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COMPETITION AND THE CAPITAL-LABOR CONFLICT

David SPECTOR

CEPREMAP-CNRS

CEPREMAP-ENS 48, Boulevard Jourdan 75014 PARIS, France

Tél. : +33 (0) 1 43 13 62 60 — Fax : +33 (0) 1 43 13 62 59

e-mail : david.spector@cepremap.cnrs.fr

Internet : Consulter le WEB : <http://www.cepremap.cnrs.fr>

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ABSTRACT

This paper analyzes the macroeconomic effects of changes in the intensity of product market competition. The focus is on the interaction between imperfect competition in product markets and bargaining in the labor market. The main result is that, while a uniform intensification of product market competition increases employment, it may cause real wages to fall, in the short run as well as in the long run. This is especially likely if labor market regulations are favorable to workers. Therefore, product market and labor market regulations tend to reinforce each other politically, and compensatory fiscal transfers may be needed in order to enact employment-enhancing deregulation policies.

CONCURRENCE ET CONFLIT CAPITAL-TRAVAIL

David SPECTOR

RÉSUMÉ

Cet article analyse les effets macroéconomiques d'une variation de l'intensité de la concurrence sur le marché des biens, et porte en particulier sur l'interaction entre la concurrence imparfaite sur le marché des biens et la négociation entre salariés et entreprises sur le marché du travail. Une intensification uniforme de la concurrence augmente l'emploi total, mais elle peut aussi provoquer une diminution des salaires réels à court terme comme à long terme. Un tel effet est susceptible de se produire si les institutions du marché du travail sont favorables aux salariés. D'un point de vue politique, les rigidités sur le marché du travail et sur le marché des biens tendent donc à se renforcer mutuellement, et il peut être indispensable de corriger par des transferts fiscaux compensatoires les effets distributifs des politiques de dérégulation favorables à l'emploi.

KEYWORDS : Imperfect Competition – Wage Bargaining – Deregulation.

MOTS CLES : Concurrence imparfaite – Négociations salariales – Dérégulation.

J.E.L. CLASSIFICATION: E24 – E25 – J5

1 Introduction

This paper provides a theoretical assessment of the impact of changes in the intensity of product market competition - be they caused by deregulation policies, international trade, or the spread of information technologies - on employment, wages and profits.

Two motivations make this topic particularly important. The first one is specifically related to Europe. It is often argued that deregulation, not only in labor markets, but also in product and capital markets, might contribute to solve Europe's unemployment problem. This view has driven efforts to deepen economic integration and promote a single market, for example through the passage of the European Unique Act in 1985. Enhancing product market competition is also one of the goals of monetary union. In the late 1990s, the difference in growth rates between Europe and the United States is often attributed, at least partly, to a difference in how competitive labor, product and capital markets are¹. However, in the very same way as the distributional effects of labor market deregulation may stir enough opposition to prevent it from taking place (see for example Saint-Paul [1995]), product market deregulation, even if it causes employment and aggregate wealth to rise, may harm some groups. Understanding its distributional effects can therefore help to design

¹Duca [1998] examines to what extent the current combination of low unemployment and low inflation in the United States can be explained by fiercer product market competition.

policies promoting employment while commanding enough political support.

The second motivation is related to the much-debated question of the link between international trade and inequality. The simultaneous increase in international trade and in income inequality in developed countries generated a lot of speculation about a possible link between the two. The most obvious argument relied on a simple general equilibrium effect, within a traditional "Heckscher-Ohlin" view of trade: since unskilled labor is more abundant, relative to skilled labor and capital, in developing than in developed countries, increased international trade should cause the price of unskilled labor to fall in developed countries (and to rise in developing countries). The dominant view among Economists today is that this effect is probably too small to account for a large part of the observed increase in inequality. Neither the volume of trade between developed and developing countries, nor the movement of the relative prices of unskilled and skilled-intensive goods, are large enough to support this explanation (Freeman and Katz [1991], Leamer [1998], Slaughter [1998, 2000] and especially Krugman [1995] for a very clear general equilibrium model).

However, another mechanism relating trade and inequality has been increasingly explored in recent years. It relies not on the effects of trade on price levels - as the approach summarized above does -, but rather on its effects on the elasticity of the demand faced by firms. The idea is that international trade increases competition in product markets - next to other factors, such as deregulation, or maybe the develop-

ment of the internet. As markets become more competitive, industry rents, part of which were captured by workers, decline. This mechanism, therefore, relies on changes not in the outcome of competitive equilibria, but, on the contrary, on changes in the deviations away from competitive equilibria².

An increasing amount of evidence lends credence to this argument. Workers seem to capture a large share of industry rents, which are large in some sectors (Katz and Summers [1989], Abowd and Lemieux [1993], Blanchflower et al. [1996]). Levinsohn [1993] and Harrison [1994] show that increased exposure to international trade causes the elasticity of the demand faced by firms to rise, and rents (measured by price-cost margins) to decline. An increased elasticity of the demand faced by firms exposed to foreign competition should logically make these firms' labor demand more elastic. Slaughter [1997] has indeed shown that the elasticity of labor demand had increased only for production workers, who are more exposed to foreign competition than non-

²Increased product market competition may affect labor markets in other ways. Duca [1998] argues that it should reduce the prevalence of nominal wage contracts and increase the prevalence of profit-sharing agreements. Bertrand [1999] shows that increased import competition weakens internal labor markets, in the sense that wages become less insulated from external labor market conditions. Spector [2001] argues that international trade, by increasing labor demand elasticities, makes it harder for governments to modify the wage distribution, and that opening up to trade may harm unskilled workers, even if governments are able to tax and redistribute income. All these mechanisms are ignored in this paper, which focuses on the wage level, without paying attention to other dimensions of labor contracts.

production workers. These various pieces, put together, suggest that international trade may cause the rents captured by workers to decline. Borjas and Ramey [1995] provide direct evidence pointing in this direction. They show that the more concentrated an industry is, the greater the impact of trade on wage inequality. Quite strikingly, they claim that, in the United States, trade had a stronger adverse impact on unskilled wages in the highly concentrated automotive industry than in the more competitive apparel industry, because rents were higher in the automotive industry prior to exposure to foreign competition, and their decline harmed workers who were capturing part of them. This strongly supports an analysis of the impact of trade on wages in terms of its effect on rents, rather than only in terms of a "Heckscher-Ohlin" view, because foreign competition in the apparel industry, unlike the automotive industry, comes largely from developing countries, with low unskilled wages.

