Macroeconomic effects of regulation and deregulation in goods and labor markets

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Abstract

Product and labor market deregulation reduce and redistribute rents, leading economic players to adjust to this new distribution. It typically comes with distribution and dynamic effects.

To study these effects, we build a macroeconomic model on two central assumptions: Monopolistic competition in the goods market, which determines the size of rents. Bargaining in the labor market, which determines the distribution of rents. Product market regulation determines entry costs and the degree of competition. Labor market regulation determines the bargaining power of workers.

We show the effects of deregulation. We then use our results to discuss the political economy of deregulation, and recent macroeconomic evolutions in Europe.

Product and labor market regulations are often blamed for the poor European performance of the last 30 years. Remove (many of) these regulations, the argument goes, and Europe will soar. Unemployment will decrease, output will increase.[1]

Deregulation however is fundamentally about reducing and redistributing rents, leading economic players to adjust in turn to this new distribution. Thus, even if deregulation eventually proves beneficial, it will come with both distribution and dynamic effects. The transition may imply the disappearance or the decline of incumbent firms. Unemployment may increase for a while. Real wages may decrease before recovering, and so on.

Understanding these dynamic and distribution effects is important, for at least two reasons. It helps clarify the political economy constraints on deregulation, and thus potentially improve its design. And, as many countries are embarking on a path of deregulation, it may help interpret their macroeconomic evolutions.

These are the issues we examine in this paper.

We start by developing, in Section 1, a simple general equilibrium model of an economy with both product and labor market regulation. The model is built on two basic assumptions: Monopolistic competition in the goods market, which determines the size of rents; and bargaining in the labor market, which determines the distribution of rents between workers and firms. We think of product market regulation as determining the entry costs faced by firms, and the degree of competition between firms. We think of labor market regulation as determining the bargaining power of workers.

We characterize the macroeconomic equilibrium in Section 2. We divide

[1]This has been a standard theme in analyses of European unemployment. For a recent study articulating this theme, see for example the study of France and Germany by the McKinsey Global Institute [1997].

time in two periods, a short run, where the number of firms is given, and a long run, where the number of firms is endogenous, determined by an entry condition. For each period, we show how the main macroeconomic variables, in particular the real wage and unemployment, depend on the various dimensions of regulation.

We then turn, in Sections 3 and 4, to the economics of deregulation. (The model is symmetric so the economics of less regulation are the same, with sign reversed, as those of more regulation. Focusing on deregulation is more natural in the current context). Among the conclusions we reach are the following:

While the direct effect of product market deregulation is to reduce total rents, and so to decrease the rents going to workers, workers gain more as consumers than they lose as workers. Product market deregulation leads to higher real wages, and to lower unemployment in the long run.

While workers eventually gain from labor market deregulation, this comes with a strong intertemporal trade off: Labor market deregulation leads to lower unemployment in the long run. But in the short run, it is likely to come with both lower real wages and higher unemployment.

We then apply our results to two sets of issues: The political economy of deregulation; and the interpretation of macroeconomic evolutions in Europe over the last 30 years.

We take up political economy issues in Section 5, focusing on the interactions between product and labor market regulation. Our results suggest that governments may want to combine labor and product market deregulation so as to reduce workers' opposition to deregulation. And they suggest that the government may want to use product market deregulation to achieve labor market deregulation. The reason is straightforward: Reducing rents in the goods markets reduces the incentives of workers to fight for a share of these rents.

We turn to European macro evolutions in Section 6. The motivation is the sharp decline in the labor share observed in continental Europe since the early 1980s–in many countries by more than 10% of GDP. Various explanations have been offered, from the dynamic response of the capital-labor ratio to changes in the relative price of labor and capital, to biased technological progress. Our results suggest another potential explanation, one based on a decrease in the bargaining power of unions. Such a decrease, our model implies, can explain the coincidence of a declining labor share combined with a further initial rise in unemployment. To the extent that this interpretation is correct, the future is brighter: The long run effects should be a recovery of the labor share, and a decrease in equilibrium unemployment.

We conclude by drawing what we see as the main lessons of our analysis for how governments should approach product and labor market deregulation.

I. Monopolistic Competition, Bargaining, and Regulation

We think of an economy in which a number of firms produce differentiated products, using labor. We make two main assumptions. The first is that of monopolistic competition in the goods market, which determines the size of the rents going to firms and their workers. The second is the presence of bargaining in the labor market, which determines how much of the rents go to firms, and how much to their workers.

We divide time in two periods: The "short run", defined as the time over which we can take the number of firms as given. The "long run", defined as the time over which the number of firms is endogenous, determined by an entry condition.

We take product market regulation as determining the degree of competition among firms and the entry cost for firms. We take labor market regulation as determining the degree of bargaining power of workers.

The specific assumptions are as follows:

Workers

There are L workers/consumers, indexed by j. In each period, worker j has a utility function given by:

$$V_j = [m^{-1/\sigma} \sum_{i=1}^{m} {C_{ij}}^{(\sigma-1)/\sigma)}]^{\sigma/(\sigma-1)} \tag{0.1}$$

where $\sigma = \bar{\sigma}\ g(m),\ \ g'(.) > 0$, $\bar{\sigma}$ is a constant, and m is the number of products (which is given in the short run, and endogenously determined in the long run).

This specification of utility has two implications:

- Under the assumption that the worker consumes all products in equal proportions (a condition which, in our symmetric model, holds in equilibrium), so $C_{ij} = C_j/m$, the utility function implies $V_j = C_j$. In other words, an increase in the number of products does not increase utility directly. (Technically, this result comes from the presence of $m^{-1/\sigma}$ in the term in brackets. Absent this term, an increase in the number of products would increase utility for a given level of consumption.)

- The increase in the number of products however increases the elasticity of substitution between products, and by implication the elasticity of demand facing firms. (This result comes from the assumption that σ, rather than being constant as in the standard Dixit-Stiglitz framework, is increasing in m, as in the Hotelling model.)

Thus, to the extent that deregulation leads to a larger number of firms, and, by implication, to a larger number of products (each firm produces a different product), its effect in our model works only through the reduction

in the monopoly power of firms. This is the effect we think is most important and we want to capture here.

Each period, worker j can supply either zero or one unit of labor, and spends his income on consumption (there is no saving, or capital in our model, and thus no link across the two periods). His budget constraint for each period, stated in nominal terms, is given by:

$$\sum_{i=1}^{m} P_i C_{ij} = W_j N_j + P f(u)(1 - N_j)$$

where N_j, labor supply, is equal either to zero (if he does not work) or to one (if he works), $f(.) > 0$, $f'(.) < 0$, and P is the price index associated with consumption:

$$P \equiv (\frac{1}{m} \sum_{i=1}^{m} P_i^{1-\sigma})^{1/(1-\sigma)}$$

Spending on consumption is equal to labor income if the worker works, and to non-labor income if he does not. The wage equivalent of being unemployed is taken to be a decreasing function of the unemployment rate, $f(u)$ This simple shortcut captures the notion that higher unemployment makes it more painful to be unemployed (we assume that $f(0)$ is sufficiently high and $f(1)$ is sufficiently low that the equilibrium unemployment rate derived below is strictly between 0 and 1).

Note that under symmetry of consumption (so $C_{ij} = C_j/m$), and using the budget constraint, the utility of worker j in each period can be rewritten as:

$$(\frac{W_j}{P} - f(u))\ N_j + f(u)$$

This expression will be useful below.

