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EMPLOYMENT PROTECTION, GROWTH AND JOBS[b]

INTRODUCTION

While there is a wide literature on the links between employment protection legislation (EPL) and labor market performance, very little work has been done on the effects of EPL on growth[1]. It is however generally recognized that EPL has negative effects on economic efficiency and that this might in turn have negative effects on growth, as it retards the adaptation of the economy to shocks and to the opportunities offered by technical progress. If this is the case, there should be negative consequences on employment in the sense that, for any given path of the real wage, lower efficiency and growth are associated with a lower path of employment. This paper explores this argument, by focussing on the links between EPL and growth and their consequences on employment under different assumptions about wages.

In recent years an impressive literature has been produced on the links between EPL and labor market performance, in an attempt to explain why unemployment has increased so much in most European countries. The general conclusion is that EPL has important effects on key aspects of the functioning of the labor markets, but has little or no bearing on performance in terms of average employment. Recent comprehensive reviews include Bertola (1998), OECD (1999), Blanchard (2000), Malinvaud (2000).

According to this literature, high employment protection reduces turnover, because firms will typically smooth their employment, leading to lower flows of both separations and hires, hence lower flows in and out of unemployment. The lower turnover leads to a higher duration of unemployment. The labor market is more stagnant, in the sense that those who have a job are less likely to lose it and those who do not have a job are less likely

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[b] The author thanks Pierfederico Asdrubali, Giuseppe Bertola, Tito Boeri, Alfonso Rosolia and Fulvio Rossi for useful comments and suggestions.

[1] We follow the literature in using EPL as an acronym for any type of employment protection, whether due to legislation, collective bargaining, court rulings or customary practice.

to find one. The net effect on average employment is ambiguous. As Blanchard (1998) puts it: «fewer workers go through unemployment, but they stay unemployed for longer».

This view is well represented by the three graphs in Fig. 1 (taken from OECD, 1999) where an unemployment protection index across countries is plotted against:

a) a measure of turnover flows into unemployment (panel a);
b) the duration of unemployment (panel b);
c) the overall unemployment rate (panel c).

As can be seen, the (partial) correlations are apparently rather strong for the first two variables, but the correlation between EPL and overall unemployment is quite weak.

The logic of the argument was formalized, under different assumptions, by Bentolila and Bertola (1990), Bertola (1990) and Bertola (1992): EPL tends to make firms more reluctant to hire, but also slows down the rate of layoffs and firings. Thus, on one hand, firms, or sectors, that want to expand employment, will do so at a lower speed. But, on the other hand, employment will contract more gradually in the firms or sectors that need to downsize. The net effect is, quite clearly, a less efficient economy, but not necessarily one in which employment is lower. Looking at the problem in a time dimension, employment will tend to be lower in upturns, because firms are less keen to hire, but will be higher in downturns because firms find it difficult to layoff or fire. Averaging over upturns and downturns, employment will be more or less the same. Under plausible assumptions about the parameters and functional forms of the demand for labor, Bertola (1990) has demonstrated that labor protection may even increase average employment.

The literature does however recognize that there may be indirect effects of EPL on employment and identifies essentially two channels. The first is through the effects of the insiders-outsiders dynamics on wages (see Layard *et al.* 1991). Employment protection, together with other labor market institutions, increases the bargaining power of insiders and makes it possible to obtain wages which are incompatible with full employment. The other is the depreciation of human capital associated with a long duration of unemployment. Workers who remain unemployed for a long period of time tend to lose their skills and become less «employable». In several European countries the policy response to these problems has tended to mainly concentrate in wage moderation by the trade unions and active labor market policies aimed at the long term unemployed (more training, incentives to hire specific segments of the labor force etc.).

All this means that the effects of EPL cannot be studied in isolation. It is crucial to understand the context in which it operates, in terms of policies and wage bargaining arrangement. The ensuing complexity of the issue, together with varying methodological choices, may explain why at least some studies do find a negative effect of EPL on employment (see for instance Lazear 1990; Boeri *et al.* 2000; Elmeskov *et al.*, forthcoming).

