

IZA DP No. 73

## The Endogenous Determination of Minimum Wage

Gil S. Epstein  
Shmuel Nitzan

November 1999

# The Endogenous Determination of Minimum Wage

**Gil S. Epstein**

*Bar-Ilan University, Ramat-Gan, Israel,  
CEPR, London and IZA, Bonn*

**Shmuel Nitzan**

*Bar-Ilan University, Ramat-Gan, Israel*

Discussion Paper No. 73  
November 1999

IZA

P.O. Box 7240  
D-53072 Bonn  
Germany

Tel.: +49-228-3894-0  
Fax: +49-228-3894-210  
Email: [iza@iza.org](mailto:iza@iza.org)

This Discussion Paper is issued within the framework of IZA's research area *The Welfare State and Labor Markets*. Any opinions expressed here are those of the author(s) and not those of the institute. Research disseminated by IZA may include views on policy, but the institute itself takes no institutional policy positions.

The Institute for the Study of Labor (IZA) in Bonn is a local and virtual international research center and a place of communication between science, politics and business. IZA is an independent, nonprofit limited liability company (Gesellschaft mit beschränkter Haftung) supported by the Deutsche Post AG. The center is associated with the University of Bonn and offers a stimulating research environment through its research networks, research support, and visitors and doctoral programs. IZA engages in (i) original and internationally competitive research in all fields of labor economics, (ii) development of policy concepts, and (iii) dissemination of research results and concepts to the interested public. The current research program deals with (1) mobility and flexibility of labor markets, (2) internationalization of labor markets and European integration, (3) the welfare state and labor markets, (4) labor markets in transition, (5) the future of work, (6) project evaluation and (7) general labor economics.

IZA Discussion Papers often represent preliminary work and are circulated to encourage discussion. Citation of such a paper should account for its provisional character.

## ABSTRACT

### The Endogenous Determination of Minimum Wage<sup>\*</sup>

In this paper we study the endogenous determination of minimum wage employing a political-economic game-theoretic approach. A major objective of the paper is to clarify the crucial role of the strength of the workers' union and of political culture on the determination of the minimum wage.

In general, the equilibrium minimum wage differs from that postulated in the literature. In our uncertain environment the optimal minimum wage from the workers' union point of view is lower than the level that maximizes its objective function in a certain environment where there is no opposition to the proposed minimum wage. We establish that a political culture that assigns a positive weight to the public well being can give rise to a wage that equals or exceeds these levels.

JEL Classification: J3, J5, J38.

Keywords: Minimum wage, endogenous determination, political culture, public policy

Gil Epstein  
Bar-Ilan University  
Department of Economics  
52900 Ramat-Gan  
Israel  
Tel: 0972-3-531-8937  
Fax: 0972-3-535-3180  
Email: epsteig@mail.biu.ac.il

---

<sup>\*</sup> This paper was presented at the European Summer Symposium in Labor Economics, CEPR and IZA, Ammersee, Germany Summer 1999. We are grateful to the participants for their helpful comments. We are indebted to Ira Gang for his helpful comments on an earlier version.

## I. Introduction

In representative democracies the minimum wage is determined by a political process that reflects the interest of the agent who proposes the pricing policy, the nature of the agent approving or rejecting the proposed policy and the pressures exerted by the capital owners and the workers' union on the second agent. In some cases the first agent is a professional civil servant and the second agent is the ruling politician. The professional office holder may propose a detailed policy in response to the request and possibly the guidelines of the ruling politician.<sup>1</sup> In other situations the policy is proposed by a politician (a Senator, a Parliament member) and the proposal needs to be approved by the legislature (the Senate, the Parliament).<sup>2</sup> Although our model can be applied to both situations, we henceforth adhere to the former interpretation referring to the agenda setter as a bureaucrat and to the agent approving or rejecting the proposed policy as the ruling politician. The bureaucrat whose objective function reflects his and the ruling politician's preferences is assumed to be a leading player.

Card and Krueger (1994), (1995) provide evidence showing that recent boosts in the minimum wage in the U.S. have little or no effect on employment. An increase in the minimum wage increases the workers' income and reduces the capital owners' (the producers) profits. The minimum wage is thus a serious economic and political issue as claimed by Levin - Waldman ( 1998 ), see also references therein. In a recent paper Saint-Paul (1998) presents a general- equilibrium analysis of the impact of active labor-market policy on unemployment, wages and the welfare of the employees. The proposed framework is used to assess the extent of the political support of such policies and of the other parameters characterizing the

---

<sup>1</sup> In some instances the implementation of the proposed policy requires only the endorsement of the ruling politician (the relevant agent in the executive branch - the Prime Minister, the Minister of Finance, etc.). If, however, endorsement by the legislature is also required, then we have to assume that the ruling politician has a secured majority in the legislature that ensures its support in the economic policy the government proposes.

