The Employment (and Output) of Nations: Theory and Policy Implications
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Abstract

I study a model where firms bargain with unions over wages and employment levels. This interaction generates unemployment. Households take unemployment risk as given in making their participation decisions. I am thus able to study the interactions of product and labor market institutions in a three-states representation of the labor market. Unemployment matters because is inserts a wedge between labor supply (participation) and employment. Employment matters because it determines output. I uncover two feedback mechanisms, each reinforced by endogenous participation. The firt exploits the endogeneity of the number of firms to amplify the adverse effects on output of regulations and frictions that raise labor costs, work practice rigidities and the bargaining power of workers. The second exploits the endogeneity of market size to amplify the adverse effects of product market frictions that raise the costs of entry or of operation for firms. The multiplier effects due to these feedback mechanisms have interesting implications for the current policy debate. Labor market reforms that reduce the cost of labor are actually more attractive when one considers the endogenous structure of the product market. Similarly, pro-competitive product market reforms are more attractive when one considers the positive feedback on market structure that runs through the labor market.

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1 Introduction

In this paper I study the interaction between non-competitive labor and product markets in order to shed new light on the effects of institutions and policies on employment, unemployment and output.

As is well known, unemployment is high in economies where unemployment benefits are unrelated to the individual's effort to find work, the labor force is organized in sectorial (or firm-level) unions that do not coordinate their activities, and taxation raises the cost of labor.[1] Research undertaken in the 90s, reviewed in Nickell (1999) and Gersbach (1999), has augmented this view and convinced economists that the characteristics of the product market matter as well. The profession is currently experiencing an explosion of research on the role of product market factors, in particular the regulation of entry and competition, in determining macroeconomic performance (see, e.g., Boeri, Nicoletti and Scarpetta 2000, Fonseca et al. 2001, Pissarides 2001, Bertrand and Kramarz 2002, Blanchard and Giavazzi 2003, Ebell and Haefke 2004). The literature indeed has grown so rapidly, and branched out in so many directions, that it is becoming difficult to keep track of all that is going on without the aid of surveys. A recent one that I found quite is useful is Schiantarelli (2005).

Much of the current literature focuses on unemployment. In practice this boils down to specifying models where labor supply is inelastic and unemployment is the outcome of employment decisions only. The mechanism giving rise to unemployment varies across models, but the logic that all that matters occurs on the demand side of the labor market seems to go unchallenged. In this paper, in contrast, I take the view that unemployment is in essence a wedge between labor supply and employment, and that from a macroeconomic viewpoint we care about employment because it determines output. Specifically, what happens to output is the outcome of actions taken on two margins. On the supply side of the labor market agents choose whether to participate to the labor market in the presence of unemployment risk. Therefore, unemployment is *involuntary* in that households

[1] In his recent review of the state of the art, for example, Nickell (1997, p. 72) concludes: "High unemployment is associated with the following labor market features: (1) generous unemployment benefits that are allowed to run indefinitely, combined with little or no pressure on the unemployed to obtain work and to low levels of active intervention to increase the ability and willingness of the unemployed to work; (2) high unionization with wages bargained collectively and no coordination between either union or employers in wage bargaining; (3) high overall taxes impinging on labor or a combination of high minimum wages for young people associated with high payroll taxes; and (4) poor educational standards at the bottom end of the labor market."

control the mass of members that supply labor but not their probability of employment. Accordingly, some of the participating members do not find employment even if at the going wage they wish to work. On the demand side, employers (firms) bargain with unions over wages and employment and thereby determine how many of the individuals willing to work actually find employment. This approach allows me to identify separately supply-side and demand-side determinants of employment and unemployment. It also allows me to derive from the model's primitives a reservation wage that is decreasing in the unemployment rate.

The explicit consideration of a participation margin, corresponding to a standard elastic labor supply, proves to be very important in understanding the interaction of the labor and product markets. The reason is that it is an additional determinant of market size and thereby of firms' incentives to enter. Most importantly, its effects potentially amplify those of changes in unemployment. To see how this works, it is useful to go through an example.

Labor market institutions, tax policy and other factors that raise labor costs reduce employers' willingness to hire workers. In bargaining models this typically results in lower employment and higher unemployment. My model sheds light on two additional dimensions of this mechanism.

- *The adverse effects on output of regulations and frictions that raise labor costs, work practice rigidities and the bargaining power of workers are larger when one considers endogenous participation.* This feature simply captures the fact that the induced fall in employment is larger when labor supply is elastic and individuals withdraw from the labor force in response to a worsening of the labor market.

- The fall in employment shrinks the size of the market and thereby triggers a reduction in the number of firms. This entails a *multiplier effect that amplifies the adverse effects on output of these factors because the fall in the number of firms reduces employment further than what would be warranted if one considered the labor market in isolation.*

In a similar fashion, the model sheds light on the role of factors that affect the product market. The regulation of entry and competition, for example, is typically thought to lead to more concentrated markets. My analysis refines this mechanism in two dimensions.

- The endogeneity of employment entails a feedback mechanism running from the product market to the labor market. Specifically, *regulations* *and frictions that raise the costs of entry and/or of operation for firms result in* a *larger reduction of the number of firms than would obtain if employment were held constant*. There is thus another multiplier effect at work that exploits the endogeneity of market size to amplify the adverse effects on output of interventions that worsen the product market.

- Because the multiplier effect running from the product to the labor market is driven by the endogeneity of employment*, the adverse effects on output of product market regulations are actually stronger when one considers endogenous participation*.

The analysis of the feedback mechanisms linking labor and product markets has two general implications concerning the current policy debate. First, labor market reforms that reduce the cost of labor, like those advocated by the OECD in its Jobs Study (1994), have effects in the product market that reinforce their direct effects on employment and unemployment. In other words, the reforms advocated by the OECD are even more attractive when one considers the endogenous structure of the product market because of the positive feedback that runs through the product market.

The second implication stems from the positive feedback in the other direction. Product market reforms that attract entry raise employment and reduce unemployment. The rise in employment expands the economy's scale of activity and attracts more entry, which further raises employment and educes unemployment. Hence, the increase in entry that these reforms generate is larger than one would expect if the labor market effect of, say, lower barriers to entry were ignored. These results provide a theoretical rationale for the pro-competitive reforms advocated in a series of studies undertaken at the McKinsey Global Institute (1995, 1997) and show that these reforms are even more attractive when one considers the positive feedback on market structure that runs through the labor market.[2]

I proceed as follows. In Section 2, I set up the model that I use to develop the main argument of the paper. In Section 3, I study the product market. In Section 4, I study the labor market. In Section 5, I study the general equilibrium of the model and show how the interaction of product and labor markets determines employment, unemployment and output. In Section 6, I discuss the effects of structural parameters and policy instruments. I conclude in Section 7.

[2]See also Baily (1993), Baily and Gersbach (1995), Gersbach and Sheldon (1996) and Gersbach (1999) for a survey article.

2 The Model

2.1 Production

A representative competitive firm produces a final good that can be consumed or invested by assembling differentiated intermediate goods according to the technology

$$Y = N^{-\frac{1}{\epsilon-1}} \left[\int_0^N x_i^{\frac{\epsilon-1}{\epsilon}} di \right]^{\frac{\epsilon}{\epsilon-1}}, \quad \epsilon > 1 \tag{1}$$

where ϵ is the elasticity of product substitution, x_i is the final producer's use of each differentiated good, and N is the mass of intermediate goods (also the mass of intermediate firms; see below).