However, empirical studies are not sufficient, because they document partial equilibrium effects, while missing important general equilibrium effects. Indeed, declining rents in a particular industry reflect lower prices for all consumers. Since workers are also consumers, the overall effect of a general increase in competition on real wages is ambiguous. More competitive product markets are also likely to cause output and employment to rise, which may cause the general wage level to rise, even if rents captured by workers fall. Therefore, although it is easy to understand why workers in a particular sector should oppose increased product market competition in their

sector (together with the shareholders of their sector's firms), preferences regarding overall product market deregulation may be ambiguous, and a theoretical analysis is needed in order to address the general equilibrium effects of increased product market competition.

This paper aims to construct such a theoretical framework. I develop a simple model, the main ingredients of which are imperfect competition in the product market and bargaining over wages in firms. I find that while increased product market competition unambiguously causes employment to rise, both in the short-run and in the long-run, the effects on wages are ambiguous: on the one hand, more competition makes firms' labor demand more elastic, which weakens workers in the bargaining process. However, the increase in employment and the fall in firms' price-cost markups have a favorable effect on real wages. I show that the overall effect can go in either direction. In particular, this implies that opposition to product market deregulation does not necessarily reflect workers' myopia - in the sense of a failure to understand its positive, if diffuse effects on real wages through price declines.

This model is close to the ones developed in the numerous papers studying the joint determination of wages and employment by modeling the bargaining process between firms and unions in a world of imperfect competition (see, e.g., Grout, 1984; Layard and Nickell, 1990; Layard, Nickell and Jackman, 1991; Manning, 1993). The difference between these papers and the present one is that, while these papers address the

relationship between the degree of union power and macroeconomic outcomes, they do not investigate the impact of changes in the degree of product market competition. To my knowledge, the only theoretical paper dealing with this question is Blanchard and Giavazzi (2001). The present paper is close to theirs, except for one crucial difference: while Blanchard and Giavazzi (2001) assume labor to be the only input, I consider both labor and capital inputs. The reason is the following. An important empirical literature has shown that unions and employers bargain not only over the rents resulting from imperfect competition, but also over the quasi-rents induced by the partial irreversibility of capital investments (see, e.g., Abowd and Allain, 1996; Caballero and Hammour, 1998a). This point has also attracted a lot of theoretical interest (Grout, 1984; Caballero and Hammour, 1998b). Therefore, analyzing the interplay between product market competition and the distributional conflict within firms requires one to take these quasi-rents into account, i.e. to take into account the existence of capital inputs next to labor inputs.

The main results of the paper are the following. First, a uniform increase in product market competition may harm workers (in the sense of causing wages to fall) even when general equilibrium effects are taken into account. This is because it affects the outcome of bargaining within firms in a way which makes it harder for workers to appropriate quasi-rents at the expense of shareholders. This may even be true in the long-run with an infinitely elastic supply of capital. More precisely,

the relationship between product market competition and wages can be expressed in terms of a political complementarity between various dimensions of deregulation, in product, labor, and capital markets. For example, weaker trade unions, smaller unemployment benefits, or greater integration in international capital markets make it more likely that product market deregulation causes wages to increase, and therefore facilitate a broad political support for deregulation.

The paper is organized as follows: section 2 presents the model, the two main ingredients of which are imperfect competition in product markets and bargaining in firms, either over wages alone, or over wages and employment simultaneously. After describing the outcome of the bargaining process in a given firm, taking external conditions as given (section 3), the paper analyzes general equilibrium with a given number of firms (section 4), and investigates the short-run effects of changes in the degree of product market competition (section 5). However, a possible goal of deregulation policies is that they trigger the entry of new firms, and section 6 analyzes general equilibrium when the number of firms is endogenous, which allows to describe the long-run effects of changes in the degree of product market competition, after the entry or exit of firms. Section 7 concludes.

2 The model

2.1 Agents, goods, and preferences

There is a continuum of goods, indexed from 0 to 1, and a continuum of firms, of measure ϕ . The population is divided in two groups, capitalists and a mass 1 of workers. Regarding capitalists, the only assumption we need is that they are sufficiently numerous to ensure that firms make their decisions independently of each other. Capitalists and workers have identical preferences: their utility depends only on their consumption of goods (labor has no disutility), and is given by

$$U = \left(\int_0^1 c_i^{\frac{\sigma-1}{\sigma}} di \right)^{\frac{\sigma}{\sigma-1}},$$

with $\sigma > 1$. σ is the elasticity of substitution between two different goods. This utility function implies that the demand for good i is given by

$$D_i = \frac{Y}{P} \left(\frac{P_i}{P} \right)^{-\sigma}, \quad (1)$$

where Y is aggregate nominal income, P_i is the price of good i , and P is the aggregate price level given by

$$P = \left(\int_0^1 P_i^{1-\sigma} di \right)^{\frac{1}{1-\sigma}}.$$

2.2 Technology and product market regulations

Although the goods are different from the consumers' viewpoint, they are identical from the producers' viewpoint: a firm can divide its total output into the different

varieties entering consumers' utility functions. However, although a firm can produce the whole continuum of varieties, product market regulations prevent it from doing so. Because of these regulations, each variety can be served by at most n different firms. We will assume that the regulations treat all goods symmetrically, in the sense that if there is a mass ϕ of firms, then each of them is allowed to sell at most $\phi^{-1}n$ different varieties. n is a policy variable: absent any regulation, it would be infinite, since all firms would be allowed to produce any variety; we will interpret an increase in n as a move toward product market deregulation.

Firms produce using capital, in quantity K_0 , and labor in quantity L . K_0 is exogenous, and it can be interpreted as the size of a plant. Labor inputs may vary, and the total output of a firm using L units of labor is given by

$$Y = f(L) = L^a,$$

with $0 < a < 1$. This output can then be divided among the varieties that each firm is allowed to produce. We define

$$\varepsilon_d = -\frac{f'}{Lf''} = \frac{1}{1-a}.$$

ε_d is the absolute value of the elasticity of labor demand that would prevail in a competitive world in the short-run (holding capital inputs constant)³. Most of the

³As the following sections show, the distributional effects of product market deregulation depend crucially on the value of ε_d , and a restriction to the case where ε_d is infinite (as assumed in Blanchard

paper deals with the effects of changes in the degree of product market competition, measured by n , the number of firms allowed to sell a particular good. In the short-run (section 4), the total mass of firms ϕ is exogenous. In the long-run (section 5), it is endogenous: changes in the degree of product market competition (or of any other variable) cause firms' profits to change, triggering exit or entry by new firms.