<sup>2</sup> For example, in October 1998, members of the U.S. Senate (ruling politicians) defeated, in a 55-to-44 vote, a proposal to raise the federal minimum wage in two 50-cent increments to \$6.15 per hour. In this case the proposal put before the Senate was initiated by the administration. However, the Senate, not the executive branch, had the decision-making power.

economic environment. In particular, Saint-Paul shows that there may be political support for poor policies because the employed might have an interest in being sheltered from competition from the unemployed. Rama and Tabellini (1998) employ the common-agency approach to analyze the joint determination of product and labor-market distortions in a small open economy where capital owners and the workers' union lobby the government on both tariffs and minimum wage. Our endogenous policy determination approach differs from the ones mentioned above because we let the policy proposals depend on the efforts exerted by the different interest groups that try to influence the policy outcome in their favor, as well as on the political culture (the bureaucrat's objective function). This enables us to provide a theoretical rationalization to some of the observed relationships between the nature of the government and the level of the minimum wage.

The role of "politics" in the endogenous determination of public policy has been examined notably in the context of international-trade policy. Some scholars have proposed a stylized non-strategic political-economic approach which is based on the assumption that the government maximizes some given political support function<sup>3</sup> that attaches different weights to the interest groups affected by the trade policy, see Hillman (1989, and references therein), Long and Vousden (1991) and Rodrik (1986). Magee, Brock and Young (1989) study a non-strategic general-equilibrium framework in which trade policy is set by an elected politician. The interest groups make contributions that affect the probability that their preferred candidates are elected. In a more general setting, Appelbaum and Katz (1986) examine the endogenous determination of wage regulation in a game where the government is an active leading player who seeks rents by setting rents. More recently, Grossman and Helpman (1994) and Rama (1997) apply the common-agency model pioneered by Bernheim and Whinston (1986), viewing trade policy as the equilibrium outcome of a strategic game in which the interest groups affected by the trade policy act as principals, taking into account the influence of their contribution schemes on the agent who sets trade policy (the government).

---

<sup>3</sup> The notion of political support function is related to the notions of 'influence function' and 'vote function', see van Winden (1999) and references therein.

The present paper proposes a different political-economic approach to public-policy determination. The proposed approach is game theoretic, that is, it takes into account the strategic nature of the interaction between the government and the interest groups. However, the analysis is based on the standard Stackelberg-Nash equilibrium. The interactions between the workers' union, the capital owners, the ruling politician and the bureaucrat (typically a professional office holder) are explicitly incorporated into a political-economic game that sheds new light on the endogenous determination of the minimum wage. In this game the bureaucrat is assumed to be a leading player who operates subject to a political constraint: the rent-seeking rent-avoidance contest between the workers' union and the capital owners on the approval or rejection of his proposed minimum wage by the ruling politician. His objective function may reflect commitment to the ruling politician, to the public and to his narrow self-interest. This objective function hinges on a single parameter that represents the prevailing political culture or the degree of politicization of the government

In general, the proposed minimum wage differs from the utility-maximizing minimum wage of the workers' union. It can be *higher or lower* than this wage. We show that in our uncertain environment, the optimal minimum wage from the workers' viewpoint is always lower than the standard workers' utility-maximizing minimum wage under certainty. There exists a political culture that gives rise to the optimal uncertain minimum wage of the workers. The bureaucrat in such a case is more committed to the enhancement of the public well being than a bureaucrat whose equilibrium policy is the standard exogenously given union's utility-maximizing minimum wage under certainty.

## **II. Minimum-Wage Determination**

### **A. *The Contest***

In our game there are four players. The first one is a bureaucrat (typically a professional office holder) who sets and proposes the regulated minimum wage  $I$ . His proposal is approved or rejected by the ruling politician. Formally, the politician is not a player but he plays a central role in our game through his effect on the bureaucrat's set of feasible policy

proposals and through his influence on the objective function of the bureaucrat. The binary decision of the ruling politician affects the two remaining players: the capital owners and the workers' union. These players are engaged in a rent-seeking rent-avoidance contest, the contest on the approval or rejection of the bureaucrat's proposed minimum wage  $I$ . The ruling politician is responsible for the existence of this contest being aware of its direct potential benefit, namely, of the possibility to collect part or all of the outlays incurred by the two contestants. He may also be aware of the effect of his decision on his probability of being re-elected either via the expected campaign contributions of the contestants (the contestants' outlays) or via the expected support of the voters whose welfare depends on the policy of the government. The bureaucrat considers the rent-seeking rent-avoidance contest, henceforth, *the contest*, as a political constraint. His action is motivated by commitment to the ruling politician, to the public or to his narrow self-interest, as explained below.

The two players in the contest choose their strategies (outlays) given (a) the proposed minimum wage  $I$  and (b) the contest success function, *CSF*, that represents the crucial involvement of the ruling politician in the game. The CSF is the mechanism that transforms the rent-seeking rent-avoidance efforts into probabilities of approval and rejection of the bureaucrat's proposed minimum wage  $I$ . Notice that the ruling politician can be considered as a phantom player who affects the outcome of the contest by creating it and, in particular, by being responsible to the existence of the specific CSF that characterizes the contest.