The final good is the *numeraire*. The final producer thus maximizes profits subject to the budget constraint $Y = \int_0^N p_i x_i di$, where p_i is the price of intermediate good i. This yields the demand schedule for good i,

$$x_i = \frac{Y}{N} \left(\frac{p_i}{P} \right)^{-\epsilon}, \tag{2}$$

where

$$P = \left[\frac{1}{N} \int_0^N p_j^{1-\epsilon} dj \right]^{\frac{1}{1-\epsilon}}$$

is the price index for intermediate goods.

Each intermediate good is produced by one firm with the technology

$$x_i = (l_i - \phi)^{\theta}, \quad 0 < \theta < 1, \ \phi > 0 \tag{3}$$

where x_i is output and l_i is labor. This technology exhibits diminishing returns to labor and a fixed labor requirement. The latter implies a fixed operating cost that justifies the assumption that each good is produced by one, and only one, firm. Since intermediate firms are atomistic, moreover, they take the price index P at the denominator of (2) as given and face demand curves that feature constant elasticity ϵ.

In equilibrium the profit of the competitive final producer is zero. It follows that the price index of intermediate goods equals the price of the final good, $P = 1$, and without loss of generality can be omitted from (2) in the rest of the analysis.

2.2 Consumption, saving and labor market participation

There is one representative household with a continuum of mass $\Lambda(t) = \Lambda_0 e^{\lambda t}$ of members. Each member is endowed with one unit of labor. The household maximizes

$$U(0) = \int_0^\infty e^{-\rho t}\Lambda\left[\log\left(\frac{C}{\Lambda}\right) + \psi\log\left(\frac{\Lambda - L^s}{\Lambda}\right)\right]dt, \quad \rho > \lambda > 0,\ \psi > 0$$

subject to the flow budget constraint

$$\dot{A} = rA + L^s\left[W(1-\tau)p_e + Bp_u\right] + T - C, \quad 0 < \tau < 1$$

where ρ is the individual discount rate, C is consumption, L^s is the mass of household members that offer their labor for a wage (participate in the labor market), A is assets holding, and T is a lump-sum transfer from the government. (To simplify the notation I omit the time argument whenever confusion does not arise.) The assets available to the household are ownership shares of firms. Hence, r is the rate of return on stocks. The assets market is competitive.

Three features of this setup are important. First, unemployment is *involuntary*: the household controls the mass of members that supply labor but not their probability of employment. Thus, some of the participating members do not find employment even if at the going wage they wish to work. The probability of being employed is p_e; the probability of being unemployed is p_u. The household takes these probabilities as given.

The second feature, which is a direct consequence of involuntary unemployment, is that the budget constraint contains the household's expected income: each household member that participates in the labor market earns the after-tax wage $W(1-\tau)$ if he is employed and the unemployment insurance benefit B if he is unemployed.[3] Since there are N firms, the pre-tax wage is the weighted average

$$W = \int_0^N w_i \frac{l_i}{L} di,$$

where the weight assigned to the wage w_i paid by firm i is its share of employment l_i/L.

[3] I assume that the benefit is not taxed. This is extreme, but it is simply meant to capture the fact that unemployment benefits are taxed more lightly than wages; see Daveri and Tabellini (2000, pp. 58-59) for evidence on this point.

The third feature captures the basic trade-off that governs labor supply and thus determines workers' wage demands. The household's instantaneous utility contains a term that captures the role of household members that do not participate in the labor market; one can think of home production or other related activities the output of which is shared by all household members.[4] This determines the opportunity cost of labor market participation, and thus contributes to determine the wage demands of employed workers. Participation takes 100% of the household's member time.

The maximization problem outlined above yields well-known results with some novel features. The household follows the usual saving rule

$$\frac{\dot{C}}{C} = r + \lambda - \rho \tag{4}$$

and equates the benefit from the marginal household member's participation to the cost. Formally,

$$W\left(1-\tau\right)p_e + Bp_u = \frac{\psi C}{\Lambda - L^s}.$$

On the left-hand-side of this expression there is the expected income from participation, on the right-hand-side there is the expected cost, the foregone contribution of the marginal individual to household production. Observe now that given employment L, the unemployment rate is

$$u \equiv 1 - \frac{L}{L^s}.$$

Assuming (instantaneous) random allocation of work among household members participating in the labor market, I can write $p_u = u$ and $p_e = 1 - u$. (Recall that the representative household takes these probabilities as given.) Participation therefore can be written

$$L^s = \Lambda - \frac{\psi C}{W\left(1-\tau\right) - \left[W\left(1-\tau\right) - B\right]u}. \tag{5}$$

This is the economy's upward sloping labor supply curve. Consumption, C, enters negatively because it raises the opportunity cost of participation; the

[4] Implicit in this setup is the assumption that the household insures its members participating in the labor market against unemployment. This simplifies the analysis because all household members get the same flow of utility.

unemployment insurance benefit, B, enters positively because it raises the expected income from participation.[5]

Labor supply depends on the unemployment rate via two effects. First, higher unemployment means that the participating individual is less likely to be employed and thus to earn the after-tax wage. This lowers the expected benefit of participation. Second, higher unemployment means that the individual is more likely to be unemployed and thus to draw the insurance benefit B. This raises the expected benefit of participation. The model's equilibrium conditions imply that the after-tax wage is higher than the unemployment benefit so that labor supply is *decreasing* in the unemployment rate (see below). This captures a "discouraged worker effect" whereby worse employment prospects in the labor market lower a worker's expected income and thus reduce participation.

2.3 Wages and prices at the firm level

The firm bargains with its workers over the wage and employment. I follow the standard approach and model bargaining as

$$\max_{w_i, l_i} \quad \left[(1-\gamma)\log \pi_i + \gamma \log \left(w_i \left(1-\tau\right) - W_a\right) l_i\right], \quad 0<\gamma<1$$

The parameter γ is the relative bargaining power of the workers. The firm and its workers maximize jointly the log-geometric average of profits and employees surplus. The firm and the workers take the alternative,

$$W_a = W\left(1-\tau\right)\left(1-u\right) + Bu = \frac{\psi C}{\Lambda - L^s},$$

as given since it depends on aggregate variables. If negotiations break down, the worker can quit the firm and reenter the labor market, in which case he gets the expected labor income. Alternatively, he can allocate all of his time to household production, in which case he gets the value of his marginal contribution. These two options are equivalent because in deciding labor supply the household sets them equal (see above).

[5] It is important not to confuse the role of the unemployment insurance benefit in raising expected income from participation with its role as the alternative to the wage in a setup where the worker chooses whether to accept employment or stay unemployed. It is well known that in that setup employment is decreasing in the benefit. The resulting unemployment, however, is not involuntary.