2.3 Bargaining over wages

The core of the model is the bargaining process taking place in each firm between workers and shareholders⁴. Much of the empirical literature stresses that bargaining can take place along two dimensions, according to whether firms retain the "right to manage". If they do, then workers and shareholders bargain over the real wage level, and the firm then freely chooses the employment level. The other possibility is to bargain simultaneously over real wages and employment. This paper considers both cases - reality is probably between these two extremes -, and it will turn out that the qualitative predictions of the model hold under both assumptions. The workers' bargaining power is β , and the shareholders' is $1-\beta$.

A worker's reservation utility, if he is not employed, is equal to $r(e)$, where e is

and Giavazzi [2000], which otherwise develops a model very close to this one, and was one of its inspirations) leads one to miss important possible links between competition and wages.

⁴We could replace the word "shareholders" with "management", because agency problems between a firm's shareholders and its management are ignored.

the employment rate, and $r'(e) > 0$. Firms are assumed to maximize profits, while the union maximizes

$$U_{union} = (w_i - r(e))L_i^\alpha,$$

where L_i is the employment level in the firm and $0 < \alpha < 1$. The parameter α captures the extent to which unions care about employment⁵. The case $\alpha = 0$ corresponds to a union purely concerned with wages (it may reflect a union representing the interests of "insiders" who are completely insulated from the unemployment risk). If $\alpha = 1$, the union maximizes the total surplus from workers in firm i . We need to assume that the parameters are such that

$$\alpha > 1 - \frac{(\varepsilon_d - 1)(n\sigma - 1)}{\varepsilon_d \beta n \sigma}. \quad (2)$$

Assumption (2) is necessary for wages to be finite in equilibrium (if the union does not care enough about employment, the outcome might be an infinite wage). It is always satisfied for $\alpha = 1$, and, depending on the other parameters, it may be satisfied for $\alpha = 0$.

3 Partial equilibrium analysis

In this section, we analyze the joint determination of employment and wages at the firm level. It results from the bargaining process within each firm, which we describe

⁵Oswald's [1985] analysis of unions makes this functional form plausible.

by distinguishing the case where firms have the right to manage and the case of efficient bargaining. This bargaining process is viewed as taking place in the short-run, so that the total measure of firms, ϕ , is fixed. We start by relating the measure of product market competition n to the elasticity of the demand faced by every firm.

Lemma 1 *In equilibrium, each good is produced by n firms, in identical quantities, and the elasticity of the demand for a firm's output is $n\sigma$.*

Proof. We prove first that each good is produced by n firms. Let us assume that this is not true., and only n' firms ($n' < n$) produce good i .

Case 1: firms have the right to manage. Because of the symmetry of the model, all firms face the same wage real wage w and produce the same total output Y (which is then divided into different varieties). Symmetry implies that all real prices are equal to 1, and that all n' firms present in market i sell the same amount. This implies that the elasticity of the demand faced by any of these n' firms in this market is $n'\sigma$. Profit maximization by these firms implies then that $f'(f^{-1}(Y)) = w(1 + (n'\sigma - 1)^{-1}) > w$. Therefore, taking the behavior of other firms as fixed, any of the $n - n'$ firms which are allowed to sell the variety i but do not could increase its profits by producing more output and selling it in market i .

Case 2: firms have no right to manage. In this case, a firm and its workers jointly maximize total profits net of workers' reservation utility. This, and the fact that the n' firms selling good i sell the same amount (by symmetry) implies that if the total

output of each firm is Y , then $f'(f^{-1}(Y)) = r(e)(1 + (n'\sigma - 1)^{-1}) > r(e)$, so that a firm which does not sell variety i but is allowed to would increase its total surplus net of reservation wages, by increasing its output to sell in market i .

In both cases, therefore, n firms sell variety i . By symmetry, they each sell $1/n$ -th of the total, so that the elasticity of the demand for a firm's output is $n\sigma$. ■

This result is not surprising. The more firms produce a particular good, the more competitive the market for this good, and the more elastic the demand faced by every firm.

Notation. We define $\mu(n) = \frac{1}{n\sigma - 1}$.

Since $n\sigma$ is the elasticity of the demand for the firm's output, $\mu(n)$ is the price markup that would be chosen by a firm free to set its output level.

3.1 Case 1: firms have the right to manage

The outcome of the bargaining process depends, among other things, on the elasticity of labor demand with respect to wages.

Lemma 2 *The elasticity of each firm's labor demand with respect to the wage it faces is equal to*

$$e(n) = - \left[\varepsilon_d^{-1} + \frac{\mu(n)}{1 + \mu(n)} (1 - \varepsilon_d^{-1}) \right]^{-1},$$

which is an increasing function of n .

Proof: see the Appendix.

This result can be interpreted as follows. An increase in n makes the demand for a firm's output more elastic. Therefore, it is harder for it to respond to a wage increase by increasing the prices it charges; instead, it responds more by changing its output level, and therefore its labor demand. This point is at the center of the analysis of the relationship between product market competition and bargaining in the labor market, because the smaller the elasticity of labor demand, the more workers can demand wage hikes without fearing unemployment. This is stated rigorously below by solving the bargaining game.

Let γ be such that the outcome of bargaining, w_i , is equal to $(1 + \gamma)r(e)$. The outcome of the bargaining process can be characterized in terms of γ : for example, the competitive outcome, which arises if the firm has full bargaining power, is characterized by $\gamma = 0$.

Proposition 3 *Given the employment rate e , bargaining over wages yields the following wage-setting rule:*

$$w = (1 + \gamma_r(\beta, n, \varepsilon_d, \alpha))r(e) = \left(1 + \beta \frac{\mu(n)\varepsilon_d + 1}{\varepsilon_d - 1 - \beta\varepsilon_d(1 - \alpha)(1 + \mu(n))}\right) r(e). \quad (3)$$

Proof: see the Appendix.

Remarks.

