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Competition of Politicians for Wages and Office

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Abstract

We examine a model in which two politicians compete for office and for wages. Their remunerations are either set by the public or are offered competitively by the candidates during campaigns. Our main finding shows that competitive wage offers by candidates lead to lower social welfare than remunerations predetermined by the public, since less competent candidates are elected or wage costs are higher.

Keywords: Competitive wage offers, remunerations of politicians, elections, free riding and underprovision, incentive contracts.

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1 Introduction

In this paper we examine how wages for politicians should be determined. If politicians in office provide public goods, remunerations should ensure that the most competent citizen runs for office, and will be elected at minimum wage costs. We consider two cases. The public can either determine in advance how much an elected politician will earn, or politicians can propose their own wage during campaigns.

We consider a highly stylized citizen-as-candidate model, where an elected politician undertakes policy projects for a society. Candidates may differ in competence, and wages for politicians are financed by taxes. Our main insights are as follows. First, as a rule, the competence of elected candidates is equal or higher when the public determines wages optimally than when remuneration is self-designed by candidates. Second, social welfare is normally lower in the case of competitive wage offers by candidates than in the case of predetermined remuneration. Competition bids up wages beyond the level required for an efficient selection of politicians, since competing candidates do not sufficiently internalize the externalities their wage proposals create for the public and the other candidate.

The current analysis draws on three strands in the literature. First, incentive elements in politics, other than elections, have been discussed in Gersbach (2001) and Gersbach (2003) where the value of holding office in the second term is made dependent on the realization of macroeconomic variables in that term. This increases the incentive for politicians to undertake socially desirable policies with long-term consequences in the first term. Politicians are allowed to offer their own long-term wage contracts during campaigns.[1] By contrast, in this paper we consider the competition of politicians for wages and office in a single term in the context of a citizen-as-candidate set-up. While the above literature suggests that contract competition between politicians is welfare-improving, our current paper provides a counterexample. We show that politicians

[1] The dual mechanism – incentive contracts and elections – has been extended in subsequent papers. For instance, Gersbach and Liessem (2001) show how first and second term monetary schemes can be designed for a politician in order to achieve a socially desirable allocation of efforts across several tasks.

should not be allowed to offer their own remuneration schemes for the next term.

Second, candidates holding office will provide a public good. Thus, we may face the standard free-riding and underprovision problem when public goods are privately supplied. This problem is discussed e.g. in Palfrey and Rosenthal (1984), Bergstrom, Blume, and Varian (1986), Mailath and Postlewaite (1990), Güth and Hellwig (1986) and recently Hellwig (2001). In our model, the public can overcome the underprovision problem by setting wages or by allowing politicians to offer wage schemes.

Third, we use a version of the citizen-as-candidate model, as developed by Osborne and Slivinski (1996) and Besley and Coate (1997). In such settings, citizens who consider running for office must take into account the private costs incurred by running for office, benefits from policies they would like to undertake, and benefits from policies other potential candidates are likely to implement.[2]

This paper is organized as follows. In the next section we introduce the model. We then examine fixed wages set by the public. In section 4 we identify equilibria in cases where politicians can propose their remuneration. Section 5 contains the welfare comparison. In section 6, we examine the robustness of the results and identify conditions under which our results are reversed. Section 7 concludes.

2 The Model

We consider a society with N voters who have to elect a politician who undertakes policy projects for all members of the group. There are two potential candidates, $i = 1, 2$, for this job. The remaining $N - 2$ individuals cannot be candidates and only act as voters.[3] Candidates differ in their competence: candidate i ($i = 1, 2$) can generate a net benefit $b_i > 0$ for every member of the society due to his policies. We label candidates in such a way that $b_1 \geq b_2$. We assume that the benefits candidates

[2] Messner and Polborn (2003) have also examined the role of wages in citizen-as-candidate models and have developed a new model of this kind. They do not focus on the comparison between remuneration set by the public and self-designed wages.

[3] We assume that N is greater than 4, and thus that there are more voters who do not seek office than there are candidates.

can generate for each member of the society are observable.

For each candidate i, there is an individual cost c_i incurred by standing for election and serving in office. This cost includes the opportunity cost of seeking office and any gains from being in office. If the latter source of utility is more important, we have $c_i < 0$. c_i is assumed to be perfectly observable by the voters. The elected politician receives a wage that is financed by distortionary taxation, which is levied on all other members of the society. Let $\lambda > 0$ denote the shadow cost of public funds. That is, taxation uses $(1 + \lambda)$ of tax payers' resources in order to levy 1 unit of resources for paying wages to candidates in office. The utility of candidate i if he is elected is

$$b_i + W - c_i, \tag{1}$$

and the utility of any other member of the society is

$$b_i - \frac{W(1+\lambda)}{N-1}. \tag{2}$$

If no potential candidate is willing to run, then a default policy will be implemented that yields a benefit of $b_0 = 0$ for every voter. If only one candidate runs for office, then he automatically assumes power.