I now use the production function (3) and the demand curve (2) to write instantaneous profits as

$$\begin{aligned} \pi_i &= p_i x_i - w_i l_i \\ &= \left(\frac{Y}{N}\right)^{\frac{1}{\epsilon}} (l_i - \phi)^{\theta\left(1-\frac{1}{\epsilon}\right)} - w_i l_i. \end{aligned}$$

Let $\eta \equiv \theta\left(1-\frac{1}{\epsilon}\right) < 1$. This parameter combines diminishing returns to labor and the responsiveness of demand to price into a single number that, together with the fixed cost, regulates the curvature of the firm's revenue function with respect to employment l_i. Specifically, the elasticity of revenue with respect to employment is

$$\frac{\partial\left(p_i x_i\right)}{\partial l_i}\frac{l_i}{p_i x_i} = \frac{\eta l_i}{l_i - \phi}.$$

This elasticity is smaller the more pronounced are diminishing returns to labor (low θ), the less elastic is demand (low ϵ), the smaller is the fixed operating cost (low ϕ), and the larger is the firm (large l_i).

The first-order conditions for the maximization problem are:

$$\frac{1-\gamma}{\gamma}\left[\frac{\partial\left(p_i x_i\right)}{\partial w_i} - l_i\right] + \frac{\pi_i}{w_i - \frac{W_a}{1-\tau}} = 0,$$

$$\frac{1-\gamma}{\gamma}\left[\frac{\partial\left(p_i x_i\right)}{\partial l_i} - w_i\right] + \frac{\pi_i}{l_i} = 0.$$

Observing that $\frac{\partial(p_i x_i)}{\partial w_i} = 0$ and substituting the first condition into the second, I obtain

$$w_i = \frac{W_a}{1-\tau} + \frac{\gamma}{1-\gamma}\frac{\pi_i}{l_i},$$

which says that workers get the reservation wage (adjusted for labor income taxation) plus a fraction of the firm's profit. Using this result, I can rewrite the condition for employment as

$$\frac{\partial\left(p_i x_i\right)}{\partial l_i} = \frac{W_a}{1-\tau},$$

which equates the marginal revenue from employment to the reservation wage. This yields

$$l_i = \frac{1-\tau}{W_a}\eta p_i x_i + \phi. \tag{6}$$

Using this expression and the definition of profit, I can rewrite the equation for the wage as

$$w_i = \frac{W_a}{1-\tau}\left(1+m_i\right), \tag{7}$$

where

$$m_i \equiv \gamma\left(\frac{l_i-\phi}{\eta l_i}-1\right).$$

This says that the wage is set as a markup over the reservation wage and that the markup is the inverse of the employment elasticity of revenue minus 1. According to this expression larger firms pay higher than average wages since they operate in the less elastic region of their revenue curve.

3 Instantaneous equilibrium of the labor market

To characterize the labor market more sharply, I assume that the government cannot borrow and satisfies the budget constraint $T = \tau WL - B(L^s - L)$, which determines the lump-sum transfer, T, as the difference between tax revenues and expenditure on benefits.[6] I also assume that the unemployment benefit is a constant fraction of the wage, $B = \sigma W$.

Next I make use of the fact that symmetry implies that all firms pay the same wage so that $w_i = W$. The wage equation (7) yields

$$1 = \frac{\left(1-\tau\right)\left(1-u\right)+\sigma u}{1-\tau}\left(1+m\right).$$

This can be solved for

$$u = \frac{1-\tau}{1-\tau-\sigma}\frac{m}{1+m}, \tag{8}$$

where

$$m = \gamma\left(\frac{l-\phi}{\eta l}-1\right). \tag{9}$$

[6] This setup keeps to a minimum the effect of the government on economic activity. Only two distortions matter: taxation, which lowers labor supply and raises the pre-tax wage that unions demand, and the unemployment benefit, which raises both labor supply and the pre-tax wage that unions demand.

Observe that unemployment is an increasing function of firm employment l that eventually becomes flat. To ensure $u < 1$, I impose

$$\gamma \left(\frac{1}{\eta} - 1 \right) < \frac{1 - \tau - \sigma}{\sigma},$$

which says that the upper asymptote of (8) is less than 1. This condition is surely satisfied if $\sigma = \tau = 0$.

An important property of this model is that the equilibrium of the labor market is not fully characterized by the unemployment equation (8) because labor supply is endogenous. Specifically, according to equation (5) participation is

$$L^s = \Lambda - \frac{\psi}{1 - \tau - (1 - \tau - \sigma)\, u} \frac{C}{W}.$$

I can divide through by population size Λ and multiply and divide the ratio $\frac{C}{W}$ by L and Y so to obtain

$$\frac{L^s}{\Lambda} = 1 - \frac{\psi}{1 - \tau - (1 - \tau - \sigma)\, u} \frac{\frac{C}{Y}}{\frac{WL}{Y}} \frac{L}{\Lambda}.$$

Observing that $L = L^s (1 - u)$, I can solve explicitly for the participation and employment ratios:

$$\frac{L^s}{\Lambda} = \frac{1}{1 + \frac{(1-u)\psi}{1-\tau-(1-\tau-\sigma)u} \frac{c}{\frac{WL}{Y}}} \tag{10}$$

$$\frac{L}{\Lambda} = \frac{1 - u}{1 + \frac{(1-u)\psi}{1-\tau-(1-\tau-\sigma)u} \frac{c}{\frac{WL}{Y}}}. \tag{11}$$

where $c \equiv C/Y$ is the economy's consumption ratio and WL/Y is the wage share.

I now use the expression for firm employment (6), the wage setting equation (7) and aggregation across firms to obtain

$$L = \frac{(1 + m)\, \eta}{W} Y + \phi N.$$

I then use the relation $L = Nl$ to compute the wage share as

$$\frac{WL}{Y} = \gamma + (1 - \gamma) \frac{\eta l}{l - \phi}. \tag{12}$$

Observe that the wage share is decreasing in firm employment l.

Equations (8) through (12) provide a complete characterization of the labor market at a point in time once one knows firm employment l and the consumption ratio c. The evolution over time of these two variables depends on the entry process that provides the fundamental accumulation mechanism of this model. The next section discusses this process in detail. As an intermediate step toward that goal, I use (12) to rewrite the expression for the employment ratio as

$$nl = \frac{1-u}{1+\frac{(1-u)\psi}{1-\tau-(1-\tau-\sigma)u}\frac{c}{\gamma+(1-\gamma)\frac{\eta l}{l-\phi}}}, \tag{13}$$

where $n \equiv N/\Lambda$ is the mass of firms per capita. I shall refer to this expression as the participation locus and to equation (8) above as the bargaining locus. The joint solution of these two equations characterizes the instantaneous equilibrium of the labor market in relation to the mass of firms per capita n and the consumption ratio c. Figure 1 and the following proposition illustrate.[7] A + on top of a variable denotes a positive partial derivative, a − denotes a negative partial derivative, while a ? denotes an ambiguous sign.