1. As shown in the appendix, Assumption (2) ensures that the bargaining problem has a solution. If (2) were not satisfied, then unions would care so little about employment that the outcome of bargaining would be unbounded (infinite wages). Notice, however, that for some values of $\beta, \mu, \varepsilon_d$, (2) is true for all α between 0 and 1.
2. γ_r is an increasing function of β and a decreasing function of α : if workers have more bargaining power, the outcome of bargaining is more favorable to them, and a larger α implies that workers care more about employment, relative to wages.
3. γ_r is a decreasing function of n . This point is central in the analysis, and it can be interpreted as follows. Given a value of γ , a further wage increase affects workers through two channels: on the one hand, the surplus per worker $w - r$ rises, on the other hand labor demand falls. The magnitude of the first effect is unrelated to n , but the second effect depends on n , because more product market competition (a larger n) makes the firm's labor demand more elastic (lemma 2). Therefore, the utility gain which the union derive from a wage increase, given γ , is a decreasing function (in percentage terms) of n . Also, the fall in the firm's profit caused by a wage increase, given γ , is an increasing function (in percentage terms) of n , because the more competitive product markets are, the

harder it is for the firm to rise its prices as a response to a wage increase. These remarks imply that if product markets are more competitive, wage increases harm firms more severely, and benefit unions less, than if product market are less competitive. Therefore, given r , bargaining leads to a lower wage if n is larger.

3.2 Case 2: efficient bargaining

Proposition 4 *The outcome of simultaneous bargaining over wages and employment is such that given the aggregate employment rate e , wages are equal to*

$$w = (1 + \gamma_e(\beta, n))r(e) = \left(1 + \beta \frac{\mu(n)\varepsilon_d + 1}{\varepsilon_d - 1 - \beta\varepsilon_d(1 - \alpha)(1 + \mu(n))}\right) r(e).$$

Proof. If the aggregate real income is $Y\phi$, then when a firm sets its (relative) price p the demand for its output is $Yp^{-\frac{1+\mu}{\mu}}$, and the firm's labor demand is then $\left(Yp^{-\frac{1+\mu}{\mu}}\right)^{\frac{\varepsilon_d}{\varepsilon_d-1}}$. This implies that, if the real wage is denoted w , the firm's profit and the union's utility are equal, respectively, to

$$\pi = Yp^{-\frac{1}{\mu}} - w \left(Yp^{-\frac{1+\mu}{\mu}}\right)^{\frac{\varepsilon_d}{\varepsilon_d-1}}$$

and

$$U = (w - r) \left(Yp^{-\frac{1+\mu}{\mu}}\right)^{\frac{\alpha\varepsilon_d}{\varepsilon_d-1}}.$$

The outcome of the bargaining process maximizes $B = \beta \text{Log} U + (1 - \beta) \text{Log} \pi$. The first-order conditions are

$$0 = \frac{\partial B}{\partial w} = \beta(w - r)^{-1} - (1 - \beta)Y^{\frac{1}{\varepsilon_d - 1}} \left(p^{\frac{\mu\varepsilon_d + 1}{\mu(\varepsilon_d - 1)}} - wY^{\frac{1}{\varepsilon_d - 1}} \right)^{-1} \quad (4)$$

and

$$0 = \frac{\partial B}{\partial p} = (1 - \beta) \frac{\mu\varepsilon_d + 1}{\mu(\varepsilon_d - 1)} p^{\frac{\mu + 1}{\mu(\varepsilon_d - 1)}} \left(p^{\frac{\mu\varepsilon_d + 1}{\mu(\varepsilon_d - 1)}} - wY^{\frac{1}{\varepsilon_d - 1}} \right)^{-1} - \frac{(\beta\alpha + 1 - \beta)(\mu + 1)\varepsilon_d}{\mu(\varepsilon_d - 1)p}. \quad (5)$$

(4) implies that

$$p^{\frac{\mu\varepsilon_d + 1}{\mu(\varepsilon_d - 1)}} = Y^{\frac{1}{\varepsilon_d - 1}} \beta^{-1} (w - (1 - \beta)r), \quad (6)$$

which, after substitution in (5) yields

$$w = \left(1 + \beta \frac{\mu\varepsilon_d + 1}{\varepsilon_d - 1 - \beta\varepsilon_d(1 - \alpha)(1 + \mu)} \right) r.$$

■

Remark. The two cases (efficient bargaining and right to manage) lead to the same relationship between the wage and the reservation utility ($\gamma_r = \gamma_e$). We view this as a coincidence, due to the assumption of iso-elasticity of the production function. If the elasticity of the marginal product of labor with respect to its quantity were not constant, then, although γ_r and γ_e would still satisfy the same equations, they would not be equal, because the output levels are not the same in the two cases, and therefore ε_d would take different values.

Notation. Since the functions γ_r and γ_e are identical, we are going to denote both of them hereafter by γ , without any subscript.

4 General equilibrium in the short-run

- **Case 1: firms have the right to manage.**

In equilibrium, the symmetry of all firms implies that all relative prices equal to 1. The price set by a firm facing an elasticity of demand σ is also equal to the marginal cost times $(1 + \mu(n))$. These two remarks imply that

$$1 = \frac{(1 + \mu(n))w}{f'(L)}.$$

If the all firms employ L workers, then the overall employment rate is ϕL , and the above equation to can be rewritten as the aggregate price-setting equation

$$f'(\phi^{-1}e) = (1 + \mu(n))w. \quad (7)$$

(7) and Proposition 3 imply that in equilibrium the employment level satisfies

$$\frac{f'(\phi^{-1}e_R)}{r(e_R)} = (1 + \mu(n))(1 + \gamma(\beta, n, \varepsilon_d, \alpha)). \quad (8)$$

- **Case 2: efficient bargaining.**

In equilibrium, all prices are equal, so the left-hand side of (6) is equal to one.

