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TAXATION AND UNEMPLOYMENT BENEFITS WITH IMPERFECT GOODS AND LABOR MARKETS

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Taxation and Unemployment Benefits with Imperfect Goods and Labor Markets

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Abstract

We consider a model in which the labour market is characterized by search frictions and there is monopolistic competition in the goods market. We introduce proportional income taxation and unemployment benefits with Government balanced budget constraint. Then, we evaluate the effects of both more competition and higher unemployment benefits in the good market on labor market equilibrium and equilibrium tax rate. We show that more competition has a positive effect on equilibrium unemployment and the Government budget. Higher unemployment benefits can be financed either with higher tax rate or increasing goods market competition. Equilibrium unemployment rate raises in the former case while decreases in the latter one.

JEL classifications: H20, J64, J65

Keywords: Matching Models, Monopolistic Competition, Fiscal Policy, Unemployment Insurance

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1 Introduction

The aim of this paper is to study the interactions between income taxation and unemployment benefits in a theoretical framework where the labour market is characterized by frictions (Pissarides (2000)) and there is monopolistic competition in the goods market.

The issue of the interactions between labour and the product markets has been studied by different streams of literature.

In a general equilibrium framework, Hopenhayn and Rogerson (1993) have analyzed the effects of firing costs on the decisions rule that perfectly competitive firms follow in order to expand or contract their own employment level and to exit or enter, in the product market. They conclude that higher firing costs imply higher welfare costs deriving from an inefficient behavior of the firms and possibly lowers total long run equilibrium employment. With respect to our contribution, in Hopenhayn and Rogerson (1993), firms have not market power;: they operate in an environment with a perfect goods market and an imperfect labour market where a positive level of firing costs is introduced. In our framework both markets are imperfect, and we consider income taxation and unemployment benefits, instead of layoff costs.

Another stream of literature, relates labour market institutions to the degree of product market competition (Koeniger (2002); Saint-Paul (2002); Ebell and Haefke (2003); Kugler and Pica (2004)). The general result of such contributions is that the more product market is competitive, the more a rigid labor market is bad for the growth rate of the economy; however, when product market is not perfectly competitive, a higher labor market rigidity can possibly enhance growth driven, among others, by higher productivity.

Haan, Ramey, and Watson (2000), Ljungqvist and Sargent (2004) and Joseph, Pierrard, and Sneessens (2004) analyze how the functioning of labour market and its institutions affect the behavior of unemployment along the business cycle.

Finally, there are contributions (Bertola and Koeniger (2004); Wasmer and Weil (2004)) that relates labour market imperfections to credit markets imperfections, and by this channel the two main components of aggregate demand: consumption and investment.

Our model is an extension of the basic framework proposed by Ziesemer (2005). In an economy where a labour market with frictions and an imperfectly competitive goods market à la Dixit and Stiglitz (1977) coexist, we show that more competition in the goods market has a positive effect on the Government budget and on equilibrium unemployment. The public budget surplus can finance either higher unemployment benefits or tax expenditure. In the former case, the cost is represented by a lower increase in aggregate employment than in the latter case.

The paper is organized as follow. Next section describes the model, while section 3 focus on equilibrium, comparative statics and some policy considerations. Section 4 concludes.

2 The Model

2.1 Frictions in the Labor Market

Consider an economy with risk-neutral workers and firms which discount future at constant rate r. Labor force is given and normalized to one. Job-worker pairs are destroyed at the exogenous Poisson rate s. Unemployed workers and vacancies randomly match according to a Poisson process. If the unemployed workers are the only job seekers and they search with fixed intensity of one unit each, and firms also search with fixed intensity of one unit for each job vacancy, the matching function gives $h = h(u, v)$ where h denotes the flow of new matches, u is the unemployment rate and v is the vacancy rate.

The matching function is assumed to be increasing in each argument and to have constant return to scale overall.[1] Furthermore, it is assumed to be continuous and differentiable, with positive first partial derivatives and negative second derivatives.

By the property of the matching function, we can define the average rate at which vacancies meet potential partners by the following “intensive” representation of the matching function:

$$\frac{h(v, v)}{v} = m(\theta) \tag{1}$$

with $m'(\theta) < 0$ and elasticity $-\varepsilon(\theta) \in (-1, 0)$. θ is the ratio between vacancies and unemployed workers $\frac{v}{u}$ and can be interpreted as a convenient measure of the labour market tightness.