Proposition 1 *The instantaneous equilibrium of the labor market is characterized by the following two functions mapping the mass of firms per capita, n, and the consumption ratio, c, into firm employment, l, and the unemployment rate, u:*

$$l\left(\overset{-}{n},\overset{-}{c};\overset{+}{\eta},\overset{+}{\phi},\overset{?}{\gamma},\overset{-}{\tau},\overset{?}{\sigma},\overset{-}{\psi}\right);$$

$$u\left(\overset{-}{n},\overset{-}{c};\overset{?}{\eta},\overset{?}{\phi},\overset{+}{\gamma},\overset{?}{\tau},\overset{+}{\sigma},\overset{-}{\psi}\right).$$

Associated to these, there is the following function mapping the mass of firms per capita, n, and the consumption ratio, c, into the economy's employment ratio, L/Λ:

$$\frac{L}{\Lambda}\left(\overset{+}{n},\overset{-}{c};\overset{+}{\eta},\overset{+}{\phi},\overset{?}{\gamma},\overset{-}{\tau},\overset{?}{\sigma},\overset{-}{\psi}\right).$$

[7] Inspection of the figure suggests that is possible that the two curves fail to intersect so that in equilibrium $u = 0$. I show below that in steady state it is always the case that the intersection occurs and $u > 0$.

The mechanism explaining the comparative statics properties of this equilibrium is the following. The bargaining locus is upward sloping because an increase in firm employment l yields an increase in the markup m. Restoring equilibrium requires a rise in unemployment u. The participation locus, in contrast, is downward sloping. The reason is that higher firm employment implies a lower wage (due to diminishing returns to labor in the firm production technology) and, holding constant n, higher aggregate employment. The latter implies a higher marginal cost of participation because diminishing returns in household activity imply that its marginal product rises. Restoring equilibrium then requires a fall in unemployment u that provides better job prospects to the marginal worker. The higher probability of employment raises the marginal benefit of participation while at the same time reduces the sacrifice of time needed for market participation and thereby rises the amount of time devoted to home activity thus reducing its marginal product.

Now observe that an increase in n does not affect the bargaining locus while it implies higher aggregate employment and thereby a higher marginal product of home activity. The corresponding lower participation requires a compensatory fall in unemployment in order to satisfy equation (13). It follows that the participation locus shifts down. As a result, both firm employment and the unemployment rate fall. In contrast to firm employment, the employment ratio rises with n. To see why, imagine to apply the relation $L/\Lambda = nl$ to rewrite the bargaining and participation loci in $(L/\Lambda, u)$ space instead of (l, u) space. With this change of variable, the participation locus shifts up because the increase in n reduce firm employment l and raises the labor share. This attracts participation and for equation (13) to hold, there must be a compensatory increase in unemployment u. The bargaining locus instead shifts down because the higher n spreads employment over more firms and makes them smaller, thus producing a smaller markup over the reservation wage. Consequently, unemployment falls and the employment ratio rises.

An increase in the consumption ratio c leaves the bargaining locus unaffected while reduces participation and thereby requires a compensatory fall in unemployment to satisfy equation (13). As a consequence, the participation locus shifts down and the new equilibrium exhibits lower firm employment and unemployment. Notice that since $L/\Lambda = nl$ and n is given, the employment ratio falls as well.

An interesting property of this equilibrium is that is captures the tension between the different effects of structural parameters on the employment and the participation margins. Ultimately this is because unemployment provides a wedge between labor supply and employment. For example, the reason why the effect of γ on firm employment is ambiguous is that the stronger bargaining power of workers results in a larger wage share – see (12) – and thereby in higher participation. This effect shows up in Figure 1 as an upward shift of the participation locus. The expansion of labor supply should yield larger employment (aggregate and, holding constant n, per firm). However, the stronger bargaining power of unions also results in higher unemployment, an effect captured by an upward shift of the bargaining locus – see (8). The overall effect on unemployment is surely positive, while the overall effect on employment is ambiguous. Notice how this logic also explains the effects of the replacement ratio σ. Higher unemployment benefits raise both participation and unemployment – both the participation and bargaining loci shift up – so that the overall effect on employment is ambiguous.

In contrast, higher taxation of wages τ reduces participation and results in smaller employment (aggregate and per firm). This effect shows up as a downward shift of the participation locus. On the other hand, higher taxation of wages raises unions' demands and tends to raise unemployment, an effect captured by the upward shift of the bargaining locus. As one can see, if the fall in participation is sufficiently large employment and unemployment can both fall. If instead participation is not very sensitive to after-tax wages, employment falls and unemployment rises.

Similar reasoning explains the effects of the parameters η and ϕ that regulate the elasticity with respect to employment of the firm's revenue. An increase in either of them lowers the markup m and raises the wage share thereby shifting the bargaining locus down and the participation locus up. This results in higher employment and higher or lower unemployment depending on which force dominates.

4 General Equilibrium

The previous analysis has provided a complete characterization of the labor market at a point in time given the consumption ratio c and the mass of firms per capita n. To characterize the evolution over time of these two variables and thereby of the whole economy I now need to characterize the entry process that provides the fundamental accumulation mechanism of this model. The construction of the general equilibrium of this economy is then straightforward. There is an Euler equation characterizing the equilibrium of the assets market, whereby all rates of return are equalized, and an equation characterizing the equilibrium of the goods market, whereby output is allocated to consumption and investment. The latter equation is where this model deviates from the standard setup because the state variable of this economy is the mass of firms per capita.

4.1 Entry

The flow of dividends accruing to firm i's shareholders is π_i. Accordingly, the share price is

$$V_i(0) = \int_0^{\infty} e^{-\int_0^t r(v)dv} \pi_i(t)dt,$$

and satisfies the arbitrage condition

$$r = \frac{\pi_i}{V_i} + \frac{\dot{V}_i}{V_i},$$

where the characterization of firm behavior in Section 2 yields that the firm's profit is

$$\frac{\pi_i}{p_i x_i} = (1-\gamma)\left(1 - \frac{\eta l_i}{l_i - \phi}\right).$$

According to this expression, the profit rate of firm i is increasing in firm employment.

I assume that entrepreneurs create new firms by sinking an entry cost $\beta p_i x_i$ in units of final output. Notice that this cost is proportional to the firm's initial revenue. Entrants are active if the value of entry is equal to its cost, that is, if $V_i = \beta p_i x_i$. In symmetric equilibrium this condition becomes $V = \beta \frac{Y}{N}$. Taking logs and time derivatives, substituting into the arbitrage condition, and using the expression for the profit rate, I obtain the free-entry condition

$$r = \frac{1-\gamma}{\beta}\left(1 - \frac{\eta l}{l - \phi}\right) + \frac{\dot{Y}}{Y} - \frac{\dot{N}}{N}. \tag{14}$$

This is the instantaneous rate of return on equity generated by firms.

4.2 The economy's dynamics

Assets market equilibrium requires $A = NV = \beta Y$. The government budget is $T + \sigma W (L^s - L) = \tau W L$. Therefore, the household budget constraint becomes

$$\frac{\dot{Y}}{Y} = r + \frac{WL - C}{\beta Y},$$

The saving schedule (4) and the definition $c \equiv C/Y$ yield

$$\frac{\dot{c}}{c} = r + \lambda - \rho - \frac{\dot{Y}}{Y}.$$

Substituting this expression into the one just derived and using equation (12) for the wage share yields

$$\frac{\dot{c}}{c} = \frac{1}{\beta}\left[c - \gamma - (1-\gamma)\frac{\eta l}{l - \phi}\right] + \lambda - \rho,$$

where l is given by the function $l\left(\overset{-}{n}, \overset{-}{c}; .\right)$ characterized in Proposition 1.

