Optimal Regulation Policy in a Unionised Economy

Lorenzo Corsini*
University of Pisa

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Abstract

The aim of this paper is to analyse to which extent a deregulation policy in the labour and product markets leads to an improvement in the utility of all the parts (firms and unions). To do that, we build a model where firms hire workers in a unionised labour market and sell their products in a market ruled by monopolistic competition. The parts bargain over nominal wages according to a Right to Manage rule. We imagine that firms aim to maximise the real profits, while the union is interested in maximising real wages and employment.

The solution of the bargaining problem allows us to determine the bargained nominal wages and through them we can obtain the equilibrium level of price, real wages, employment and the consequent utilities for union and the firms.

We use this model to examine the effects of (de)regulation policies and we search for the existence of a policy that is optimal in the sense that increases the utilities of both parts. Our finding shows that such a Pareto optimal policy exists and it can be either a regulation or a deregulation policy depending on how distant the markets are from a perfectly competitive situation.

JEL Classifications:C78, J51, L50

1 Introduction

The regulation of labour and product market is an issue that in recent years has aroused the interest of many researchers. The aim of the works on this topic has been to examine to which extent deregulation policies can effectively improve the working of the economic systems. The widespread idea was that deregulation is always good and it should be brought forth whenever possible: hence the need to examine more closely whether this idea rests on solid ground.

*lcorsini@sssup.it

In order to do that it is important to fully understand how the various forms of imperfections[1] in the markets affect the economics systems. Moreover, and even more importantly, it is fundamental to understand the interrelations between imperfections in the different markets: in the most typical of case, this means to study the relationship between a non perfectly competitive product market and a unionised labour market. Once this is achieved, it is possible to examine the effect of (de)regulation policies.

This is what two recent papers have pursued: Blanchard and Giavazzi (2003) develop a model of monopolistic competition and union bargaining and use it to examine what happens when the factors that determine the degree of imperfection change due to a deregulation policy. Similarly, Spector (2004) explores this issue trying to generalize the results that Blanchard and Giavazzi obtained. Both the papers adopt models of labour and product market imperfections which draw from the work of Layard et alii (1991).

The aim of this paper is to further develop this kind of analysis, introducing two novelties. First, we build a model that while sharing the same framework of monopolistic competition and wage bargaining, adds some key aspects. More in details, in our model firms and union bargain over wages in order to maximize their utility but, in contrast with previous works, we imagine that: 1) they bargain over nominal wages even if their utility depends on the real amounts, 2) they have rational expectations on the post-bargaining level of prices and 3) the outside option is fixed in nominal terms. We will explain better the effects of these hypotheses when we fully describe our model.

The second novelty is the way we treat the analysis of the (de)regulation policies. Previous works studied these policies examining how a change in the the parameters that measure the degree of imperfections impact on some relevant variables (usually employment and real wages). Here not only we do that, but we also use our model to derive the utility of union and of the firms and we explore whether it is possible to change the parameters that measure the degree of imperfections in the market in such a way that both parts are better of. In other words, if we think to the change in the parameters as a (de)regulation policy, we are searching for a policy that is Pareto improving. We are particularly interested in examing whether we can reach a Pareto improvement through policies that affect a market only or if it is necessary to implement them on both the labour and product market.

The rest of the paper is organized as follows: in section 2 we build a model of monopolistic competition and wage bargaining, in section 3 we examine the effects that the parameters that measures the degree of imperfection have on the bargaining outcome, in section 4 we examine the effect of (de)regulation policies and we search for a policy that generate a Pareto improvement and, finally, in section 5 we conclude.

[1] We refer here to imperfections as to the elements that prevent markets to behave as in the perfect competition case. These elements may depends on institution and on the legislation that regulate the markets. Hence the connection between imperfection and regulation.