Assuming complete information on the above parameters, we first examine the Nash equilibrium of the two-player sub-game, namely the contest on the approval of the bureaucrat's proposal. This equilibrium is in fact the reduced form of the political constraint the bureaucrat faces when setting his preferred policy.

Let  $x_w$  and  $x_p$  denote the rent-seeking and rent-avoidance expenditures of the risk-neutral players: the workers' union ( $w$ ) and the capital owners ( $p$ ). Viewing capital owners as a single agent implies that we disregard the process of interest-group formation and, in particular, the collective-action problems associated with it. The contestants' expenditures determine the probability of approval of the policy proposed by the bureaucrat. With probability  $Pr_p$  the ruling politician rejects the proposed minimum wage  $I$ . That is, he approves the preferred

status-quo minimum wage of the capital owners which, for convenience, we assume is equal to zero, implying that the capital owners are not subjected to any wage control. With probability  $Pr_w$  the ruling politician approves the proposed minimum wage  $I$ .

The capital owners prefer that the minimum wage remains at zero. The preferred minimum wage of the workers' union is denoted by  $w^*$ . This minimum wage maximizes the payoff of the worker's union. The union is interested in a positive and sufficiently high minimum wage that nevertheless does not cause the unemployment rate to be too high. In other words,  $w^*$  is determined taking into account the awareness of the union to the effect of the wage on the unemployment level.

The expected net payoff (surplus) of the capital owners and the workers' union are, respectively, given by

$$(1) \quad E(u_p) = A_p + Pr_p n_p - x_p$$

and

$$(2) \quad E(u_w) = A_w + Pr_w n_w - x_w$$

where  $A_p$  is the payoff (profits) of the capital owners when their preferred policy is not approved and  $n_p$  is their benefit (stake) from winning the contest, in which case the minimum wage is set at zero.  $A_w$  is the payoff of the workers' union when their preferred policy is not approved and  $n_w$  is its benefit (stake) from winning the contest ( $A_w$  is the workers' union's payoff at the status-quo minimum wage). Notice that when the policy is approved some workers may become unemployed. The stake  $n_w$  in (2) takes into account the aggregate utility of the workers and, in particular, the decrease in utility of those workers losing their jobs (if there are such workers) and the increase in the utility of those workers who earn a higher wage.

$n_p$  and  $n_w$  are the real benefits of rent seeking and of rent avoidance of the players. The capital owners win the contest when their preferred policy, viz. rejection of the proposed minimum wage, is the outcome of the contest. Their benefit in such a case is their avoided



loss. The workers win the contest when their preferred outcome, namely, approval of the proposed minimum wage, is the outcome of the contest.

The probabilities  $Pr_p$  and  $Pr_w$  are obtained by the contest success function. This function transforms the two contestants' expenditures into probabilities of securing their preferred policy outcome. In the present study we assume that the contest is determined by Tullock's (1980) commonly used rule. That is, player  $i$ 's probability of success in competing against player  $j$  is given by

$$(3) \quad Pr_w = Pr_w(x_w, x_p) = \frac{d x_w}{d x_w + x_p}, \quad Pr_p = 1 - Pr_w, \quad x_w, x_p, d > 0$$

where  $d > 0$  is a parameter representing either asymmetry in the contestants' lobbying ability or the bias of the politician in favor or against the workers.

By our assumptions both players participate in the contest. We therefore focus on interior Nash equilibria of the contest. The conditions characterizing an interior equilibrium of the two-player contest (subgame) are <sup>4</sup>

$$(4) \quad \begin{aligned} \frac{\partial E(u_p)}{\partial x_p} &= \frac{d x_w}{(x_p + d x_w)^2} n_p - 1 = 0 \\ &\text{and} \\ \frac{\partial E(u_w)}{\partial x_w} &= \frac{d x_p}{(x_p + d x_w)^2} n_w - 1 = 0 \end{aligned}$$

The equilibrium expenditures and winning probabilities of the two players are given by

$$(5) \quad \begin{aligned} x_p^* &= \frac{d n_p^2 n_w}{(n_p + d n_w)^2} ; \quad x_w^* = \frac{d n_w^2 n_p}{(n_p + d n_w)^2} \\ &\text{and} \\ Pr_p^* &= \frac{n_p}{n_p + d n_w} ; \quad Pr_w^* = \frac{d n_w}{n_p + d n_w} \end{aligned}$$

---

<sup>4</sup> The sufficient (second-order) conditions of such equilibria are satisfied.

By differentiating (5), we directly obtain that an increase in  $d$  increases (decreases) the expenditures of both players if  $n_p - d n_w > 0$  ( $n_p - d n_w < 0$ ). Moreover, an increase in  $d$  increases the probability that the workers' union wins the contest.