We examine two scenarios. In the first scenario, we discuss how voters would determine the wages for politicians. The timing in the first scenario is as follows:

Stage 1: Voters decide about the level of the politician's wage denoted by W.

Stage 2: The candidates decide simultaneously whether to run for office or not.

Stage 3: The voters elect one of the two candidates.

It is obvious in this first scenario that, if both candidates run for office, it is always optimal for the voters to elect candidate 1, because $b_1 > b_2$, and the wages for both candidates are identical. Note that we assume complete information. That is, voters observe the parameters $\{b_1, b_2, c_1, c_2\}$ before they set their wages.

In the second scenario, candidates themselves can offer wages, denoted by W_1 and W_2, which become effective if a candidate runs and is elected. Therefore, in the second scenario, the first two stages are replaced by:

Stage 1′: Candidates offer W_1 and W_2.

Note that it is always possible for a candidate to propose a salary so large that he will never get elected. Therefore we do not explicitly model a stage where candidates decide whether to run or not.

3 Fixed Wages

We first consider fixed wages. We neglect equilibria in weakly dominated strategies and obtain our first result.

Proposition 1

There exists an equilibrium for stages 2 and 3 that depends on the wage level in the following way:

- *If* $W \geq c_2 - b_2$ *and*
$$W \geq \frac{N-1}{N+\lambda}\big(c_1 - (b_1 - b_2)\big), \tag{3}$$
then both candidates run for office and candidate 1 is elected.

- *If* $W \geq c_2 - b_2$ *and*
$$W < \frac{N-1}{N+\lambda}\big(c_1 - (b_1 - b_2)\big), \tag{4}$$
then candidate 2 runs for office and is elected.

- *If* $W < c_2 - b_2$ *and* $W \geq c_1 - b_1$, *then candidate 2 does not run for office. Candidate 1 runs for office and is elected.*

- *If* $W < c_2 - b_2$ *and* $W < c_1 - b_1$ *no candidate runs for office.*

Proof of Proposition 1

Note that if candidate 1 decides to run for office he will be elected, independently of whether candidate 2 decides to run for office or not. Therefore, candidate 2 should run for office if and only if his utility from serving as a politician is greater than zero, which is his utility from the default outcome when no candidate runs for office. Thus, the strategies "run for office if $b_2 + W - c_2 \geq 0$" and "do not run otherwise" are (weakly) dominant for candidate 2. Hence, if $W \geq c_2 - b_2$, candidate 2 runs for office. If $W \geq c_2 - b_2$, then candidate 1 runs for office if

$$b_1 + W - c_1 \geq b_2 - \frac{W}{N-1}(1+\lambda)$$

and thus if his utility from holding office is higher than the utility when candidate 2 governs. The condition can be transformed into

$$W \geq \frac{N-1}{N+\lambda}\big(c_1 - (b_1 - b_2)\big)$$

If $W < c_2 - b_2$, candidate 1 runs for office if $b_1 + W - c_1 \geq 0$ and thus if $W \geq c_1 - b_1$.

□

Proposition 1 indicates that higher wages can attract the more competent politician to run for office.[4] We will later determine optimal wage levels the public should set for the political race.

4 Competition for Wage Contracts

In this section we explore what happens if candidates can offer to perform political duties for a certain wage. After the candidates have proposed their remuneration scheme, the voters elect the candidate who creates the highest utility for them. Thus, the timing is as follows:

Stage 1′: Each candidate proposes a remuneration scheme W_i.

Stage 2: The voters elect one of the two candidates

The wage offers of W_1 and W_2 are common knowledge for voters. Note that we can neglect the decision of candidates to run for office, since they can propose arbitrarily

[4]The equilibrium is unique if we eliminate weakly dominated strategies.

high wages. We first observe that candidate 1 is elected if [5]

$$b_1 - \frac{W_1}{N-1}(1+\lambda) \geq b_2 - \frac{W_2}{N-1}(1+\lambda). \tag{5}$$

Now we will look at the equilibrium in which candidate 1 is elected.

Proposition 2

If $(1+\lambda)(c_1 - c_2) \leq (N+\lambda)(b_1 - b_2)$, *there exists an equilibrium in which candidate* 1 *is elected with wage offers that satisfy:*

$$W_1 = (b_1 - b_2)\frac{N-1}{1+\lambda} + W_2$$

The proof is given in the appendix. An important feature of Proposition 2 is that wages are indeterminate, i.e., there are infinitely many combinations of pairs (W_1, W_2) that can constitute an equilibrium. As a corollary we obtain:

Corollary 1

Suppose $(1+\lambda)(c_1 - c_2) < (N+\lambda)(b_1 - b_2)$.