Products and firms

Each product is produced by one firm, so i indexes both the product and

the firm. The production function of firm i is simply:

$$Y_i = N_i$$

There is no capital. And there is no effect, direct or indirect, of the number of products, and thus of competition, on the productivity of labor—which is identically equal to one.

Each firm is run by an entrepreneur, with utility also given by equation (0.1). In each period, the entrepreneur keeps the profit of the firm, and spends it on consumption goods. Nominal profit in firm i is given by $P_i Y_i - W_i N_i$, or equivalently:

$$(P_i - W_i)N_i$$

Bargaining

Each period, each firm bargains with L/m workers. The workers can either work in the firm or be unemployed during the period.

We assume Nash bargaining: Together firm i and the workers choose a wage and a level of employment so as to maximize the (log) geometric average of their surpluses from employment:

$$\beta \log((W_i - Pf(u))\ N_i) + (1-\beta)\log((P_i - W_i)N_i) \tag{0.2}$$

where the first term reflects the surplus to workers from working in firm i (under the assumption of symmetric consumption), the second reflects the profit of firm i, and β reflects the relative bargaining power of workers.[2]

This assumption is known as (privately) "efficient bargaining". Why this assumption? Because we want to allow for the fact that, when there are rents, stronger workers (a higher β) may be able to obtain a higher

[2]While we write the objective function in nominal terms, we could equivalently write it in real terms, given that both parties take the price level as given.

wage without suffering a decrease in employment, at least in the short run. Efficient bargaining naturally delivers that implication. But any assumption which relaxed the link between the wage and the marginal revenue product of labor would yield qualitatively similar results. We return to a discussion of alternative assumptions about bargaining in Section 4.

The short and the long run

In the short run, we take the number of firms/products as given. But, in the long run, the number of firms/products is determined by an entry condition, so the short run distribution of rents between firms and workers determines the equilibrium number of firms in the long run.

We assume that firms face a cost of entry equal to c, which we think of as coming from product market regulation. We make two assumptions about c:

- We assume that c is a shadow cost. The motivation is our focus on regulation, and the fact that many regulatory barriers to entry take the form of legal and administrative restrictions on entry, rather than direct costs. Except for accounting purposes, this assumption has no implication for the characterization of the equilibrium. It implies that, in our long run equilibrium, existing firms make pure profits; if c were an actual cost, these profits would be dissipated in entry costs. Going back to the motivation of this paper, it seems reasonable to think that, in many markets, regulation allows firms to make positive pure profits for a long time, if perhaps not forever.

- The second is that c is proportional to output (or employment, as the two are equal here). The reason for having a proportional rather than a fixed cost is algebraic simplicity: It makes the long run equilibrium easier to characterize. It trivially implies that, in the long run, the

profit rate (profit per unit of output) must be equal to c, and delivers the result that, in the limit, the equilibrium converges to the competitive equilibrium as c goes to zero. It obviously eliminates the standard issues examined by models of monopolistic competition, such as optimality of the number of products and so on. But they are not the focus here, and either allowing for a non–regulatory fixed cost or allowing the regulatory cost itself to be a fixed cost would not make any substantial difference to the results we want to focus on here.

Regulation

We think of regulation as being captured, admittedly in reduced form fashion, by three parameters in the model:

- We think of c and $\bar{\sigma}$ as reflecting two dimensions of product market regulation. Decreases in c may come, for example, from the elimination of state monopolies, or the reduction of red tape associated with the creation of new firms. In the context of European integration for example, decreases in $\bar{\sigma}$ may reflect the elimination of tariff barriers, or standardization measures making it easier to sell domestic products in other European Union countries. In equation (1.1) $\bar{\sigma}$ was formally introduced as a taste parameter. To interpret an increase in $\bar{\sigma}$ as the result of deregulation, one should think of our specification of utility as a reduced form reflecting higher substitutability among products, for whatever reason.

- We think of β as reflecting any aspect of labor market regulation which increases the bargaining power of workers, ranging, for example, from the existence and the nature of extension agreements, to closed shop arrangements, to rules on the right to strike.

Our goal is to show how these three parameters determine the size and the distribution of rents, and by implication, the macroeconomic equilibrium.

II. Short–Run and Long–Run Equilibrium

The easiest way to characterize the equilibrium is to do so in three steps, starting with the short run partial equilibrium, then turning to the short run general equilibrium, and finally to the long run general equilibrium.

The short run partial equilibrium

Consider the problem faced by firm i, producing good i. Given the preferences of workers and entrepreneurs, the demand for good i (by workers and entrepreneurs) is given by:

$$Y_i = \frac{Y}{m}\left(\frac{P_i}{P}\right)^{-\sigma} \tag{0.3}$$

where Y is total demand (total output), and Y_i the demand for good i. At a relative price of one, the firm faces a demand equal to one-mth of total demand. The elasticity of demand with respect to the relative price is equal to $(-\sigma)$.

Taking Y, P, and the unemployment rate u as given, firm i and the workers associated with firm i choose employment N_i, the price P_i, and the wage W_i so as to maximize (0.2) where, from the production function, $N_i = Y_i$, and demand Y_i is given by (0.3). It follows that:

- The relative price P_i/P chosen by the firm (and the workers) is given by:

$$\frac{P_i}{P} = (1 + \mu(m))\ f(u) \tag{0.4}$$

where $\mu(m)$, the markup of the relative price over the reservation wage,

is given by:

$$\mu(m) = \frac{1}{\bar{\sigma} g(m) - 1} \text{ so } \mu'(m) < 0$$

- The real consumption wage (the wage in terms of the consumption basket), W_i/P, is given by:

$$\frac{W_i}{P} = (1 - \beta)\, f(u) + \beta\, \frac{P_i}{P}$$

So, using equation (0.4):

$$\frac{W_i}{P} = [1 + \beta\mu(m)]\, f(u) \tag{0.5}$$

A graphical representation of the partial equilibrium is given in Figure 1. Employment, N_i (equivalently, output, Y_i) is measured on the horizontal axis, the relative price, P_i/P, and the real consumption wage, W_i/P, on the vertical axis.

[Figure 1. Here]

The demand curve and marginal revenue product curves are drawn as DD and MRP. The reservation wage is drawn as the horizontal line, at $f(u)$.

From the point of view of workers and the firm, the efficient level of employment is such that the marginal revenue product of labor is equal to the reservation wage, so at point A, with associated level of employment N_i. This in turn implies the choice of a relative price, P_i/P, on the demand curve, so a price equal to one plus a markup μ, times the reservation wage; the markup depends on the elasticity of demand and is given by $\mu = 1/(\sigma - 1)$.

Given the relative price, rents per unit of output are given by $(P_i/P - f(u))$, or $\mu f(u)$. The workers get a proportion β of those rents, so the real

wage, which plays no allocative role under efficient bargaining, is equal to $(1+\beta\mu)f(u)$.

Note that, in partial equilibrium, the real wage is an increasing function of both β and μ:

- The higher β, the higher the proportion of rents going to workers. And because the reservation wage is unaffected, the increase in the wage has no effect on employment.
- The higher μ, the higher the real wage. The firm receives larger rents, of which some proportion goes to the workers in the form of a higher real wage.

General equilibrium. Short run.

In partial equilibrium, each firm chooses its relative price P_i/P freely. But, in general equilibrium, not all firms can have a relative price greater than one. Indeed, under our symmetric assumptions, all prices must be equal in general equilibrium. Putting $P_i/P = 1$ in equation (0.4) implies:

$$1 = (1+\mu(m))\ f(u) \tag{0.6}$$

In the short run, the number of firms is given, so $\sigma = \bar{\sigma}g(m)$ is given, and by implication so is $\mu(m)$. Given $\mu(m)$, equation (0.6) determines the equilibrium unemployment rate.