This paper explores a different indirect link between EPL and employment. The argument is quite simple. Labor market rigidity has a negative impact on economic

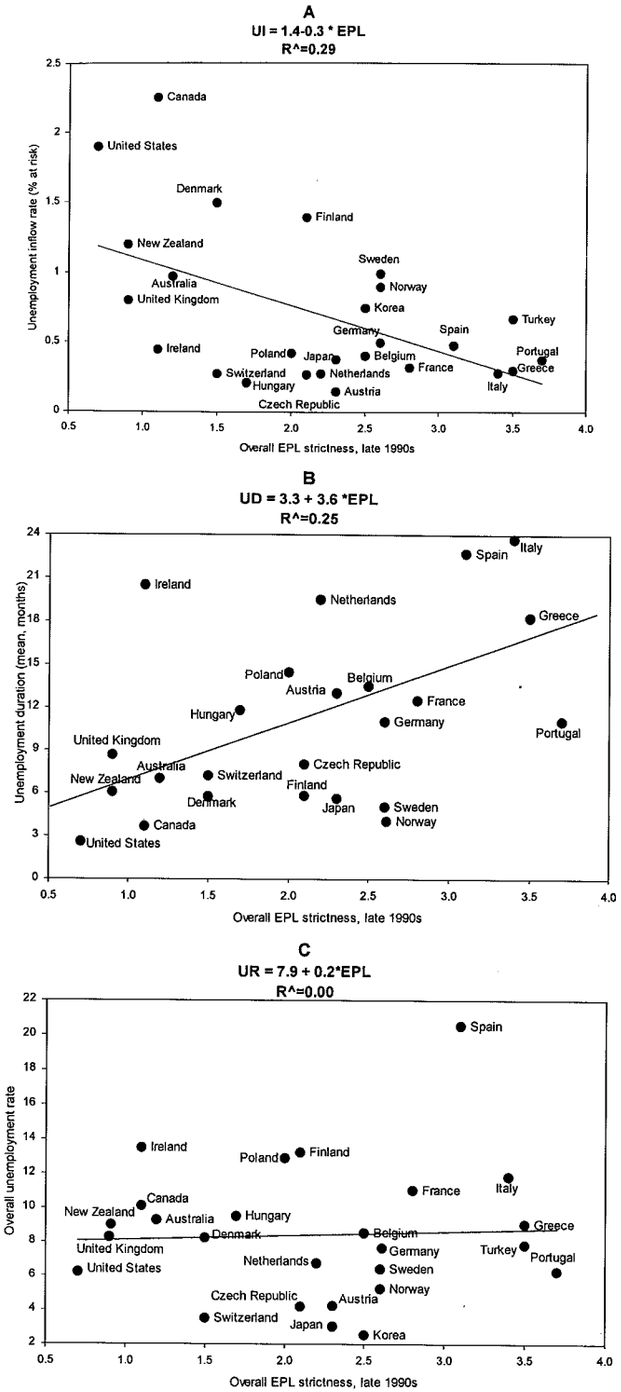

Fig. 1 – Labor market protection and employment performance (Source: OECD 1999).

efficiency and on the rate of return on capital. This tends to lower the rate of growth of the economy because it discourages investment and retards the adaptation of the economy to innovations in demand and technology, which is the bread and butter of the growth process. A lower rate of growth of the economy implies a lower sustainable level of employment for any desired path of the real wage. Conversely, in order to attain a desired path of employment (including full employment), workers must accept lower wages in rigid economies than in flexible economies.

In simple words, flexibility enhances the attractiveness of investment and increases growth. Growth is the key to creating jobs.

The link between growth and jobs depends of course on what is assumed about wages. If wages are assumed to be flexible and to adjust to demand and supply conditions, there is no link because full employment is always attained, by definition. However, in most real world situations, wages do not clear the labor market and investment is necessary to create jobs. In other words, with more flexible labor markets, Europe's growth rate in the 1990s would have been higher. Hence, for any given wage, today's Europe would have a higher productive capacity and could afford a higher level of employment. The same would of course be true in the next decade. With more flexibility, Europe would be better equipped to gradually satisfy both the growing income expectations of those who have a job and the needs of those who do not, or will not, have a job.

The paper is organized as follows. In section two, we present a model that essentially replicates the basic results of Bertola (1994) and Schivardi (1999) within a very standard Solow-Swan framework with uncertainty about future productivity at the level of the individual firm. It is shown that labor rigidity determines a misallocation of labor across firms, which reduces output and the return to capital, hence hampering the growth rate of the economy. We then impose on a rigid economy the same real wage that is consistent with full employment in a flexible economy. This causes unemployment. There are two ways out of the problem: reducing the real wage or making the labor market more flexible.

Section three discusses the robustness of the results in light of the existing literature. Section four concludes and draws some policy implications.

2. A GROWTH MODEL WITH LABOR RIGIDITY

In this section we build on Bertola (1994) and Schivardi (1999), who have produced similar models showing the negative links between EPL and growth. Their models may appear rather unfamiliar to many readers and based on special assumptions. Bertola's model has been around for several years, but it is rarely cited, perhaps because it appears somewhat esoteric. For instance, the chapter on EPL in OECD (1999) contains an impressive number of references (76!), five of which by Bertola; but the 1994 paper is not among them. The task of this section is to apply his basic concepts to the most standard textbook growth model, i.e. the Solow-Swan model with a Cobb-Douglas production function and constant returns to scale.

