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Abstract

This paper challenges the traditional view that unemployment is high because insiders determine the union wage. The insiders in this paper are characterized by being more efficient when they search for a job than the outsiders, implying that they experience relatively less unemployment. We assume that wages are determined by a monopoly union and further that a union leader is elected by a majority voting rule. Insiders may prefer a lower wage than outsiders, implying the possibility of lower unemployment

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when insiders are decisive in the union than if outsiders were decisive in the union.

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JEL classifications: J2, J5, J6.

1. Introduction

The purpose of this paper is to analyse what happens to equilibrium wages and unemployment in the hypothetical case that outsiders have the decision power in the union. The conventional wisdom is that the union wage is determined by the preferences of the insiders. As insiders are believed to prefer higher wages than the outsiders, equilibrium unemployment ends up being higher than if the outsiders were to determine wages.

However, the present paper questions this hypothesis. We show that it is possible that insiders prefer lower wages than outsiders, leading to a lower unemployment rate when insiders determine wages compared to the hypothetical case of outsiders determining wages.

Furthermore, the paper introduces a new and more general framework in which to analyse this question. In a traditional Insider-Outsider model (See for example, Lindbeck and Snower 1986) a group of workers happen to be employed and another group is unemployed at a point in time. If the firm's employment decision is based on a strict seniority rule, as for example in Oswald (1985) and Booth (1995) this implies that for a given labour demand an individual worker's employment probability is either zero or one. However, in European Countries only an average of one third of the labour force is unemployed for more than a year.[1] Furthermore, this traditional framework do not consider the continuous flows into and out of employment. A worker can never be absolutely sure of keeping his present job and unemployed workers do have a positive employment probability. Hence, the assumption that a worker has either a zero employment probability or an employment probability of one is not realistic. At the other extreme we often find in traditional labour union models the assumption that workers have equal employment probabilities, see for example Oswald (1985) for a survey. However, some workers may have higher employment probabilities than

[1] OECD Jobs Study, 1993, chart 1.17

other workers. Empirical evidence shows that individual employment probabilities differ. For example Pedersen & Westergård-Nielsen (1993) survey evidence for OECD countries obtained from panel data concerning factors which influence individual employment probabilities. They find that individual characteristics, such as age, gender, marital status, children, health status and education influence the probability of being employed. Hence in short, we believe that a softening and generalization of the strict insider-outsider model is needed, without going to the extreme of equal employment probabilities.

In this paper we assume that the workers's individual employment probabilities differ. When considering unemployment we need a flow equilibrium model acknowledging the continuing flows between unemployment and employment constituting the equilibrium unemployment rate. We redefine the terms insiders and outsiders. We define a flow-model insider, FM-insider, as a worker with more employment periods during a working life than a flow-model outsider, FM-outsider.

We consider an economy where firms are homogenous and subject to mismatch, which leaves some of their vacancies unfilled. There are two groups of workers who differ in terms of the efficiency of search. The group of high search efficiency workers has a tighter connection to the labour market compared to the group of low search efficiency workers as their transition rate from unemployment to employment is higher: the high efficiency workers experience a lower rate of unemployment. This corresponds to that the group of high efficiency workers has a higher employment probability during a working life, whereby this group constitutes the majority of the *employed* workers. We therefore denote the group of workers with a high search efficiency the FM-insiders and the other group the FM-outsiders, which is a generalisation of the definition in the traditional insider-outsider theory (Lindbeck and Snower 1986). Insiders have a higher employment probability than outsiders, but they do take into account the risk of becoming unemployed.

The wage determination procedure is essential. The workers are members of

a trade union. Even though workers have different preferences they engage in collective bargaining and are paid the same wage. Usually unions are assumed to be utilitarian implying that the union leader acts upon the interests of all members. But recognizing that union leaders are elected (see for example Kaufman 2000, Sandver and Ready 1998 and Clark and Gilbert 1998) and assuming that all union leaders care about is to be reelected implies that the union leader acts upon the interests of the majority. Farber 1978 and Blair and Crawford 1984 discuss the problem of defining the union's objective function when a union leader is elected by majority voting. In this paper we follow Farber by considering a monopoly union, in order to simplify while introducing endogenous search. Hence, a union leader is elected by a majority voting rule and the preferences of the majority determine the union wage.

