important consequences of considering the level of immigration I as optimally chosen by a social planner. Indeed, a different result arises if, starting from the competitive equilibrium, a union is introduced while keeping the level of immigration *fixed* at I^C. In this case, the union increases wages above the competitive level, and, if b is not too small, it increases workers' welfare at the expense of entrepreneurs. More specifically, we can write:

Proposition 2 *Let $I = I^C$. Then, the introduction of the union decreases social welfare. If and only if $b > \underline{b} = \alpha \left[\frac{N}{H}\left(\frac{1-\alpha}{\alpha}\right)^{\delta}\right]^{\frac{1}{(\delta-1)\sigma}} \left(\frac{1-\Delta^{-\sigma}}{1-\Delta^{1-\delta-\sigma}}\right)^{\frac{1}{\delta-1}}$, the union increases the expected utility of workers.*

Proof. (i) Let $W^u(I^C)$ be the level of social welfare when the labor market is unionized and $I = I^C$. Then:

$$W^u(I^C) < W(I^C) \Leftrightarrow N\alpha^{1-\delta}\left(\frac{N+I^C}{H}\right)^{\delta-1} + H(1-\alpha)^{1-\delta}\left(\Delta^{1-\delta} + \Delta^{\alpha\sigma(\delta-1)} - 1\right) > 0 \quad (10)$$

which is satisfied since $\left(\Delta^{1-\delta} + \Delta^{\alpha\sigma(\delta-1)} - 1\right) > 0$.

(ii) The expected utility of the representative worker in presence of the union is given by:

$$W_w = \frac{1}{1-\delta}\left[\Delta^{-\sigma} w^{1-\delta} + \left(1 - \Delta^{-\sigma}\right) b^{1-\delta}\right] \quad (11)$$

Notice that this is larger than $\frac{(w^c)^{1-\delta}}{1-\delta}$ if and only if $b > \alpha \left[\frac{N}{H}\left(\frac{1-\alpha}{\alpha}\right)^{\delta}\right]^{\frac{1}{(\delta-1)\sigma}} \left(\frac{1-\Delta^{-\sigma}}{1-\Delta^{1-\delta-\sigma}}\right)^{\frac{1}{\delta-1}}$. ■

For a given I, the introduction of the union has standard efficiency and redistributive effects. Wages are increased so that unemployment is generated. This reduces social welfare. Workers will be better off provided that the cost of being unemployed is not too large.

Instead, if the government responds optimally to the existence of the union, it will increase the immigration level to I^{SP}. This allows the government to increase social welfare although it cannot achieve the competitive level. The resulting fall in wages hurt workers, who would be better off without the union.

The welfare loss of workers due to the presence of the union raises the natural question of why workers would deliberately accept membership and provide support for its existence. The next section tackles this issue by investigating the political determination of immigration policy.

4 The politico-economic equilibrium

In the welfare analysis that we conducted so far, we have assumed the presence of a benevolent social planner, who set the immigration level in order to maximize the welfare of the natives.

In reality, immigration policy is the realm of special interests which try to shape government decisions. In many countries employers and the trade union bargain over wages and the government implements various policies which affect the labor market. Lobbies representing entrepreneurs and workers seek to influence the outcome of the legislative process.

According to this description, the politico-economic equilibrium that we have in mind is the following:

1. The lobbies of entrepreneurs and workers offer contributions to the government conditional on the immigration policy.

2. The government sets the immigration level I taking into account the contributions of the lobbies of entrepreneurs and workers and anticipating how the wage rate will be determined on the labor market.

3. The union sets the wage rate taking I as given and employment is determined by labor demand.

Notice that the lobbies of entrepreneurs and workers do not necessarily correspond to the actors of the bargaining process on the labor market, namely the trade union and the associations of entrepreneurs. For instance, conflicting interests on immigration policy may be defended by other political organizations, such as political parties, human rights activists, etc.

It should also be noted that, in general, both natives and immigrant workers can be represented in the lobbying activity. In this section we will assume that only natives participate in the lobbying process; later we will discuss the implications of extending representation to the immigrants.