Similarly, $\frac{h(u,v)}{u}$ is the probability for an unemployed worker to find a job. Simple algebra shows that:

$$\frac{h(u, v)}{u} = \frac{h(u, v)}{v}\frac{v}{u} = \theta m(\theta) \tag{2}$$

The linear homogeneity of the matching function implies that $\theta m(\theta)$ is increasing with θ. The average durations of unemployment and vacancies are respectively $\frac{1}{\theta m(\theta)}$ and $\frac{1}{m(\theta)}$. This implies that the duration of unemployment decreases with the labour market tightness while the duration of a vacant job increases with θ. The dependence of the two transition probabilities, $m(\theta)$ and $\theta m(\theta)$, on the relative number of traders implies the existence of a trading externality (Diamond (1982)). Increasing vacancies causes a

[1] On the ground of empirical plausibility, see Petrongolo and Pissarides (2001) for a survey.

congestion on other firms as increasing unemployed job searchers causes a congestion on other workers.

The measure of workers who enter unemployment is $s(1-u)$, while the measure of workers who leave unemployment is $\theta m(\theta)u$. The dynamics of unemployment is given by the difference between inflows and outflows: $\dot{u} = s(1-u) - \theta m(\theta)u$. This differential equation defines dynamics converging to the unique steady state:

$$u = \frac{s}{s + \theta m(\theta)} \tag{3}$$

showing that θ determines uniquely the unemployment rate. The properties of the matching function ensures that the equation (3) is decreasing and convex.

Since $\theta u = \frac{uv}{v} = v$, we can derive the following equation for the vacancy rate:

$$v = \frac{s}{\frac{s}{\theta} + m(\theta)} \tag{4}$$

with $\frac{\partial \nu}{\partial \theta} > 0$.

Taking into account that there is proportional income taxation, consider now the "value" E of being an employed worker, This is defined by the following equation:

$$rE = w(1-t) + s(U - E) \tag{5}$$

An employed worker earns net wage $w(1-t)$, but looses his job with the flow probability s. In the latter case, his utility jumps down to that of an unemployed worker. The value U of being an unemployed worker is given by:

$$rU = b + \rho w(1-t) + \theta m(\theta)(E - U) \tag{6}$$

The unemployed worker earns a flow utility b, representing the value of leisure, plus the unemployment benefit as a fixed percentage ρ (replacement ratio) of the net wage $w(1-t)$. Then, with probability $\theta m(\theta)$, he finds employment.

2.2 Monopolistic Competition in the Goods Market

We assume that households have love-of-variety preferences that can be expressed by the following constant elasticity of substitution type:

$$y = \left[\int_{i=0}^{n} y_i^{\frac{\sigma-1}{\sigma}} di \right]^{\frac{\sigma}{\sigma-1}} \tag{7}$$

where y_i is the household consumption of good i and $\sigma > 1$ is the elasticity of substitution among differentiated goods, ranging from zero to n.

In continuos time, the problem of the representative household is to choose the value of consumption y_i that maximize:

$$\int_0^\infty e^{-\mu t} \left[\int_{i=0}^{n} y_i^{\frac{\sigma-1}{\sigma}} di \right]^{\frac{\sigma}{\sigma-1}} dt \tag{8}$$

subject to the following budget constraint:

$$\dot{A} = rA + I - \int_0^n p_i y_i di \tag{9}$$

and $A(0) = \bar{A} \geq 0$.

Where μ is the subjective discount rate, A is the current wealth, r is the interest rate, p_i is the price of good i. I can be defined as a mean of the workers income when employed or unemployed, weighted with his/her probability to be in the two states: $I = (1-u)\, w(1-t) + u\, [b + \rho w\,(1-t)]$.