Then there exists an equilibrium in which candidate 1 *is elected with minimal wages* W_1^{min} *and* W_2^{min} *given by:*

$$W_2^{min} = \frac{N-1}{N+\lambda}c_1 - (b_1 - b_2)\frac{N-1}{1+\lambda}$$
$$W_1^{min} = \frac{N-1}{N+\lambda}c_1$$

There also exists an equilibrium in which candidate 1 *is elected with maximal wages* W_1^{max} *and* W_2^{max} *given by:*

$$W_2^{max} = \frac{N-1}{N+\lambda}c_2$$
$$W_1^{max} = (b_1 - b_2)\frac{N-1}{1+\lambda} + \frac{N-1}{N+\lambda}c_2$$

The reason for the multiplicity of equilibria can be summarized as follows. Within the range $[W_1^{\min}, W_1^{\max}]$, candidate 2 is either better off when candidate 1 is elected,

[5] For convenience, we will use a tie-breaking rule in all propositions in favor of the elected candidate in equilibrium.

or he has no chance of winning the election if he proposes a high wage of W_2. Which candidate is elected depends solely on the wage difference $W_1 - W_2$. Hence, there is no anchor for wage W_2 which causes the indeterminacy.

Candidate 2 and all voters strictly prefer the equilibrium associated with $[W_1^{\min}, W_2^{\min}]$ over all other equilibrium wage combinations. Candidate 1, however, benefits most if $[W_1^{\max}, W_2^{\max}]$ is realized. Hence simple refinement criteria, such as the Pareto principle, cannot reduce the multiplicity of equilibria. In the next step, we look at equilibria in which candidate 2 wins. Proposition 2 and Corollary 1 indicate that candidate 1 can ask for higher wages than candidate 2. The wage difference is naturally closely related to the additional benefits $b_1 - b_2$ that candidate 1 will generate for voters.

Proposition 3

For $(1+\lambda)(c_1 - c_2) > (N+\lambda)(b_1 - b_2)$, there exists an equilibrium in which candidate 2 is elected with wage offers W_1 and W_2 that satisfy:

$$W_1 = (b_1 - b_2)\,\frac{N-1}{1+\lambda} + W_2$$

The proof of Proposition 3 follows the lines of the proof of Proposition 2, and is therefore omitted. As a corollary we obtain:

Corollary 2

Suppose $(1+\lambda)(c_1 - c_2) > (N+\lambda)(b_1 - b_2)$.

Then there exists an equilibrium in which candidate 2 is elected with minimal wages W_2^{min} and W_1^{min} given by:

$$\begin{aligned} W_1^{min} &= (b_1 - b_2)\,\frac{N-1}{1+\lambda} + \frac{N-1}{N+\lambda}\,c_2, \\ W_2^{min} &= \frac{N-1}{N+\lambda}\,c_2. \end{aligned}$$

There also exists an equilibrium in which candidate 2 is elected with maximal wages W_2^{max} and W_1^{max} given by:

$$\begin{aligned} W_1^{max} &= \frac{N-1}{N+\lambda}\,c_1, \\ W_2^{max} &= \frac{N-1}{N+\lambda}\,c_1 - (b_1 - b_2)\,\frac{N-1}{1+\lambda}. \end{aligned}$$

Corollary 2 is the mirror image of Corollary 1. Again, there is a continuum of pairs (W_1, W_2) that can constitute an equilibrium.

5 Welfare Comparisons for $\mathbf{c_2 = 0}$

In this section we provide welfare comparisons for the case $c_2 = 0$ to illustrate potential drawbacks of competitively offered wage schemes by politicians. We assume that the public determines the wage in the first scenario in order to maximize welfare in terms of the utilitarian welfare function. Following the logic of section 3 in the case of a fixed wage, candidate 2 will run for office for any wage $W \geq 0$ because $b_2 + W \geq 0$. Candidate 1 will enter the political competition if

$$W \geq \tilde{W} := \frac{N-1}{N+\lambda}\big(c_1 - (b_1 - b_2)\big),$$

where we have denoted the critical wage level by $\tilde{W}$.

If $\tilde{W} < 0$, then the welfare maximizing wage under a fixed remuneration scheme, denoted by W^{opt}, is zero. Candidate 1 runs for office for any non-negative wage W and is elected with certainty. Therefore the public sets $W^{opt} = 0$, because otherwise they would have to incur the wage costs.

Overall welfare, denoted by U^{fix}, is given by

$$U^{fix} = Nb_1 - c_1 - \lambda W^{opt} = Nb_1 - c_1.$$

If $\tilde{W} > 0$, two potentially optimal wage offers exist. The first of these wage levels is $W^{opt} = 0$, in which case candidate 1 would not run for office and candidate 2 would be elected. In this case overall welfare would be given by $U^{fix} = Nb_2$.