Following the recent literature pioneered by Bernheim and Whinston [4], we will model the lobbying game as a menu auction game with globally truthful contributions.

In the first stage, the lobby $j \in \{e, w\}$ offers contributions C_j that are globally truthful, so that we can write:

$$C_j(I) = \max\{0, V_j(I) - v_j\} \tag{12}$$

where V_j is the objective function of lobby j and v_j is a scalar optimally set by each lobby j. The objective functions for the lobby of workers and entrepreneurs are given by:

$$V_w = \frac{N}{1-\delta}\left[\frac{Hl(w)}{N+I}w^{1-\delta} + \left(1 - \frac{Hl(w)}{N+I}\right)b^{1-\delta}\right] \tag{13}$$

$$V_e = \frac{H}{1-\delta}\pi^{1-\delta} \tag{14}$$

In the second stage, government chooses I to maximize a weighted average of social welfare and contributions:

$$I^* = \arg\max\left[\lambda W(I) + (1-\lambda)\sum_j C_j\right] \tag{15}$$

with $\lambda \in (0, 1)$.

Finally, in the third stage, the union sets the wage to maximize equation (3) given the number of immigrants I chosen by the government in the previous stage.

Definition 1 ***(Truthful Perfect Equilibrium)*** *The contribution schedules $C_e^*(I)$, $C_w^*(I)$ and the immigration level $I^*(C_e(\cdot), C_w(\cdot))$ form a* Truthful Perfect Equilibrium *(TPE) if and only if:*

(i) for $C_e(\cdot)$ and $C_w(\cdot)$, $I^*(C_e(\cdot), C_w(\cdot))$ is a solution to

$$\max_I \lambda W(I) + (1-\lambda)\sum_j C_j$$

(ii) there is no other contribution schedule $C_e'(I)$ such that

$$V_e(I') > V_e(I^*)$$

where $I^* = I^*(C_e^*(\cdot), C_w^*(\cdot))$ and $I' = I'(C_e'(\cdot), C_w^*(\cdot))$ are best response actions to $(C_e^*(\cdot), C_w^*(\cdot))$ and $(C_e'(\cdot), C_w^*(\cdot))$ respectively.

(iii) there is no other contribution schedule $C_w'(I)$ such that

$$V_w(I') > V_w(I^*)$$

where $I^* = I^*(C_e^*(\cdot), C_w^*(\cdot))$ *and* $I' = I'(C_e^*(\cdot), C_w'(\cdot))$ *are best response actions to* $(C_e^*(\cdot), C_w^*(\cdot))$ *and* $(C_e^*(\cdot), C_w'(\cdot))$ *respectively.*

(iv) $C_e^*(\cdot)$ *and* $C_w^*(\cdot)$ *are truthful strategies with respect to* $I^*(\cdot)$.

The existence of the TPE has been established by Bernheim and Whinston [4]. As for the characterization of our TPE, let us assume that $b = \underline{b}$. Then, we can write the following result:

Proposition 3 ***(The politico-economic equilibrium)*** *The Truthful Perfect Equilibrium of the lobbying game is such that:*

(i) $I^* = \left[N\left(\frac{1-\alpha}{\Delta^{\sigma}\alpha H}\right)^{\delta}\right]^{\frac{1}{1-\delta}} - N$

(ii) $C_w^* = \begin{cases} \overline{C}\left(\alpha + \frac{\lambda^{\alpha}-1}{1-\lambda}\right) & \text{if } \lambda \geq \Gamma^{\sigma} \\ \overline{C}\left(\frac{1-\alpha}{1-\lambda}\Gamma^{\alpha\sigma} + \frac{\alpha\lambda}{1-\lambda}\Gamma^{-1} + \alpha - \frac{1}{1-\lambda}\right) & \text{if } \lambda < \Gamma^{\sigma} \end{cases}$