The Hamiltonian current value of the intertemporal optimization problem is given by:

$$H = \left[\int_{i=0}^{n} y_i^{\frac{\sigma-1}{\sigma}} di \right]^{\frac{\sigma}{\sigma-1}} + \lambda \left[rA + (1-u)\, w(1-t) + u\, [b + \rho w\,(1-t)] - \int_0^n p_i y_i di \right] \tag{10}$$

The FOCs are:

$$\left[\int_{i=0}^{n} y_i^{\frac{\sigma-1}{\sigma}} di \right]^{\frac{1}{\sigma-1}} y_i^{-\frac{1}{\sigma}} - \lambda p_i = 0 \tag{11}$$

$$\dot{\lambda} - \mu\lambda = r\lambda \tag{12}$$

From equation (11) we can derive the following relationship for every couple of goods i and j:

$$\frac{y_i}{y_j} = \left(\frac{p_i}{p_j} \right)^{-\sigma} \tag{13}$$

Equation () shows that the relative demand for goods is independent of the income earned by employed or unemployed. σ is the constant elasticity of the demand function.

In steady state, condition (12) gives $r = \mu$. From equation (11) we can write:

$$\left[\int_{i=0}^{n} y_i^{\frac{\sigma-1}{\sigma}} di\right]^{\frac{1}{\sigma-1}} y_i^{-\frac{1}{\sigma}} = \lambda p_i$$

Solving for y_i yields:

$$y_i = (\lambda p_i)^{-\sigma} y \tag{14}$$

Substituting into (7) we obtain:

$$\lambda = \left(\int_0^n p_i^{1-\sigma} di\right)^{\frac{1}{\sigma-1}} = \frac{1}{p}$$

That is λ is the inverse of the price index. Substituting the latter equation into (14) we obtain the demand for good i:

$$y_i = \left(\frac{p_i}{p}\right)^{-\sigma} y \tag{15}$$

2.3 Profit Maximization

There is a large number of multiple-worker firms and each single firm is not able to affect the labour market tightness θ. Monopolistic competition in the goods market implies that each firm produces one of the goods that appear in the utility function.

Technology exhibits increasing return to scale and is defined by the following production function:

$$l_i = \phi + \alpha y_i \tag{16}$$

where l_i is the number of workers involved in production of good i. The marginal labour productivity is equal to one $\frac{1}{\alpha}$. ϕ is a fixed cost component.

The firm instantaneous profit in real term is given by:

$$\frac{\pi_i}{p} = \frac{p_i(y_i)}{p} y_i - w_i(\phi + \alpha y_i) - c v_i \tag{17}$$

where $p_i(y_i)$ is the inverse demand function facing by the firm producing good i, w_i is the real wage, and c is the cost of keeping the vacancy opened.

The firm maximizes the present discount value of expected profits:

$$\int_0^{\infty} e^{-rt}\left[\frac{p_i(y_i)}{p} y_i - w_i(\phi + \alpha y_i) - c v_i\right] dt \tag{18}$$

subject to the law of motion of quantity[2]:

[2] Equation (19) is derived from the law of motion of the firm employment given by $\dot{l} = m(\theta) v - sl$ using the production function (16).

$$\dot{y}_i = \frac{m(\theta)}{\alpha} v_i - s\left(\frac{\phi}{\alpha} y_i\right) \tag{19}$$

Solving the maximization problem, the firm chooses the number of vacancies, given the demand for goods, the output dynamic and the other parameters that describe the economy.

The Hamiltonian current value is:

$$H = \frac{p_i(y_i)}{p} y_i - w_i(\phi + \alpha y_i) - c v_i + \lambda\left[\frac{m(\theta)}{\alpha} v_i - s\left(\frac{\phi}{\alpha} y_i\right)\right] \tag{20}$$

The first order conditions are:

$$\frac{\partial H}{\partial v_i} = 0 \Rightarrow \lambda = \frac{c\alpha}{m(\theta)} \tag{21}$$

$$-\frac{\partial H}{\partial y_i} = \dot{\lambda} - r\lambda \Rightarrow \dot{\lambda} - r\lambda = -\left[\frac{p_i'(y_i)}{p} y_i + \frac{p_i'(y_i)}{p} - \alpha w_i - \lambda s\right] \tag{22}$$

Substituting equation (21) into (22), considering steady state ($\dot{\lambda} = 0$) and reminding that $\frac{1}{\sigma} = p_i'(y_i)\frac{y_i}{p_i(y_i)}$, we get the following job creation condition in price terms:

$$\frac{p_i(y_i)}{p} = \frac{\sigma}{\sigma - 1}\left(\alpha w_i + \frac{(r+s)c\alpha}{m(\theta)}\right) \tag{23}$$

which represents the standard price setting rule under imperfect competition: the firm sets the price of good i by a mark-up $\frac{1}{1-\sigma}$ on the marginal costs, given by the state of technology and the expected recruiting costs.