This implies that

$$Y^{-\frac{1}{\varepsilon_d-1}} = \beta^{-1}(w - (1 - \beta)r). \quad (9)$$

But the definition of f and the identity $Y = f(\phi^{-1}e)$ imply that

$$Y^{-\frac{1}{\varepsilon_d-1}} = (1 - \varepsilon_d^{-1})^{-1} f'(\phi^{-1}e),$$

so that (9) can be written as

$$f'(\phi^{-1}e) = (1 - \varepsilon_d^{-1})\beta^{-1}(w - (1 - \beta)r(e)).$$

Substituting the result of Proposition 4 finally leads to

$$\frac{f'(\phi^{-1}e_e)}{r(e_e)} = (1 - \varepsilon_d^{-1})(\beta^{-1}\gamma + 1). \quad (10)$$

5 Short-run effects of product market deregulation

The equilibrium conditions derived above allow us to describe the effects of changes in the degree of competition. What is the effect of an increased competition in the product market on total employment, profits, and wages? One can expect more competition to increase aggregate welfare, but what are the distributional effects? In particular, we are interested in finding out whether, in spite of a favorable effect on aggregate welfare, an increase in product market competition may harm some categories of society, which would help to understand why it might be rationally opposed.

Before stating formal results, it is useful to represent graphically the effect of changes in product market regulations by looking at how it affects labor demand and labor supply curves, in the (e, w) space. We do this in the case where firms have the

right to manage, because if firms and workers bargain over wages and employment the notions of labor demand and labor supply makes little sense - although, as Proposition 5 below shows, the results are qualitatively the same in both cases.

The wage-setting curve, characterized by equation (3), is upward-sloping, and more competition (an increase in n) shifts it downwards and to the right. The aggregate price-setting curve, characterized by equation (7), is downward sloping. The right-hand side of (7) is a decreasing function of n , which means that product market deregulation causes the labor demand curve to shift to the right.⁶

Looking at how the labor demand and labor supply curves are shifted as the degree of product market competition varies allows us to see that product market deregulation has an unambiguous effect on employment. Indeed, an increase in product market deregulation shifts both the labor demand and the labor supply curve to the right, causing the equilibrium level of employment to increase. Since the employment level is below the social optimum (both equilibrium conditions imply indeed that the marginal product of labor exceeds the reservation utility), an increase in the employment level causes aggregate welfare to rise.

However, it is impossible to reach a clear-cut conclusion regarding the effect of competition on wages. An increased competition causes the labor supply curve to

⁶These remarks are similar to those in Blanchard and Kiyotaki (1987). Notice however an important difference between their model and the present one: they do not consider intra-firm bargaining but rather assume that each worker has some market power because of the heterogeneity of labor.

shift downwards, which, if unaccompanied by a shift in labor demand, would cause wages to fall. But it also causes the labor demand curve to shift to the right, and this, together with the fact that the labor supply curve is upward-sloping, causes wages to rise, so that the overall effect is ambiguous. The following proposition clarifies how it depends on the parameters of the model by looking at a few extreme cases.

Proposition 5 *The following statements are true both if firms have the right to manage and in the case of efficient bargaining.*

1. *An increase in product market competition causes employment, aggregate welfare, and the share of labor in aggregate output to rise in the short-run.*
2. *If $r'(e) > 0$ and either $\varepsilon_d = \infty$ or $\beta = 0$, then an increase in product market competition causes real wages to rise in the short run.*
3. *If the reservation wage is constant, and $\varepsilon_d < \infty$ and $\beta > 0$, then an increase in product market competition causes real wages to fall in the short run.*

Proof. 1. The left-hand sides of (8) and (10) are decreasing functions of e , and the right-hand sides are decreasing functions of n . So an increase in competition (i.e., an increase in n) causes e to rise. Therefore aggregate welfare rises, since it is equal to $\phi f(\phi^{-1}e) + (1-e)r(e)$, and $f'(\phi^{-1}e) > r(e)$. If firms have the right to manage, the employment level L in all firms satisfies $f'(L) = (1 + \mu(n))w$, so that

$$\frac{wL}{f(L)} = \frac{Lf'(L)}{L} \frac{wL}{Lf'(L)} = a \frac{w}{f'(L)} = (1 - \varepsilon_d^{-1}) \frac{1}{1 + \mu(n)}, \quad (11)$$

which increases as n increases. In the case of efficient bargaining, proposition 4 and (10) imply that

$$\frac{w}{f'(L)} = (1 - \varepsilon_d^{-1})^{-1} \frac{1 + \gamma(n)}{1 + \beta^{-1}\gamma(n)},$$

so that

$$\frac{wL}{f(L)} = (1 - \varepsilon_d^{-1}) \frac{w}{f'(L)} = \frac{1 + \gamma(n)}{1 + \beta^{-1}\gamma(n)}, \quad (12)$$

which is an increasing function of n , because $\gamma(n)$ is a decreasing function of n and $\beta \leq 1$.

2. a) Assume that $r'(e) > 0$ and $\varepsilon_d = \infty$. This implies that the marginal productivity of labor, f' , is constant at some value MP . If firms have the right to manage, then the wage is determined by (7), or

$$w = \frac{f'}{(1 + \mu(n))} = \frac{MP}{(1 + \mu(n))},$$

which is an increasing function of n . In the case of efficient bargaining, $\varepsilon_d = \infty$ implies that (10) becomes

$$r(e) = \frac{MP}{1 + \beta^{-1}\gamma(n)},$$

implying that

$$w = (1 + \gamma(n))r(e) = \frac{1 + \gamma(n)}{1 + \beta^{-1}\gamma(n)}MP,$$

which increases with n .

b) Assume now that $r'(e) > 0$ and $\beta = 0$. In this case, Propositions 3 and 4 (whichever applies, depending on whether firms have the right to manage or employ-

ment is bargained over) imply that $w = r(e)$. But we know (from point 1 of this proposition, proved above) that e increases with n . $r'(e) > 0$, so $r(e)$, and therefore w , increase with n .

3. Assume that the reservation wage is constant at some value r . Propositions 3 and 4 imply that, respectively, that γ_r and γ_e are increasing functions of n . But if $r(e) = r$, then the wage is determined by the identity $w = (1 + \gamma(n))r$. The right-hand side is a decreasing function of n , which proves the result. ■

Remarks. Two opposing forces are at work in determining the effect of product market competition. The first one is that less competition means an increased markup. If firms' profits come mostly from their market power, while they would be zero in a competitive equilibrium, then these profits are necessarily taken away from workers, and the degree of competition determines how total surplus is divided between firms and workers. This is the case in particular if there are constant returns to labor inputs, which is equivalent to $\varepsilon_d = 0$. In such a world, a short-sighted worker may wrongly believe that competition harms him, because it decreases the rent enjoyed by his firm, of which he can appropriate a fraction. But taking into account the price-decreasing effect of competition would lead this worker to recognize that he is in fact made better off by competition⁷.