Replacing $f(u)$ by $1/(1+\mu(m))$ in equation (0.5), the real wage is given in turn by:

$$\frac{W_i}{P} = \frac{(1+\mu(m)\beta)}{(1+\mu(m))} \tag{0.7}$$

The short–run general equilibrium is characterized in Figure 2. Figure 2 starts by replicating Figure 1. Equilibrium is still at the point where the

marginal revenue product of labor is equal to the reservation wage, at point A. But now, the implied relative price must be equal to 1. Given that the relative price is a markup over the reservation wage, and given that the markup is fixed in the short run, this condition determines the reservation wage, and in turn the equilibrium level of unemployment. The real wage is still set as a weighted average of the reservation wage and the relative price.

[Figure 2. Here]

Return to the effects of β and μ on the real wage, now in the short run general equilibrium:

- As was the case in partial equilibrium, the real wage is an increasing function of β.

  An increase in β increases the proportion of rents going to workers, and thus leads to a higher real wage. And, because, in the short run, the real wage is not allocative, this higher real wage has no effect on employment, or unemployment.

- In contrast however to the partial equilibrium case, the real wage is now a *decreasing* function of μ.

  This is because there are now two effects at work. The first is the partial equilibrium effect we saw earlier: A higher μ means higher rents to the firm where the worker works, leading to a higher real wage. The second is the general equilibrium effect. The rents going to firms come from consumers, who now pay more for the goods they buy. So workers gain as workers, but lose as consumers. Because, as workers, they only get a proportion β of the rents, the second effect dominates the first. The real wage goes down.

General equilibrium. Long run

In the long run, rents determine entry or exit of firms. In the long run, rents must cover entry costs.[3] Given our assumption that entry costs are proportional to output, this condition takes the simple form:

$$\frac{\mu(m)(1-\beta)}{(1+\mu(m))} = c \tag{0.8}$$

Profit per worker must be equal to the shadow cost c. This equation determines the equilibrium number of products m. Recall that the number of products determines the elasticity of substitution between products, and thus the elasticity of demand facing firms. Thus, the number of products must be such as to generate a degree of competition consistent with profits equal to entry costs.

Using the definition of $\mu(m)$, equation (0.8) can be rewritten as:

$$\bar{\sigma} g(m) = \frac{(1-\beta)}{c} \tag{0.9}$$

Given that $g'(.) > 0$, the equilibrium number of products is a decreasing function of $\bar{\sigma}$: More competition for a given number of firms decreases rents, making entry less attractive. The number of firms is also a decreasing function of β: A smaller proportion of rents going to firms also makes entry less attractive. And the number of firms is a decreasing function of c: Higher entry costs require higher rents, leading to a smaller number of firms.

Replacing the markup from (0.8) in (0.6), the unemployment rate is given by:

$$f(u) = 1 - \frac{c}{(1-\beta)} \tag{0.10}$$

[3]Our two-period model cannot capture the specific dynamics of entry and exit. Presumably, if rents are less than entry costs, firms which die will not be replaced until rents have recovered sufficiently to justify entry. If rents are larger than entry costs, firms will enter until rents have been bid down to entry costs.

The higher c or the higher β, the higher the markup required to cover entry costs, thus the smaller the equilibrium reservation wage, and, in turn, the higher the unemployment rate.

Finally, replacing the markup from (0.8) in (0.7), the real wage is given by:

$$\frac{W_i}{P} = 1 - c \tag{0.11}$$

Productivity is equal to one. Firms must receive c per unit in order to cover entry costs. The real wage must therefore be equal to $1 - c$.

Return once again to the role of β and μ on the real wage:

- Because the supply of firms is fully elastic in the long run, an increase in β no longer increases the real wage. The effect now shows up in higher unemployment. Higher β means lower rents for firms, and for given entry costs, a lower number of firms, a higher markup, a lower reservation wage, and so a higher rate of unemployment.

- The markup, μ, is no longer an exogenous parameter, but is now determined in equilibrium by both β and c, so we must look at the effects of c instead. An increase in μ coming from an increase in c, leads to a decrease in the real wage. But, now, it leads also to an increase in the unemployment rate. A higher c leads to a smaller number of firms, a higher markup, a lower required reservation wage, and a higher unemployment rate.

Having characterized the equilibrium, we can now turn to the effects of various dimensions of deregulation. While the results have already been implicitly given, something is gained from the discussion. We do so in the next section.

III. Deregulation

We start with the two dimensions of product market deregulation, then turn to labor market deregulation.

Product market deregulation. An increase in $\bar{\sigma}$

Suppose the government increases $\bar{\sigma}$, increasing competition in the product market, for a given number of firms.

In the short run, firms facing more elastic demand decrease their markup, leading in turn to both an increase in real wages, and a decrease in unemployment.

The favorable effects however vanish in the long run. The reason is, given an unchanged entry cost, the decrease in the profit rate leads a decrease in the number of firms over time (Because it is not profitable to enter, firms that die are not replaced). In the long run, the profit rate must go back to its initial, pre-deregulation, level. But for the profit rate to return back to its initial level, so must the markup. By implication, so do the unemployment rate and the real wage.

In short, this dimension of product market deregulation is eventually self-defeating: The favorable short-run effects disappear over time and the economy returns to its pre-deregulation equilibrium.

These results are surely too strong, in that we take c, the entry cost, as given, when looking at changes in $\bar{\sigma}$. In practice, many deregulation measures are likely to affect c as well. If for example, we think of c as the shadow cost of a quantitative restriction on the number of firms (for example, the granting of a market to a monopoly firm), then these firms will stay in the market even if $\bar{\sigma}$ increases. More formally, the shadow cost c will go down one–for–one with the profit rate, leading to the same favorable effects of deregulation in the short-run and the long-run. Netherveless, the results

make a relevant point: To the extent that rents in the economy ultimately come from restrictions to entry, then, if nothing is done to decrease these restrictions, attempts to increase competition by other means are likely to be partly self-defeating.

Product market deregulation. A decrease in c

The previous argument suggests that the second dimension of product market deregulation, a decrease in entry costs, is more likely to be favorable, even in the long run. And indeed, it is.

Obviously, from our assumption that the number of firms is fixed in the short run, the decrease in entry costs has no effect in the short run. But in the long run, it leads to entry of firms, thus to a higher elasticity of demand, a lower markup, and thus lower unemployment and a higher real wage. (What happens to the size of incumbent firms, an aspect which will be relevant when we turn to the political economy of deregulation, is theoretically ambiguous: The number of firms increases, but, as the unemployment rate decreases, total employment increases as well. To the extent that, as seems plausible, the relative increase in total employment is smaller than the relative increase in the number of firms, employment in incumbent firms decreases.)

In short, this dimension of product market deregulation works because it attacks the problem at the root, decreasing the rents the firms require to enter and stay in the market. This allows for more competition, and in turn lower unemployment and higher real wages.

Note that, for neither dimension of product market deregulation, is there an intertemporal trade-off for real wages or unemployment. The first dimension leads to higher real wages and lower unemployment in the short-run and no long-run effect, the second to no short-run effect, and higher real wages and lower unemployment in the long run. Things are quite different in the case of labor market deregulation, to which we now turn.