Finally, solving equation (23) for w_i, and considering symmetric equilibrium ($\frac{p_i(y_i)}{p} = 1$) we get the job creation condition as a relationship between real wage and labor market tightness:

$$w = \frac{1}{\alpha}\frac{\sigma - 1}{\sigma} - \frac{(r+s)c}{m(\theta)} \tag{24}$$

Equation (24) can be considered as a pseudo-labour demand and represents the level of wage that firms are willing to pay. The worker receives a wage lower than productivity $\frac{1}{\alpha}$ because of both the finite value of the demand elasticity of product ($\frac{\sigma-1}{\sigma} < 1$), and the search externality $\frac{(r+s)c}{m(\theta)}$.

2.4 Wage Setting

Since firms are multiple-worker, their outside option is to produce with one work less. Consider a firm with an open vacancy and $l_i - 1$ workers and define its value by $V(l_i - 1)$. Thus the stock price of this firm, $V(l_i - 1)$ must satisfy:

$$rV(l_i - 1) = -c + m(\theta)[J(l_i) - V(l_i - 1)] \tag{25}$$

With a flow probability $m(\theta)$ the firm fills the vacancy and its value jumps from $V(l_i - 1)$ to $J(l_i)$. Free entry implies that the value of a firm with an open vacancy cannot exceed the value of an inactive firm, i.e. zero. Thus, as long as some vacancies are held open at t, $V(l_i - 1) = 0$. Hence, equation (25) plus free-entry implies that:

$$J(l_i) = \frac{c}{m(\theta)} \tag{26}$$

Equation (26) states that the value of a filled job must be equal to the maintenance cost by the expected duration of a vacancy. Since a filled job can be destroyed with probability s, the current value of the expected value of a filled job is $(r+s)J(l_i) = \frac{(r+s)c}{m(\theta)}$. Labour cost per worker then equal $w + \frac{(r+s)c}{m(\theta)}$.

When a searching firm and a searching worker meet, there is a potential gain from trade. The wage contract is the instrument to split this surplus. Firms and workers are assumed to bargain over the wage and conditions under which separation occurs. Each party can force renegotiation whenever it wishes, and in particular when new information arrives (or, equivalently, the parties bargain continuously as long as they remain matched).

We assume that the sharing rule stems from the following Nash bargaining problem:

$$w = \arg\max\,[E - U]^{\beta}[J(l_i) - V(l_i - 1)]^{1-\beta} \tag{27}$$

The solution of this maximization programme yields the following sharing rule:

$$E - U = \frac{\beta(1-t)}{1-\beta}[J(l_i) - V(l_i - 1)] \tag{28}$$

which states that the worker obtain a fraction β of the total surplus produced by the economic activity.

Making use of the free entry condition and of equations (5), (6) and noting that $J(l_i) = \frac{c}{m(\theta)} = \frac{\frac{1}{\alpha}\frac{\sigma-1}{\sigma} - w}{r+s}$, we get:

$$w = \frac{(1-\beta)b}{(1-t)[1-(1-\beta)\rho]} + \frac{\beta}{1-(1-\beta)\rho}\left[\frac{1}{\alpha}\frac{\sigma-1}{\sigma} + c\theta\right] \tag{29}$$

This condition is known as the wage equation, and it is a positively sloped relationship between the wage and the labor market tightness. Note that, since cv is the total recruiting cost in the economy, $c\theta$ is the recruiting cost per unemployed worker. When θ is high (tight labour market) the expected recruiting cost faced by firms is high, while, conversely, the cost for workers to wait for the next job offer is low. This implies that workers can bargain better wages. Monopoly power in the goods market reduces the level of bargained wage. Moreover, the wage bargained by the workers increases in the value of their outside option, b, in the worker's bargaining power β, in the level of productivity $\frac{1}{\alpha}$ and in the cost of recruiting unemployed workers c.