Using such simple and familiar framework will help clarifying the basic concepts that are involved and asking questions about their robustness and likely relevance for the real word.

The key assumption is that firms must decide how much labor to hire before they know if they will be hit by a high or low productivity shock. The decision they take is sub-optimal relative to the one they would take if they could revise their choices after the resolution of uncertainty.

2.1. *The model*

Like in Schivardi (1999), there is a continuum of identical firms (sites), indexed from zero to one. In each period they are hit by shocks, which are uncorrelated both over time and across firms.

Technology is assumed to be Cobb-Douglas with constant returns to scale. Omitting firm specific indexes for notational convenience, we have:

$$Y_i = A_i K^{\alpha} L^{1-\alpha} \qquad i = H, L \tag{1}$$

Each firm may be hit by a high productivity shock (A_H) with probability p or by a low productivity shock ($A_L < A_H$) with probability 1-p. Shocks are temporary: they last only for one period and are not correlated over time.

The exercise consists in comparing the behavior of two economies: Flexland (F) and Rigidland (R). In Flexland, firms can first observe the shock and then decide how much labor they want to hire. In Rigidland instead, firms must decide before the shock is observed. This captures the idea that in a flexible market firms can rapidly adjust the number of employees, while in a rigid economy this takes time. In Rigidland we assume that labor is completely predetermined over the (arbitrary) time span of one period.

The quantity of capital is in both cases decided before uncertainty is resolved, a way to capture a degree of irreversibility in investment decisions. In both lands we assume, for the moment, that wages clear the labor market. In Rigidland the market clears ex-ante: all workers are hired before the resolution of uncertainty, at the market clearing wage rate. In Flexland instead the wage rate is determined after the shocks. In Flexland all workers earn the same wage, because labor is perfectly mobile. In Rigidland labor is immobile ex-post, but it is mobile ex-ante, when the wage is set: therefore, in Rigidland as well, all workers earn the same wage. Wages may and will generally differ between the two lands.

In both lands aggregate output (per firm) equals expected output of each firm and can be written as:

$$Y = \int_0^1 Y(j)dj = pY_H + (1-p)Y_L \tag{2}$$

Where Y_i is output (per firm) of the firms with high and low productivity. If one denotes as Y_R and Y_F the level of aggregate output in Rigidland and Flexland respectively, then:

(3) $$Y_R = pA_H K^{\alpha} L^{1-\alpha} + (1-p)A_L K^{\alpha} L^{1-\alpha} = \overline{A_R} K^{\alpha} L^{1-\alpha}$$

(4) $$Y_F = pA_H K^{\alpha} L_H^{1-\alpha} + (1-p)A_L K^{\alpha} L_L^{1-\alpha} = \overline{A_F} K^{\alpha} L^{1-\alpha}$$

Where

$$\overline{A_R} = pA_H + (1-p)A_L$$

$$\overline{A_F} = p\overline{A_H}\left(\frac{L_H}{L}\right)^{1-\alpha} + (1-p)\overline{A_L}\left(\frac{L_L}{L}\right)^{1-\alpha}$$

For notational simplicity, we omit the subscripts R and F except when it is necessary to avoid confusion.

In eq. 3 (rigid economy) K and L are the same across low and high productivity firms, because decisions are taken before the shock is observed. In eq. 4 instead, labor is adjusted so that high and low productivity firms have different labor intensities.

The labor market clearing condition is:

(5) $$pL_H + (1-p)L_L = L$$

where L is the fixed supply of labor (per firm).

The level of the aggregate capital stock, K(t), is given by past saving decisions, like in the standard dynamic Solow equation:

(6) $$K(t+1) - K(t) = sY(t) - \delta K(t)$$

where s is a constant saving ratio and δ is depreciation.

Given this setting, it is easy to show that:

a) For any initial level of the capital stock, Rigidland will display lower investment.
b) In the long run Rigidland converges to a lower level of capital and output per capita.
c) Wages are lower in Rigidland both initially, along the adjustment path, and in the steady state.

Rigidland

Consider first the Rigidland case. Since firms decide on labor allocation before the shocks take place, they will have ex-post the same K and L regardless of whether productivity is high or low. Therefore total output (Y_R) is simply determined by eq. 3 above, with K determined by past history and L by the full employment condition. From the first order conditions, we can find the wage and the rental rate. Each firms maximizes:

$$\underset{K,L}{Max}\ \pi_R = E[A_i K^{\alpha} L^{1-\alpha} - wL - rK] \qquad i = h, l$$

Since the distribution of A_i is binomial:

(7) $$\pi_R = p[A_H K^{\alpha} L^{1-\alpha} - wL - rK] + (1-p)[A_L K^{\alpha} L^{1-\alpha} - wL - rK]$$

The first order conditions are:

(8) $$\frac{d\pi_R}{dL} = \overline{A}_R(1-\alpha)k^{\alpha} - w = 0$$

(9) $$\frac{d\pi_R}{dk} = \overline{A}_R\alpha\left(\frac{1}{k}\right)^{(1-\alpha)} - r = 0$$

where $k = \frac{K}{L}$.