⁷This point is made by Blanchard and Giavazzi [2000], who assume constant returns to labor inputs.

The other force matters if firms' profits do not only come from market power, which is the case if returns to labor inputs are decreasing⁸. Then, it is possible for workers to earn more than their competitive wage, by appropriating part of what would constitute the firm's profit in equilibrium. For example, in the case of constant returns to scale with capital inputs as well as labor inputs (inducing decreasing returns to labor in the short-run), workers can appropriate "quasi-rents" at the expense of capital. An increase in competition weakens workers' bargaining position, and makes this appropriation more difficult, which may cause real wages to fall.

In other words, when workers in a given sector resent the intensification of product market competition because it decreases the monopoly rents they can share with the firm's shareholders, they are myopic: if these monopoly rents were the only reason why wages are above the reservation utility, then a uniform increase in competition benefits workers through lower prices. A more intense competition may however harm workers, but through a subtler channel, which is the relationship between product market competition and quasi-rent appropriation.

This allows us to understand why workers with no bargaining power at all ($\beta = 0$) always prefer more competition: they do not care about changes in their bargaining position brought about by changes in the degree of competition, because they have

⁸"Profits" here simply mean a firm's revenue minus wages paid, without taking into account payment to other inputs, such as capital. In the short-run, what matters is that these other inputs are assumed to be fixed.

no bargaining power in any case and are going to earn their reservation wage in any case. Therefore, the degree of competition only affects the amount of rents captured by firms at the expense of workers, and an increase in competition increases real wages.

Political complementarity between labor market deregulation and product market deregulation

Two aspects of Proposition 5 imply that if the labor market is not very regulated, then increased product market competition causes wages to rise: product market deregulation and labor market deregulation are thus "political complements".

First, if workers enjoy little bargaining power (β is small), then increasing product market competition is likely to increase real wages, and therefore to be widely supported. On the contrary, workers enjoying much bargaining power might be more reluctant to accept increased competition, because they correctly foresee the adverse effect on their real wages, caused by a weaker bargaining position.

Second, we can interpret the elasticity of the reservation wage with respect to the employment level as a measure of the extent of the welfare state: if unemployment benefits are an important part of the expected utility of being unemployed, then the reservation wage does not vary a lot with the employment level. On the contrary, if unemployment benefits are small, then the utility of being unemployed is deter-

mined both by the marginal returns to some non-market activity, which depend on the employment level if the non-market activity has aggregate decreasing returns to scale, and by the probability of going back to employment, which also depends on the unemployment rate. This implies that the reservation wage is sensitive to the level of employment. In Proposition 5, it was shown that in the first case - if the reservation wage is close to constant - then an increase in product market competition causes wages to fall. Therefore, product market deregulation is likely to have fewer supporters in an economy where the welfare state is generous than in one where there is none⁹.

6 General equilibrium in the long-run

The results of the previous section rely on the assumption of a fixed number of firms. While this restriction may be legitimate in the short-run, an analysis of the long-run effects of changing product market competition should take into account the possibility that firms enter the market or exit from the market.

The long-run equilibrium can be summarized by an increasing function $\Pi(\phi)$, such

⁹Since this reasoning is based on the relationship between the wage level and the degree of product market competition, it implicitly relies on the assumption that most workers care only about wages, and do not take into account the employment level. This view is plausible in the case of labor markets characterized by a large number of "insiders", insulated from the unemployment risk, which is borne mostly by a small population of "outsiders" (see Lindbeck and Snower, 1986).

that in the long-run, if a measure ϕ of firms are active, they must earn profits equal to $\Pi(\phi)$. Assume for example that in every period, firms have a very small probability of disappearing, and there are infinitely many potential firms which can decide to enter in every period. If the supply of capital is characterized by a function $r(K)$, where $r(K)$ is the interest rate compatible with total loans amounting to K , and if there is a cost of entry equal to c , then the per-period profit level compatible with a measure ϕ of active firms in the long run is equal to

$$\Pi(\phi) = (K_0 + c)r(\phi K_0).$$

The elasticity of $\Pi(\phi)$ with respect to ϕ reflects the degree of openness of capital markets: the more open they are, the less the interest rate varies with the number of firms in a given country, and the more inelastic $\Pi(\phi)$ is. We characterize below how long-run outcomes depend on the degree of product market competition¹⁰.

Proposition 6 *1. An increase in product market competition causes the aggregate employment level to rise in the long-run*

¹⁰Readers may be puzzled by a particular feature of the long-term version of the model, as presented in this section: the degree of competition in product markets, measured by n , the number of firms allowed to operate in a given sector, is assumed not to vary as the number of firms varies. This means that, for example, the entry of new firms *reduces* the number of goods sold by any single firm! This unrealistic assumption can be corrected without affecting the results (by taking as constant the number of goods per firm, rather than the number of firms per good), but at the cost of heavier notations.

2. *An increase in product market competition causes the share of labor in total output to increase in the long-run.*

3. *If the long-run supply of capital is infinitely elastic, and the marginal product of labor exceeds the wage (which is always true if firms have the right to manage), then an increase in product market competition causes wages to increase in the long-run.*

4. *If the long-run supply of capital is infinitely elastic and the wage exceeds the marginal product of labor (which can happen only in the case of efficient bargaining), then a small increase in product market competition causes wages to fall in the long-run.*

5. *Facilitating the entry of new firms (i.e. inducing c to decrease) causes wages and employment to rise in the long-run.*

Proof: See the appendix.

Remark. Proposition 6 sheds light on another kind of political complementarity between various kinds of deregulation. It shows that, at least in the case where wages are below the marginal product of labor, a large international integration of financial markets makes product market deregulation appealing to workers in terms of the long-run impact on wages and employment. This may seem counterintuitive: if the long-run supply of capital is infinitely elastic, then the long-run return on capital is given and this should constrain workers' ability to extract quasi-rents. The solution to this apparent paradox is that, even in such a case, an intensification of product market

competition may cause wages to fall and harm incumbent workers because it raises employment, and thus forces a redistribution from incumbent workers towards "new" workers. Also, the fact that product market deregulation harms labor in the long-run only if wages exceed the marginal product of labor provides one more example of a case where the more favorable to workers wage distortions are (with respect to the marginal product of labor), the more workers are likely to be harmed by product market competition. Another implication is that, given the degree of integration of international financial markets, product market deregulation should meet more support in small economies than in large ones, because the former take the interest rate as "more exogenous" than the latter.