Search is costly and the optimal search intensity is affected by wages. Acknowledging costly search and how wages affect worker's search intensity, give rise to opposite directed effects on wages when the decision power changes from FM-insiders to FM-outsiders. Higher wages and higher unemployment when FM-insiders decide wages compared to FM-outsiders deciding wages, is a possible outcome. However, the possibility of FM-insiders preferring lower wages than FM-outsiders arises if it is optimal for the FM-insiders to search more than the FM-outsiders. The expected utility of demanding a high wage as an unemployed FM-insider is low when the optimal search intensity is high as a high search intensity implies high search costs. The implication is that the chosen wage and hence unemployment is not necessarily higher when FM-insiders decide compared to FM-outsiders deciding.

The paper is organized as follows. The model is presented in Section 2. In Section 3, the equilibrium is described when search is exogenous and we examine the impact of a change in decision power from FM-insiders to FM-outsiders. Section 4 and 5 consider the same issue when search is endogenous. Section 6 offers simulations and the last section concludes.

2. The Model[2]

Consider an economy consisting of many homogenous firms and one monopoly trade union organizing all employed workers. Employed workers elect a union leader by a majority voting rule and the union leader determines wages on their behalf taking into consideration that the individual worker's search intensity is a function of the wage level.

Workers are heterogeneous, they have different search efficiency. For simplicity, we only consider two groups of workers. The group of workers with the high search efficiency we denote the FM-insiders, as they are more often employed during their working life than the other group, the FM-outsiders. Only the unemployed workers search for a job. Unemployed workers choose how much to search according to their expected lifetime utility function.

In this section we describe the model and in the next section we derive equilibrium wages and search intensity.

2.1. Workers' Value Functions

Let Γ_i^E and Γ_i^U denote the expected present values of lifetime utilities of being employed and unemployed, respectively. Subscript $i = H, L$ denotes high search efficiency workers, H, and low search efficiency workers, L. Pedersen and Westergård-Nielsen (1993) find in their survey that individual characteristics such as age and gender influence the probability of being employed. Hence the evidence shows that other things than productivity affect the probability of being employed. In this paper we assume that high and low search efficiency workers have the same productivity and hence receive the same wage.[3] Workers only differ with respect to their efficiency of search. We then have:

[2] Our model is inspired by Kiander 1992, Hosios 1990, and Pissarides 1990.

[3] See Larsen (2000) for an analysis where workers risk a loss of skill while unemployed. Hence, some workers become less productive and less attractive for the firms, implying they receive lower wages than the workers who have not lost some of their skills.

$$\delta\Gamma_i^E = w + q(\Gamma_i^U - \Gamma_i^E), i = H, L \tag{2.1}$$

$$\delta\Gamma_i^U = b - cs_i + p_i(\Gamma_i^E - \Gamma_i^U), i = H, L \tag{2.2}$$

where b is the unemployment insurance, w is the wage rate, δ is the discount rate and q is an exogenous fraction of currently employed workers leaving their jobs. Search intensity is denoted by s_i, c is the marginal cost of search and p_i is a worker's transition rate from unemployment into employment. Only the unemployed workers search for a job. Equation (2.1) states that the utility stream of being employed equals the wage level plus the probability of getting separated from a job times the change in lifetime utility. While unemployed, the worker receives unemployment insurance and pays a search cost given by cs_i.

We define the steady state lifetime utility flow of an (un)employed worker as $Z_i^m = \delta\Gamma_i^m, \quad m = U, E$, giving:

$$Z_i^E = \frac{(\delta + p_i)w + q(b - cs_i)}{\delta + p_i + q}, \qquad Z_i^U = \frac{p_i w + (\delta + q)(b - cs_i)}{\delta + p_i + q}, i = H, L \tag{2.3}$$

The utility flow is a weighted average of employment and of unemployment given the worker's current employment status.

2.2. Matching and Unemployment

The work force is divided into two groups who differ in one respect only. One group, H, has a higher transition rate, p_H, than the other group, L, which has transition rate p_L. We normalize the labour force to one. The number of workers with the high transition rate is given by Λ and the number of workers with the low transition rate is $1 - \Lambda$. In a steady state, unemployment for group H, U_H, is determined by:

$$q(\Lambda - U_H) = p_H U_H. \tag{2.4}$$

The inflow into unemployment, the left hand side, is equal to the outflow from unemployment, the right hand side. Equation (2.4) reduces to:

$$U_H = \frac{q}{q + p_H}\Lambda.$$

Similarly, unemployment for the L group is determined by:

$$U_L = \frac{q}{q + p_L}(1 - \Lambda).$$

The total rate of unemployment is therefore:

$$U = \frac{q}{q + p_H}\Lambda + \frac{q}{q + p_L}(1 - \Lambda).$$

Unemployment is increasing in the separation rates and decreasing in the transition rates.