In the aggregate k is given. Hence eqs. 8 and 9 determine w and r:

(10) $$w = \overline{A}_R(1-\alpha)k^{\alpha}$$

(11) $$r = \overline{A}_R\alpha k^{\alpha-1}$$

Flexland

We now turn to Flexland. Decisions are taken in two steps. Firms first decide on the capital stock and then, after the resolution on uncertainty, on labor. For the solution we start from the end. Given the capital stock, firms must decide on labor. This problem is quite simple because firms know their state. So they have either high or low productivity and will maximize:

$$\pi_{Fi} = A_i K^{\alpha} L_i^{1-\alpha} - wL_i - rK$$

where π_{Fi} indicates profits of firms in state i (i = H,L) in Flexland.

The first order conditions with respect to labor yield:

(12) $$\frac{d\pi_{FH}}{dL_H} = (1-\alpha)A_H K^{\alpha} L_H^{-\alpha} - w = 0$$

(13) $$\frac{d\pi_{FL}}{dL_L} = (1-\alpha)A_L K^{\alpha} L_L^{-\alpha} - w = 0$$

Due to labor mobility, the wage is the same across the two types of firms. Equating these two expressions for the marginal product of labor yields a useful equation:

(14) $$\frac{L_H}{L_L} = \left(\frac{A_H}{A_L}\right)^{\frac{1}{\alpha}}$$

Eq. 14 says that the ratio of labor allocated to the two sectors is proportional to the ratio of productivity and is independent from any other variable (capital, labor, relative prices). Combining 14 and 5 yields, after simple manipulations:

(15) $$\frac{L_H}{L} = \frac{1}{p + (1-p)\left(\frac{A_L}{A_H}\right)^{\frac{1}{\alpha}}}$$

(16) $$\frac{L_L}{L} = \frac{1}{(1-p) + p\left(\frac{A_H}{A_L}\right)^{\frac{1}{\alpha}}}$$

These two equations tell us that $\overline{A}_F$ above is a constant.

This makes it easy to compare output, wages and the return to capital in the two lands.

Rigidland versus Flexland

Comparing 3 and 4 it is easy to show that, for a given capital stock, output is higher in Flexland, i.e.:

(17) $$Y_F > Y_R \qquad or \qquad \overline{A}_F > \overline{A}_R$$

The proof is in the appendix. By simple intuition, labor is allocated more efficiently in Flexland.

The two economies are equivalent only in the (trivial) case in which $A_H = A_L$ (no uncertainty). In all other cases, the rigid economy is inefficient because it allocates too much labor to low productivity firms.

Since aggregate output is lower in the rigid economy, investment will also be lower, as shown by eq. 6.

Given the initial capital stock, investment can be written as:

(18) $$K_R(t+1) - K(t) = s\overline{A}_R K^\alpha L^{1-\alpha} - \delta K$$

for the rigid economy and

(19) $$K_F(t+1) - K(t) = s\overline{A}_F K^\alpha L^{1-\alpha} - \delta K$$

for the flexible economy.

Labor market rigidity has the effect of shifting downward the production function. In this model, it is equivalent to a negative productivity shock which reduces both current investment and steady state capital stock (propositions a and b above), as shown in the following figure (Fig. 2).

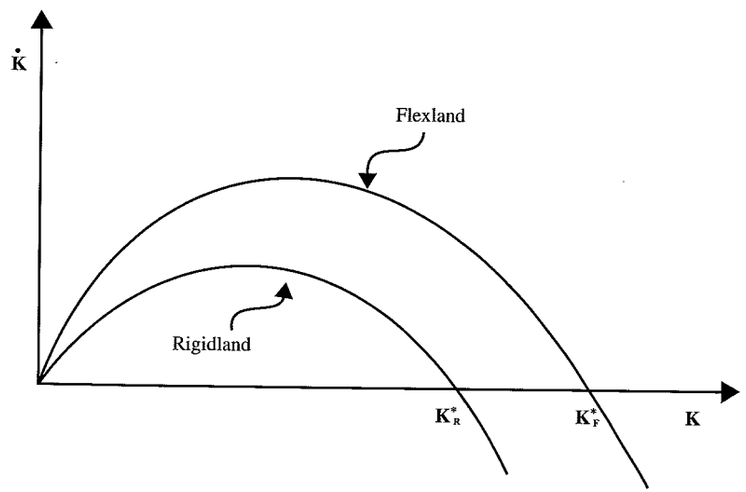

Fig. 2.