2 The model

The model we are to build retains several of the standard assumptions that are made when dealing with macro model of market imperfections and it shares many features with Corsini (2005). We imagine that the economy is made by a number of symmetrically identical firms which use labour to produce differentiated goods according to the following production function:

$$Y_i = L_i^{\alpha} \tag{1}$$

where Y_i is the production of the good i from the firm i and L_i is the amount of labour employed. The parameter α determines the kind of return of scale: in what follows we will assume that $\alpha < 1$. The parameter α effectively measure the elasticity of labour with respect of production.

Each firm produces a different good and sells it under monopolistic competition: the demand function for each firm is

$$Y_i = \left(\frac{P_i}{P}\right)^{-\varepsilon} \frac{M}{P} \tag{2}$$

where P_i is the price of good i, P is the aggregate index of price, M is the quantity of money (which is exogenously set) and ε is a parameter that measures the elasticity of demand. Such demand function has been widely used in macro models of monopolistic competition and can be microfounded: see Blanchard and Kyotaki (1989). The parameter ε is particularly important in our work as it is a measure of a how monopolistic (and regulated) is the product market. A higher ε implies a more competitive market (with perfect competition reached when ε tends toward infinite), while lower values depict a situation where firms detain more market power. We imagine that ε is always higher than 1.

In the markets operate n firms so that the aggregate values of production and employment are obtained multiplying individual value per n. Obviously, since n is fixed, we can study everything in terms of the individual production and employment without any loss of generity.

As for the labour market, the wage is determined through a bargaining. In particular, workers are organized in a central union that bargains with firms over wages according to a 'right to manage' rule, that is, the parts bargain over wages leaving to the firms the right to set employment.

In such a scheme, the bargaining may possibly happen either on the real wage or on the nominal wage; here we choose an intermediate position: the parts settle over nominal wage but it is the real amount that enters their utility functions. We believe that such a scheme better reflects the reality: in the end the parts are interested in the purchasing power related to a certain wage but it is easier for them to struck an agreement over nominal amounts. We will return better on this when we will describe the utility functions of the parts.

The process of bargaining can be represented, and solved, through the following Nash Maximandum:

$$\begin{cases} W^B = \arg\max_W U^\beta \Pi_i^{1-\beta} \\ s.v \\ L_i = \arg\max_{L_i} \Pi_i \end{cases} \tag{3}$$

where W^B is the bargained nominal wage, U is the union utility, Π_i is firms utility, β is the bargaining power of the union (with $0 \leq \beta \leq 1$). The parameter β measure how regulated is the labour market: when $\beta = 0$ the wage is set in perfect competition, when $\beta = 1$ the wage is set as in the case of a monopolistic union. Note that the constraint

$$L_i = \arg\max_{L_i} \Pi_i \tag{3c}$$

represents the right of the firm to choose the level of employment once the wage has been set: in brief the constraint (3c) represents the key aspect of the 'right to manage' rule of bargaining.

If we consider the elasticity of demand ε and the bargaining power β a measure of how regulated (and imperfect) is a market, then we can study the effect of a de(regulation) policy examining how the variables of interested change when these two parameters vary.

Before to proceed it is important to stress the role that the general price level P has in this model. In fact, many of the decisions of the agents are influenced by the general level of price but, at the same time, those decisions contribute to determine it. In our model all firms are identical so that in equilibrium we reach a symmetric situation where each firm choose the same price and produce the same amount of output, implying the equilibrium condition $P = P_i$. Under these circumstances it may be misleading to consider P as an exogenous variable that the agents consider as given when taking their decisions. In effect, the general price level is determined after the bargaining (and according to it) so that parts are forced to make conjectures during the negotiations. In other words, they have expectations on P and on the variables that depends on it. De facto, the demand functions that the union and the firms takes into consideration when taking their decisions is

$$Y_i^e = \left(\frac{P_i}{P^e}\right)^{-\varepsilon} \frac{M}{P^e} \tag{2a}$$

where P^e is the expected level of price that, in our case, coincides with the post-bargaining level of price[2]. In what follows we will assume that agents forms such expectations rationally[3]. The choice of rational expectations is always arguable, however we adopt this to take into account the fact that the parts