The second potentially optimal wage level is $W^{opt} = \tilde{W}$. In this case, candidate 1 would run for office and would be elected with certainty. Overall welfare would be given as: $U^{fix} = Nb_1 - c_1 - \lambda\tilde{W}$. Therefore, for $\tilde{W} > 0$, $W^{opt} = \tilde{W}$ is the optimal remuneration for politicians, if $Nb_1 - c_1 - \lambda\tilde{W} \geq Nb_2$.

We turn next to remuneration schemes offered competitively by the politicians. According to section 4, for $(1+\lambda)\, c_1 \leq (N+\lambda)(b_1-b_2)$ candidate 1 offers the wage

$$W_1 = (b_1 - b_2)\frac{N-1}{1+\lambda} + W_2$$

and is elected.

In this case candidate 2 would not deviate from a wage W_2 if $W_2 \leq c_2(N-1)/(N+\lambda)$. As $c_2 = 0$, this requires $W_2 = 0$. Thus $W_2 = 0$ is the equilibrium remuneration scheme by candidate 2, and the equilibrium wage of candidate 1 is therefore given by:

$$W_1 = (b_1 - b_2)\frac{N-1}{1+\lambda}.$$

In this case the overall welfare, denoted by U^{var}, is given by:

$$U^{var} = Nb_1 - c_1 - \lambda\frac{N-1}{1+\lambda}\,(b_1 - b_2).$$

For $(1+\lambda)\, c_1 > (N+\lambda)(b_1-b_2)$, candidate 2 is elected with a wage W_2 which must satisfy the equilibrium boundaries. Overall welfare is simply:

$$U^{var} = Nb_2 - \lambda W_2.$$

In the next result, we summarize the comparison between fixed and self-designed remunerations.

Proposition 4

For $0 < \lambda$, welfare is always higher under fixed wages than under competitive wages, and monotonically decreasing in λ.

The proof of Proposition 4 is given in the appendix. Proposition 4 is our first main result. In principle, welfare can be lower because less competent candidates are elected or wage costs, and therefore tax distortions are higher. The comparisons in the proof illustrate that under competitive wage offers by candidates, realized wage costs become higher than under fixed and predetermined remunerations for politicians. The main reason is that wage competition by politicians bids up wages, because externalities for the other candidate and for all voters are not taken into account. The next proposition shows that the competence of politicians also tends to be higher when wages are set by the public.

Proposition 5

For $0 < \lambda$, candidate 1 is elected more often under fixed wages than under competitive wages.

The proof of Proposition 5 is given in the appendix.The next corollary shows that the costs of redistribution are essential for the preceding arguments.

Corollary 3

For $\lambda = 0$, candidate 1 is elected under fixed wages and competitive wages equally often as candidate 2. Both scenarios yield the same welfare.

The proof of Corollary 3 is given in the appendix. If there are no redistribution costs, the level of wages is irrelevant for welfare comparisons. Since for $\lambda = 0$ the same candidate is elected under fixed and self-designed wages, welfare is identical as well.

6 Welfare Comparisons. The General Case.

In this section, we examine the robustness of the argument by allowing for $c_1 > 0$ and $c_2 > 0$. Following the logic of section 3 in the case of a fixed wage, candidate 2 will run for office for any wage $W \geq c_2 - b_2$, because $b_2 + W - c_2 \geq 0$. Candidate 1 will enter the political competition if

$$W \geq \tilde{W} := \frac{N-1}{N+\lambda}\big(c_1 - (b_1 - b_2)\big).$$

If $\tilde{W} < 0$, then the welfare maximizing wage under a fixed remuneration scheme W^{opt} is zero. Candidate 1 runs for office for any non-negative wage W and is elected with certainty. Therefore the public sets $W^{opt} = 0$, because otherwise they would have to incur the wage costs. In this case, welfare, denoted by U^{fix}, is given by

$$U^{fix} = Nb_1 - c_1 - \lambda W^{opt} = Nb_1 - c_1.$$

If $\tilde{W} > 0$ and $\tilde{W} > c_2 - b_2$, there exist two potentially optimal wage offers. The first of these wage levels is $W^{opt} = c_2 - b_2$, in which case candidate 1 would not run for office and candidate 2 would be elected. In this case, overall welfare would be given by

$$U^{fix} = Nb_2 - c_2 - \lambda W^{opt} = Nb_2 - c_2 - \lambda(c_2 - b_2).$$

The second potentially optimal wage level is $W^{opt} = \tilde{W}$. In this case, candidate 1 would run for office and would be elected with certainty. Overall welfare would be given as

$$U^{fix} = Nb_1 - c_1 - \lambda\tilde{W}.$$

Therefore, for $\tilde{W} > 0$ and $\tilde{W} > c_2 - b_2$, $W^{opt} = \tilde{W}$ is the optimal remuneration for politicians, if $Nb_1 - c_1 - \lambda\tilde{W} \geq Nb_2 - c_2 - \lambda(c_2 - b_2)$.