The underlying microeconomic foundation of this result is that labor rigidity reduces the marginal product of capital and makes investment less attractive. This is easily seen by differentiating output with respect to capital([2]) in eq. 3 (Rigidland) and eq. 4 (Flexland):

(20) $$\frac{dY_R}{dK} = \overline{A}_R \alpha \left(\frac{1}{k}\right)^{1-\alpha} = r_R$$

(21) $$\frac{dY_F}{dK} = \overline{A}_F \alpha \left(\frac{1}{k}\right)^{1-\alpha} = r_F$$

Since, as shown above, $\overline{A}_F > \overline{A}_R$, it follows that, for any given level of k:

(22) $$r_F > r_R$$

Investment is more profitable in the flexible economy.

With the same logic, the wage rate is lower in the rigid economy, even with the same initial capital stock([3]).

(23) $$\frac{dY_R}{dL} = \overline{A}_R (1-\alpha) k^\alpha = w_R$$

(24) $$\frac{dY_F}{dL} = \overline{A}_F (1-\alpha) k^\alpha = w_F$$

Since $\overline{A_R} < \overline{A_F}$, the marginal product of labor and the wage are lower in the rigid economy([4]).

Over time, the gap between the two wages becomes larger because of the faster growth rate of Flexland's economy.

Note that in eq. 24 the marginal product must be interpreted as the effect on revenue of an additional unit of labor that is optimally distributed across the two sectors.

2.2. *Labor rigidity and unemployment*

Nothing has been said so far about unemployment. Rigidland enjoyed full employment as much as Flexland. As has been previously noticed however, this came at the cost of lower wages both in initial equilibrium and in the steady state. That is:

(25) $$w_R^0 < w_F^0$$

and

(26) $$w_R^* < w_F^*$$

where w_i^0 and w_i^* are initial and steady state wages in the two Lands. Because of the

([2]) Note that since the allocation of labor does not depend on k, there is no need to appeal to the envelop theorem.

([3]) Again, it is crucial that labor allocation is a constant.

([4]) As will be discussed in sect. 3, this particular result is not robust with respect to the choice of functional form for the production function.

diverging growth paths of the two lands, the wage gap is much larger in the steady state than initially.

Now suppose that the trade unions of Rigidland demand the same wage as in Flexland. Since Rigidland has a lower production potential, it supports a lower level of employment for given wages (or wage path) or a lower level of wages for a given employment. The rate of unemployment (u) that would prevail in Rigidland if Rigidland adopted Flexland wages is readily computed by equating equations 23 and 24. After some manipulations:

$$u \equiv 1 - \frac{L_R}{L} = 1 - \left(\frac{\overline{A}_R}{\overline{A}_F}\right)^{1/\alpha} \left(\frac{K_R}{K_F}\right) \tag{27}$$

If initially $K_R = K_F$, employment in Rigidland (L_R) falls short of the labor force (L) only because of the first term in parenthesis. Over time, unemployment increases because capital grows at a lower rate than in Flexland. In Fig. 3 unemployment in Rigidland is plotted against the ratio between the capital stock of Flexland and that of Rigidland.

If the initial capital stock is the same, unemployment at u_0 is $= 1 - \left(\frac{\overline{A}_R}{\overline{A}_F}\right)^{1/\alpha}$. In steady state, unemployment converges to u^*.

Along the adjustment path, firms with high productivity do not hire either from the pool of unemployed or from the workers of the low productivity firms. This may of course be due to hiring costs. However, even if hiring costs are zero and there are only firing costs, high productivity firms will not hire because they must consider that in the next period

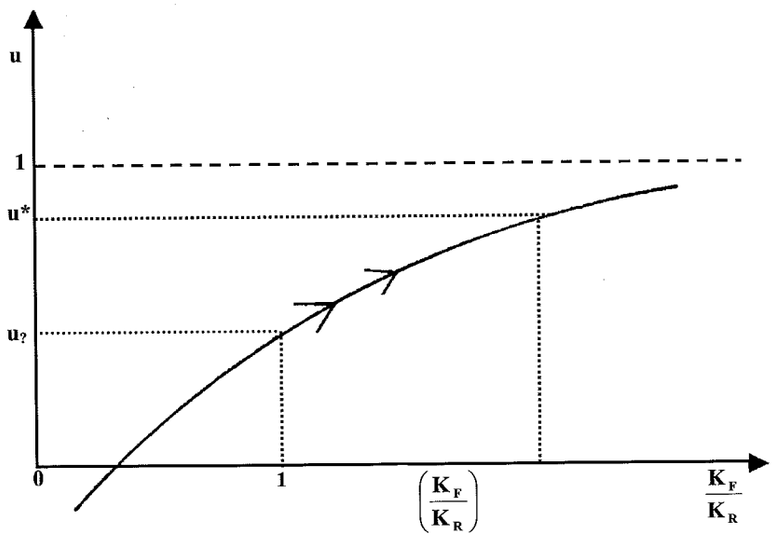

Fig. 3 – Unemployment in Rigidland.