The individual transition rate, p_i, $i = H, L$, depends both on the individual match efficiency function, $f(e_i, s_i)$, and on labour market tightness, θ:

$$p(e_i, s_i, \theta) = f(e_i, s_i)\sqrt{\theta},\ \theta = \frac{V}{FU},\ \ i = H, L, \tag{2.5}$$

where s_i is search intensity of a worker in group i, and e_i is a measure of efficiency of a worker in group i.

Labour market tightness measures how tight the labour market is in terms of vacant jobs, V, relatively to unemployment, U, in efficiency terms, FU. F is the average match efficiency function:

$$F = \frac{U_H}{U} f(e_H, s_H) + \frac{U_L}{U} f(e_L, s_L) \tag{2.6}$$

The individual worker is atomistic and therefore perceives labour market tightness, θ, as a constant.

The individual efficiency function $f(e_i, s_i)$ is defined in the domain $s_i \in [0, 1]$, $e_i \in [0, \infty]$. We only consider situations where higher efficiency implies a higher transition rate: $e_H > e_L \Rightarrow p_H > p_L$. Worker flows are illustrated in figure 1.

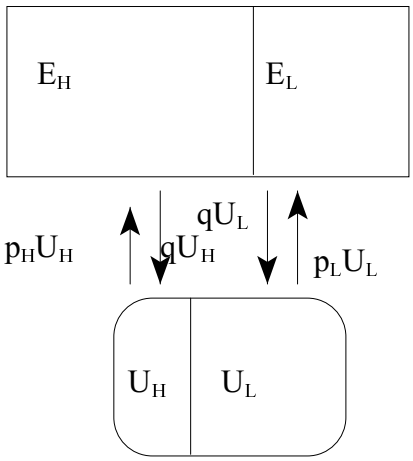

Figure 2.1: Worker Flows

The search efficiency function, $f(e_i, s_i)$, fulfills the following restrictions:

$$\frac{\partial f}{\partial e_i} > 0, \quad \frac{\partial f}{\partial s_i} \geq 0, \quad \frac{\partial^2 f}{\partial s_i \partial s_i} < 0, \quad \frac{\partial f(e_i, 0)}{\partial s_i} > 0, \quad f(e_i, 0) = 0. \tag{2.7}$$

The function is everywhere strictly concave in s_i and increases with match efficiency. Note that the transition rate, $p(e_i, s_i, \theta)$ is a linear transformation of the search efficiency function, $f(e_i, s_i)$, and fulfills all the restrictions given in (2.7). Furthermore, when s_H and s_L are both equal to zero, the workers' transition rates are zero and unemployment is equal to one.

We assume the two groups are of equal size in order to focus on the asymmetry due to the difference in search efficiency, i.e. $\Lambda = \frac{1}{2}$.

The number of matches formed in the economy, x, is given by the matching function:

$$x(V, FU) = \sqrt{V}\sqrt{FU}. \tag{2.8}$$

Note that the number of matches has positive first order derivatives in FU and V, negative second order derivatives, positive cross partial derivatives and is homogenous of degree one in FU and V. Pissarides 86 and Blanchard and Diamond 89 provide empirical justification for the Cobb-Douglas matching function

with equal exponents. The transition rate is chosen so it implies the particular matching function given in (2.8).

2.3. Employment Distribution

The rates of group L and group H employed workers relatively to the total rate of employment are denoted by η and $1-\eta$, respectively:

$$\eta = \frac{E_L}{E} = \frac{1}{1+\frac{\Lambda}{1-\Lambda}\frac{p_H/(q+p_H)}{p_L/(q+p_L)}}, \quad 1-\eta = \frac{E_H}{E} = \frac{1}{1+\frac{1-\Lambda}{\Lambda}\frac{p_L/(q+p_L)}{p_H/(q+p_H)}}.$$

For $\Lambda \geq 1/2$ we have $\eta < 1/2$: there are relatively more high efficiency employed workers (the workers with the high transition rate), than employed low efficiency workers. The group of workers with the low transition rate experiences a lower employment probability, $\frac{p_L}{q+p_L}$ than the group with the high transition rate. The L group of workers are less employed during their working life than the H group of workers. We therefore consider the low efficiency group of workers as being the FM-outsiders and the high efficiency group of workers as being the FM-insiders.