If $\tilde{W} > 0$ and $\tilde{W} < c_2 - b_2$, then the welfare maximizing wage under a fixed remuneration scheme is $W^{opt} = \tilde{W}$. Candidate 1 runs for office for $\tilde{W}$ and is elected with certainty. In this case, overall welfare is given by

$$U^{fix} = Nb_1 - c_1 - \lambda\tilde{W}.$$

We turn next to compensation schemes competitively offered by the politicians. According to section 4, for $(1+\lambda)(c_1 - c_2) \leq (N+\lambda)(b_1 - b_2)$ candidate 1 offers the wage

$$W_1 = (b_1 - b_2)\frac{N-1}{1+\lambda} + W_2$$

and is elected.

The overall welfare, denoted by U^{var}, is given in this case by

$$U^{var} = Nb_1 - c_1 - \lambda W_1.$$

Note that

$$\begin{aligned} W_2^{min} &= \frac{N-1}{N+\lambda}\, c_1 - (b_1 - b_2)\frac{N-1}{1+\lambda}, \\ W_1^{min} &= \frac{N-1}{N+\lambda}\, c_1. \end{aligned}$$

and

$$\begin{aligned} W_2^{max} &= \frac{N-1}{N+\lambda}\, c_2, \\ W_1^{max} &= (b_1 - b_2)\,\frac{N-1}{1+\lambda} + \frac{N-1}{N+\lambda}\, c_2. \end{aligned}$$

For $(1+\lambda)(c_1-c_2) > (N+\lambda)(b_1-b_2)$, candidate 2 is elected with a wage W_2 which must satisfy the equilibrium boundaries. Overall welfare is simply:

$$U^{var} = Nb_2 - c_2 - \lambda W_2,$$
$$W_2 = W_1 - (b_1 - b_2)\frac{N-1}{1+\lambda}.$$

Note that

$$W_1^{min} = (b_1 - b_2)\frac{N-1}{1+\lambda} + \frac{N-1}{N+\lambda}c_2,$$
$$W_2^{min} = \frac{N-1}{N+\lambda}c_2.$$

and

$$W_1^{max} = \frac{N-1}{N+\lambda}c_1,$$
$$W_2^{max} = \frac{N-1}{N+\lambda}c_1 - (b_1 - b_2)\frac{N-1}{1+\lambda}.$$

The preceding observations lead to the following result.

Proposition 6

(i) For $(1+\lambda)(c_1-c_2) \le (N+\lambda)(b_1-b_2)$, welfare is higher under fixed wages than under competitive wages.

(ii) For $(1+\lambda)(c_1-c_2) > (N+\lambda)(b_1-b_2)$, welfare can be higher under competitive wages than under fixed wages.

The proof of Proposition 6 is given in the appendix. Proposition 6 indicates that fixed wages outperform self-designed remuneration packages as long as the size of the society is not too small, when the difference in competence outweighs the cost difference, or when the most competent candidate has lower costs when running for office. Note that $(1+\lambda)(c_1-c_2) \le (N+\lambda)(b_1-b_2)$ is always fulfilled if N is sufficiently large, if $b_1 - b_2 > c_1 - c_2$, or if $c_1 < c_2$.

It can, however, occur that welfare is higher under competitive wages than under wages determined by the public. If $(1+\lambda)(c_1-c_2) > (N+\lambda)(b_1-b_2)$, then candidate 2 can be elected under competitive wages, while candidate 1 is elected under fixed wages.

However, wages and tax distortions are so much higher under fixed wages that these costs outweigh the competency advantage of candidate 1.

7 Conclusion

Our results can be interpreted in several ways. The drawback of competitively offered wages can be understood as an argument against the general application of the dual mechanism in politics – incentive contracts and elections – as advocated by Gersbach (2003) and Gersbach (2000). Allowing candidates to design the conditions of their term may cause excessive wage costs, or cause less competent politicians to be elected.

Nevertheless, the argument in terms of high wage costs may not be as serious as it appears to be from the model. First, wages set by the public must be tailored in such a way that the welfare-maximizing candidate runs and will be elected. Second, higher wage costs under competitively offered earning schemes may be negligible in the government budget.

For a broader perspective, the most important drawback of competitively offered remuneration packages might be less competency in politics. In addition, allowing politicians to compete with self-designed compensation packages might involve further adverse consequences. Wealthy candidates who are running for office may be able to forgo remuneration by the public completely. Accordingly, other, less wealthy candidates, may not be able to compete on equal terms in political campaigns. As we will examine in subsequent research, this might undermine a pillar of democracies that the pool of candidates for political positions should not be constrained a priori. Hence, allowing for competitively offered wages in each term does not appear to be a priority in broadening the scope of democracies.

