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About Equilibrium Wages

Abstract

We consider two different sharing rules in a random matching model of job markets in- spired by Montgomery (1991, QJE). We show that the results are sensitive to the shar- ing rule. In particular, sharing rules that differ from that of Montgomery result in a difference between quoted wages and realised wages.
Key words: Random matching, wage differences, sharing rules
JEL classification: J41, D83

1. Introduction

The purpose of this note is to draw attention to the effects of different sharing rules, or mechanisms of wage determination, in labour markets. As a tool we use a matching model of labour markets by Montgomery (1991). He tries to capture three features. First, jobs with higher production potential, or higher capital-labour ratio, offer higher wages to identical workers than jobs with lower production potential. Second, the existence of queues, or multiple applications, for one job. Further, the queues should be longer for higher paying jobs. Third, the strategic complementarity of wages.

Montgomery (1991) constructs the following two-stage model that generates all three features. First firms post wages which are observed by workers. Then workers choose which firm to apply to. The workers adopt a symmetric mixed strategy over which firm to visit. If a firm meets a worker he is hired at the posted wage. If several workers apply to the same firm everyone of them has an equal probability of being selected.

Our point is that the sharing rule adopted by Montgomery (1991) is of importance, and it is by no means the only possible. We consider the same model but we change the sharing rule in such a way that when there are multiple workers applying for a job the employer plays the workers against each other. In other words, he gives the job to the worker who is willing to accept the lowest wage. This is theoretically a more satisfactory assumption than deciding randomly who gets the job since in this case the employer has market power, and he also utilises it.

From the empirical point of view it looks like when jobs are advertised the price/wage is not always quoted. In Helsingin Sanomat (January 31) from Finland there were 24 pages of vacancy announcements with no wage quotes for the private sector jobs. In Dagens Nyheter (January 31) from Sweden there were 30 pages of vacancy announcements with no wage quotes. In the Independent (January 30) from the UK there were 3 pages of vacancy announcements, and in most of them wages were mentioned. In the New York Times (January 31) there were 7 pages of vacancy announcement with no wages quoted; instead almost every advertisement offered competive salary. If the wage is not quoted the employer is not committed to any compensation above the minimum wage. We also shortly present a model where employers do not quote wages but the workers just decide which employer to visit. If exactly one worker visits a particular employer they share the available surplus, and if there are more applicants the employer plays them against each other.

2. The model

Montgomery (1991) presents a two-worker and two-employer case which captures all the relevant features of the more general model. Our approach is to consider the same 2x2-case for the same reason.

Firms 1 and 2 offer wages w1 and w2. Workers choose a symmetric mixed strategy (p,1–p) where p is the probability of applying to firm 1 and 1–p the probability of applying to firm 2. The workers' and the firms' reservation utility is zero. One could assume that it is positive but this would not change the results.

First we determine the workers' strategy. The equilibrium condition for the mixed-strategy is that a worker should earn the same expected wage in firms 1 and firm 2, i.e.,

w1Pr{one applicant}+0Pr{two applicants} = w2Pr{one applicant}+0Pr{two applicants}

Worker 1 is indifferent between firm 1 and firm 2 when

(1) w1(1–p)+0¥p=w2p+0¥(1–p)1

from which the probabilities can be solved

(2) p= , 1–p=

The probability above is not well defined when both firms announce zero wages. In this case we assume that the workers go to each firm with equal probability.

Raising the wage of firm 1 increases the probability that the workers apply to it as can be seen from

(3) = >0

Let us denote the value of the firms' production by vi, i=1,2. Firm 1 maximises its expected profits

Max(v1–w1)Pr{one applicant}+

(v1 – 0)Pr{two applicants},

which can be rewritten as

(4) Max(v1–w1)2p(1–p)+v1p2.

By inserting p from (2) into (4) we obtain

(5) Max(v1–w1) +v1 .

The first order condition for w1is

(6) – + +

=0.

From which firm 1's optimal wage can be solved

(7) w1= .

For firm 2 we obtain analogously

(8) w2= .

Let us assume that firm 1 is more capital-intensive, i.e. v1>v2. We immediately see that firm 1 offers higher wage than firm 2, w1>w2. By inserting w1 from (7) and w2 from (8) to (2), the application probabilities become

(9) p= ,1–p= .

Since v1 > v2 , p > 1 – p and workers apply to firm 1 with higher probability than to firm 2.

From (7) and (8) it is seen that the wages of the firms have no effect to each other. Thus, the strategic complementarity in Montgomery (1991) follows from the sharing rule. It is true that the firm with higher value of production quotes a higher wage, and that the workers put more weight to that firm. This results in longer queues in that firm, too, like in Montgomery (1991). However, one can easily think about the more general case by considering what would happen if there were three workers and two firms. When the workers adopt a symmetric mixed strategy it may happen that two workers end up in the firm that quotes the higher wage and one worker to the firm that quotes the lower wage. Then the realised wages are such that the worker who gets the job in firm 1 receives his reservation wage, i.e., zero, and the worker in firm 2 receives a higher wage. Thus, the second feature of Montgomery's model has to be qualified since there is a difference between quoted wages, and realised wages, or ex ante wages and ex post wages.

Finally, let us see what happens if the firms just advertise their existence without any wage offers. We assume that the sharing rule is such that the firm and the worker divide the available surplus in half if there is just one applicant. Otherwise the firm plays the applicants against each other. As the reservation value of the workers and firms is zero the available surplus is the same as the value of a firm's production. The workers' mixed strategy is determined by

(10) v1(1–p)+0p= v2p+0(1–p)

where the left hand side is the value of going to firm 1 and the right hand side the value of going to firm 2. From (10) one gets

(11) p = .

This sharing rule seems reasonable if the firms do not quote wages but just advertise open jobs. The rule produces similar results, as the rule considered previously.

References

Montgomery, J.D. 1991. Equilibrium wage dispersion and interindustry wage differentials. Quarterly Journal of Economics 106, 163–179.