Labor market deregulation. A decrease in β

Consider a decrease in β, a decrease in the bargaining power of workers.

In the short run, workers give up rents; From equation (0.7), their real wage decreases; equivalently, the profit rate increases. But this change in the factor income distribution has no effect on unemployment, which remains given by equation (0.6). Thus, workers clearly lose in the short run.

In the long run however, the larger rents left to firms lead to entry until the profit rate is again equal to c. As firms enter, competition increases, the markup decreases, leading to a decrease in the unemployment rate, and an increase in the real wage. Indeed, in the long run, the unemployment rate is lower than pre-deregulation. The real wage is back to its initial, pre-deregulation, level: The short run decrease in real wage due to the decrease in β is exactly offset by the decrease in the markup.

In short, labor market deregulation works by changing the distribution of rents in favor of firms, leading to more competition in the long run, and lower unemployment. Thus, in the short run, a change in the bargaining power of workers does no more than simply redistributing rents between workers and firms. But in the long run, by changing profits and leading to entry or exit of firms, it induces changes in the level of unemployment. In contrast to product market deregulation, labor market deregulation comes with a sharp intertemporal trade-off, lower real wages in the short run in exchange for lower unemployment in the long run. This will be relevant when we discuss the political economy of labor market deregulation below.

IV. Extensions

Our model is based on a number of strong simplifying assumptions. We explore the implications of two alternative assumptions here, one about the form of bargaining, the other about the form of utility. The motivation for

doing so will be made clear in each case.[4]

Ex-post determination of employment

Under our assumption that bargaining is privately efficient, the wage plays only a distributive role in the short run. Under that assumption, labor market deregulation, in the form of a decrease in β, gives rise to a sharp intertemporal trade-off, lower wages in the short run, in exchange for lower unemployment in the long run.

To show, a contrario, the implications of our assumption, we characterize the equilibrium under the assumption that employment is chosen ex-post by firms so as to maximize profit given the bargained wage—the so called "right to manage" model.

Consider the partial equilibrium first.[5] If firms can choose employment ex-post, then workers and the firm maximize equation (0.2) by choosing a wage equal to:

$$\frac{W_i}{P} = (1 + \beta\mu)\ f(u) \tag{0.12}$$

In partial equilibrium, and for a given unemployment rate, the wage turns out to be the same as under efficient bargaining. But the relative price is

[4]A more ambitious extension would be to allow output to be produced by both labor and capital. This would not only lead to a richer picture, but also allow to capture the fight for rents between workers, entrepreneurs, and rentiers, and, by implication, the interactions between labor, product, and financial market reform. We do not take up this task here. For an extension which allows for capital and labor in production, see Spector [2002]. For an exploration of the effects of labor, product, and financial market reforms, see Blanchard and Philippon [2002].

[5]What follows is well travelled ground. See in particular Layard and Nickell [1990] who derive partial and general equilibrium implications of the right to manage and the efficient bargaining models.

different, and given by:

$$\frac{P_i}{P} = (1+\mu)\frac{W_i}{P} = (1+\mu)[1+\beta\mu]\ f(u) \tag{0.13}$$

The price is now a markup over the real wage, not the reservation wage. Because firms take the bargained wage as given when choosing employment, the wage is now allocative. Equation (0.13) shows the "double marginalization" present in the economy. The wage is equal to $(1+\beta\mu)$ times the reservation wage, and the price is equal to $(1+\mu)$ times the wage.

Turn to the short-run general equilibrium. The unemployment rate must be such that the relative price in (0.13) is equal to one, so:

$$1 = (1+\mu)\ [1+\beta\mu]\ f(u) \tag{0.14}$$

This expression differs from that in the benchmark model because of the presence of the term in brackets. This term is greater than one, so, for a given value of μ, equilibrium unemployment is higher than under efficient bargaining.

Because the price is now a markup over the wage rather than over the reservation wage, the real wage is lower than under efficient bargaining (and depends only on monopoly power in the goods market):

$$\frac{W_i}{P} = \frac{1}{1+\mu}$$

By implication, profit per unit is larger than under efficient bargaining.

Turn to the long run equilibrium. In the long run, the zero net profit condition gives:

$$\frac{\mu(m)}{1+\mu(m)} = c, \quad \text{or equivalently:} \qquad \bar{\sigma}g(m) = 1/c$$

So, an economy where firms have the right to manage has a larger number of firms, and thus a higher elasticity of demand, and thus a lower markup.

We saw that, given the number of firms, unemployment was higher. But the number of firms is larger, leading to a lower markup, and thus lower unemployment. Replacing $\mu(m)$ in (0.14) by its value from above gives:

$$f(u) = \frac{(1-c)^2}{1-c+\beta c} \tag{0.15}$$

Comparing it to the expression for unemployment in the benchmark model, equation (10), it follows that, if β is positive, the unemployment rate is actually lower in the long run than under efficient bargaining.

Finally, the zero profit condition implies that the real wage is the same as under efficient bargaining, namely:[6]

$$\frac{W_i}{P} = 1 - c$$

Now consider the effects of labor market deregulation, i.e. of a decrease in β. In the short run, wages do not change, and unemployment decreases. As the profit rate also does not change, the long run is just like the short run. Thus, under the right–to–manage assumption, there is no intertemporal trade-off from labor market deregulation: Workers gain in both the short and the long run.

Concave utility

Our result that, under efficient bargaining, employment is independent of β, the bargaining power of workers, depends very much on the assumption that utility is linear. We now relax this assumption, and assume that utility

[6]Note the distinct second-best flavor of these results: A shift to privately inefficient bargaining leads to unchanged real wages, and lower unemployment in the long run.

is concave instead. As we shall see, the intertemporal trade-off faced by workers in the event of labor market deregulation becomes even starker than in our benchmark model: lower real wages and higher unemployment in the short run, in exchange for lower unemployment in the long run.

Suppose that the utility of workers is given by a power transformation of our previous linear utility function:[7]

$$\tilde{V_j} = \frac{1}{1-\gamma} V_j^{1-\gamma}$$

where V_j was defined earlier as a CES function of consumptions of individual products, and $\gamma < 1$. (We keep the assumption that entrepreneurs are risk neutral. This is not essential but is convenient).

In partial equilibrium, and under efficient bargaining, the real wage and the relative price of firm i are now given by:

$$\frac{W_i}{P} = f(u) \, (\frac{1+\beta\mu}{1+\beta\gamma\mu})^{\frac{1}{1-\gamma}}$$

and

$$\frac{P_i}{P} = \frac{W_i}{P} \, \frac{1+\mu}{1+\beta\mu}$$

For $\gamma = 0$, the results are the same as before. For $\gamma > 0$, the solution is characterized in Figure 3. The contract curve, the set of employment and real wages for different values of β, is no longer vertical, but is now upward sloping. For $\beta = 0$, the equilibrium is the same as before: The wage is equal to the reservation wage, and employment is such that the marginal revenue product is equal to the reservation wage. As β increases however, the contract curve slopes up, with infinite slope at point A, and decreasing slope thereafter.

[7] Our derivation is a straightforward extension of McDonald and Solow [1981].

[Figure 3.]

Thus, in partial equilibrium, a decrease in β implies a movement down the contract curve, a decrease in both employment and the real wage.