### ***B. The Proposed Minimum Wage, Stakes, Efforts and Winning Probabilities***

The effect of a change in the proposed minimum wage  $I$  on the extent of the equilibrium expenditures of the two players is

$$(6) \quad \frac{\partial x_p^*}{\partial I} = n_p n_w n'_p (n_p - d n_w) \left[ \frac{h_w}{h_p} + 2 \frac{d n_w}{n_p - d n_w} \right] \frac{d}{(n_p + d n_w)^3}$$

and

$$\frac{\partial x_w^*}{\partial I} = n_p n_w n'_w (d n_w - n_p) \left[ \frac{h_p}{h_w} + 2 \frac{n_p}{d n_w - n_p} \right] \frac{d}{(n_p + d n_w)^3}$$

where  $h_j = \frac{\partial n_j}{\partial I} \frac{I}{n_j} = n'_j \frac{I}{n_j}$  is the elasticity of player  $j$ 's stake (benefit) with respect to a change in the proposed minimum wage  $I$ .

Note that, for  $w^* > I > 0$ ,  $\frac{\partial n_j}{\partial I} = n'_j > 0$ ,  $\forall j = w, p$  and for  $I > w^*$ ,  $\frac{\partial n_w}{\partial I} < 0$  and  $\frac{\partial n_p}{\partial I} > 0$ . Also notice that there exists  $\bar{w}$ , such that the workers' union prefers a high minimum wage  $I$  that exceeds the optimal level  $w^*$  ( $w^* < I < \bar{w}$ ) to having the status-quo zero minimum wage. On the other hand, a very high minimum wage  $I$ , ( $I > \bar{w}$ ), is inferior to the status-quo zero minimum wage.<sup>5</sup>

We can therefore conclude that the effect of an increase in the minimum wage on the contestants' outlays is unclear. This effect hinges on the elasticities of the contestants' stakes

---

<sup>5</sup> Notice that there may exist a minimum wage  $I > \bar{w}$ , such that the firms' profits are negative. In this case the workers' union is not interested in the approval of the proposed minimum wage and hence does not take part in the contest. The two potential contestants share the same objective, namely, that such a minimum wage is not approved. (we are grateful to Jan Svejnar for pointing out this possibility).

with respect to changes in the minimum wage. The effect of a change in the proposed minimum wage on the contestants' outlays also depends on the value of  $d$ . As can be seen from (6), the sign of the derivatives may change when the value of  $d$  is increased. Namely, an increase in the asymmetry or bias parameter  $d$  may reverse the effect a change of the minimum wage has on the expenditures of the two interest groups.

By (5),

$$(7) \quad \frac{\Pr_p^*}{\Pr_w^*} = \frac{1}{d} \frac{x_p^*}{x_w^*} = \frac{1}{d} \frac{n_p(I)}{n_w(I)}$$

Since

$$(8) \quad \frac{\eta \left( \frac{\Pr_p^*}{\Pr_w^*} \right)}{\eta I} = \frac{\eta \left( \frac{x_p^*}{x_w^*} \right)}{\eta I} = \frac{1}{d} \frac{n_p(I)}{n_w(I)} (h_p - h_w)$$

we obtain

**Proposition 1:**

a. If  $w^* > I > 0$ , the effect of a change in the proposed minimum wage on the capital owners' odds of winning the contest and on their relative investment in the contest is ambiguous. This effect depend on the elasticities  $h_p$  and  $h_w$ . Specifically,

$$\frac{\eta \left( \frac{\Pr_p^*}{\Pr_w^*} \right)}{\eta I} = \frac{\eta \left( \frac{x_p^*}{x_w^*} \right)}{\eta I} > 0 \quad \text{if} \quad h_p - h_w > 0.$$

b. If  $\bar{w} > I > w^*$ , a change in the proposed minimum wage  $I$  directly affects the capital owners' odds of winning the contest and their relative investment in the contest. That is,

$$\frac{\eta \left( \frac{\Pr_p^*}{\Pr_w^*} \right)}{\eta I} = \frac{\eta \left( \frac{x_p^*}{x_w^*} \right)}{\eta I} > 0.$$

Consider, for example, an increase in the proposed minimum wage. In case (a) the effect of such a change that increases the stakes of the two contestants on their relative efforts and on their relative probabilities of winning the contest is ambiguous. These effects depend on

the relationship between the elasticities  $h_p$  and  $h_w$ . If  $h_p$  exceeds  $h_w$ , then the union's odds of winning the contest (secure the approval of the proposed minimum wage) and its relative rent-seeking efforts increase with the increase in the proposed minimum wage. In case (b), the increase in the proposed wage reduces the stake of the workers' union but increases the capital owners' stake. In turn, the odds of the workers' union to win the contest and its relative efforts are reduced.