2.5 Number and Firm Size

In order to determine the equilibrium size of the firm we have to impose the zero profit condition. Given equation (17) in symmetric equilibrium and equating it to zero, we get:

$$y - w\left(\phi + \alpha y\right) - cv = 0 \tag{30}$$

Let consider the low of motion of the firm's employment given by $\dot{l} = m\left(\theta\right)v - sl$, making use of the production function (16), solving for v in steady state equilibrium ($\dot{l} = 0$) we have:

$$v = \frac{s\left(\phi + \alpha y\right)}{m\left(\theta\right)} \tag{31}$$

Substituting the latter equation into zero profit condition (30) and solving by y yields:

$$y = \frac{1}{\alpha}\frac{\phi\left[\left(\sigma - 1\right)m\left(\theta\right) - \alpha\sigma cr\right]}{m\left(\theta\right) + \alpha\sigma rc} \tag{32}$$

which represents the equilibrium firm size. Looking at the first derivative with respect to θ of equation ((32), and considering that $m'\left(\theta\right) < 0$ we get:

$$\frac{\partial y}{\partial \theta} = \frac{m'\left(\theta\right)\phi\sigma^2 cr}{\left[m\left(\theta\right) + \sigma\alpha cr\right]^2} < 0$$

that is, the equilibrium single firm's production is a decreasing function of the labor market tightness. This is because higher tightness θ increases the expected recruiting costs, caused by the reduction of the probability of filling a vacancy $m\left(\theta\right)$.

We can now determine the equilibrium number of active firms. Total labor requirement is nl_i, where n is the number of firms. Equating this to the employment $1 - u$ and solving for n we get:

$$n = \frac{1-u}{l_i} \tag{33}$$

recalling that in symmetric equilibrium $\frac{P_i}{P} = 1$, and making use of the Beveridge curve (3), the production function (16) and the equation (32) we obtain:

$$n = \frac{1}{\phi} \frac{\theta}{s + \theta m(\theta)} \left[\frac{m(\theta) + \alpha\sigma cr}{\sigma} \right] \tag{34}$$

Since $\frac{\partial[1-u(\theta)]}{\partial\theta} > 0$ and $m'(\theta) < 0$ we get:

$$\frac{\partial n}{\partial \theta} = \frac{1}{\phi\sigma} \left[\frac{\partial [1-u(\theta)]}{\partial \theta} + \frac{\alpha\sigma cr \left[s - \theta^2 m'(\theta) \right]}{[s + \theta m(\theta)]^2} \right] > 0$$

that is, there is a positive relationship between the number of active firms n and the tightness of the labor market θ. Higher tightness of the labor market decreases the firm size and the unemployment rate with a positive effect on the equilibrium number of firms.

Finally, the aggregate level of output Y is simply obtained by multiplying the firm's equilibrium output (equation (32)) by the firm's equilibrium number (equation (34)):

$$Y = ny = \frac{\theta m(\theta)(\sigma - 1) - \theta\alpha\sigma cr}{\alpha\sigma [s + \theta m(\theta)]} \tag{35}$$

2.6 Government Budget Constraint

No public deficits are allowed, hence Government faces the following budget constraint:

$$t[(1-u)w + u\rho w] = u\rho w \tag{36}$$

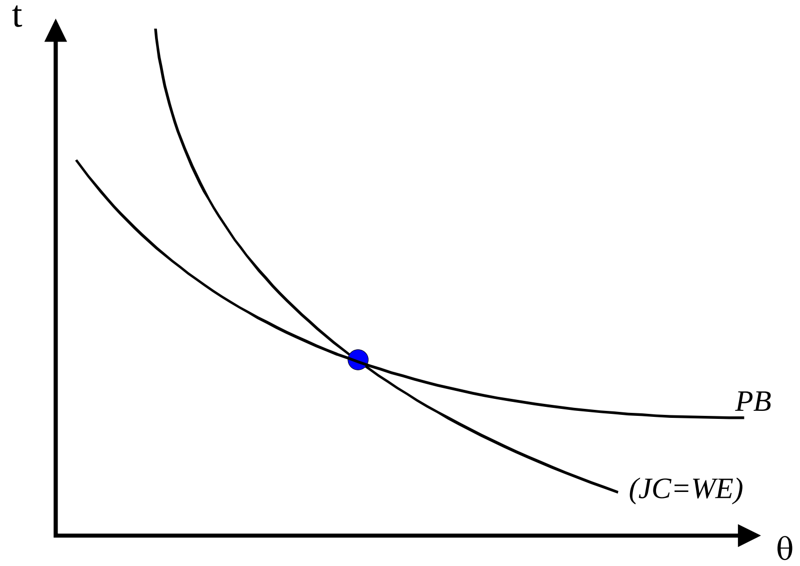
Looking at equation (36), on the left side we put the public revenue and on the right side we put the public expenditure. Public revenues comes from taxation t on gross wage bulk $(1-u)w$ and on unemployment benefit $u\rho w$, while public expenditure is the unemployment benefit ρw corresponded to unemployed workers u.