The output market clearing condition requires

$$Y = C + \beta \frac{Y}{N}\dot{N}.$$

Since entry is non-negative, one has $\dot{N} > 0$ for $Y > C$ and $\dot{N} = 0$ otherwise. This condition identifies two regions: the entry region, where entry is profitable, and the hysteresis region, where entry is not profitable and the mass of firms is fixed. For simplicity, I ignore the hysteresis region since population growth implies that the steady state of the dynamical system is inside the entry region. Dividing through by Y, and using the definition $n \equiv N/\Lambda$, the output market clearing condition reads

$$1 = c + \beta\left(\frac{\dot{n}}{n} + \lambda\right).$$

The analysis is now straightforward. The $\dot{n} = 0$ locus is simply $c = 1 - \beta\lambda$. The $\dot{c} = 0$ locus is

$$c = \beta(\rho - \lambda) + \gamma + (1-\gamma)\frac{\eta l}{l - \phi}.$$

This equation defines an upward sloping locus $c(n)_{\dot{c}=0}$. Consider now the phase diagram in Figure 2. Paths above the saddle path eventually yield zero or negative n and thus cannot be equilibria. Paths below the saddle path eventually yield zero or negative c and similarly cannot be equilibria. Hence, I have:

Proposition 2 *There is a unique perfect-foresight general equilibrium: given initial condition n_0, the economy jumps on the saddle path and converges to the steady state (n^*, c^*).*

4.3 The steady state

The characterization of the steady state is extremely simple. Substituting $c^* = 1 - \beta\lambda$ into the $\dot{c} = 0$ locus and using (12) I obtain

$$\left(\frac{WL}{Y}\right)^* = 1 - \beta\rho = 1 - \left(\frac{N\pi}{Y}\right)^*. \tag{15}$$

This expression says that in the long run the wage and profit shares depend solely on the entry cost, β, and the discount rate, ρ. The intuition is straightforward. In steady state the free-entry condition reduces to

$$\beta\rho = \frac{\pi}{px} = \frac{N\Pi}{Y},$$

which says that firms must deliver to savers the reservation interest rate ρ, and that to do so they must generate a profit ratio equal to $\beta\rho$. Accordingly, I can use (12) to solve for firm employment

$$l^* = \frac{\phi}{1 - \frac{\eta}{1 - \frac{\beta\rho}{1-\gamma}}}. \tag{16}$$

Notice how taxes on labor and the replacement ratio do not enter this solution. Also, notice that l^* is increasing in ϕ, η, β, ρ, γ.

Substitution of l^* into the bargaining locus (8) yields

$$\begin{aligned} u^* &= \frac{1-\tau}{1-\tau-\sigma} \frac{1}{1 + \gamma\left(\frac{l^* - \phi}{\eta l^*} - 1\right)} \\ &= \frac{1-\tau}{1-\tau-\sigma} \frac{\gamma}{(1-\gamma)\left(\frac{1}{\beta\rho} - 1\right)}. \end{aligned}$$

Notice how, differently from the instantaneous equilibrium discussed above, in steady state the effects of structural parameters on unemployment are no longer ambiguous. The reason is that taking into account the endogeneity of consumption and of the mass of firms allows me to resolve the tension between effects on participation and on bargaining. Higher taxes on labor, for example, lead workers to demand higher wages, which results in higher unemployment. This is the upward shift of the bargaining locus discussed above. The reason why the potentially offsetting downward shift of the participation locus is now not operational is that firm employment is pinned down by equation (16) independently of taxation. In other words, in the long run the mass of firms per capita adjusts endogenously and the participation locus in (l, u) becomes vertical and independent of taxation.

The value for the wage share obtained above yields

$$\frac{c^*}{\left(\frac{WL}{Y}\right)^*} = \left(\frac{C}{WL}\right)^* = \frac{1-\beta\lambda}{1-\beta\rho}. \tag{17}$$

Thus, expressions (10)-(11) for the participation and employment ratios become:

$$\left(\frac{L^s}{\Lambda}\right)^* = \frac{1}{1+\frac{(1-u^*)\psi}{1-\tau-(1-\tau-\sigma)u^*}\frac{1-\beta\lambda}{1-\beta\rho}}; \tag{18}$$

$$\left(\frac{L}{\Lambda}\right)^* = \frac{1}{\frac{1}{1-u^*}+\frac{\psi}{1-\tau-(1-\tau-\sigma)u^*}\frac{1-\beta\lambda}{1-\beta\rho}}. \tag{19}$$

Using these expressions, I can establish:

Proposition 3 *The steady-state general equilibrium of the model is characterized by the following properties:*

1. *the unemployment rate u is increasing in γ, τ, σ, β, ρ;*
2. *the employment ratio L/Λ is decreasing in ψ, γ, τ, σ, β, ρ, and increasing in λ;*
3. *the participation ratio L^s/Λ is decreasing in ψ, β, ρ, and increasing in γ, σ, λ, while it is decreasing in τ if*

   $$\left(1-\frac{\sigma}{1-\tau}\right)^2 > \tilde{u} \equiv \frac{\gamma}{(1-\gamma)\left(\frac{1}{\beta\rho}-1\right)},$$

   and increasing in τ otherwise.
4. *The mass of firms per capita n is decreasing in γ, τ, σ, β, ρ, ϕ, η.*

Proof. These results follow from the following properties. First, the ratio of consumption to wages in (17) is decreasing in λ and increasing in β and ρ. So the direct effects of β and ρ on participation and employment are negative, while the direct effect of λ is positive. Second, the denominator of (19) is increasing in u^* so that the employment ratio is decreasing in u^*.

Since u^* is increasing in β and ρ, overall the employment ratio is decreasing in β and ρ. Similarly, since u^* is increasing in τ and the direct effect of taxation is negative, overall the employment ratio is decreasing in τ. Third, the denominator of (18) shows that the relation between the participation ratio and unemployment depends on the factor

$$\frac{1-u^*}{1-\tau-(1-\tau-\sigma)\,u^*}=\frac{1}{1-\tilde{u}}\left(\frac{1}{1-\tau}-\frac{1}{1-\tau-\sigma}\tilde{u}\right),$$

where

$$\tilde{u}\equiv\frac{\gamma}{(1-\gamma)\left(\frac{1}{\beta\rho}-1\right)}$$

is the unemployment rate that obtains absent government distortions (i.e., for $\tau=\sigma=0$). This factor is decreasing in u^* and σ. Thus, the participation ratio is increasing in u^* and thereby in γ. Differentiating with respect to τ, I find that

$$\frac{d\left(\frac{1-u^*}{1-\tau-(1-\tau-\sigma)u^*}\right)}{d\tau}\gtrless 0\Leftrightarrow\left(1-\frac{\sigma}{1-\tau}\right)^2\gtrless\tilde{u}.$$