Denote by  $X$  the total rent-seeking rent-avoidance outlays. By (5), in equilibrium

$$(9) \quad X^* = x_w^* + x_p^* = \frac{dn_p(I)n_w(I)(n_w(I)+n_p(I))}{(dn_w(I)+n_p(I))^2}$$

By differentiating (9), we directly obtain that an increase in  $d$  increases (decreases) the total expenditures if  $n_p - dn_w > 0$  ( $n_p - dn_w < 0$ ). The effect of a change in the proposed minimum wage  $I$  on the total contestants' outlays is ambiguous.

$$(10) \quad \frac{\partial X^*}{\partial I} = d \frac{n_w n_p n'_w}{(n_p + dn_w)^3} (n_p - dn_w) \left( \frac{n_p}{n_w} - \frac{h_p}{h_w} + 2 \frac{n_p \left( \frac{h_p}{h_w} + 1 \right)}{(n_p - dn_w)} \right)$$

For  $d=1$ ,  $\frac{\partial X^*}{\partial I} = \frac{n_w(I)n_p(I)n'_w(I)}{(n_p(I)+n_w(I))^2} \left( \frac{h_p}{h_w} + \frac{n_p(I)}{n_w(I)} \right)$ . The effect of a change in the minimum

wage on the total outlays depends therefore on the value of  $d$ . More specifically,

**Lemma 1:** The effect of a change in the minimum wage on the total outlays is unclear.

In a symmetric game where  $d=1$ ,

a. If  $w^* > I > 0$ , then  $\frac{\partial X^*}{\partial I} > 0$ .

b. If  $\bar{w} > I > w^*$ , then  $\frac{\partial X^*}{\partial I} < 0$  if  $\frac{-h_p}{h_w} < \frac{n_p}{n_w}$ .<sup>6</sup>

In case (a) the effect of a change in the proposed minimum wage on the contestants' outlays is unequivocal. In particular, an increase in the proposed minimum wage induces larger total efforts. This result implies that even when such an increase induces the workers' union to reduce its rent-seeking efforts, this reduction is more than counterbalanced by the increase in the rent-avoidance efforts of the capital owners.

In case (b) the above proposition specifies the conditions that determine the effect of a change in the proposed minimum wage on the equilibrium total rent-seeking rent-avoidance outlays.

### ***C. The Politically Constrained Bureaucrat***

The ruling politician is a phantom player whose existence imposes a political constraint on the bureaucrat, namely, the contest on the approval of the bureaucrat's proposal. The bureaucrat, who is typically a professional civil servant, is the actual third player in our political-economic game of minimum-wage determination. This player proposes the wage  $I$ , possibly in response to the initiative of the ruling politician and subject to his guidelines that may affect the set of feasible proposals. The proposed minimum wage is then approved or rejected by the ruling politician. The bureaucrat takes into account the contest between the capital owners and the workers' union and his commitments to the ruling politician and to the enhancement of the public well being. These commitments are represented by his specific objective function, which may allow complete independence of the ruling politician, complete dependence on the ruling politician or some intermediate case of mixed commitments. The bureaucrat benefits from the contestants' outlays that correspond to the proposed minimum wage and, in turn, to the four possible payoffs of the capital owners and the workers' union, because part or all of these outlays constitute a transfer of resources to the ruling politician to

---

<sup>6</sup> A sufficient condition for the total rent-seeking expenditures to be inversely related to  $I$  is that  $h_p < -h_w$  and  $n_p > n_w$ .

whom he is committed or to himself. Hence his objective function is given by  $G(E(u_p); E(u_w); (x_p + x_w))$ .  $E(u_p)$  and  $E(u_w)$  are the expected net payoffs of the capital owners and the workers' union. The contestants' outlays  $(x_p + x_w)$  represent either transfers to the government (the ruling politician and/or the regulator) or resources wasted in the contest. The ruling politician's utility is increasing in the fraction of the outlays transferred to him. His utility can also depend on the aggregate expected payoff of the contestants being either a benevolent politician or a realistic one who wishes to be re-elected. The aggregate expected payoff is henceforth referred to as the public well being.

Let us denote by  $\bar{E}(u_l^*)$  the equilibrium expected payoff of player  $l$ . That is,  $\bar{E}(u_l^*)$  is player  $l$ 's equilibrium expected payoff when the rent-seeking rent-avoidance costs are disregarded,  $E(u_l^*) = \bar{E}(u_l^*) - x_l^*$ . We assume that the bureaucrat's objective function is of the following additive form that reflects his mixed commitments.<sup>7</sup>

$$(11) \quad G(E(u_p); E(u_w); (x_p + x_w)) = \alpha g(\bar{E}(u_p^*) + \bar{E}(u_w^*)) + (1 - 2\alpha) f(x_p^* + x_w^*)$$