For simplicity and in order to focus on the asymmetries due to efficiency we assume the two groups are of equal size. In this case, the low efficiency group have the majority among the unemployed workers and the high efficiency group have the majority among the employed workers. It does not, however, have any impact on the direction of our results compared to the more realistic case: more high efficiency than low efficiency workers. The high efficiency workers would still have the majority among the employed workers. They may also have the majority among the unemployed workers, even though their employment probability is higher than the employment probability of a low efficiency worker. The case with more high efficiency workers than low efficiency workers is more realistic because of the fact that the average rate of long-term unemployment for European countries is one third.[4] In other words, it is a small group of workers

[4]OECD Jobs Study, 1993, chart 1.17

who experiences the highest unemployment probabilities.

2.4. Firms

Firms supply jobs dependent upon the wage and their hiring costs. Firms supply one job each and hire both low search efficiency and high search efficiency workers as they have the same productivity. Let y be the marginal product of a worker. The expected present values of a filled job, Γ_J, and of a vacant job, Γ_V, are determined by the equations:

$$\delta\Gamma_J = y - w + q(\Gamma_V - \Gamma_J), \tag{2.9}$$

$$\delta\Gamma_V = \frac{1}{\sqrt{\theta}}(\Gamma_J - \Gamma_V) - k, \tag{2.10}$$

where $\frac{1}{\sqrt{\theta}}$ is the firm's transition rate, i.e. the number of matches given in (2.8) divided by the number of vacancies. The direct costs associated with job supply are given by k. Free entry implies that jobs are supplied as long as it is profitable, i.e. until $\Gamma_V = 0$. Using this condition and combining equations (2.9) and (2.10) give an equation to determine labour market tightness:

$$\theta(w) = \left(\frac{(y-w)}{k(q+\delta)}\right)^2. \tag{2.11}$$

Labour market tightness depends negatively on wages.

3. Exogenous Search

In this section we derive the standard result in this more general model. Search is exogenous, that is, search intensity does not respond to wages. Wages are determined by the leader of the monopoly union. Only employed workers are members of the union. The union members elect a union leader directly by majority voting. The elected union leader then determines the wage level. The union leader is only concerned about being reelected, thus he chooses a wage

level that maximizes the utility of the majority. The union wage solves the maximization problem:

$$\max_{w} \Gamma_i^E = \frac{(\delta + p(e_i, s_i, \theta))w + q(b - cs_i)}{\delta + p(e_i, s_i, \theta) + q}, \tag{3.1}$$

st. equation (2.11). The maximization problem has the first order condition:

$$(\delta + p(e_i, s_i, \theta))\,(\delta + p(e_i, s_i, \theta) + q) + q\frac{\partial p(e_i, s_i, \theta)}{\partial \theta}\frac{\partial \theta}{\partial w}\,(w - b + cs) = 0.$$

Substituting for the derivatives we obtain:

$$(\delta + p(e_i, s_i, \theta))\,(\delta + p(e_i, s_i, \theta) + q) - q\frac{f(e_i, s_i)}{k(q + \delta)}\,(w - b + cs) = 0. \tag{3.2}$$

The second order condition is:

$$SOC(w)|_{exog.\ s} = -2\frac{f(e_i, s_i)}{k(q + \delta)}\,(\delta + p(e_i, s_i, \theta) + q) < 0.$$

Outsiders determining wages instead of FM-insiders correspond to considering the maximization problem (3.1) for low search efficiency, e_L, instead of for high search efficiency, e_H. We differentiate equation (3.2) with respect to e_i and w_i to obtain:

$$\frac{dw}{de_i} = \frac{1}{f(e_i, s_i)}\frac{\partial f(e_i, s_i)}{\partial e_i}\frac{p(e_i, s_i, \theta)^2 - \delta\,(\delta + q)}{-SOC(w)|_{exog.\ s}}.$$

We observe that wages increase with efficiency whenever the job probability is larger than the separation rate plus discounting. Hence, for $p(e_i, s_i, \theta) > \delta + q$, a change in decision power towards FM-outsiders, $de_i < 0$, would reduce wages and as:

$$\frac{\partial U}{\partial e_i}de_i = -\frac{1}{2}q\left(\frac{f(e_H, s_H)}{(q + p_H)^2} + \frac{f(e_L, s_L)}{(q + p_L)^2}\right)\frac{\partial \theta}{\partial w}\frac{dw}{de_i}de_i,$$

unemployment would fall. In the following two sections we introduce endogenous search intensity and analyse how the result is modified.