7 Conclusion

The results established in this paper imply that widespread opposition to product market deregulation does not necessarily mean that workers, blinded by a partial equilibrium view of the world, fail to understand its economic benefits. Such opposition may simply reflect an attempt to protect the rents workers as a whole extract at the expense of firms' shareholders. Indeed, contrary to much conventional wisdom, this paper shows that more intense competition may cause wages to fall, even when general equilibrium effects and the long-run adjustment of the capital stock are taken

into account¹¹.

Since product market deregulation raises total employment and aggregate output, both in the short-run and in the long-run, it is worthwhile to understand how its political feasibility can be improved. This paper established that product market deregulation is more likely to benefit workers if they hold little bargaining power in the labor market, if firms have the right to manage, and if unemployment benefits are low. If firms have the right to manage, then workers are more likely to gain from product market deregulation in the long-run if the supply of capital is very elastic, which can be interpreted in terms of a complementarity between deregulation in financial markets and in product markets.

The complementarity between product market and labor market deregulation has ambiguous implications as to the feasibility of product market deregulation: it should be politically feasible in countries where labor markets are not very regulated, but

¹¹For example, Blanchard and Giavazzi (2000) write (p.37): "In both the short and the long run, the effects [of product market deregulation] on the utility of workers, whether employed or unemployed, are unambiguously favorable. [...] So why don't workers more strongly endorse product market deregulation?". They propose two explanations (based on the idea that deregulation is unlikely to take place uniformly across sectors, and on the observation that employment per firm may fall - which is not the case in the present model. This paper sheds light on a third possible explanation: deregulation may simply be unfavorable to workers, both in the short and in the long run.

much more difficult to implement elsewhere. Does this remark mean that governments should start with labor market deregulation? Alas, the complementarity between the two dimensions of deregulation works in both directions: if product markets are not very competitive, rents are large, and it is worthwhile for workers to increase their bargaining power in order to appropriate part of them¹². The conclusion is, therefore, that in countries where both labor and product markets are very regulated, the beginning of the deregulation process is the most difficult political step. Once deregulation has started in one dimension, moving forward in another dimension should become easier. Notice also that the only kind of reform that is unambiguously supported by workers - facilitating the entry of new firms - is also the only one which incumbent firms necessarily oppose. This is one more example of the difficulty of finding unanimous support for policies promoting employment. But the general message of this paper is that, since the distributional effect of product market deregulation may prevent the building up of sufficient political support, it may be necessary to complement it with fiscal redistribution.

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¹²The idea has been explored in Joskow and Rose (1989), Neven et al. (1998), and Blanchard and Giavazzi (2001).

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APPENDIX

Proof of Lemma 2.

Assume that in a given firm wages increase by $\alpha\%$. By how much does employment decrease? The firm's profit is equal to

$$\pi_i = p_i Y_i - w_i L_i = p_i f(L_i) - w_i L_i = \left(\frac{f(L)}{f(L_i)} \right)^{1/n\sigma} f(L_i) - w_i L_i,$$

where L denotes the employment level in all other firms. The first order condition for profit maximization, $\frac{\partial \pi_i}{\partial L_i} = 0$, is

$$f'(L_i) (f(L_i))^{-\frac{1}{\sigma}} = \frac{n\sigma}{n\sigma - 1} w_i (f(L))^{-\frac{1}{\sigma}}.$$

Differentiating it implies the following relation between an infinitesimal change in w_i and in L_i :

$$\frac{dL_i}{L_i} \left[\frac{L_i f''}{f'} - (n\sigma)^{-1} \frac{L_i f'}{f} \right] = \frac{dw_i}{w_i}. \quad (13)$$

The identity $\varepsilon_d = \frac{1}{1-a}$ allows to rewrite (13) as

$$\frac{dL_i}{L_i} \left[\varepsilon_d^{-1} + (n\sigma)^{-1} (1 - \varepsilon_d^{-1}) \right] = - \frac{dw_i}{w_i},$$

meaning that the elasticity of each firm's labor demand with respect to wages is equal to

$$- \left[\varepsilon_d^{-1} + (n\sigma)^{-1} (1 - \varepsilon_d^{-1}) \right]^{-1} = - \left[\varepsilon_d^{-1} + \frac{\mu}{1 + \mu} (1 - \varepsilon_d^{-1}) \right]^{-1}.$$

Proof of Proposition 3.

Consider a hypothetical increase of w_i by 1%. The rent per employed worker increases by $\frac{1+\gamma_r}{\gamma_r}\%$, but employment decreases by $\left[\varepsilon_d^{-1} + \frac{\mu(n)}{1+\mu(n)} (1 - \varepsilon_d^{-1}) \right]^{-1}\%$, causing

total workers' rents to increase by

$$\left(\frac{1 + \gamma_r}{\gamma_r} - \alpha \left[\varepsilon_d^{-1} + \frac{\mu(n)}{1 + \mu(n)} (1 - \varepsilon_d^{-1}) \right]^{-1} \right) \%.$$

Similarly, the impact on the firm's profit of a hypothetical increase of w_i by 1% can be inferred by assuming that the firm does not change its labor demand (thanks to the envelope theorem), which implies a decrease in profits of $x\%$, where x is the ratio of the firm's total wage bill over its total profits. Since the firm's markup is $\mu(n)$, the total wage bill is equal to a fraction

$$\frac{L_i f'}{f(1 + \mu(n))} = (1 - \varepsilon_d^{-1})(1 + \mu(n))^{-1}$$

of the firm's output, implying that the wage/profit ratio is equal to $\frac{1 - \varepsilon_d^{-1}}{\mu(n) + \varepsilon_d^{-1}}$, and that the firm's profit decreases by

$$\frac{1 - \varepsilon_d^{-1}}{\mu(n) + \varepsilon_d^{-1}} \%$$

if wages increase by 1%.