The weight  $(1 - 2\alpha)$  determines whether the second expression in the bureaucrat's objective function is a positive or a negative welfare component. A negative weight implies that the total rent-seeking rent-avoidance outlays are considered as wasteful resources.  $g$  and  $f$  are monotone increasing functions that specify the welfare corresponding to the aggregate expected benefit of the public and to the contestants' total expenditures. The parameters  $\alpha$  and  $1 - 2\alpha$  are the weights assigned to the two welfare components. The bureaucrat's mixed commitments to the public and to the ruling politician are thus represented by  $\alpha$ . This parameter represents the political culture of the government. It reflects the allocation of the contestants' expenditures between wasteful resources, non-wasteful resources transferred to the ruling politician and non-wasteful resources transferred to the bureaucrat. It also reflects the commitments of the ruling politician to the public well being, and to his narrow interest of

---

<sup>7</sup> All the following results hold for the function:

$G(E(U^*); (x_p + x_w)) = \alpha g(E(U^*)) + (1 - 2\alpha) f(x_p^* + x_w^*)$  where  $E(U^*)$  is the expected welfare of the public.

collecting the contestants' expenditures. Finally,  $\alpha$  also reflects the commitment of the bureaucrat to the public well being to the ruling politician and to his narrow interest of collecting the contestants' outlays transferred to him.

Note that since,  $\bar{E}(u_i^*) = E(u_i^*) + x_i^*$ , if  $f(y) = g(y) = y$ , then (11) can be written as

$$(12) \quad G(.) = a \left( E(u_p^*) + E(u_w^*) \right) + (1-a)(x_p^* + x_w^*)$$

In this form  $a$  and  $1-a$  are the weights assigned respectively to the aggregate expected benefit and to the total contestants' outlays.

Given (11), when the bureaucrat is only committed to the enhancement of the public well being,  $a = 1$  and the completely wasteful rent-seeking rent-avoidance expenditures are conceived as total loss to society. When the bureaucrat is, again, totally committed to the public interest and the contestants' expenditures constitute a transfer from the capital owners and the workers' union to the government that redistributes it back to them,  $\alpha = 1/2$ . In the extreme case where the bureaucrat's objective is the maximization of the total contestants' outlays while disregarding the public well being,  $\alpha = 0$ . Other intermediate cases are obtained for  $0 < \alpha < 1$ ,  $\alpha \neq 1/3$ ,  $\alpha \neq 1/2$ . When the rent-seeking rent-avoidance efforts positively affect the bureaucrat's objective function,  $0 < \alpha < 0.5$ . When these efforts negatively affect the bureaucrat's objective function,  $0.5 < \alpha < 1$ .

#### D. The Equilibrium Minimum Wage

The bureaucrat maximizes his objective function by determining the optimal level of  $I$ . The first-order condition that characterizes an interior solution of his problem (we assume that the second-order condition holds<sup>8</sup>) is

$$(13) \quad \frac{\partial G(.)}{\partial I} = a \frac{\partial g(\bar{E}(u_p^*) + \bar{E}(u_w^*))}{\partial I} + (1-2a) \frac{\partial f(X^*)}{\partial I} = 0$$

or,

---

<sup>8</sup> By the second-order condition,  $\frac{\partial^2 G(.)}{\partial I^2} = a \frac{\partial^2 g(\bar{E}(u_p^*) + \bar{E}(u_w^*))}{\partial I^2} + (1-2a) \frac{\partial^2 f(X^*)}{\partial I^2} < 0$ .

$$\begin{aligned}
& \frac{\partial g(\bar{E}(u_p^*) + \bar{E}(u_w^*))}{\partial (\bar{E}(u_p^*) + \bar{E}(u_w^*))} \frac{\partial (\bar{E}(u_p^*) + \bar{E}(u_w^*))}{\partial I} \\
(14) \quad & = -\frac{(1-2a)}{a} \frac{\partial f(X^*)}{\partial (X^*)} \frac{\partial (X^*)}{\partial I}
\end{aligned}$$

An interior Stackelberg-Nash equilibrium  $(x_p^*, x_w^*, I^*)$  is characterized by (4) and (14).

Let us turn to the study of the effect of a change in  $\alpha$ , the parameter representing the political culture or the degree of politicization of the government, on the equilibrium minimum wage  $I^*$ . It can be verified that  $\frac{\partial I^*}{\partial a} = \frac{-\partial^2 G(\cdot) / \partial I \partial a}{\partial^2 G(\cdot) / \partial I^2}$ . By the second-order condition,

$\frac{\partial^2 G(\cdot)}{\partial I^2} < 0$ . Using the first-order conditions, we therefore conclude that the derivative  $\frac{\partial I^*}{\partial a}$  and the derivative  $\frac{\partial X^*}{\partial I}$  have opposite signs. That is,

**Proposition 2:**

$$\text{Sign}\left(\frac{\partial I^*}{\partial \alpha}\right) = - \text{Sign}\left(\frac{\partial X^*}{\partial I}\right)$$

Using (10), we can specify the conditions that determine the sign of  $\left(\frac{\partial I^*}{\partial \alpha}\right)$ .