(iii) $C_e^* = \begin{cases} \overline{C}\left(-\alpha + \frac{\lambda^{1-\alpha}-\lambda}{1-\lambda}\right) & \text{if } \lambda \leq \Gamma^{-\sigma} \\ \overline{C}\left(\frac{\alpha\left(\Gamma^{-1}-1\right)-(1-\alpha)\lambda(1-\Gamma^{\alpha\sigma})}{1-\lambda}\right) & \text{if } \lambda > \Gamma^{-\sigma} \end{cases}$

where $\overline{C} \equiv \frac{1}{1-\delta}N^{\alpha}H^{1-\alpha}\Delta^{-\alpha\sigma}(1-\alpha)^{-\delta(1-\alpha)}\alpha^{-\alpha\delta}$ *and* $\Gamma \equiv \frac{\Delta\left(1-\Delta^{-\sigma}\right)}{1-\Delta^{1-\delta-\sigma}}$

Proof. See Appendix. ■

As it is well known in the literature following Bernheim and Whinston [4], the solution which arises when all agents are represented in the lobbying process is equivalent to the solution of the benevolent planner.

As we have seen in Proposition 1, this solution hurts the workers, who would be better off in the absence of the union. Then, why should the workers support the union?

The politico-economic equilibrium that we have analyzed in this section can help us to answer this question. Specifically, we argue that, without the union, workers lose voice in the political process and their ability to influence government policy is reduced. Thus, although the union can be detrimental to workers on the economic side, it could be nonetheless beneficial for them in the political arena.

To formalize this idea, let us consider the extreme case where, in the absence of the union, workers have no voice at all so that government's decisions are influenced by entrepreneurs' lobbies only. In this case, the objective function of the government becomes:

$$G(I, C_e) = \lambda W(I) + (1 - \lambda)C_e \tag{16}$$

Notice that, in the absence of the union, the labor market is competitive, $w = w^c$ and there is full employment. Thus, under the assumption of truthful contributions, substituting equation (12) in equation (16), the objective function of the government can be rewritten as:

$$G(I) = \lambda \left[\frac{N}{1-\delta} \alpha^{1-\delta} \left(\frac{N+I}{H} \right)^{(1-\delta)(\alpha-1)} \right] + \frac{H}{1-\delta} (1-\alpha)^{1-\delta} \left(\frac{N+I}{H} \right)^{\alpha(1-\delta)} \tag{17}$$

Maximization of equation (17) with respect to I yields:

$$I^E = \left[\lambda N \left(\frac{1-\alpha}{\alpha H} \right)^{\delta} \right]^{\frac{1}{1-\delta}} - N \tag{18}$$

Clearly, $I^E > I^C$ as the lobby of entrepreneurs induces the government to deviate from the welfare maximizing level of immigration. With higher immigration, income is redistributed away from workers towards the entrepreneurs.

In this case, it is not a priori clear whether workers are hurt by the presence of the union. As the workers lose voice in the lobbying process, immigration level increases up to a point which may make it costly for them to eliminate the union.

Intuitively, the cost for workers of not being represented in the lobbying activity depends on how much the government weights contributions. The higher is this weight, the more distorted will be immigration policy in favor of entrepreneurs.

This intuition is formalized in the following:

Proposition 4 *There exists a* $\underline{\lambda} \in (0, 1)$ *such that, for any* $\lambda < \underline{\lambda}$, *workers benefit from the presence of the union.*

Proof. See Appendix ■

Summing up, when the immigration level is determined by the political interaction between government and lobbies, workers may find it profitable to support the union in order to be more effective in the lobbying activity and avoid the implementation of excessively high levels of immigration. This happens when the bias of the government in favor of contributions is high enough or, in other words, when the government is not sufficiently benevolent.

5 A numerical example

In this section, we present a numerical example based on our model. Let:

$$\alpha = .85 \quad \delta = 2.5 \quad H = 30 \quad N = 160 \quad \theta = .3$$

be the parameter values.

Given these values, it is easy to show that:

$$I^{SP} = I^{*} = 210 \quad w\left(I^{SP}\right) = 0.62 \quad I^{C} = 17 \quad w^{c}(I^{C}) = 0.65 \quad \underline{b} = 0.58 \quad \Delta \simeq 1.07$$

Notice that, as discussed above, when the level of immigration is chosen by the social planner, the unionized wage rate turns out to be lower than the competitive wage, due to the higher level of immigration chosen by the planner in order to compensate for the non-competitive wage.