Turning to general equilibrium and setting $P_i/P = 1$, the real wage and unemployment are given by:

$$\frac{W_i}{P} = \frac{1+\beta\mu}{1+\mu}$$

$$1 = f(u)\ (\frac{1+\beta\mu}{1+\gamma\beta\mu})^{\frac{1}{1-\gamma}}\ \frac{1+\mu}{1+\beta\mu}$$

The real wage is given by the same expression as before. Unemployment can be shown to be a decreasing function of β. So, the partial equilibrium result extends to general equilibrium: In the short run, a decrease in the bargaining power of workers leads to both a decrease in their real wage and an increase in unemployment.

Turning to the long run general equilibrium, the condition that the profit rate be equal to c gives:

$$\bar{\sigma} g(m) = \frac{(1-\beta)}{c}$$

So, just as in the benchmark model, labor market deregulation, i.e. a decrease in β ,leads to an increase in the number of firms, and thus a decrease in the markup. As before, the real wage must be equal to $1-c$. There are now two opposite effects of labor market deregulation on unemployment. On the one hand, for a given number of firms, the lower value of β leads to higher unemployment. On the other, the increase in the number of firms, and the lower markup, leads to lower unemployment. From the equations above, the net effect is however unambiguous: Unemployment decreases in the long run.

To summarize: At the center of discussions of labor market deregulation

are the trade-offs between short-run and long-run effects. In our benchmark model, the trade-off takes the form of lower wages in the short run in exchange for lower unemployment in the long run. The first extension shows that to the extent that wages determine employment in the short run, the trade-off may be more attractive to workers: Under our specific assumptions, labor market deregulation has no effect on real wages, and decreases unemployment in both the short and the long run. The second extension shows however that, if workers have concave utility functions, the trade-off is even starker than in the benchmark, with a decrease in real wages and an increase in unemployment in the short run, in exchange for lower unemployment in the long run.

V. Application: The Political Economy of Deregulation

Deregulation raises many political economy issues. Consider the following list:

- Who loses and who gains from labor market deregulation? What are the intertemporal trade-offs?
- Why do workers so often oppose product market deregulation?
- How are deregulation in the labor market and the product market likely to interact? Is one likely to help or hinder the other?

Fully answering these questions would take us too far. But our model gives a number of hints, which we believe are likely to be robust to further analysis. Let us address each of the three issues above.

Labor Market Deregulation

Labor market deregulation (a decrease in β) decreases wages in the short run, leaves them unchanged in the long run. For a worker who is sure to be employed in both periods, the effect is thus unambiguously negative.

There are employment effects however. In the short run, both aggregate unemployment and firm employment remain unchanged. But, in the long run, entry of firms is likely to decrease employment in incumbent firms (Recall that the effect is formally ambiguous, because of the decrease in aggregate unemployment.) This in turn implies that the currently employed workers now face a positive probability of becoming unemployed, another reason for them to oppose labor market deregulation.

In short, why currently employed workers oppose labor market deregulation is straightforward: They lose from it, both because real wages fall and the probability of becoming unemployed increases. Those who gain are those who would have been unemployed in the future: some of them end up employed, and those who remain unemployed benefit from an increase in the wage equivalent of being unemployed. [8]

Product market deregulation

[8]The rules mapping aggregate and firm employment into individual employment probabilities are obviously important here. We have implicitly assumed that workers currently employed by a firm have priority in that firm's employment in the long run: thus they care about what happens to employment in the firm. Since labor market deregulation leads to entry of new firms, employment in existing firms may decline, even if aggregate employment increases. The issues are familiar from insider-outsider models. (They play a central role for example in the analysis of labor market reform by Saint-Paul [2000]). If, instead, employment status in the long run is unrelated to employment status in the short run, then all workers benefit from the long–run decrease in unemployment. It is also important to know when the reforms are introduced: before or after workers know they are unemployed in the first period. Our informal argument assumes that reforms are announced after the pre-reform equilibrium has been realized—so workers know their pre-reform employment status. These veil-of-ignorance issues are familiar from the research on political economy of reform. For example, see Fernandez and Rodrik [1991].

Think of deregulation as a decrease in μ. As we have seen, this decrease can be achieved in the short run through an increase in $\bar{\sigma}$; in the long run, it must be achieved through a decrease in c.

In both the short and the long run, the effects on workers appear unambiguously favorable: A decrease in μ leads to an increase in real wages and to a decrease in unemployment. So why don't workers more strongly endorse product market deregulation? The model suggests two reasons:

First, in partial equilibrium, deregulation decreases the rents to the firm, and thus the rents to the workers. Under symmetry, this partial equilibrium perception is, as we have seen, misleading, as the decline in prices elsewhere more than compensates workers for the decrease in rents. But, if deregulation only affects part of the economy (because the rest of the economy was competitive, or because it remains regulated), then the partial equilibrium argument may extend to general equilibrium. If the deregulated sector is small enough, the partial equilibrium effect will indeed dominate and make workers in that sector worse off.[9]

Second, and as in the case of labor market deregulation, lower markups come, in the long run, from entry of new firms, and higher competition. Thus, employment in incumbent firms is likely to decrease, increasing the risk of unemployment for currently employed workers. This again may lead them to oppose product market deregulation, despite higher wages and lower unemployment.

The remarks above suggest that product market deregulation, which increases the wage, may help implement labor market deregulation, which initially decreases it. Because both however lead to entry, and a likely decrease in employment in incumbent firms, this may not be enough to get the support of employed workers.

[9]This theme is also emphasized in Gersbach [2003].

Interactions between product and labor market deregulation

There is much evidence that product and labor market regulations come together. Figure 4, taken from Nicoletti et al. [1999] and based on work at the OECD, makes the point. The variable on the vertical axis is an index of employment protection, which we can think of as a proxy for the degree of labor market regulation; the variable on the horizontal axis is an index of goods market regulation. The cross country relation between the two indexes is striking. In countries where product markets are highly regulated, such as Italy or Greece, workers tend to be highly protected. A natural explanation comes to mind: If product market regulation increases total rents, the incentives for workers to appropriate a proportion of these rents are increased, leading to more labor market regulation.[10]

[Figure 4. Here]

This suggests that a similar argument may apply to deregulation: Product market deregulation may, by decreasing total rents, lead to a decrease in the incentives of workers to appropriate the now smaller rents, and thus make it easier to achieve labor market deregulation.

To follow up on this intuition, consider the following example.[11] Think of product market deregulation as a decrease in $\bar{\sigma}$, which in turn leads to a decrease in μ. Think of employed workers as lobbying for a higher value

[10]This idea has been explored, in a partial equilibrium context, in both the labor and industrial organization literature. See for example Joskow and Rose [1989], Section 9, for a survey, or more recently Neven et al. [1998], and articles in the Summer 1999 issue of the *Journal of Economic Perspectives*.

[11]This example is close in spirit to the informal argument developed by Gersbach [1999]. The effects of product market deregulation on bargaining are also discussed in Nicoletti et al. [2001].

of β, and assume that they maximize the utility of being employed, net of lobbying costs:

$$\frac{1+\beta\mu}{1+\mu} - \frac{a}{2}\beta^2$$

The first term is the short run utility when employed. The second is the cost of lobbying, which is taken to be quadratic in β, and a is a parameter.

Maximization with respect to β yields:

$$\beta = \frac{1}{a}\,\frac{\mu}{1+\mu}$$

So a decrease in μ leads to a decrease in β. Product market deregulation leads to labor market deregulation. Having less rents to appropriate, unions fight less hard, or nearly equivalently, workers are less likely to join unions, making them weaker.