The outcome of bargaining must then be such that

$$(1 - \beta) \frac{1 - \varepsilon_d^{-1}}{\mu(n) + \varepsilon_d^{-1}} = \beta \left(\frac{1 + \gamma_r}{\gamma_r} - \alpha \left[\varepsilon_d^{-1} + \frac{\mu(n)}{1 + \mu(n)} (1 - \varepsilon_d^{-1}) \right]^{-1} \right),$$

leading to

$$\gamma_r = \beta \frac{\mu(n) \varepsilon_d + 1}{\varepsilon_d - 1 - \beta \varepsilon_d (1 - \alpha) (1 + \mu(n))},$$

which is positive and finite if Assumption (2) holds.

Proof of Proposition 6.

1. Let $R(e, n)$ denote the profit per firm when the employment level is e and the number of firms allowed to sell any particular good is n . If firms have the right to manage, employment per firm L satisfies the equation $f'(L) = w(1 + \mu(n)) = (1 + \mu(n))(1 + \gamma(n))r(e)$. This, and the identity $f(L) = L^a = L^{1-\varepsilon_d^{-1}}$, implies that each firm's profit is given by

$$\pi = f(L) - wL = \frac{\mu(n)\varepsilon_d + 1}{\varepsilon_d - 1} \left(\frac{(1 + \mu(n))\varepsilon_d}{\varepsilon_d - 1} \right)^{-\varepsilon_d} (1 + \gamma(n))^{1-\varepsilon_d} r(e)^{1-\varepsilon_d}. \quad (14)$$

In the case of efficient bargaining, the fact that the left-hand side of (6) is equal to one in equilibrium, and the equation $L = Y^{\frac{1}{a}} = Y^{\frac{\varepsilon_d}{\varepsilon_d - 1}}$ imply that

$$L = \beta^{\varepsilon_d} (w - (1 - \beta)r)^{-\varepsilon_d} = \left((1 + \beta^{-1}\gamma)r(e) \right)^{-\varepsilon_d}.$$

This and Proposition 4 implies that each firm's profit is given by

$$\pi = f(L) - wL = \left(\beta^{-1} - 1 \right) \gamma (1 + \beta^{-1}\gamma)^{-\varepsilon_d} r(e)^{1-\varepsilon_d}. \quad (15)$$

One can easily check that the product $(\mu + 1)^{-\varepsilon_d}(\mu\varepsilon_d + 1)$ is a decreasing function of μ , implying that the right-hand side of (14) is an increasing functions of n and a decreasing function of e . The same is true of the right-hand side of (15): it is obviously a decreasing function of e , and it is a decreasing function of γ if $\gamma\beta^{-1}(\varepsilon_d - 1) \geq 1$, which is the case by Proposition 4. Therefore $\frac{\partial R}{\partial n} > 0$, and $\frac{\partial R}{\partial e} < 0$. Assume that in the long run n rises and e falls. Then, profits per firm, equal to $R(e, n)$, rise. But profits per firm are also equal to $\Pi(\phi)$, so ϕ rises. Each firm's labor demand

L satisfies $f'(L) = (1 + \mu(n))(1 + \gamma(n))r(e)$ if firms have the right to manage and $f'(L) = (1 - \varepsilon_d^{-1})(\beta^{-1}\gamma(n) + 1)r(e)$ in the case of efficient bargaining (these identities are obtained by substituting L for $\phi^{-1}e$ in (8) and (10), respectively). In both cases, the right-hand side is a decreasing function of n and an increasing function of e , so L rises if n rises and e falls. But $L = \phi^{-1}e$, which falls if ϕ and e rise. This contradiction implies that a rise in n causes e to rise in the long-run.

2. Equations (11) and (12) are valid both in the long-run and in the short-run, since they make no reference to the number of firms. Therefore, it is still true that an increase in product market competition causes the share of labor in total output to rise.

3. If the supply of capital is infinitely elastic, then $\Pi(\phi)$ is constant at some π . In the long-run, an increase in product market competition causes the share of labor to rise, and if profits per firm are constant this is equivalent to an increase in wL in every firm. Each firm's profit is equal to $g(L, w) = f(L) - wL$ which is a decreasing function of w and an increasing function of L if $f'(L) > w$. (Notice that the last inequality necessarily holds if firms have the right to manage, because $f'(L) = (1 + \mu(n))w$). Therefore, constant profits require that w and L move in the same direction. This and the fact that an increase in n causes wL to increase in the long-run implies that an increase in n causes both w and L to rise in the long-run. Finally, the identity

$r(e) = (1 + \gamma)^{-1}w$ implies that an increase in n causes e to rise in the long-run (both factors rise in the right-hand side of the last equation: the first one does because $\frac{\partial \gamma}{\partial n} < 0$, and the second one because we just proved that w increases.)

4. If wages are above the marginal product of labor, then the function $g(L, w)$ defined above is a decreasing function of both w and L , so that constant profits require that w and L move in opposite directions. But each firm's profit can be written as $\pi = f(L) - wL = f(L) \left(1 - \frac{wL}{f(L)}\right)$. Since an increase in n causes $\frac{wL}{f(L)}$ to rise, constant profits in the long-run (a consequence of the assumption that the long-run supply of capital is infinitely elastic) imply that an increase in n causes $f(L)$, and therefore L , to rise, and thus w to fall (the result holds if wages are above the marginal cost of labor both before and after products markets are deregulated, which is why it is formulated in terms of a *small* increase in the intensity of product market competition).

5. A policy facilitating investment can be described as a downward shift of the function $\Pi(\phi)$. Let us consider two increasing functions such that for all ϕ , $\Pi_2(\phi) < \Pi_1(\phi)$. Let e_i , L_i and ϕ_i respectively denote the long-run aggregate employment level, the employment level per firm, and the long-run measure of firms corresponding to the function Π_i . I prove first that, given n , $e_2 > e_1$. Assume this were not true, and $e_2 \leq e_1$. The labor demand equations (8) and (10) imply that $L_2 \geq L_1$. Also, $e_2 \leq e_1$

implies that $R(e_2, n) > R(e_1, n)$. But the identity $R(e_i, n) = \Pi_i(\phi_i)$ implies

$$\Pi_1(\phi_2) > \Pi_2(\phi_2) = R(e_2, n) > R(e_1, n) = \Pi_1(\phi_1),$$

so that $\phi_2 > \phi_1$. But this implies that $e_2 = \phi_2 L_2 > \phi_1 L_1 = e_1$, leading to a contradiction. Q.E.D.