In our extended game of minimum-wage determination  $I^*$  is the equilibrium minimum wage. However, from the viewpoint of the workers' union the optimal proposed minimum wage is the wage  $w_0$  that its expected net payoff. We conclude this subsection by comparing  $w^*$ ,  $I^*$  and  $w_0$  and by examining the relationship between the political culture of the government and the outcome of this comparison. In particular, we are interested in the following two questions: (i) Can the political culture give rise to a minimum wage  $I^*$  which is equal to  $w^*$ ? (ii) Can the political culture give rise to a minimum wage  $I^*$  which is equal to  $w^0$ , the workers' optimal wage level?



When  $a = 0$ , the objective of the bureaucrat is to maximize the contestants' outlays disregarding the welfare of the public. Such an assumption implies an extreme political culture where the bureaucrat is totally committed to his and/or to the ruling politician's narrow interest of controlling the resources expended by the contestants. The equilibrium minimum wage  $I^*$  maximizes  $G(I)=f(X^*(I))$ . Such a wage satisfies the first-order condition

$$(15) \quad \frac{\partial(f(X^*))}{\partial I} = \frac{\partial(f(X^*))}{\partial(X^*)} \frac{\partial(X^*)}{\partial I} = 0$$

Since  $f(\cdot)$  is monotone increasing in  $(X^*)$ , (15) implies that in equilibrium  $\frac{\partial(X^*)}{\partial I} = 0$ .

We thus obtain

**Proposition 3:**

- a. There exists  $d_c (d_0, d_1)$ , ( $d_0 < d_1$ ) and  $a_1$ , such that  $I^*(a_1) = w^*$ . If  $d=I$ , then the condition for  $I^*(a_1) = w^*$  is:  $\frac{-h_p}{h_w} < \frac{n_p(I)}{n_w(I)}$ .
- b. There exists  $d_c (d_2, d_3)$ , ( $d_2 < d_3$ ) and  $a_2$ , such that  $I^*(a_2) > w^*$ . If  $d=I$ , then the condition for  $I^*(a_2) > w^*$  is:  $\frac{-h_p}{h_w} > \frac{n_p(I)}{n_w(I)}$ .

This proposition establishes that there exists a political culture that gives rise to the minimum wage  $w^*$ . It also specifies conditions that ensure that the proposed wage exceeds  $w^*$ . The emergence of the minimum wage  $w^*$  in our setting may require that  $\alpha$  be positive, that is, that a positive weight be assigned by the government (the ruling politician and/or the bureaucrat) to the aggregate expected benefit of the public.

As mentioned above, if the workers' union wins the contest with certainty, then it prefers that the wage set by the bureaucrat be equal to  $w^*$ . This wage which maximizes the union's benefit  $n_w$  satisfies the equality:  $\left. \frac{\partial n_w(I)}{\partial I} \right|_{I=w^*} = 0$ . Since in our extended strategic setting the workers' union does not win the contest with certainty, it must take into account the possibility that an increase in its net benefit (by increasing  $I$ ), may increase the opposition of

the capital owners and that this may, in turn, reduce its probability of winning the contest. The union in our setting prefers that the minimum wage set by the bureaucrat will be  $w^0$  - the wage that maximizes its expected net payoff in equilibrium. Given (2) and (5), the union's expected payoff is given by

$$(16) \quad E(u_w^*) = A_w + \frac{(d^2 n_w(I))^3}{(n_p(I) + d n_w(I))^2}$$

The positive minimum wage level  $I = w_0$  that maximizes  $E(u_w^*)$  is characterized by the following first order condition:

$$(17) \quad \frac{\partial E(u_w^*)}{\partial I} = d^2 \frac{3(n_w(I))^2 \frac{\partial n_w(I)}{\partial I}}{(n_p(I) + n_w(I))^2} - \frac{2(n_w(I))^3 \left( \frac{\partial n_w(I)}{\partial I} + \frac{\partial n_p(I)}{\partial I} \right)}{(n_p(I) + n_w(I))^3}$$

At  $I^* = w^*$ ,  $\frac{\partial n_w(I)}{\partial I} = 0$ . Since,  $\frac{\partial n_p(I)}{\partial I} > 0$  at  $w^*$ ,  $\left. \frac{\partial E(u_w^*)}{\partial I} \right|_{I=w^*} < 0$ . This implies that

the wage that maximizes the expected net payoff of the union is smaller than  $w^*$ . To sum up,

**Proposition 4:**

- (a)  $w^0 < w^*$ .
- (b) There exists  $a_3$ , such that  $I^*(a_3) = w^0$ .

The bureaucrat who operates in a political culture which is represented by this positive  $a_3$  is more committed to the enhancement of social welfare than a bureaucrat whose equilibrium policy is equal to  $w^*$ .

### III. Implications and Concluding Remarks

Our results highlight the significance of the political culture of the government (the bureaucrat and the ruling politicians) in the endogenous determination of the minimum wage. In particular, we examine the relationship between the parameter that represents the political culture (the degree of politicization of the government) and the contestants' stakes and the rent-seeking rent-avoidance efforts of the interest groups affected by the proposed minimum wage and their probability of winning the contest on the approval of the proposed policy.