Making use of the Beveridge curve (3) and taking into account that $1 - u = \frac{\theta m(\theta)}{s + \theta m(\theta)}$, we can express the budget constraint as:

$$t = \frac{s\rho}{s\rho + \theta m(\theta)} \tag{37}$$

As $\theta m(\theta)$ is a decreasing function of θ, equation (37) states a decreasing relationship between the tax rate t and the labor market tightness. This is because higher θ decreases the unemployment rate; as a consequence we

FIGURE 1



have a reduction of the expenditure for unemployment benefits and, given t, an increase of the public revenue. Hence, the public budget balance requires a lower level of t.

3 Results

3.1 Equilibrium

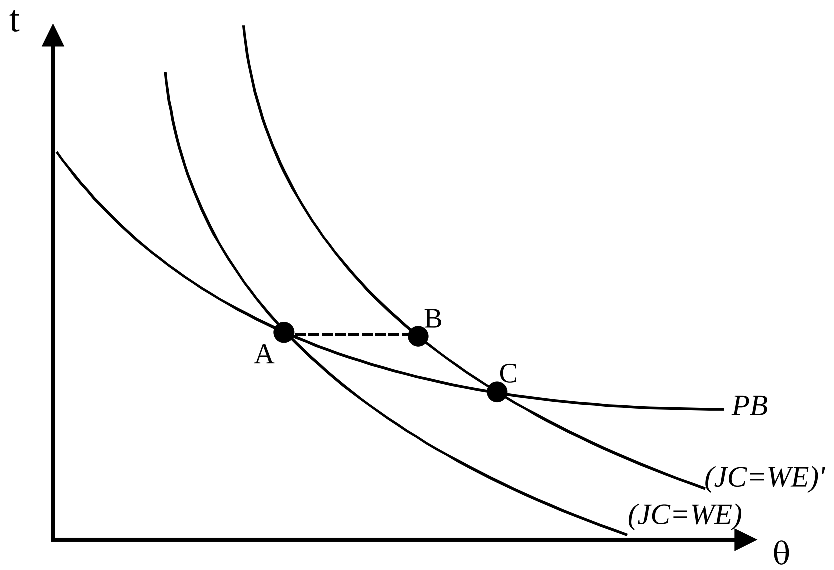
The steady state equilibrium is defined as a vector (w, θ, u, t, y, n) that solves the system of equations (24), (29), (3), (37), (32), and (34).

Equating equation (24) with equation (29) we obtain the following relationship:

$$\frac{1}{\alpha}\frac{\sigma-1}{\sigma} - \frac{(r+s)\,c}{m(\theta)} = \frac{(1-\beta)\,b}{(1-t)\,[1-(1-\beta)\,\rho]} + \frac{\beta}{1-(1-\beta)\,\rho}\left[\frac{1}{\alpha}\frac{\sigma-1}{\sigma} + c\theta\right] \tag{38}$$

that gives the pairs (t, θ) such that the labor market is in equilibrium. Equation (38) states a decreasing relationship between the tax rate t and the tightness of the labor market θ. To see this start from an initial situation where the labor market is in equilibrium for a given value of the tax rate t. Higher t increases the worker's option value (by the reduction of the net wage) leading firms to reduce the number of vacancies and, in this way, diminishing the equilibrium value of θ.