they may be hit by a low productivity shock and will incur in firing costs([5]). Taken literally, this is not an implication of a model in which markets become flexible every other period. If there was one day in a year or in a week in which firms were allowed to freely fire, then they would not be afraid to hire an excessive quantity of labor in normal times. The fixity of labor in this model must hence be interpreted as the result of a smoothing behavior of firms faced with microeconomic shocks that are not persistent. It is implicitly assumed that macroeconomic shocks are persistent – and, hence, firms adjust their employment – while microeconomic shocks are temporary. This distinction greatly simplifies the analysis, because it eliminates aggregate uncertainty, but is clearly somewhat artificial. It does not affect the key points of this section that can be summed up as follows.

Unemployment is caused by high real wages as much as by labor rigidity. An increase in the real wage, within a given framework of labor market institutions, will increase unemployment. Likewise, for any given real wage, an increase in labor rigidity will increase unemployment. In this model, this is true both instantaneously (or in the short run) and over time. The standard view that unemployment is caused only by high real wages and not by labor rigidity is based on the implicit assumption that any increase in rigidity is offset by lower real wages, so as to maintain full employment. Or it is based on partial equilibrium analysis that neglects the general equilibrium implications on equilibrium wages and unemployment. Once general equilibrium feedbacks are taken into account, it is not correct to say that real wages matter for employment, while labor rigidity does not. It follows that the cure for unemployment may either be lower wages or lower rigidity.

The role of uncertainty should be pointed out. The difference between the two economies (with and without rigidities) is larger the greater is the variance of the productivity shock, in terms of relevant variables. An increase in the variance increases the gap in terms of growth rates as well as wages and/or employment. If the variance of the shock is zero (no uncertainty), rigidity becomes irrelevant.

3. Discussion

How robust are these results? And how do they relate to the literature that denies the existence of a link between EPL and employment?

One result that does not appear to be robust is the initial fall in the wage (or in employment), at the moment in which rigidity is introduced. With a different production function this result may well be reversed. For instance, with a production function that is logarithmic in labor, as in Schivardi (1999), the immediate effect of rigidity is to reduce profits and output, but not employment. This is an important point to note, because it helps clarifying that there is no contradiction between our results and those of the partial

([5]) Hiring the unemployed may be difficult also for other reasons, such as high mobility costs (see Faini et al., 1997).

equilibrium literature which typically studies the immediate effects of an increase in rigidity, holding constant the wage and the interest rate. In particular, Bertola (1990) found that the employment effect of EPL is generally ambiguous and depends crucially on the shape of the labor demand function; a negative effect is more easily found (depending on the specific values of other parameters, such as the discount rate) with a Cobb-Douglas than, say, with a linear-quadratic function.

The results that appear to be robust are those relating to the behavior of the system over time. This is because rigidity tends to reduce output and the return to capital in virtually any model of the economy, whatever the effect on employment. Rigidity implies that profits are maximized under an additional constraint: they must hence be lower than in an unconstrained environment. Output is dampened by rigidity because labor is less efficiently allocated across firms and sectors. It is easy to check that these statements do apply to the above-mentioned linear quadratic function in the context of Bertola's model of the firm.

This paper has shown that the results do not depend either on growth being endogenous, as in Bertola (1994) and Schivardi (1999), or on some special assumption of their models, such as different factor endowments of workers and asset owners. Nor do they depend on the assumption that shocks are serially uncorrelated. If shocks were correlated over time, labor would still be misallocated in relation to the unexpected component of the stochastic process([6]).

The key points that make the difference with the standard results are hence the general equilibrium and dynamic features of the analysis. To see this, note that in a partial equilibrium model one does not get the result that lower output leads to lower saving and investment. Nor does one obtain any change in the interest rate, which is typically considered exogenous.

Overall, as suggested by Bertola, it seems that EPL works essentially as a tax on capital which drives a wedge between the total profitability of capital and the portion of it that is appropriated by investors.