In our extended strategic setting, where the professional bureaucrat is a leading player who sets the minimum wage subject to a political contest (the contest on the approval of his proposal), the equilibrium minimum wage usually differs from the level that maximizes the certain payoff of the workers' union. The most preferred wage from the union's viewpoint is always lower than that level. We show that a political culture that assigns a positive weight to the public well being can give rise to an equilibrium minimum wage that exceeds both levels, namely the levels that maximize the workers' payoff under uncertainty as well as under certainty.

Empirical investigations demonstrated that the determinants of labor market rigidities and their underlying institutional regulation are the outcome of political influence of incumbent employees, Saint- Paul ( 1996 ). In particular, the existence of a right – wing government slow down the growth rate of the minimum wage. Our analysis provides a theoretical rationalization to this latter observation, provided that the political-culture parameter  $\alpha$  is interpreted to represent the nature of the government (its location on the spectrum ranging between extreme left and right wing). In light of the propositions presented above, to some extent we could identify the degree of politicization of the bureaucrats and the ruling politicians in different countries. This degree is determined by  $\alpha$ , the weight assigned to the aggregate public welfare. As  $\alpha$  decreases, the degree of politicization increases, i.e., a larger weight is assigned to the positive transfers reaching the ruling politicians. Our results establish the relationship between  $\alpha$  and the proposed minimum wage. The minimum wages proposed in different countries reflect the revealed preferences of the bureaucrats and the ruling politicians in these environments. One can therefore estimate the values of the parameter  $\alpha$  that represent the

degree of politicization of the government in different countries using the data on the proposed minimum wages. In the symmetric case where  $d=1$ , it is clear that an increase in the minimum wage is associated with an increase in the degree of politicization. If, for instance, the proposed minimum wages in three countries are  $w^0 = I^*(a_3)$ ,  $w^* = I^*(a_1)$  and  $w^+ = I^*(a_2)$ , ( $w^0 < w^* < w^+$ ), then, by Propositions 3 and 4,  $\alpha_3 > \alpha_1 > \alpha_2$ . To sum up, the degree of politicization of different governments can be inferred from observations on the proposed minimum wages.

In developing our analytical framework, we made some simplifying assumptions (for example, regarding the CSF and the status-quo minimum wage) that enabled us to focus on the new elements of our extended political-economic game of the endogenous minimum- wage determination. Our main results are nevertheless robust, i.e., they can be established under more general assumptions regarding the CSF or the status-quo payoff of the workers.

## References

- Appelbaum, E. and Katz, E., 1986, Seeking Rents by Setting Rents: The Political Economy of Rent Seeking. *Economic Journal*, 97, 685-699.
- Bernheim, D. and Whinston, M.D., 1986, Common Agency. *Econometrica*, 54(4), 923-942.
- Card, D. and Krueger A.B., 1995, *Myth and Measurement: The New Economics of the Minimum Wage*, Princeton: Princeton University Press.
- Card, D. and Krueger A.B., 1994, Minimum Wage and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania, *American Economic Review*, 84(4), 772-93.
- Grossman, G.M. and Helpman, E., 1994, Protection for Sale. *American Economic Review*, 84(4), 833-850.
- Hillman, A.L., 1989, *The Political Economy of Protection*. (Harwood Academic Publishers: London).
- Levin-Waldman, O.M., 1998, Exploring the Politics of the Minimum Wage, *Journal of Economics Issues*, 32(3), 773-802.
- Long, N.V. and Vousden, N., 1991, Protectionist Responses and Declining Industries. *Journal of International Economics*, 30(1-2), 87-103.
- Magee, S.P., Brock, W.A. and Young, L., 1989, *Black Hole Tariffs and Endogenous Policy Theory, Political Economy in General Equilibrium*. (Cambridge University Press: Cambridge).
- Rama, M., 1997, Imperfect Rent Dissipation with Unionized Labor. *Public Choice*, 94, 55-75.
- Rama, M. and Tabellini, G., 1998, Lobbying by Capital and Labor Over Trade and Labor Market Policies, *European Economic Review*, 42(7), 1295-316.
- Rodrik, D., 1986, Tariffs, Subsidies and Welfare with Endogenous Policy. *Journal of International Economics*, 21, 285-299.
- Saint-Paul, G., (1998), A Framework for Analyzing the Political Support for Active Labor Market Policy, *Journal of Public Economics*, 67, 151-65.
- Saint-Paul G., (1996), Exploring the Political Economy of Labor Market Institutions, *Economic Policy*, 23, 263-315.
- Tullock, G., 1980, Efficient Rent-Seeking. In Buchanan, J.M., Tollison, R.D. and Tullock, G., *Toward a Theory of the Rent-Seeking Society*. (College Station: Texas A. and M. University Press, 97-112).

van Winden, F., 1998, On the Economic Theory of Interest Groups. *Public Choice*, 96, 405-410.