Figure 1 shows the level of utility of workers as a function of λ.

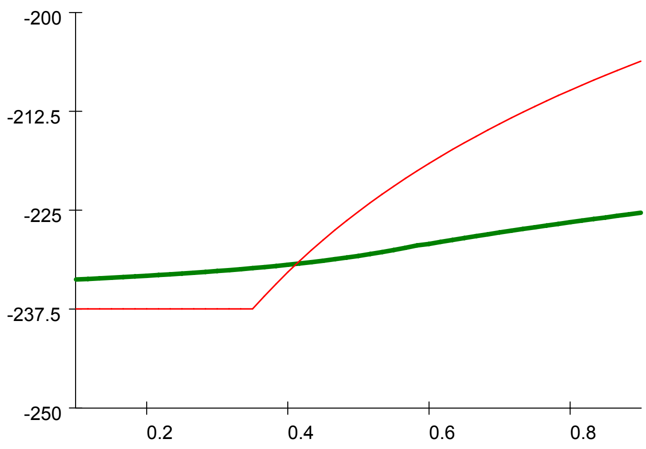

Figure 1: Welfare of workers with and without the union

The thin curve represents the expected utility of workers when there is no trade union. As explained in detail in appendix 2, the equation of this curve is given by:

$$W_w = \begin{cases} \frac{1}{1-\delta} N^{\alpha} H^{1-\alpha} \alpha^{1-\delta\alpha} (1-\alpha)^{-\delta(1-\alpha)} \lambda^{\alpha-1} & \text{for } 1 > \lambda > \left(\frac{\Gamma}{\Delta}\right)^{\sigma} \\ \underline{b}^{1-\delta} N \frac{1}{1-\delta} & \text{for } 0 < \lambda \leq \left(\frac{\Gamma}{\Delta}\right)^{\sigma} \end{cases}$$

The thick curve represents the expected utility of workers when there is a trade union. Its equation is:

$$W_w^u = \begin{cases} \frac{1}{1-\delta} \alpha^{-\alpha\delta} N^{\alpha} H^{\frac{1}{\sigma}} (1-\alpha)^{\frac{-\delta}{\sigma}} \left(\left(\frac{1-\lambda^{\alpha}}{1-\lambda} \right) \Delta^{1-\sigma} + \alpha \left(1 - \Delta^{1-\delta-\sigma}\right) \right) & \text{for } 1 > \lambda > \Gamma^{\sigma} \\ \frac{1}{(1-\delta)(1-\lambda)} \left(\begin{array}{l} \Delta^{1-\sigma} \alpha^{1-\alpha\delta} N^{\alpha} H^{\frac{1}{\sigma}} (1-\alpha)^{\frac{-\delta}{\sigma}} \left(\frac{1}{\alpha}\right) + \\ (1 - \Delta^{-\sigma} - \lambda) \underline{b}^{1-\delta} N - H (1-\alpha)^{1-\delta} \left(\alpha^{\alpha\sigma(1-\delta)} \underline{b}^{-\alpha\sigma(1-\delta)} \right) \end{array} \right) & \text{for } 0 \leq \lambda \leq \Gamma^{\sigma} \end{cases}$$

The intersection of the two curves defines $\underline{\lambda}$. As we know from Proposition 4, for any $\lambda > \underline{\lambda}$, the thin curve is above the thick curve and workers are better off with a competitive labor market and without contributing to the government. For any $\lambda < \underline{\lambda}$, the thin curve is below the thick curve and workers are better off with a unionized labor market and paying contributions to the government. Our numerical example implies $\underline{\lambda} = 0.41$.

Finally, as stated in Proposition 1, notice that the expected level of utility of workers is higher in the competitive case than when immigration is chosen by the social planner in the presence of the union; in particular, $W_w(I^C) = -203$ while $W_w(I^{SP}) = -224$.