Can product market deregulation in the end lead to a lower, not a higher, real wage? In other words, can the indirect effect, through the decrease in β, dominate the direct effect through the decrease in μ (by the envelope theorem, we know that net utility above must go up if μ goes down)? The answer is yes. It is straightforward to show that a condition for product market deregulation to lead to a lower real wage is that

$$(2/a)\mu/(1+\mu) > 1 \qquad \text{or equivalently} \qquad \beta > 1/2$$

. This will occur if a is small enough, so β responds strongly to μ.

Our formalization is no more than an example, and further steps would be to endogenize μ, and to consider both the short and the long run. But it shows the basic complementarity between the two types of deregulation. Applied to Europe, it suggests that the measures taken to increase competition in the goods market within the European Union, most notably the

Single Market Initiative, may facilitate to labor market deregulation.[12]

VI. Application. The labor share and unemployment in Europe

The evolution of European unemployment, namely the rise of unemployment in the 1970s and 1980s and the persistence of high unemployment for much of the 1990s, is well known. Less so is the major shift in factor income distribution which has taken place in Europe over the same period: After increasing in the 1970s, the labor share has declined since the early 1980s. The decline has been sharp and deep. In many countries, the labor share is 10 percentage points or more below its value at the start of the 1970s.

Figure 5 shows the evolution of the unemployment rate and of the labor share in the business sector for the four large Continental European economies, Germany, France, Italy, and Spain.[13] Note in particular how the major decline in the share in the 1980s coincided with a further increase in the unemployment rate during that decade. Since then, the labor share has remained lower, and unemployment has only recently started to decline.

[Figure 5. here.]

Research aimed at jointly explaining these two facts has explored two

[12]The importance of reform complementarities is also stressed by Coe and Snower [1997], although their focus is on complementarities between different labor market reforms.

[13]The data for the labor share stopped in 1998, the date at which the OECD stopped publication of business sector statistics. The OECD has just restarted publication, but the levels of the new series are not comparable to the old. The evidence from individual countries for which data has been continuously available shows little change in the share since 1998.

lines of explanation.[14]

The first has focused on the increase in wages (relative to tfp growth) in the late 1960s and early 1970s. Under the assumption that the elasticity of substitution between capital and labor is less than one in the short run, but larger than one in the long run, this wage increase can explain why the labor share initially went up in the 1970s, only to go down later on. As firms have moved away from labor, the labor share decreased, while unemployment continued to rise.[15]

The main problem with this line of explanation is that the initial increase in wages was followed, from the late 1970s on, by wage moderation: By the early 1990s, cumulative wage growth since 1970 was substantially less than cumulative total factor productivity growth. Unless firms expect a dramatic increase in wages in the future, it is difficult to see why they would still be reacting to the wage increases of the past. For this reason, a second line of explanation has taken the opposite track and focused instead on the effects of this wage moderation. If we maintain the assumption that the elasticity of substitution is less than one in the short run, wage moderation will initially translate in a decrease in the labor share, and this can explain what happened in the 1980s. The problem with this second line of explanation lies in the behavior of unemployment. Wage moderation should lead to a decrease in unemployment. Yet, as Figure 5 shows, unemployment continued to increase while the labor share decreased.

Our analysis suggests another interpretation, one with the potential to

[14]For more on the facts and the explanations, see for example the discussion in Blanchard [1997] and Blanchard [2000].

[15]See for example Caballero and Hammour [1998]. A variation on this theme is that the increase in wages may have led not just to substitution of capital for labor, but also to biased technological progress, with firms shifting to labor saving technologies to avoid high labor costs. See for example Acemoglu [2002]

explain the joint behavior of the labor share and of unemployment. To see why, go back to the expresssion for the labor share in our model. Given the simple linear technology, labor productivity is by definition equal to one, and the labor share is simply equal to the wage:

$$\alpha = \frac{1 + \mu\beta}{1 + \mu}$$

There are therefore two other reasons why the labor share may decrease. The first is an increase in μ, the markup set by firms. This seems an unlikely explanation for the decrease in the labor share in Europe in the 1980s. The second is a decrease in β, a decrease in the bargaining power of workers. In our model, such a decrease leads not only to a decrease in the share in the short run, but also (under the assumption of concave utility) to an increase in unemployment. Thus, it can potentially explain both the decrease in the share and the increase in unemployment we observed in the 1980s. If this is indeed the explanation, our model predicts a brighter future: As larger rents lead to entry of new firms, and increased competition, the labor share should eventually return to its earlier level. And unemployment should eventually end up lower.

Note that, to be convincing, the argument must have two elements. The first is that, since the mid 1980s, Europe has gone through labor market deregulation, at least in the sense of a decrease in the bargaining power of workers. The second is that the effects of labor market deregulation have so far dominated the effects of product market deregulation. In terms of our model, to explain the decrease in the labor share, it must be that the decline in β has dominated the decline in μ. Otherwise, our model implies, we would have seen an increase, not a decrease, in the labor share, and a stronger decline in unemployment.

How much support is there for this interpretation? Looking at the measures of product market and labor market regulation constructed by the

OECD and by others yields a mixed answer. Product market deregulation, which has taken place largely as a result of the European Union initiatives, has been widespread, although with much of the deregulation taking place late in the 1990s, so after the major decline in the labor share (see for example the evidence in Nicoletti and Scarpetta [2003]). On the labor market side, reforms have been more timid and piecemeal (see for example the evidence in Boeri et al. [2000]). At the same time however, the unionization rate has decreased, often substantially, in most European countries, starting in the early 1980s (see for example Booth et al. [2001].) The general attitude of governments towards unions also appears to have changed, and so has the attitude of unions themselves. All these evolutions may have led to what we capture in our model as a decrease in β, and so to the decrease in the labor share.

Establishing the respective roles of product and labor market reforms and other shocks on the evolution of the labor share and unemployment in Europe is beyond our reach here. But the general point stands: Changes in product and labor market regulations may well play an important role in explaining macro evolutions, not only in Europe, but around the world.

Conclusions

Our purpose in this paper was to construct a general equilibrium model with rents and bargaining, and use it to think about the effects of product and labor market deregulation.

We see the main policy lesson about the design and the sequencing of deregulation as a simple one: Start from the product market. By lowering the price of goods, product market deregulation raises the real wage. To the extent that it also reduces barriers to entry, it leads a fall in unemployment. Moreover, product market deregulation, by decreasing total rents, reduces the incentives for workers to appropriate a proportion of these rents, and

this is likely to facilitate labor market deregulation.

There are, however, two caveats:

- First, lower markups come, in the long run, from the entry of new firms: this means that incumbent firms may shrink, increasing the risk of unemployment for currently employed workers, even if overall unemployment falls. This will lead them to oppose product market deregulation, despite higher wages and lower unemployment. Deregulation should come with measures designed to protect workers in incumbent industries.

- Second, deregulation in one sector decreases the rents to the firms in that sector, and thus the rents to the workers. If deregulation is widespread, then this partial equilibrium effect is more than offset by the general decline in prices, and the associated increase in real wages. But, if deregulation only affects part of the economy (because the rest of the economy was competitive, or because it remains regulated), then the partial equilibrium argument may extend to general equilibrium. One implication is that deregulation should be widespread: Piecemeal deregulation will be strongly opposed by workers in the deregulated sector.