The effects of such tax are likely to be more important if one considers agent's heterogeneity coupled with imperfect information. In our model, the inefficiency comes from a quantitative misallocation of resources: too much labor in low productivity firms and too little in high productivity ones. In a model with heterogeneous agents qualitative issues would become dominant. With firing restrictions, firms find it difficult to have the workers that are most suitable for their needs. However careful, the ex-ante selection process cannot substitute for an on the job knowledge of the actual abilities of the worker. Thus, firms are obliged to live with a sub-optimal composition of the labor force and cannot adapt it according to the changing needs of technology and demand. Incentive problems are also likely to be relevant. Restrictions on individual (as opposed to collective)

([6]) This point is relevant for empirical tests, because, to the extent that shocks are serially correlated, firms can form reasonable expectations and adjust their factor allocation decisions accordingly.

firing, coupled with other labor market institutions such as «equal pay for equal jobs», are bound to reduce the incentive to individual efficiency.

Two arguments pointing in the opposite direction should be mentioned. The first one is that EPL obliges firms to internalize costs that would otherwise be born by the taxpayers, because, with less protection, governments may have to spend more for unemployment subsidies. The second argument relies on EPL's effects on human capital, due for instance to learning by doing or to insurance benefits induced by a more stable employment. Both arguments are interesting in terms of political economy, as they help explaining why EPL exists in the first place in virtually all countries, though with very different intensities. Analytically, they do not seem convincing. Unemployment subsidies are likely to be a better way to dampen the social consequences of unemployment, because, for any given target in terms of costs and levels of protection, they do not distort production decisions and have smaller efficiency effects. This is, in a nutshell, one of the key findings that has emerged from the recent literature on transition economies: the generally accepted recommendation was to set up social security networks and restructure the firm sector according to efficiency criteria. The human capital argument seems to assume systematic myopic behavior on the part of firms. Normally, the profit motive should be sufficient to induce a firm to give its employees the level of employment stability that is required in relation to its needs in terms of human capital accumulation. It is not clear why there should be such large market failures in this respect as to justify a form of government intervention that is inevitably distortionary, to the very least because it applies equally to firms which have very different needs in terms of human capital.

Our results relate rather naturally to the main thrust of Blanchard's (1999) argument on the links between EPL and shocks. Blanchard starts from the observation that unemployment in Europe has been rising especially in the last two decades, in spite of the fact that labor legislation has tended to become less rigid in most countries. So, he notices, it is not EPL in itself that causes unemployment, but its interaction with shocks (such as increases in oil prices, higher real rates of interest, productivity slow-down etc). The transition between an old and a new equilibrium is longer and may imply long periods of high unemployment. Blanchard focuses on the major macroeconomic shocks that have hit the economy in the recent past. We focus instead on microeconomic shocks, much as in Bertola and Ichino (1995) and in Ljungquist and Sargent (1998). Indeed, as we have pointed out, our model does not produce unemployment only in the degenerate case in which the variance of the productivity shock is equal to zero. Thus, in our model as well, what matters is the interaction of shocks and rigidity. Major macroeconomic shocks certainly add to microeconomic uncertainty, but the latter is a fact of life every day in every firm, even in the most peaceful times. The idea of a balanced growth with no uncertainty, where all firms grow along identical isoquants, is obviously no more than a (very useful) abstraction of economists.

We do part company with Blanchard, however, when he assumes that wages adjust so as to offset the employment effects of changes in labor market rigidity. The assumption in itself is of course legitimate, but the message should be made explicit: EPL does not affect

employment if workers are willing to accept lower wages. To see this point it is useful to refer to Blanchard's LSE Lionell Robbins Lecture (October 2000) where the argument is set out analytically. In lecture three he has a flow model of the labor market where the wage and the exit rate from unemployment are jointly determined by a standard labor demand equation (determining what he calls the feasible wage) and a bargaining equation. The feasible wage does not depend on the exit rate; hence, an increase in labor protection unambiguously reduces the equilibrium wage, since «the wage that firms can afford to pay goes down» (page 12). At the same time, greater protection increases the bargaining power of workers and induces them to bargain for higher wages. To reconcile the stronger wage demands with the lower feasible wage, worse labor market conditions are needed: the exit rate from unemployment must go down. The net effect on unemployment is however ambiguous because unemployment is equal to flows times duration and the decrease in job flows may or may not dominate the increase in duration. The model is quite insightful, but there is no question that the ambiguous effect on unemployment crucially depends on the fact that the wage is allowed to adjust downward. If the wage were held constant, the result would unambiguously be a fall in the demand for labor.

Hence, in Blanchard's model, there is no reason to say that higher wage demand causes (classical) unemployment, while higher job protection does not. For any given wage, job protection causes unemployment just like, for any given degree of job protection, higher wages cause unemployment.