Moreover, differentiating with respect to σ the denominator of (19), and using the expression for u^*, I find

$$\frac{d\left(\frac{1}{1-u^*}+\frac{\psi}{1-\tau-(1-\tau-\sigma)u^*}\right)}{d\sigma}>0\Leftrightarrow\left[\frac{1-\tau-(1-\tau-\sigma)\,u^*}{1-u^*}\right]^2\frac{1}{1-\tau-\sigma}>0$$

so that L/Λ is decreasing in σ. Finally, the relation

$$n^*=\left(\frac{L^*}{\Lambda}\right)\frac{1}{l^*}$$

yields that n^* is decreasing in τ, σ because they do not affect l^* while they depress the employment ratio. Similarly, n^* is decreasing in ϕ, η because they do not affect the employment ratio while they raise l^*. β, ρ, γ depress n^* because they depress the employment ratio and raise firm employment. ■

To investigate the reason why participation might be increasing in taxation, recall that (18) comes from

$$\frac{L^s}{\Lambda} = 1 - \frac{\psi}{1 - \tau - (1 - \tau - \sigma)\, u} \frac{C}{W\Lambda}.$$

This expression reveals that there are three effects of taxation. First there is the direct negative effect of reducing the expected after-tax benefit of participation. Then there is the indirect negative effect of raising unemployment thereby worsening the marginal worker's job prospects – this is the "discouraged worker" effect discussed in Section 2. Finally there is the effect on the ratio $C/W\Lambda$ that in steady state is

$$\left(\frac{C}{W\Lambda}\right)^* = \frac{\left(\frac{C}{Y}\right)^*}{\left(\frac{WL}{Y}\right)^*} \left(\frac{L}{\Lambda}\right)^* = \frac{1 - \beta\lambda}{1 - \beta\rho} \left(\frac{L}{\Lambda}\right)^*.$$

Hence, the reduction in the employment ratio due to taxation yields a reduction of the consumption-wage ratio. This is nothing else than a negative income effect that produces an "additional worker" effect similar to that discussed in the labor supply literature. Differentiating with respect to τ and rearranging terms, the balance of these three effects boils down to

$$\frac{d\left(\frac{L^s}{\Lambda}\right)^*}{d\tau} \gtrless 0 \Longleftrightarrow -\frac{d\left(\frac{L}{\Lambda}\right)^*}{d\tau} \frac{\tau}{\frac{L}{\Lambda}} \gtrless \frac{\tau}{1 - \tau},$$

which says that higher taxation of labor results in higher participation when the elasticity of employment with respect to taxation is high. Using (19) to calculate the elasticity, I recover exactly the condition stated in the Proposition. It is informative to rewrite the condition as

$$\frac{d\left(\frac{L^s}{\Lambda}\right)^*}{d\tau} \gtrless 0 \Longleftrightarrow 1 - \frac{\sigma}{1 - \tilde{u}^{\frac{1}{2}}} \gtrless \tau,$$

which shows explicitly that the participation ratio is a U-shaped function of taxation. The minimum of the function shifts to the left with σ and $\tilde{u}$. The interpretation therefore, is that the positive relation between taxation and participation – the dominance of the additional worker effect driven by the income effect – occurs in economies with heavily distorted markets (high σ, γ, β) and high taxation.

4.4 Output

As mentioned in the introduction, the analysis of this paper is predicated on the notion that unemployment matters because it inserts a wedge between labor supply and employment. Employment in turn determines output, which is one of the prominent measures of economic performance we focus on. It tis thus important to make explicit how the labor and product market outcomes result in particular level of GDP.

In symmetric equilibrium, the production functions (1) and (3) yield

$$Y = N\left(l-\phi\right)^{\theta} \quad \text{or} \quad y \equiv \frac{Y}{\Lambda} = n\left(l-\phi\right)^{\theta}.$$

This reveals that there are competing effects of many parameters on output per capita due to the fact that n and l move in opposite directions. For example, l^{*} is increasing in ϕ, η, β, ρ, γ, while n^{*} is decreasing in ϕ, η, β, ρ, γ. Interestingly, τ and σ have an unambiguous negative effect because they do not affect l^{*} while they depress n^{*} through their negative effect on the employment ratio $(L/\Lambda)^{*}$.

A related, and perhaps more interesting measure of performance, is the level of welfare. Specifically, in steady state one can compute

$$\begin{aligned} U^{*} &= \int_{0}^{\infty} e^{-\rho t}\Lambda\left[\log\left(\frac{C}{Y}\frac{Y}{\Lambda}\right)^{*} + \psi\log\left(1-\left(\frac{L^{s}}{\Lambda}\right)^{*}\right)\right]dt \\ &= \frac{\Lambda_{0}}{\rho-\lambda}\left[\log c^{*} + \log y^{*} + \psi\log\left(1-\left(\frac{L^{s}}{\Lambda}\right)^{*}\right)\right]. \end{aligned}$$

This too exhibits competing effects that prevent unambiguous analytical statements concerning the role of many structural parameters. Once again, however, taxation appears to be special. As argued, in highly regulated economies taxation of wages results in higher participation because of a dominant income effect. It follows that τ unambiguously reduces welfare because it reduces output per capita y^{*}, and therefore consumption per capita of market goods $(C/\Lambda)^{*}$, and the consumption per capita of household goods. The reason is that a large fraction of the representative household members end up their time in the unemployment, which neither earns them a wage nor allows them to engage in household activity.

5 The Effects of Labor and Product Market Factors

One of the interesting properties of this model is that it allows me to study the transitional dynamics in response to structural changes. In this section, I exploit this property to discuss the effects of factors affecting the labor and product markets. Some of these factors are good analytical proxies for things like frictions, regulations and other policy interventions that affect the bargaining power of workers (γ), the cost of labor (τ, σ), work practices (ϕ), the costs of setting up new businesses (β) and the degree of substitution among products and thus of price competition among producers (ϵ).

I begin the analysis with a discussion of an important aspect of the interaction between labor and products markets. Namely that the endogenous participation rate produces a reinforcing mechanism that amplifies the effects on employment of structural changes that affect the labor market. To see this, consider equations (18) and (19) and set $\psi = 0$. This removes from the model the opportunity cost of participation and yields $L^s/\Lambda = 1$. Accordingly,

$$\frac{L}{\Lambda} = 1 - u$$

so that structural parameters affect employment only through the unemployment rate. If $\psi > 0$, instead, there are additional effects due to the endogeneity of participation. These effects are best seen by recalling the definition

$$\frac{L}{\Lambda} = (1 - u)\,\frac{L^s}{\Lambda}.$$

In some cases, the effects due to participation work in the opposite direction of the direct wedge effects through unemployment and one needs to work out the balance. This is what equation (19) does, revealing for example that the negative effect of labor taxes τ and unemployment benefits σ on employment is larger because of the participation channel

In the following analysis, I show how this feature of the model reinforces two important feedback mechanisms linking the labor and product markets. The first is due to the endogenous mass of firms and produces a *multiplier effect* that amplifies the role of structural changes that originate in the labor market. A second multiplier effect operates in the opposite direction. Namely the endogenous market size due to the participation and unemployment margins, amplifies the effects on entry decisions and therefore on the mass of firms of structural changes that originate in the product market.

5.1 Factors Affecting the Labor Market: The First Multiplier Effect

This subsection makes the following point: *the adverse effects of changes in regulations and frictions that affect labor costs, work practices and the bargaining power of workers are larger when one considers the endogenous mass of firms.* To illustrate, I consider first the effects of labor income taxes.