4. Endogenous Search

In this section we derive the equilibrium in the *FM-insider-outsider* model when search is endogenous. In the next section we analyse what happens to wages, search intensities for the two groups of workers and unemployment in the hypothetical case where the decision power changes from FM-insiders to FM-outsiders.

When search intensity is endogenous, the union determines wages given a knowledge of how search intensity responds to the wage level. Each worker is atomistic and therefore the individual worker perceives the wage and labour market tightness as constants.

The optimal search intensity of an individual worker is determined such that it maximizes the expected utility when unemployed, taking as given the wage and labour market tightness. Hence, search intensity is found by solving the maximization problem:

$$\max_{s_i} \left\{ \frac{p(e_i, s_i, \theta)w + (\delta + q)(b - cs_i)}{\delta + p(e_i, s_i, \theta) + q} \right\}, \quad i = H, L, \tag{4.1}$$

st. equation (2.11), which gives the first order condition to determine search intensity:

$$\frac{\partial p(e_i, s_i, \theta)/\partial s_i}{(\delta + q + p(e_i, s_i, \theta))} (w - b + cs_i) - c = 0. \tag{4.2}$$

The second order condition is fulfilled given the restrictions on the efficiency function in (2.7):

$$SOC(s_i) = \frac{\partial^2 p(e_i, s_i, \theta)}{\partial s_i \partial s_i} (w - b + cs_i) < 0. \tag{4.3}$$

The optimal search intensity equates the marginal gain from search to the marginal search costs. The marginal search cost is constant, thus FM-insiders have an incentive to search more (less) than FM-outsiders if their marginal gain from search is higher (lower).

Note that equation (4.2) implicitly determines the optimal search intensity as a function of efficiency and the wage:

$$s_i^* = s_i^*(e_i, w) \tag{4.4}$$

Wages are determined by the monopoly union. Only employed workers are members of the union. The union members elect a union leader directly by majority voting. The elected union leader then determines the wage level. The union leader is only concerned about being reelected, thus he chooses a wage level that maximizes the utility of the majority, taking into account that the wage affects the optimal search intensity. The union wage solves the maximization problem:

$$\begin{aligned} \max_w \qquad & \Gamma_E = \frac{(\delta + p(e_i, s_i^*, \theta))w + q(b - cs_i^*)}{\delta + p(e_i, s_i^*, \theta) + q} \\ & s.t. \\ \theta(w) \quad = \quad & \left(\frac{(y-w)}{k(q+\delta)}\right)^2, \quad s_i^* = s_i^*(e_i, w), \end{aligned} \tag{4.5}$$

which has the first order condition:

$$(\delta + p(e_i, s_i^*, \theta))\,(\delta + p(e_i, s_i^*, \theta) + q) + q\frac{dp(e_i, s_i^*, \theta)}{dw}\,(w - b + cs_i^*) = 0. \tag{4.6}$$

Using the first order condition for search, equation (4.2) and substituting for the derivatives we obtain:

$$(\delta + p(e_i, s_i^*, \theta))\,\frac{\partial f(e_i, s_i^*)}{\partial s_i^*}(y - w) - qcf(e_i, s_i^*) = 0, \tag{4.7}$$

where the second order condition is:

$$SOC(w) = -\,(\delta + p(e_i, s_i^*, \theta)) + \frac{dp(e_i, s_i^*, \theta)}{dw}\,(y - w) < 0.$$

Equation (4.2) and (4.7) together determine equilibrium search intensity and wages.

5. Change in Decision Power

Consider the hypothetical case where the decision power changes from the FM-insiders to the FM-outsiders. Hence the FM-outsiders' preferences determine the behaviour of the union leader, even though FM-outsiders do not have the majority in the union. A change in decision power from group H to group L corresponds to a change in the search efficiency parameter e_i in the union leader's maximization problem, equation (4.5). We perform this analysis by considering the effect on the wage from a decrease in the search efficiency parameter e_i, i.e. $de_i < 0$ in equation (4.5). The wage change further implies changed search intensities of both groups of workers.