FIGURE 2



Equation (37) and (38) are a self contained block that gives the pair (t, θ) such that labor market is in equilibrium and the Government budget is in balance (see figure 1).[3] Because of equations (3), (32) and (34) depend only on labor market tightness we have the equilibrium value of the unemployment rate u, the firm production y and the number of firms n. Finally, substituting the equilibrium value of θ into the job creation condition (24), we get the equilibrium value of the gross wage.

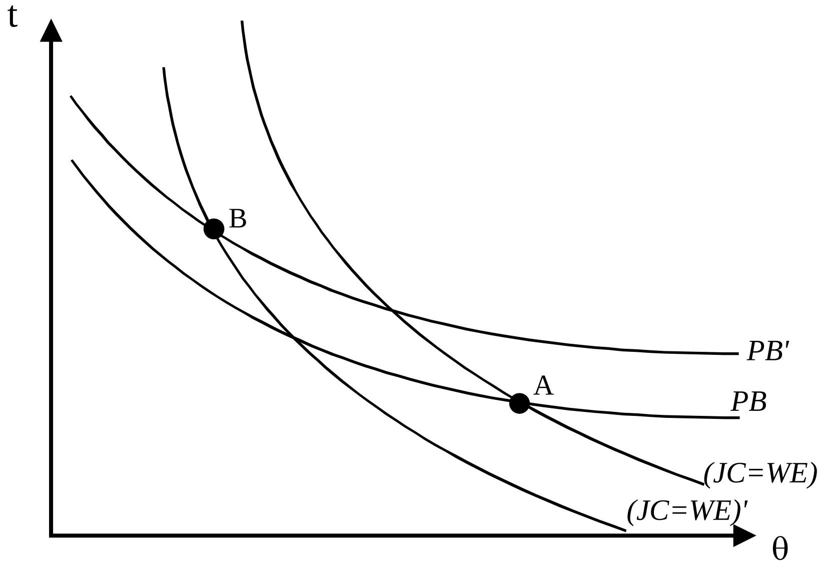
3.2 Comparative Statics

In this section we are going to do some comparative statics analysis, in order to assess the effects of changes in the demand elasticity σ and in the replacement ratio ρ.

Let consider the effect of an increase in the demand elasticity. Looking at figure 2, the $(JC = WE)$ curve moves up to the right. Given t, we have that both the wage that firms are willing to pay (*via* the job creation condition) and the one required by the workers (*via* the wage equation) increase; however, the latter increase is proportionally lower than the former: hence, given t, the "demand side" wage is higher than the "supply side" one. As a consequence, firms will open a higher number of vacancies, that in turn implies a higher level of θ: higher θ implies a lower equilibrium unemployment rate u (*via* the Beveridge curve) In terms of figure 2, this

[3] In principle, the PB curve could be steeper or flatter than the (JC=WE) curve. We focus on the latter situation since it guarantees a stable equilibrium.