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APPENDIX 1

Proof of Proposition 3

(i) Using equations (6) and (12) , the maximization problem of the government can be rewritten (in an interior equilibrium) as:

$$I = \arg\max \sum_{j\in\{e,w\}} V_j(I) \tag{19}$$

which yields $I = I^*$.

(ii) As explained in Grossman and Helpman [9], equilibrium contributions are given by:

$$C_w^* = V_e(I^{-w}) - V_e(I^*) + \frac{\lambda}{1-\lambda}\left[W(I^{-w}) - W(I^*)\right] \tag{20}$$

where I^{-w} is the solution to (15) when only entrepreneurs offer contributions. Simple calculations show that $I^{-w} = \left[\lambda N\left(\frac{1-\alpha}{\alpha H}\right)^{\delta}\right]^{\frac{1}{1-\delta}} - N$. The wage level when $I = I^{-w}$ is given by $w(I^{-w}) = \alpha\left(\frac{N+I^{-w}}{H}\right)^{\frac{-1}{\sigma}}$ so that for $\lambda = \Gamma^{\sigma}$ we get $w(I^{-w}) = \underline{b}$. Thus, for any $\lambda < \Gamma^{\sigma}$, I^{-w} is fixed and equal to $\left[\Gamma^{\sigma} N\left(\frac{1-\alpha}{\alpha H}\right)^{\delta}\right]^{\frac{1}{1-\delta}}$. Some additional algebra yields the expression for C_w^* which was given in the Proposition.

(iii) Similarly to (ii), equilibrium contributions for the lobby of entrepreneurs are given by:

$$C_e^* = V_w(I^{-e}) - V_w(I^*) + \frac{\lambda}{1-\lambda}\left[W(I^{-e}) - W(I^*)\right] \tag{21}$$

where I^{-e} is the solution to (15) when only workers offer contributions. It can be easily verified that $I^{-w} = \left[\lambda^{-1}\Delta^{-\delta\sigma} N\left(\frac{1-\alpha}{\alpha H}\right)^{\delta}\right]^{\frac{1}{1-\delta}}$ so that we have $w(I^{-e}) = \underline{b}$ when $\lambda = \Gamma^{-\sigma}$. Thus, for any $\lambda < \Gamma^{-\sigma}$, I^{-e} is fixed and equal to $\left[\Gamma^{\sigma}\Delta^{-\delta\sigma} N\left(\frac{1-\alpha}{\alpha H}\right)^{\delta}\right]^{\frac{1}{1-\delta}}$. Additional algebra yields the expression for C_e^* which was given in the Proposition.

APPENDIX 2

Proof of Proposition 4

First of all, let W_w^u denote the welfare of workers with the union (that is, when both lobbies contribute) and W_w the welfare of workers without the union (that is, when only the lobby of entrepreneurs effectively contribute). Then:

$$W_w = \frac{1}{1-\delta} N^{\alpha} H^{1-\alpha} \alpha^{1-\delta\alpha} (1-\alpha)^{-\delta(1-\alpha)} \lambda^{\alpha-1} \tag{22}$$

which is an increasing and strictly concave function of λ. Notice that when $\lambda = \left(\frac{1-\Delta^{-\sigma}}{1-\Delta^{-\sigma-\delta+1}}\right)^{\sigma}$ the wage rate is equal to $\underline{b}$ so that we can write:

$$W_w = \begin{cases} \frac{1}{1-\delta} N^\alpha H^{1-\alpha} \alpha^{1-\delta\alpha} (1-\alpha)^{-\delta(1-\alpha)} \lambda^{\alpha-1} & \text{for } 1 > \lambda > \left(\frac{1-\Delta^{-\sigma}}{1-\Delta^{-\sigma-\delta+1}}\right)^\sigma \\ \underline{b}^{1-\delta} N \frac{1}{1-\delta} & \text{for } 0 < \lambda \leq \left(\frac{1-\Delta^{-\sigma}}{1-\Delta^{-\sigma-\delta+1}}\right)^\sigma \end{cases} \tag{23}$$