8 Appendix

Proof of Proposition 2

First note that in order for candidate 1 to be elected, W_1, must satisfy

$$W_1 \leq (b_1 - b_2)\frac{N-1}{1+\lambda} + W_2$$

because otherwise the public is better off electing candidate 2. This follows from equation (5). Therefore, when candidate 1 wants to be elected he offers the wage

$$W_1 = (b_1 - b_2)\frac{N-1}{1+\lambda} + W_2. \tag{6}$$

A downward deviation can be excluded, because then candidate 1 could raise his utility by offering a higher wage and would still be elected. Deviation to a higher wage leads to the election of candidate 2.

Candidate 1 will not deviate to a higher wage than in 6, and will not leave the office to candidate 2 if

$$b_1 + W_1 - c_1 \geq b_2 - \frac{W_2}{N-1}(1+\lambda).$$

Inserting the equilibrium value of W_1 as a function of W_2 from equation (6), this condition becomes

$$b_1 + (b_1 - b_2)\frac{N-1}{1+\lambda} + W_2 - c_1 \geq b_2 - \frac{W_2}{N-1}(1+\lambda),$$

which can be transformed into

$$(b_1 - b_2)\left(1 + \frac{N-1}{1+\lambda}\right) + W_2\left(1 + \frac{1+\lambda}{N-1}\right) \geq c_1,$$

which yields

$$W_2 \geq \frac{N-1}{N+\lambda}c_1 - (b_1 - b_2)\frac{N-1}{1+\lambda} \tag{7}$$

Thus, candidate 1 will want to run for office if condition (7) is fulfilled and, hence, the proposed remuneration W_2 exceeds a certain threshold.

We next examine the optimal choice of W_2 by candidate 2. A possible deviation from the proposed equilibrium in the proposition for candidate 2 would be to offer a wage

$W_2' = W_2 - \epsilon$ which would lead to his election. Candidate 2 will not choose this option if

$$b_1 - \frac{W_1}{N-1}(1+\lambda) \geq b_2 + W_2' - c_2$$

and thus if his utility from being a citizen under candidate 1 is higher than his utility from holding office himself. By inserting the equilibrium value of W_1, as given by (6), we obtain the condition

$$b_1 - \frac{W_2}{N-1}(1+\lambda) - (b_1 - b_2) \geq b_2 + W_2 - \epsilon - c_2,$$

which can be transformed into

$$W_2 \leq \frac{N-1}{N+\lambda}(c_2 + \epsilon). \tag{8}$$

Therefore, if wage W_2 is small enough, candidate 2 would prefer to be a citizen under candidate 1 as opposed to running for office with a lower wage.

Therefore, there only exist values for wage offers W_2 that satisfy both conditions (8) and (7) if

$$\frac{N-1}{N+\lambda}c_2 \geq \frac{N-1}{N+\lambda}c_1 - (b_1 - b_2)\frac{N-1}{1+\lambda}$$

and hence we obtain the assumption of the proposition given by

$$(1+\lambda)(c_1 - c_2) \leq (N+\lambda)(b_1 - b_2)$$

$\square$

Proof of Proposition 4

We now examine different cases.

Case 1: Suppose $\tilde{W} < 0$. This implies $c_1 < b_1 - b_2$, which can be easily verified by checking the definition of $\tilde{W}$. Then $(1+\lambda)c_1 \leq (N+\lambda)(b_1 - b_2)$ holds. Therefore, candidate 1 is elected under competition for wages with $W_2 = 0$, since $W_2^{max} = 0$, and welfare is given by

$$U^{var} = Nb_1 - c_1 - \lambda\frac{N-1}{1+\lambda}(b_1 - b_2).$$

Under a fixed wage we have

$$U^{fix} = Nb_1 - c_1.$$

Thus, welfare is higher under the fixed wage scenario.

Case 2: Suppose $\tilde{W} > 0$ and $(1+\lambda)\, c_1 \leq (N+\lambda)(b_1 - b_2)$. Then candidate 1 is elected under competition for wages. Since $W_2^{max} = 0$, welfare in this case is given by

$$U^{var} = Nb_1 - c_1 - \lambda \frac{N-1}{1+\lambda}\,(b_1 - b_2).$$

Under a fixed wage, candidate 1 is elected if $Nb_1 - c_1 - \lambda\tilde{W} \geq Nb_2$.