Usually you would expect wages and unemployment to be lower if the FM-outsiders, i.e. group L were decisive. I.e. when e_i decreases we should see a negative effect on wages. We would also expect lower wages to be associated with lower search intensity, as it becomes less attractive to find a job. However, it is shown below that in equilibrium, lower wages in fact increases the optimal search intensity.

We assume that the search efficiency function is given by: $f(e_i, s_i) = \gamma_i s_i^{\alpha_i}$. Either γ_i or α_i (or both) may be a function of efficiency, e_i. In the following we consider the simplest possible efficiency function, only γ is a function of e_i, $\gamma_i = e_i$ and α_i is a constant, $\alpha_i = \alpha$ The first order conditions for search respectively wages become:

$$FOC(s_i) = \frac{e_i \alpha s_i^{\alpha-1} \sqrt{\theta}\,(w - b + cs_i)}{(\delta + q + e_i s_i^{\alpha}\sqrt{\theta})} - c = 0, \tag{5.1}$$

$$FOC(w) = \left(\delta + e_i s_i^{\alpha}\sqrt{\theta}\right)\alpha(y - w) - qcs_i = 0. \tag{5.2}$$

Unemployment is affected by a change in decision power from FM-insiders to FM-outsiders in the following way:

$$\frac{\partial U}{\partial e_i} de_i = -\frac{1}{2}\left(\frac{q}{(q+p_H)^2}\left(\frac{\partial p_H}{\partial s_H}\frac{\partial s_H}{\partial w} + \frac{\partial p_H}{\partial w}\right) + \frac{q}{(q+p_L)^2}\left(\frac{\partial p_L}{\partial s_L}\frac{\partial s_L}{\partial w} + \frac{\partial p_L}{\partial w}\right)\right)\frac{dw}{de_i} de_i.$$

If FM-outsiders prefer a higher wage level than the FM-insiders, unemployment increases when the decision power changes if

$$\left(\frac{q}{(q+p_H)^2}\left(\frac{\partial p_H}{\partial s_H}\frac{\partial s_H}{\partial w}+\frac{\partial p_H}{\partial w}\right)+\frac{q}{(q+p_L)^2}\left(\frac{\partial p_L}{\partial s_L}\frac{\partial s_L}{\partial w}+\frac{\partial p_L}{\partial w}\right)\right)<0. \qquad (5.3)$$

As higher wages imply a direct negative effect on the workers' transition rates, a sufficient condition for condition (5.3) to hold is that search intensity is decreasing in wages. The effect of higher wages on search intensity is:

$$\frac{ds_i}{dw}=\frac{\frac{1}{y-w}\left(-c(\delta+q)+\alpha p_i s_i^{-1}(y-w)\right)}{-SOC(s_i)}, \qquad (5.4)$$

where we have used the first order condition, equation (5.1) for search to simplify.

There is a negative and a positive effect on search when wages increase. The negative effect on search results from the negative impact on the worker's transition rate. The positive effect on search is due to the fact that higher wages make employment more attractive.

We can show that around the equilibrium, the negative effect dominates:

Proposition 5.1. *Around the equilibrium, search decreases in wages,* $\frac{ds_i}{dw}<0$.

Proof. We have from equation (5.4) that

$$\begin{aligned}\frac{ds_i}{dw} &= \frac{\frac{1}{y-w}\left(-c(\delta+q)+\alpha p_i s_i^{-1}(y-w)\right)}{-SOC(s_i)}<0 \Leftrightarrow\\ \alpha s_i^{-1}(y-w)p_i &< c(\delta+q).\end{aligned}$$

Rewriting the left hand side using the first order condition for wages, equation (5.2) we obtain:

$$\begin{aligned}\alpha s_i^{-1}(y-w)p_i &= \frac{qcp_i}{(\delta+p_i)}<c(\delta+q)\Leftrightarrow\\ qp_i &< (\delta+q)(\delta+p_i).\end{aligned}$$

That is, $\frac{ds_i}{dw}<0$. ■

With this result we can determine the impact on unemployment when wages decrease:

Corollary 5.2. *When the decision power changes from FM-insiders to FM-outsiders, unemployment decreases if and only if a lower wage level is preferred.*