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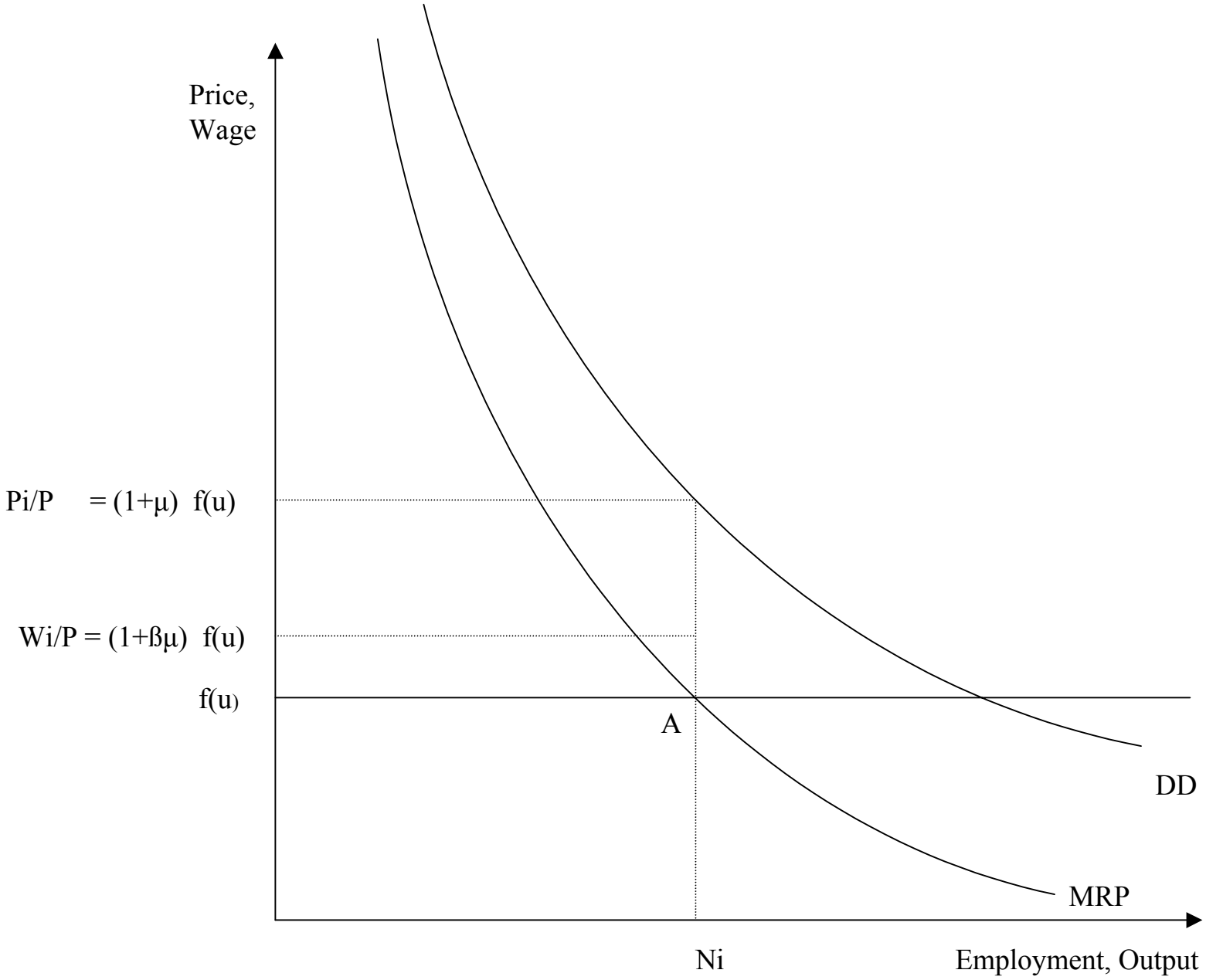