For

$$\tilde{W} := \frac{N-1}{N+\lambda}\big(c_1 - (b_1 - b_2)\big),$$

this equation can be transformed into

$$Nb_1 - c_1 - \lambda\frac{N-1}{N+\lambda}\big(c_1 - (b_1 - b_2)\big) \geq Nb_2.$$

This implies

$$(b_1 - b_2) \geq c_1 \frac{1+\lambda}{N + \lambda(2 - \frac{1}{N})},$$

which always holds for $(1+\lambda)\, c_1 \leq (N+\lambda)(b_1 - b_2)$ because

$$(b_1 - b_2) \geq c_1 \frac{1+\lambda}{N+\lambda} \geq c_1 \frac{1+\lambda}{N + \lambda(2 - \frac{1}{N})}.$$

This implies that, under a fixed wage scenario, candidate 1 runs and is elected with certainty. We have welfare as

$$U^{fix} = Nb_1 - c_1 - \lambda\tilde{W}.$$

Welfare is higher under a fixed wage scenario because

$$\tilde{W} < \frac{N-1}{1+\lambda}\,(b_1 - b_2).$$

Case 3: Suppose $\tilde{W} > 0$ and $(1+\lambda)\,c_1 > (N+\lambda)(b_1 - b_2)$. In this case, candidate 2 is elected under competitive wages. The welfare under competition for wages is given by

$$U^{var} = Nb_2 - \lambda W_2.$$

Under the fixed wage framework, welfare is

$$U^{fix} = \max\left\{Nb_1 - c_1 - \lambda\tilde{W}, Nb_2\right\}.$$

Hence, welfare with wages set by the public is higher than or equal to what it is under competitive wages.

□

Proof of Proposition 5

Case 1: We consider the case $\tilde{W} < 0$. Under a fixed remuneration scheme, candidate 1 runs for office and is elected with certainty. Under competition for wages candidate 1 is also elected, because $(1+\lambda)c_1 \leq (N+\lambda)(b_1 - b_2)$ holds.

Case 2: Suppose $\tilde{W} > 0$ and $(1+\lambda)\,c_1 \leq (N+\lambda)(b_1 - b_2)$. Then candidate 1 is elected under competition for wages. Under a fixed wage, candidate 1 is elected if $Nb_1 - c_1 - \lambda\tilde{W} \geq Nb_2$, which always holds for $(1+\lambda)\,c_1 \leq (N+\lambda)(b_1 - b_2)$.

Case 3: Suppose $\tilde{W} > 0$ and $(1+\lambda)\,c_1 > (N+\lambda)(b_1 - b_2)$. Under competition for wages, candidate 2 is elected. Under the fixed wage, candidate 2 is elected if, and only if

$$Nb_1 - c_1 - \lambda\tilde{W} < Nb_2,$$

which can be transformed into

$$(b_1 - b_2) < c_1 \frac{1+\lambda}{N + \lambda(2 - \frac{1}{N})}.$$

For

$$(b_1 - b_2) \geq c_1 \frac{1+\lambda}{N + \lambda(2 - \frac{1}{N})},$$

candidate 1 is elected. Note that candidate 2 is elected if

$$(b_1 - b_2) < c_1 \frac{1+\lambda}{N+\lambda}.$$

This implies that candidate 2 is elected more often under competition for wages than under the fixed wage scenario. Hence, under fixed wages the more competent candidate is elected more often than under competitive wages.

$\square$

Proof of Corollary 3

Case 1: Suppose $\tilde{W} < 0$. Candidate 1 is elected. Welfare under competition for wages is given by

$$U^{var} = Nb_1 - c_1.$$

Under a fixed wage we have

$$U^{fix} = Nb_1 - c_1.$$

Case 2: Suppose $\tilde{W} > 0$ and $(1+\lambda)\, c_1 \leq (N+\lambda)(b_1 - b_2)$. Welfare under competition for wages is given by

$$U^{var} = Nb_1 - c_1.$$

Under a fixed wage it is

$$U^{fix} = Nb_1 - c_1.$$

Case 3: Suppose $\tilde{W} > 0$ and $(1+\lambda)\, c_1 > (N+\lambda)(b_1 - b_2)$. The welfare under competition for wages is given by

$$U^{var} = Nb_2.$$

For $\lambda = 0$ under the fixed wage scenario, candidate 2 is always elected, because with $\lambda = 0$ we have

$$c_1 \frac{1+\lambda}{N+\lambda(2-\frac{1}{N})} = c_1 \frac{1}{N} > b_1 - b_2.$$

Under fixed wages we obtain

$$U^{fix} = Nb_2,$$

Hence, fixed wages and competitive wages yield the same welfare.

□

Proof of Proposition 6

We now obtain five cases.

Case 1: Suppose $\tilde{W} < 0$. This implies $c_1 < b_1 - b_2$.

Then $(1+\lambda)(c_1 - c_2) \leq (N+\lambda)(b_1 - b_2)$ holds. Therefore, candidate 1 is elected with competition for wages, and welfare is given by

$$U^{var} = Nb_1 - c_1 - \lambda W_1.$$

Under a fixed wage we have

$$U^{fix} = Nb_1 - c_1.$$

Thus, welfare under the fixed wage scenario is higher than or equal to what it is under competition for wages.