Consider Figure 2. If τ increases, the $\dot{n} = 0$ locus is unchanged while the $\dot{c} = 0$ locus shifts to the left. The economy then jumps on the saddle path that converges to new steady state which features the same consumption ratio as the initial and a lower mass of firms per capita. On impact, the mass of firms is given while the consumption ratio jumps up. According to Proposition 1, the rise in c and τ produces a fall in firm employment l and the employment ratio L/Λ, and possibly an increase in unemployment u. I say possibly because, as discussed in section 3, the direct effect of τ on unemployment is ambiguous due the endogeneity of the participation rate. According to (12) the fall in firm employment l produces a rise in the labor share WL/Y. According to (10), finally, the competing effects of the higher consumption ratio, wage share, and unemployment rate produce an ambiguous change in participation. One might conjecture that the direct negative effect of taxation of wages tilt the balance toward a fall of the participation ratio. Unfortunately, I have been unable to prove that this is the case.

The transition features falling c and n. According to Proposition 1, then, it features rising firm employment l and unemployment u. The rising l in turn produces a falling labor share. The competing effects of the falling c and n produce an ambiguous change in the employment ratio. However, we know that at the end of the transition the employment rate must be lower so that eventually the rate must be falling. As to the participation rate, the competing effects of its determinants again result in an ambiguous change. Since the steady state effects are known, however, one can infer that if the tax increase occurs in a highly regulated economy it results in the participation rate eventually rising because of the dominant income effect (see Proposition 3). The reverse happens in a lightly regulated economy.

To see the role of the endogenous mass of firms, one simply compares what happens on impact, when the mass of firms is given, to the end-of-transition situation. There is a clear *multiplier effect* at work in that the gradual reduction of the mass of firms per capita drives unemployment up and employment down further than the initial tax increase warrants. The reason is that with higher taxation workers demand higher wages and the associated higher labor cost requires the market to become more concentrated in order to sustain firms' profitability and allow them to deliver to households the reservation interest rate ρ. Crucially, since firm employment l in the long run does not respond to taxation, the smaller mass of firms per capita must be produced by a combination of lower employment and higher unemployment. The latter margin is very important, because in highly regulated economies the participation rate goes up so that to produce a lower employment rate requires a large increase in the unemployment rate.

The replacement ratio has effects similar to those of the tax on wages with the important difference that the tax reduces participation (labor supply) while the replacement ratio raises it. Hence, the tax creates less unemployment than the replacement ratio.

A factor that has attracted a lot of attention recently is the parameter γ that measures the bargaining power of workers. Consider again Figure 2. If γ increases, the $\dot{n} = 0$ locus is unchanged while the $\dot{c} = 0$ locus shifts to the left. The economy jumps on the saddle path that converges to the new steady state, experiencing a falling consumption ratio and a falling mass of firms per capita along the transition. So far all this is quite similar to the effects of a rise in the tax on wages. The details, however, differ in some crucial aspect.

When γ rises, on impact the mass of firms is given while the consumption ratio jumps up. According to Proposition 1, the rise in c produces a fall in firm employment l and the employment ratio L/Λ, and an increase in unemployment u. However, the direct effect of γ on firm employment and the employment rate is now ambiguous. The different behavior of these variables with respect to the case of taxation is that higher bargaining power of workers attracts participation instead of discouraging it because it raises wages. If firm employment falls, it produces a rise in the labor share WL/Y. This effect is in fact stronger than in the case of taxation because γ redistributes rents from firms to workers (they capture a larger share of profits) and thus raises the wage share directly. Again the competing effects of the higher consumption ratio, wage share, and unemployment rate produce an ambiguous change in participation.

The transition features falling c and n. This produces a rising firm employment l and unemployment rate u. The rising l in turn produces a falling labor share. The competing effects of the falling c and n produce an ambiguous change in the employment ratio. However, we know that at the end of the transition the employment ratio must be lower so that eventually the ratio must be falling. As to the participation rate, again, the competing effects result in an ambiguous change. Since the steady state effect is positive, however, one can infer that the higher bargaining power results in the participation rate eventually rising. This fact is important. Contrary to the instantaneous equilibrium where the ambiguous effect of γ comes from the endogenous variables, c and u, in steady state the dominant factor driving participation up is the additional worker effect due to higher unemployment. To see this, observe that in equation (18) the consumption ratio and the labor share in the long run do not depend on γ, only u^* does.

One can again see the *multiplier effect* of the mass of firms per capita by comparing impact to steady state effects. Interestingly, γ has a permanent positive effect on firm employment and thus drives unemployment up further than taxation of wages. The reason is again that the higher labor cost requires the market to become more concentrated to sustain firms' profitability and allow them to deliver to households the reservation interest rate ρ. However, since firm employment now must rise, and the employment ratio falls, the fall in the mass of firms must be larger.

5.2 Factors Affecting the Product Market: The Second Multiplier Effect

To consider the effects of changes in the toughness of price competition, ϵ, recall that $\eta = \theta\left(1 - \frac{1}{\epsilon}\right)$ and refer again to Figure 2. When ϵ increases, the economy jumps on the saddle path that converges to a point located to the left of the initial one on the same $\dot{n} = 0$ locus. The associated transition features changes in c and n in line with the discussion of the previous subsection. The main difference concerns the long run effects. Perhaps surprisingly, in the long run ϵ does not affect unemployment and the employment and participation ratios. The reason why is in fact quite intuitive. In steady state firms must deliver to shareholders the reservation interest rate ρ, and this pins down the profit share according to the relation in (15). Consequently, changes in ϵ are absorbed by firm employment l in such a way that keeps the profit ratio constant. But this implies that the employment elasticity of revenue does not respond to ϵ. Consequently, both the unemployment rate and the labor share do not respond to ϵ. This in turn means the participation and employment ratios as well do not respond to ϵ.

Consider now the role of barriers to entry. Together with the population growth rate λ, this is the only factor that affects the consumption ratio in steady state. The reason is that it pins down the amount of "replacement investment" needed to keep constant the mass of firms per capita. Moreover, as discussed above, β determines the profit and labor shares. Consider Figure 2. If β rises, the $\dot{n} = 0$ locus shifts down while the $\dot{c} = 0$ locus shifts to the left. The economy then jumps on the saddle path that leads to the new steady state, featuring lower n^* and c^*. The reason is that the higher β implies that steady-state incumbency is more costly and thus that the rate of return is equal to ρ only if the mass of firms falls. The smaller mass of firms reduces employment and raises unemployment. This captures the second multiplier effect. Higher barriers to entry ultimately raise the profit share and thus redistribute rents toward profits. This lowers the labor share and discourages participation. At the same time, it raises firm employment l and thus raises the wage markup, thereby raising unemployment. Accordingly, employment falls. Most importantly, *the reduction of the mass of firms per capita is larger than it would be if employment were held constant.* There is thus a reinforcing feedback mechanism whereby the redistribution of rents away from wages shrinks the size of the market and thus requires a further reduction of the mass of firms per capita.

6 Conclusion

The view that unemployment is high in economies where the state provides long-lasting unemployment benefits that are unrelated to the individual's effort to find work, the labor force is organized in sectorial or firm-level unions that do not coordinate their activities, and taxation raises the cost of labor, is generally correct and supported by much of the available empirical evidence. It is, however, incomplete because it ignores the characteristics of the product market. There are good reasons, theoretical and empirical, to think that in addition to labor market frictions, unemployment depends on a broad class of factors that characterize the structure of the product market.

