

Problem set 4

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December 21, 2011

Question 1

Consider the problem of a firm in the efficiency wages model. Let's define the effective units of labour $E = e(w)L$. The firm produces using production function $Y = F(E)$.

- (i) what are the choice variables of the firm in the efficiency wage model? What that implies about the nature of the labour market or the nature of the jobs on offer?
- (ii) Derive and interpret the optimality condition of the firm's hiring decision.
- (iii) Consider effect on a earthquake which destroys big part of the national stock of capital. What would be response in the labour market? Contrast the effects in Solow model and in Efficiency wages model
- (iv) Can you think of some other effects which might affect the effort function either up or down? What will be the effect on unemployment and wages?

Solution

- (i) The firm chooses the wage rate w and the amount of labour L , so w and L are two choice variables.

In general, equilibrium in the labour market is a point in $w \times L$ space. In standard models, the equilibrium is pinned down by intersection of demand and supply curve. In another words, the firms are willing to hire more people as long as there are workers willing to accept the job if the wage is marginally decreased. However, in efficiency wage model, the firms also choose wage. Hence, two variables are chosen by the demand side, disregarding the supply side (provided that there are enough workers willing to work at the efficiency wage).

- (ii) The profit function in this case is

$$\Pi(w, L) = F(E) - wL = F(e(w)L) - wl$$

The first order conditions with respect to w and L give

$$F'(E) = \frac{1}{e'(w)} \tag{1}$$

$$F'(E) = \frac{w}{e(w)} \tag{2}$$

Equation (2) have standard interpretation; the firm hires labour as long as the marginal benefit of doing so is higher then the marginal cost. In this case note that the effort e directly scales the amount of hours worked. In traditional models, e would be fixed at 1. Here however, having twice as high effort allows firm to hire only half of the workers while maintaining the same output, hence the effort enters the equation (2).

Equations and (2) can be combined to obtain

$$\frac{e'(w)w}{e(w)} = 1. \quad (3)$$

Note that the left hand side is in fact the elasticity of effort with respect to wage. From the two first order conditions we get that the optimality requires firms to offer such wages that this elasticity is equal to 1. The intuition comes from the fact mentioned above. In order to increase production, the firm can either hire more people (increase L), keeping wage rate w fixed, or pay more to the existing workers (increasing w , keeping L fixed). In equilibrium none can be profitable.

- (iii) The effect of a drop in capital stock in Solow model has been studied in detail in previous classes. In the essence, the lower capital stock means that the labour is now less productive, which implies shift of the labour demand curve. Due to market clearing on the labour market, both wages and hours worked fall.

The effects in efficient wages model is different.

- (a) first see that (3) still has to hold and since there was no change in effort function, the optimal wage rate is still the same.
- (b) As in Solow model, lower stock of capital makes labour less effective (imagine $F(K, E)$ instead of $F(E)$), so the demand at any wage rate falls.
- (c) This means that the wage rate does no change, but the firms hire fewer workers (or hours). This means that the unemployment increases.
- (iv) In the simplest setting, the effort function is assumed to be exogenous. However, it is easy to think of incentives which might induce higher/lower effort:
- higher opportunities elsewhere might mean that workers less worried about loosing their job and hence shirk more
 - on the other hand, lower benefits might work in the opposite direction, as unemployment becomes harsher

Question 2

Suppose that you are suppose to advise the government on how to tackle the unemployment problem. The list of possible policies is following:

- *increase number of job centres,*
- *increase funding to re-training programmes,*
- *reduce minimum wage,*
- *increase unemployment benefits.*

Discuss what is the effect of each policy on different types of unemployment. Try to relate your answers to the models covered in the lectures.

Solution

More a discussion/open ended question, just briefly

- increase number of job centres
Job centres help to match employers with vacancies with job seekers. This can decrease the time needed to find a job and hence decrease the frictional unemployment

- increase funding to re-training programmes
Re-training programmes help unemployed workers to acquire new skills. This might help when the whole industry is made obsolete (think about decline of importance of heavy industry or mining). Hence this can address the structural unemployment
- reduce minimum wage
Minimum wage caps the labour market in the case where market clearing wage is below the market clearing wage. Note that for example in efficiency wages model, the minimum wage does not matter as long it is below the wage rate the firms decide to offer on their own and hence in this model the policy change would not have any effect.
- increase unemployment benefits.
Increase in benefits is decreasing the pain of unemployment. While this has positive effects on preventing aggregate demand from falling (as people who lost their jobs are not required to cut their consumption dramatically), it also makes the relative value of current job lower, relative to the unemployment state. This means that the frictional unemployment can go up. Furthermore, this policy change can have negative effects on the effort function of employed workers.