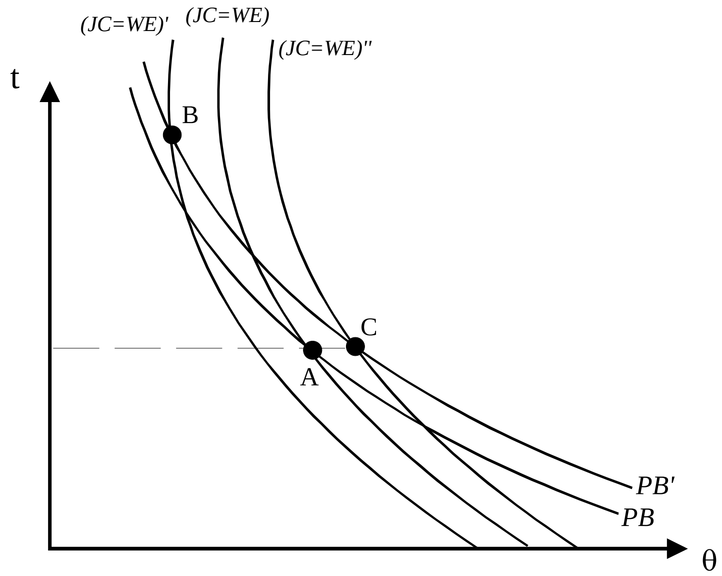
FIGURE 3



implies a shift from equilibrium A to point B, where the labor market is in equilibrium (point B is on the $(JC = WE)$ curve) but the public budget is in surplus (because of the lower level of unemployment). Given σ, lower tax rate t is required in order to balance the Government budget. The reduction of the tax rate produces a feedback on the bargained wage because workers will perceive a higher net wage and they will claim a lower gross wage, with a further positive effect on θ (given the wage offered by the firm). The final result of this process will be a higher equilibrium value of θ and a lower equilibrium value of t (point C in figure 2). We can also derive the effects on the equilibrium firm size and number of firms: from equations (32) and (34), the firm size decreases and the number of firms increases.

Consider now an increase in the replacement ratio ρ. This implies a shift down to the left of the $(JC = WE)$ curve and up to the right of the PB curve. The former effect stands from the fact that, given t, an increase in ρ enhances the option value of the worker which will claim for a higher gross wage. Consequently, because of the negative effect on profit, firms reduce vacancies. This leads to a higher level of wage w and a lower level of tightness θ. The shift of the PB curve is due to the fact that, given θ, an increase in ρ requires a higher tax rate t in order to balance the public budget. A specular process with respect to the one discussed above with regard to an increase in σ, leads to a lower equilibrium value of θ and a higher equilibrium tax rate t. Looking at figure 3, we move from equilibrium A to equilibrium B. From equations (32) and (34), the firm size increases and the number of firms decreases.

FIGURE 4



3.3 Discussion

Our framework suggests interesting implications for policy. In particular, it shows that labor market performance is not only a labor market story.

Looking at the experience of some European countries (especially Italy and Spain), the late Nineties have been the years of the increase in labor market flexibility by the introduction of atypical labor contracts and the change of the employment relationships. In terms of our model, this kind of labor market reforms can be viewed as a reduction of the workers' bargaining power β. The effect of a reduction in β has the same qualitatively effect on both the equilibrium value of the tax rate and the unemployment rate as an increase in goods market competition. Looking at figure 4 that assume that we are in both cases at equilibrium A.

The difference between the two policies is that lower bargaining power reduces the equilibrium gross wage while more competition increases it. Consequently, if the decrease in unemployment had been implemented by an increase in competition, we would have been a higher gross wage. Since the first way has been pursued, we have registered either a reduction or a lower increase in net wage and unemployed workers' income.

This has raised a policy debate on the opportunity to introduce some supports to unemployed workers (i.e. an increase in the replacement ratio ρ). The results of our model show that the introduction of an unemployment benefit, which produces negative effects on labor market performance, can be financed in two ways: increasing taxation (point B in figure 4) or with a proper increase in competition in the goods market (point C in figure 4). The first way can introduce in the economic system another distortions, with a further negative effects on unemployment. In contrast, reforms in the goods market towards a higher degree of competition can be able to maintain the same level of tax rate and to offset the negative effects on unemployment brought about by the raise of unemployment benefit.

4 Conclusion

In this paper we have analyzed the policy implications in a model with frictions in the labour market and monopolistic competition in the goods market, when Government has a balanced budget constraint. We have made comparative statics analyzing the effects on equilibrium of a change in the degree of product market competition and a change in the replacement ratio. It results that: *a*) more competition in the goods market leads to a lower equilibrium unemployment and, given the replacement ratio, a lower tax rate; *b*) higher unemployment benefits make the labor market tighter with a negative effect on equilibrium unemployment and require higher tax rate in order to balance the public budget. Summarizing, increasing competition in the goods market has a positive effect on the Government budget and on equilibrium unemployment; the public budget surplus can finance either higher unemployment benefits or tax expenditure. In the former case, the cost is represented by a lower increase in aggregate employment than in the latter case.

In this paper we do not tackle some interesting issues that could be object for future research. First of all, optimal income taxation implications should be investigated. Secondly, it would be interesting to evaluate the redistributive effects deriving from comparative static analysis. Such issue could be treated in two respects: redistributive effects between labor and entrepreneurs income and, introducing heterogeneity, redistributive effects among different type of agents. Finally, modelling progressive taxation could be able to enrich the model. These issues are on the top of the list in our agenda for future research.

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