Before we can derive the impact on wages resulting from a change in decision power, we derive the effect on search intensity from a higher search efficiency. Note that search efficiency of the two groups do not change, we merely want to compare the search intensities of the two groups for a given wage. The impact on search intensity from higher efficiency is positive if the marginal gain from search increases. From equation (4.2) we have that search intensity changes with efficiency in the following way:

$$\frac{ds_i}{de_i} = \frac{\left(\frac{\partial f(e_i,s_i)}{\partial s_i \partial e_i}\left(\delta + q + p(e_i, s_i, \theta)\right) - \frac{\partial f(e_i,s_i)}{\partial s_i}\frac{\partial f(e_i,s_i)}{\partial e_i}\sqrt{\theta}\right)\frac{c}{\frac{\partial f(e_i,s_i)}{\partial s_i}}}{-SOC(s_i)}.$$

There is a negative and a potential positive effect. The positive effect arises if a higher efficiency increases the worker's marginal search efficiency function, i.e. if $\frac{\partial f(e_i,s_i)}{\partial s_i \partial e_i} > 0$. However, as search is costly it pays, in expected utility terms, to reduce search intensity when efficiency is higher. For the specific search efficiency function where only γ is a function of e_i, $\gamma_i = e_i$ and α_i is a constant, $\alpha_i = \alpha$, the positive effect dominates, search intensity unambiguously increases with efficiency.

Proposition 5.3. *For the efficiency function, $f(e_i, s_i) = e_i s_i^{\alpha}$, optimal search intensity increases with efficiency.*

Proof. For the search efficiency function, $f(e_i, s_i) = e_i s_i^{\alpha}$. search intensity increases with efficiency as $\frac{\partial f(e_i,s_i)}{\partial s_i \partial e_i}\left(\delta + q + p(e_i, s_i, \theta)\right) - \frac{\partial f(e_i,s_i)}{\partial s_i}\frac{\partial f(e_i,s_i)}{\partial e_i}\sqrt{\theta} = \left(\delta + q\right)\alpha s_i^{\alpha-1} > 0$. ■

Differentiating the first order condition for wages, equation (5.2), with respect to search efficiency and wages give the effect on wages from a change in decision power from FM-insiders to FM-outsiders :

$$\frac{dw}{de_i}de_i = \frac{\left(\alpha s_i^{\alpha}\sqrt{\theta}(y-w) - \left(qc - e_i\alpha^2 s_i^{\alpha-1}\sqrt{\theta}(y-w)\right)\frac{ds_i}{de_i}\right)}{-SOC(w)}de_i. \tag{5.5}$$

There is a direct negative effect on wages from lower efficiency as the transition rate directly decreases. There are two indirect search effects. There is a positive indirect search effect, due to the fact that a lower search intensity decreases search costs and thereby increases the value of unemployment for given wages. There is a negative indirect search effect, stemming from the direct reduction in the worker's transition rate when search intensity decreases. We note that the cost effect dominates, i.e. $qc - e_i\alpha^2 s_i^{\alpha-1}\sqrt{\theta}(y-w)$ is positive,(see the proof of proposition 5.4).

For our specific search efficiency function we obtain the following preposition.

Proposition 5.4. *For the search efficiency function $f(e_i, s_i) = e_i s_i^{\alpha}$, wages increase when the decision power changes from FM-insiders to FM-outsiders if and only if $\frac{p_i}{\delta+(1-\alpha)p_i} < \frac{e_i}{s_i}\frac{ds_i}{de_i}$, the elasticity of search intensity with respect to search efficiency is not too small.*

Proof. Rewriting the first order condition for wages we have:

$$\alpha(y-w)\delta = s_i\left(qc - e_i\alpha s_i^{\alpha-1}\sqrt{\theta}(y-w)\right).$$

As $y - w > 0$, which it must be for positive search intensity, see equation (5.1), we have that $\left(qc - e_i\alpha s_i^{\alpha-1}\sqrt{\theta}(y-w)\right) > 0$

We have that $\frac{dw}{de_i}de_i > 0$ if and only if:

$$\alpha s_i^{\alpha}\sqrt{\theta}(y-w) < \left(qc - e_i\alpha^2 s^{\alpha-1}\sqrt{\theta}(y-w)\right)\frac{ds_i}{de_i}.$$