When the union exists, in the computation of the welfare of workers we must take into account the contribution paid to the government. Therefore, we can write:

$$W_w^u = \frac{1}{1-\delta} \alpha^{-\alpha\delta} N^\alpha H^{\frac{1}{\sigma}} (1-\alpha)^{\frac{-\delta}{\sigma}} \left(\left(\frac{1-\lambda^\alpha}{1-\lambda} \right) \Delta^{1-\sigma} + \alpha \left(1 - \Delta^{1-\delta-\sigma}\right) \right) \tag{24}$$

which is an increasing and strictly concave function of λ. However, it should be noted (see Appendix 1) that, when $\lambda = \Gamma^\sigma$, we have that $w(I^{-w}) = \underline{b}$, so that, for $\lambda < \Gamma^\sigma$, I^{-w} becomes fixed. Thus, we can write:

$$W_w^u = \begin{cases} \frac{1}{1-\delta} \alpha^{-\alpha\delta} N^\alpha H^{\frac{1}{\sigma}} (1-\alpha)^{\frac{-\delta}{\sigma}} \left(\left(\frac{1-\lambda^\alpha}{1-\lambda} \right) \Delta^{1-\sigma} + \alpha \left(1 - \Delta^{1-\delta-\sigma}\right) \right) & \text{for } 1 > \lambda > \Gamma^\sigma \\ \frac{1}{(1-\delta)(1-\lambda)} \begin{pmatrix} \Delta^{1-\sigma} \alpha^{1-\alpha\delta} N^\alpha H^{\frac{1}{\sigma}} (1-\alpha)^{\frac{-\delta}{\sigma}} \left(\frac{1}{\alpha}\right) + \\ (1-\Delta^{-\sigma}-\lambda) \underline{b}^{1-\delta} N - H (1-\alpha)^{1-\delta} \left(\alpha^{\alpha\sigma(1-\delta)} \underline{b}^{-\alpha\sigma(1-\delta)} \right) \end{pmatrix} & \text{for } 0 \leq \lambda \leq \Gamma^\sigma \end{cases} \tag{25}$$

After some algebra, it can be shown that, for $0 < \lambda \leq \Gamma^\sigma$, W_w^u is an increasing and *convex* function of λ. Notice also that $\lim_{\lambda \to 1} W_w^u = \frac{1}{1-\delta} \left(\Delta^{1-\sigma} \alpha^{1-\alpha\delta} N^\alpha H^{\frac{1}{\sigma}} (1-\alpha)^{\frac{-\delta}{\sigma}} + (1-\Delta^{-\sigma}) \underline{b}^{1-\delta} N \right)$. Moreover, we have that $\lim_{\lambda \to 0} W_w^u > \lim_{\lambda \to 0} W_w$.

Let us now prove that $W_w^u = W_w$ for only one $\lambda \in (0, 1)$.

First of all, we have that $\lim_{\lambda \to 0} W_w^u > \lim_{\lambda \to 0} W_w$ (after some algebra) and $\lim_{\lambda \to 1} W_w^u < \lim_{\lambda \to 1} W_w$ (by Proposition 1) so that at least one λ for which $W_w^u = W_w$ exists. To show that is unique, we can use the fact that W_w^u is convex for $\lambda \leq \Gamma^\sigma$, so that the two functions can intersect at most once between 0 and Γ^σ. If W_w^u and W_w intersect between 0 and Γ^σ, then this is the only intersection point since, for $\lambda > \Gamma^\sigma$, W_w^u is strictly smaller than W_w^u calculated at Γ^σ.

If instead W_w^u and W_w do *not* intersect between 0 and Γ^σ, their intersection point is unique since, for $\lambda > \Gamma^\sigma$, $W_w^u = W_w \Leftrightarrow \Delta^{-\alpha\sigma} = \alpha(\lambda - 1)\left(1 - \Delta^{1-\delta-\sigma}\right) + \lambda^\alpha \Delta^{-\alpha\sigma} + \alpha\lambda^{\alpha-1}(1-\lambda)$, which is satisfied for only one $\lambda \in (0, 1)$.