This discussion is useful to clarify what is an appropriate empirical test of our hypothesis. The key point is that we want an employment equation that keeps a check on wages rather than on the determinants of the wage bargaining process. In principle, we want the growth rate (of GDP or employment) on the left side of the equation. On the right side we want a measure of EPL, such as the one produced by the OECD, i.e., the growth rate of wages and other variables that are relevant to explain growth (convergence parameter, taxation, education etc.). Of course, there is a simultaneity problem with wages that must be tackled with standard econometric techniques. This is a very different equation from those estimated in the literature, where the employment or unemployment rate is regressed on EPL and specific labor market variables, such as union density or the fiscal wedge on labor. This is the route taken for instance in Boeri et al. (2000) and OECD (1999). Instead, we want to focus on a growth rate variable and hold constant both the wage and any other variable that potentially affects the rate of growth of employment. The fact the EPL matters via the growth rate makes empirical estimation very difficult since one has to have a good equation of growth and growth is affected by a very large number of factors. Nonetheless this is the task.

4. Conclusions

This paper has introduced uncertainty and labor market protection in a standard textbook model of economic growth and has shown that rigidity lowers growth and long

run income per capita. It has argued that this result is rather robust, in the sense that it does not depend on the details of a specific model, and does not conflict with the existing partial equilibrium literature. The key point is that in virtually any model of the economy profits and the level of output are negatively affected by market rigidities. In turn, lower output and profits must have the effect of depressing the aggregate levels of saving and investment.

Unemployment enters the picture when we drop the assumption that wages adjust so as to clear the market. If wages adjust, full employment (or any desired path of employment) can always be attained, regardless of whether the economy grows at a high or at a low rate. However, for any given wage, or a given path of wages, higher job protection implies that over time employment will be lower. The mechanism that determines wages is not relevant here. The relevant point is that, for any given real wage, employment protection can cause unemployment exactly in the same way that high real wages do, for a given level of job protection.

In short, in order to create jobs the economy needs investment and growth.

The link between investment and jobs is quite common in economic policy debates: in Europe it is documented in the well known white paper on «Growth, competitiveness, employment» of 1993, the so called Delors Report. This view is not very popular among economists for the good reason that unemployment is equally distributed among rich and poor nations. Thirty years ago the stock of accumulated investment was enormously lower than today and our economies were much poorer; nonetheless, we had full employment. Likewise, a country like Thailand, which has a much lower capital stock than France, has a lower rate of unemployment. This said, we see a good point on both sides of this argument. The dividing line is not economics, but political economy. Since French wages cannot be reduced to Thai levels, the best way to make them compatible with full employment in France is to create conditions in which investment and GDP growth are higher than they are today.

According to Olivier Blanchard (1999), the popular argument among «politicians» that flexibility is good for jobs is wrong and neglects the results of economic theory. In our view, both Blanchard and Blanchard's «politicians» are essentially right. As for the Delors Report type of argument, the dividing line is not economics, but political economy. As we have seen in section three, Blanchard performs conceptual experiments in which real wages can adjust to changes in labor market legislation. Policy makers would instead like to know how to create jobs without having to reduce real wages. So neither Blanchard nor the policy makers that he criticizes are either wrong or inconsistent.

Those who are definitely inconsistent are those who argue that investment is the heart of job creation policies (the Delors argument) and at the same time use Blanchard's argument that flexibility has no relation with average employment. From a policy perspective, such inconsistent view is very relevant since it involves a large part of policy makers in the trade unions as well as in national and European parliaments. It has had, and still has, a major influence in many European countries and is shaping policy in a major way: for instance, firms are not given the flexibility they need to be competitive, but, on the

other hand, they are given state aid to step up investment. It would be quite useful if economists were to clarify the point. Perhaps it is just a matter of semantics, but semantics is very important and has real effects in the real world.

Appendix

Proof that $Y_F > Y_R$

We must show that

$$(A1) \qquad \overline{A}_F > \overline{A}_R$$

i.e. that

$$(A2) \qquad pA_H\left(\frac{L_H}{L}\right)^{1-\alpha} + (1-p)A_L\left(\frac{L_L}{L}\right)^{1-\alpha} > pA_H + (1-p)A_L$$

Let

$$(A3) \qquad x \equiv \frac{L_H}{L}$$

From the market clearing equation, we know that

$$(A4) \qquad \frac{L_L}{L} = \frac{1-px}{1-p}$$

Hence, we must show that

$$(A5) \qquad pA_H x^{1-\alpha} + (1-p)A_L\left(\frac{1-px}{1-p}\right)^{1-\alpha} > pA_H + (1-p)A_L$$

Since the LHS of A5 is concave in x, we can find its maximum by differentiating with respect to x. The solution to this problem yields

$$x = \frac{1}{p + (1-p)\left(\frac{A_L}{A_H}\right)^{\frac{1}{\alpha}}}$$

This expression is exactly eq. 15 for L_H/L that was found from profit maximization in Flexland. The LHS of A5 is larger than the RHS because in the RHS the variable x is constrained to be equal to one. Hence, output is maximized in Flexland, while it is not in Rigidland.

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