Figure 1. Partial equilibrium

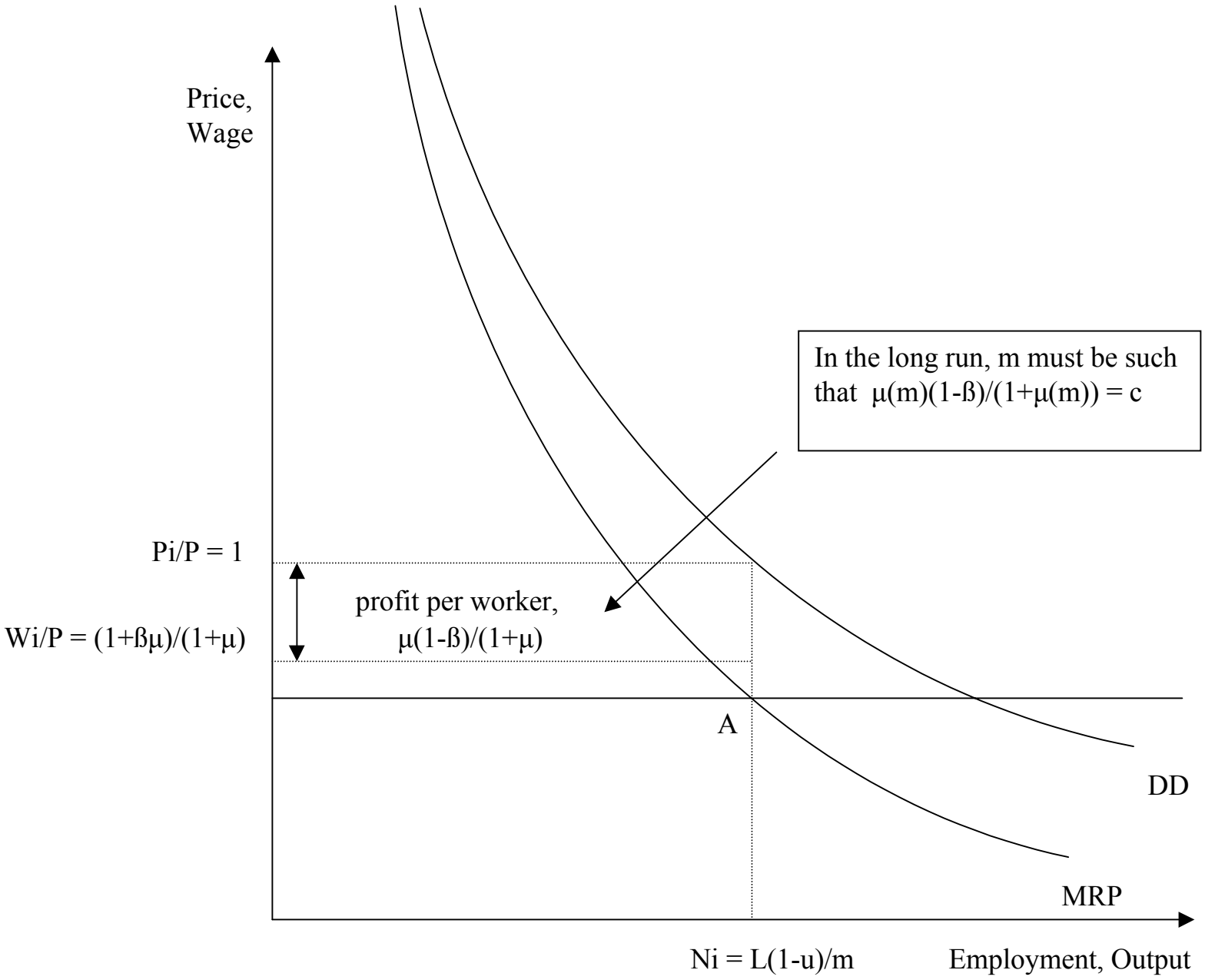

Figure 2. General equilibrium

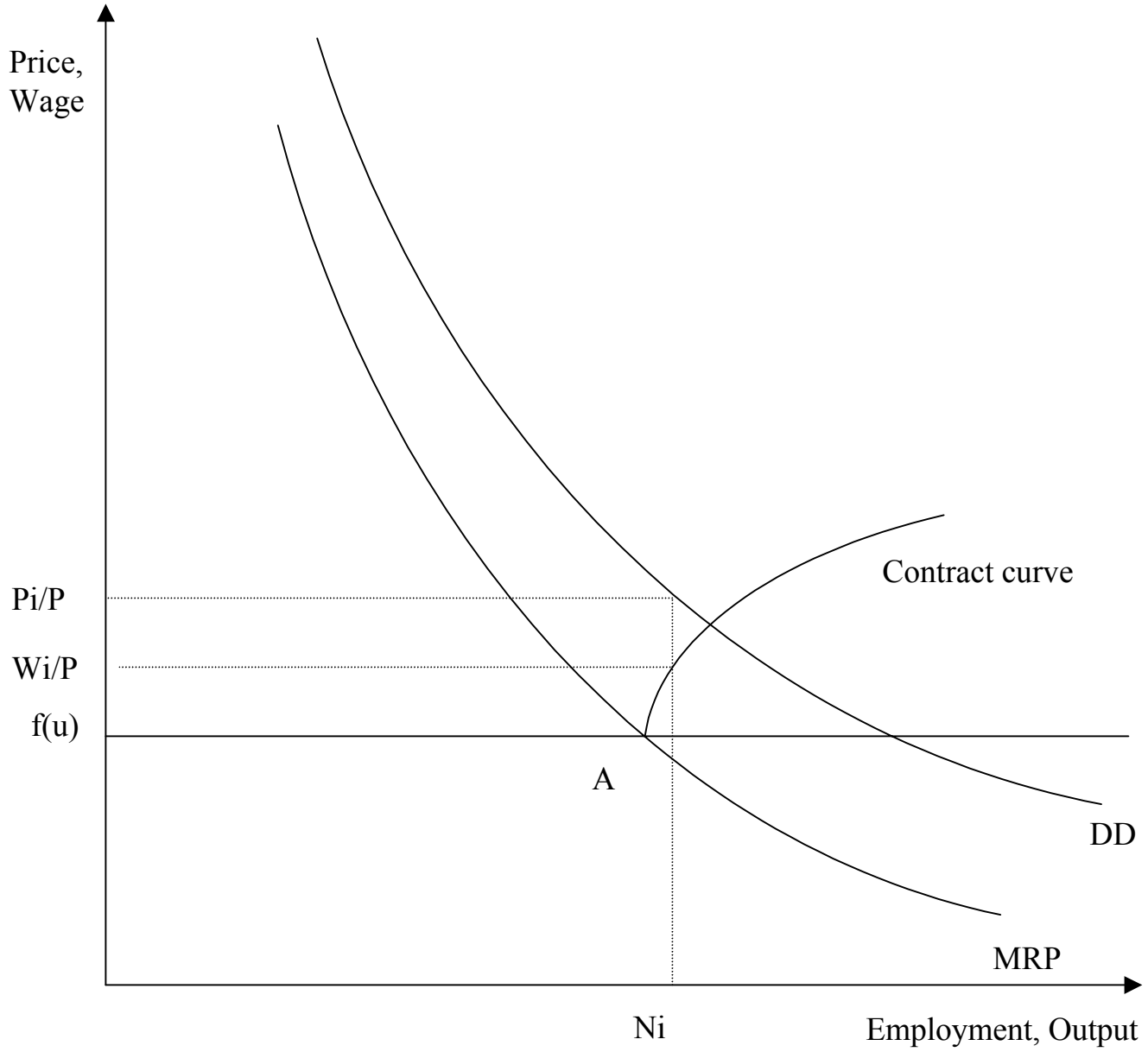

Figure 3. Partial equilibrium, with concave utility

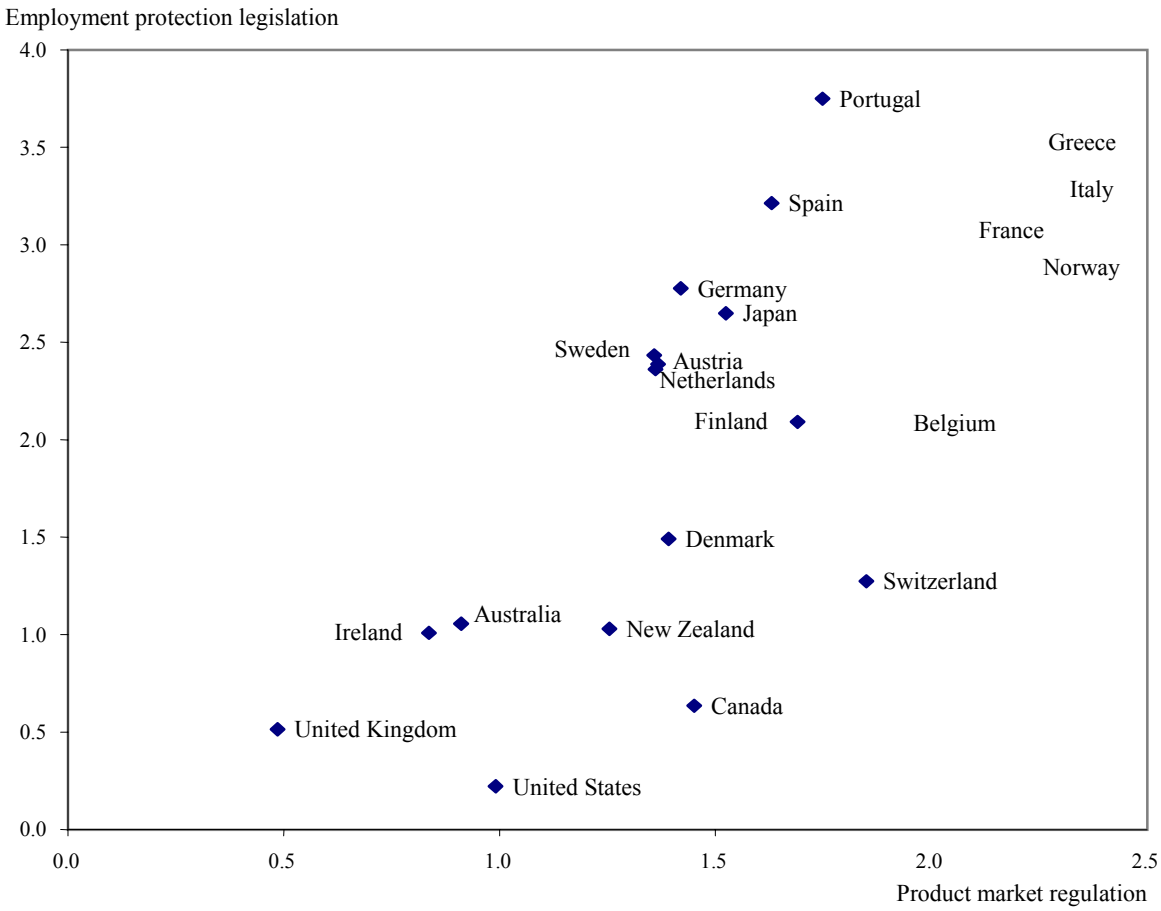

Figure 4
Product market regulation and employment protection legislation (from Nicoletti et al, 1999]

Figure 5. Unemployment rates and labor shares

Germany, France, Italy, and Spain, 1970-2000