Case 2: Suppose $\tilde{W} > 0$, $\tilde{W} > c_2 - b_2$ and $(1+\lambda)(c_1 - c_2) \leq (N+\lambda)(b_1 - b_2)$. Then candidate 1 is elected under competition for wages. Welfare in this case is given by

$$U^{var} = Nb_1 - c_1 - \lambda W_1,$$

$$U^{var}_{max} = Nb_1 - c_1 - \lambda W_1^{min} = Nb_1 - c_1 - \lambda \frac{N-1}{N+\lambda} c_1.$$

Under a fixed wage, welfare depends on which candidate is elected. Given the assumptions of case 2, we have

$$U^{fix} = \max\left\{ Nb_2 - c_2 - \lambda(c_2 - b_2), Nb_1 - c_1 - \lambda\tilde{W} \right\} = Nb_1 - c_1 - \lambda\tilde{W}.$$

Welfare is higher under a fixed wage scenario, because

$$Nb_1 - c_1 - \lambda \left[\frac{N-1}{N+\lambda} c_1\right] < Nb_1 - c_1 - \lambda \left[\frac{N-1}{N+\lambda} (c_1 - (b_1 - b_2))\right].$$

Case 3: Suppose $\tilde{W} > 0$, $\tilde{W} < c_2 - b_2$ and $(1+\lambda)(c_1 - c_2) \leq (N+\lambda)(b_1 - b_2)$. Then candidate 1 is elected under competition for wages. Welfare is given by

$$U^{var} = Nb_1 - c_1 - \lambda W_1.$$

Under a fixed wage, candidate 1 runs for office and is elected. In this case, welfare is given by

$$U^{fix} = Nb_1 - c_1 - \lambda \tilde{W}.$$

Welfare is higher under a fixed wage (see case 2).

Case 4: Suppose $\tilde{W} > 0$, $\tilde{W} > c_2 - b_2$ and $(1+\lambda)(c_1 - c_2) > (N+\lambda)(b_1 - b_2)$. In this case, candidate 2 is elected under competitive wages. Welfare under competition for wages is given by

$$U^{var} = Nb_2 - \lambda W_2 - c_2,$$

$$U^{var}_{max} = Nb_2 - c_2 - \lambda W_2^{min} = Nb_2 - c_2 - \lambda \frac{N-1}{N+\lambda} c_2.$$

Under the fixed wage framework and using the conditions in case 4, welfare is given by

$$U^{fix} = \max\left\{Nb_2 - c_2 - \lambda(c_2 - b_2), Nb_1 - c_1 - \lambda\tilde{W}\right\} = Nb_2 - c_2 - \lambda(c_2 - b_2).$$

In this case, welfare will always be higher under the fixed wage than under competitive wages if

$$Nb_2 - c_2 - \lambda(c_2 - b_2) > Nb_2 - c_2 - \lambda \frac{N-1}{N+\lambda} c_2$$

$$\Rightarrow \lambda(c_2 - b_2) < \lambda \frac{N-1}{N+\lambda} c_2$$

Hence, welfare is always higher than or equal to what it is under competitive wages if

$$b_2 > c_2 \left(1 - \frac{N-1}{N+\lambda}\right)$$

Case 5: Suppose $\tilde{W} > 0$, $\tilde{W} < c_2 - b_2$ and $(1+\lambda)(c_1 - c_2) > (N+\lambda)(b_1 - b_2)$. In this case, candidate 2 is elected under competitive wages. Welfare under competition for wages is given by

$$U^{var} = Nb_2 - \lambda W_2 - c_2,$$

$$U^{var}_{max} = Nb_2 - c_2 - \lambda W_2^{min} = Nb_2 - c_2 - \lambda \frac{N-1}{N+\lambda} c_2.$$

Under the fixed wage, candidate 1 runs for office and is elected. Welfare is given by

$$U^{fix} = Nb_1 - c_1 - \lambda \tilde{W}.$$

Welfare under the fixed wage can be smaller than under the competition for wages. For example, this is the case if

$$U^{var} = U^{var}_{max} = Nb_2 - c_2 - \lambda W_2^{min} = Nb_2 - c_2 - \lambda \frac{N-1}{N+\lambda} c_2.$$

Then $U^{var} > U^{fix}$, if

$$Nb_2 - c_2 - \lambda \frac{N-1}{N+\lambda} c_2 > Nb_1 - c_1 - \lambda \left[\frac{N-1}{N+\lambda} (c_1 - (b_1 - b_2)) \right],$$

which implies

$$(b_1 - b_2) < (c_1 - c_2) \frac{1+\lambda}{N + \lambda(2 - \frac{1}{N})},$$

which always holds for $(1+\lambda)(c_1 - c_2) > (N+\lambda)(b_1 - b_2)$ because

$$(b_1 - b_2) < (c_1 - c_2) \frac{1+\lambda}{N+\lambda},$$

and

$$(c_1 - c_2) \frac{1+\lambda}{N+\lambda} > (c_1 - c_2) \frac{1+\lambda}{N + \lambda(2 - \frac{1}{N})}.$$

□

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