In this paper, I discussed a model where firms bargain with unions over wages and employment levels. This interaction generates unemployment. Households take the associated unemployment risk as given in making their participation decisions. I have thus been able to study the interactions of product and labor market institutions in a three-states representation of the labor market. This features allowed me to uncover two feedback mechanisms, each reinforced by endogenous participation. Specifically:

- *The adverse effects on output of regulations and frictions that raise labor costs, work practice rigidities and the bargaining power of workers are larger when one considers endogenous participation.* This reinforcing mechanism captures the fact that the induced fall in employment is larger when labor supply is elastic and individuals withdraw from the labor force in response to a worsening of the labor market.

- The fall in employment shrinks the size of the market and thereby triggers a reduction in the number of firms. This feedback mechanism entails a *multiplier effect that amplifies the adverse effects on output of labor market factors because the fall in the number of firms reduces employment further than what would be warranted if one considered the labor market in isolation*.

- The endogeneity of employment entails a feedback mechanism running from the product market to the labor market. Specifically, *regulations and frictions that raise the costs of entry and/or of operation for firms result in* a *larger reduction of the number of firms than would obtain if employment were held constant*. There is thus another multiplier effect at work that exploits the endogeneity of market size to amplify the adverse effects on output of interventions that worsen the product market.

- Because the multiplier effect running from the product to the labor market is driven by the endogeneity of employment*, the adverse effects on output of product market regulations are actually stronger when one considers endogenous participation*.

The analysis of these feedback mechanisms has interesting implications for the current policy debate. Labor market reforms that reduce the cost of labor, like those advocated by the OECD in its Jobs Study (1994), are actually more attractive when one considers the endogenous structure of the product market because of the amplified benefits in terms of employment and unemployment. Similarly, the increase in entry that product market reforms generate is larger than one would expect if the labor market effect were ignored. This provides a theoretical rationale for the pro-competitive reforms advocated in a series of studies undertaken at the McKinsey Global Institute (1995, 1997) and shows that these reforms are in fact more attractive when one considers the positive feedback on market structure that runs through the labor market.

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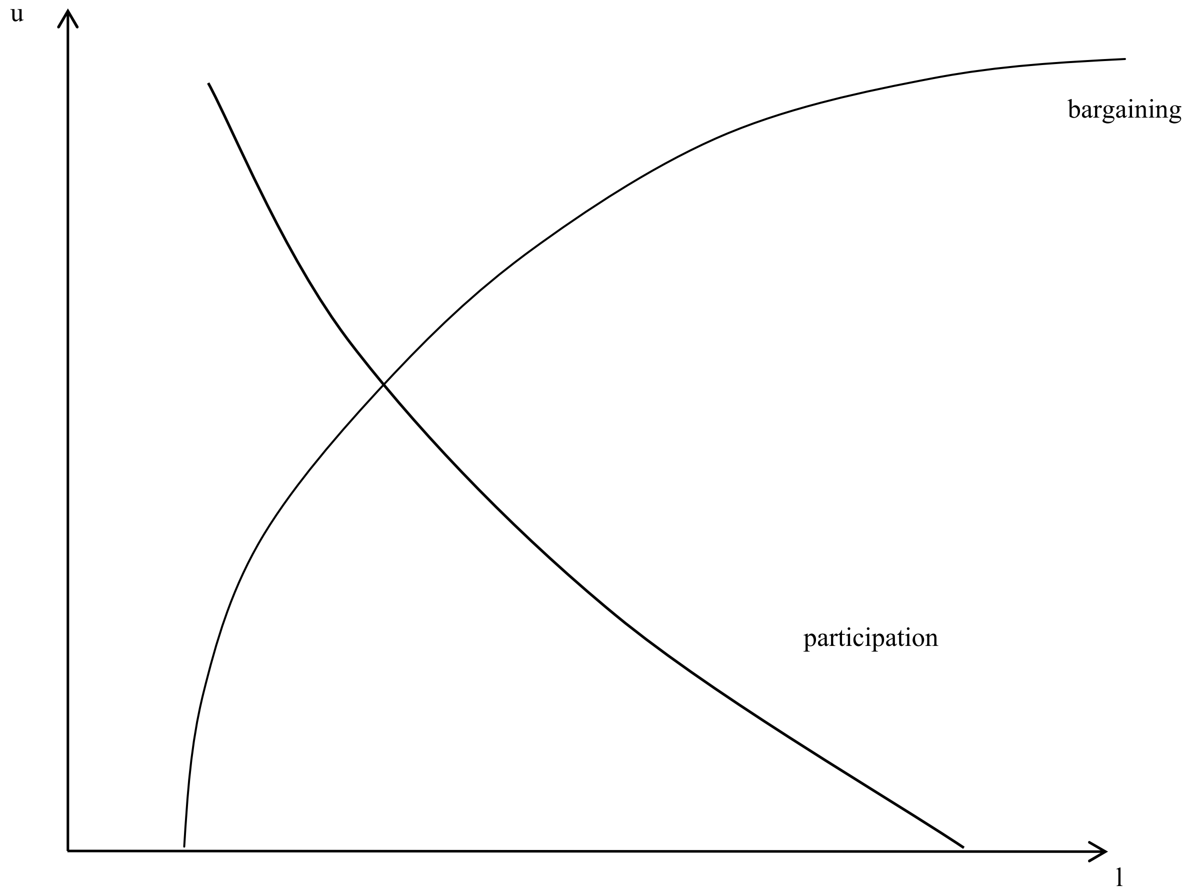

Figure 1: Instantaneous equilibrium of the labor market

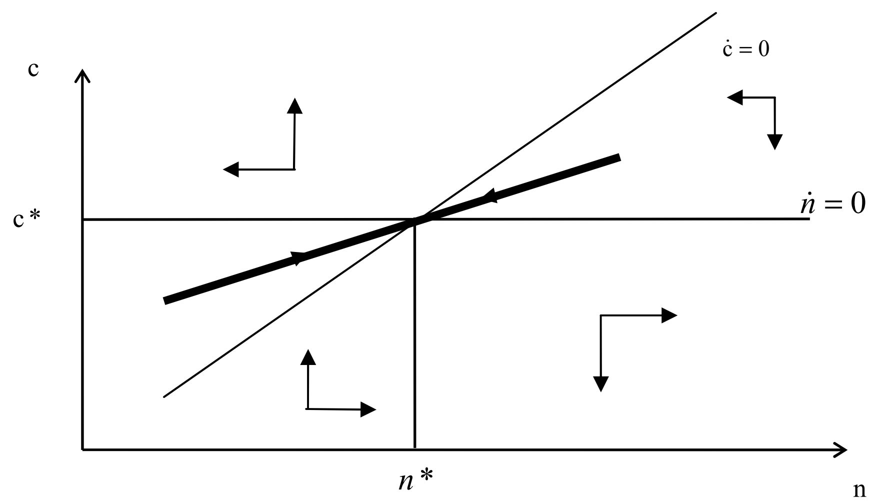

Figure 2: General Equilibrium Dynamics