Using the first order condition for wages gives

$$\alpha s_i^{\alpha}\sqrt{\theta}(y-w) < \frac{\alpha(y-w)(\delta+(1-\alpha)p_i}{s_i}\frac{ds_i}{de_i}.$$

Multiplying with e_i on both sides of the inequality sign we obtain:

$$p_i < \frac{e_i}{s_i}\frac{ds_i}{de_i}\left(\delta + (1-\alpha)p_i\right). \tag{5.6}$$

The result is immediate. ■

Hence if this condition is satisfied, the impact on search intensity is so strong that FM-outsiders actually prefer higher wages than FM-insiders. Then we know from the corollary that unemployment increases when the decision power changes from FM-insiders to FM-outsiders.

For the specific search efficiency function $f(e_i, s_i) = e_i s_i^{\alpha}$ we can reduce condition (5.6) further. Substituting for $\frac{ds_i}{de_i}$ gives:

$$\frac{p_i}{\delta + (1-\alpha)p_i} < \frac{c(\delta + q)}{(1-\alpha)\alpha e_i s_i^{\alpha-1}\sqrt{\theta}(w - b + cs_i)}.$$

Using the first order condition for search, equation (5.1) we have:

$$\begin{aligned} \frac{p_i}{\delta + (1-\alpha)p_i} &< \frac{\delta + q}{(1-\alpha)(\delta + q + p_i)} \Leftrightarrow \\ p_i^2(1-\alpha) &< \delta(\delta + q). \end{aligned}$$

Hence FM-outsiders prefer higher wages than FM-insiders if the transition rate is not too high. However, the condition is a condition in endogenous terms. We therefore need simulations in order to determine if the condition may be satisfied for realistic parameter values. The next section offers simulations where the workers with the higher search efficiency, FM-insiders determining wages lead to lower wages and thereby lower unemployment than if FM-outsiders determined wages.

6. Simulations

For the simulations we use the search efficiency function $f(e_i, s_i) = e_i s_i^{\alpha}$. The specific values of the variables are given in the table below (see Millard and Mortensen 1997):

b	k	y	q	c	δ
$0.7w$	0.3	1	0.06	1.5	0.1

The values of e_i and α are set in order to get a reasonable unemployment rate. The simulations performed are to compare the wage level and corresponding

unemployment rate when wages is chosen by high efficiency workers with $e_H = 0.63$ to the wage level and corresponding unemployment rate when wages is chosen by low efficiency workers with $e_L = 0.62$. α is throughout set to $\alpha = 0.96$. The results are given in the table below:

Variables\Decisive group	Insiders	Outsiders
s_H	0. 57529	0.56688
s_L	0.52688	0.51841
w	0. 92264	0.92288
U	0. 09563	0.09720

It follows that the marginal gain from search unambiguously increases with efficiency, implying that FM-insiders search more than FM-outsiders. For the specific search efficiency function and the parameters chosen, FM-insiders prefer a lower wage than FM-outsiders. We have that unemployment is lower when FM-insiders decide than when FM-outsiders decide.

The conclusion is that it may not be bad for the FM-outsiders, in terms of their employment chances, that the FM-insiders' preferences determine union wages. Depending upon the specific search efficiency function it may be the case that it is optimal for FM-insiders to search more than FM-outsiders, leading to a lower union wage and hence unemployment when FM-insiders have the majority in the union.

7. Conclusion

In this paper we have asked the question: is unemployment always higher when FM-insiders decide? The answer turns out to be no.

We have shown that when search is endogenous, FM-insiders may prefer lower wages than FM-outsiders, implying the wage level is higher in the hypothetical case of FM-outsiders being decisive in the union instead of the FM-insiders. This potentially happens when the optimal search intensity of the FM-insiders is higher

than the optimal search intensity of the FM-outsiders, for a given wage level. As search is costly, higher search intensity is associated with a lower expected income if the worker should lose his or her job and become unemployed. Hence, the union modifies its wage demand in order to increase the individual worker's transition rate from unemployment into employment.

We derived that lower wages, as expected, may reduce unemployment and presented simulations which generated higher wages and higher unemployment for FM-outsiders being decisive in the union. We do not prove that this is always so. The result depends upon the specification of the search efficiency function. The paper thus serves to illustrate that the effect of union bargaining on unemployment is, given search is endogenous, which we believe it is, perhaps not as clear-cut as expected.

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