[2] Simlarly we have that $L_i^e = \left(Y_i^e\right)^{\frac{1}{\alpha}}$

[3] Obviously this is not the only possibility, for example we could have imagined that the agents would consider the price fixed at the pre-bargaining level. Most of the literature seems to neglect this problem considering first the price exogenously fixed and than applying the symmetric equilibrium $P = P_i$.

somehow understand that the level of price depends on the bargaining outcome. While it is not always true that the parts can perfectly predict this, it would be even less likely that they completely forgone such an aspect.

Finally, we want to stress that the expectations on those variable, if rational, necessarily coincides with the actual realization of the variables: this depends on the facts that no stochastic elements are present in the model so that the predictions of agents are necessarily correct.

2.1 Firms behaviour

We have already said that firms enter the bargaining in order to maximise their utility and here we better specify this, asserting that firms' utility is given directly by their real profits π_i:

$$\Pi_i = \pi_i = Y_i^e \frac{P_i}{P^e} - \frac{W}{P^e} L_i^e \tag{4}$$

Even if the above equations contains the expected value of some variables we should not considered it an utility under uncertainty, in fact all those predictions are not subject to any random element but will be considered fixed[4] (and exact) once the agents have computed them.

Firms sell their goods in a monopolistic market choosing the price that maximise their profits. This behaviour enters directly in the bargaining process, in facts firms retain the right to set employment and the choice of a certain level of employment is directly correlated to the choice of a price. In other words, once the nominal wage has been chosen, firms set the price and, through it, the employment. It follows that the constraint (3c) can simply be expressed through the choice of a price that maximise profits, so that:

$$\frac{\partial \pi_i}{\partial P_i} = 0 \tag{5}$$

which yields:

$$P_i = \frac{\varepsilon}{\varepsilon - 1} \frac{1}{\partial Y_i^e / \partial L_i^e} W \tag{5a}$$

We can use equation (5a) to derive first the exact pricing rule of firms and then their labour demand. To do that we have to compute the marginal productivity $\partial Y_i^e / \partial L_i^e$ so that[5] we can rewrite (5a) as

$$P_i = \left(\frac{\varepsilon}{\varepsilon - 1} \frac{1}{\alpha} W M^{\frac{1-\alpha}{\alpha}} \right)^{\frac{\alpha}{\alpha + \varepsilon - \varepsilon\alpha}} P^{e \frac{\alpha + \varepsilon(1-\alpha) - 1}{\alpha + \varepsilon - \varepsilon\alpha}} \tag{5b}$$

[4]We say that the variables are considered fixed in the sense that their determination does not depend from any random components.

[5]Combining (1) and (2a) it is easy to show that $\frac{\partial Y_i^e}{\partial L_i^e} \partial Y_i^e / \partial L_i^e = \alpha \left(\left(\frac{P_i}{P^e} \right)^{-\varepsilon} \frac{M}{P^e} \right)^{\frac{\alpha - 1}{\alpha}}$.

We can solve (5b) under the rational expectation hypothesis ($P^e = E(P) = P = P_i$) obtaining

$$P_i = P^e = \left[\frac{\varepsilon}{\varepsilon-1}\frac{1}{\alpha}W\right]^{\alpha} M^{1-\alpha} \tag{5c}$$

This is the optimal pricing rule and it directly defines the labour demand. In fact, inserting (5c) in (5a), under the rational expectations we have[6]

$$L_i = L_i^e = MG^{-1}W^{-1} \tag{6}$$

where $G = \left(\frac{\varepsilon}{\varepsilon-1}\frac{1}{\alpha}\right)$. Equation (6) is the labour demand of firms.

We can now compute the indirect function of profits, inserting (6) and (5c) in (4) we have

$$\pi_i(W) = KW^{-\alpha} \tag{7}$$

where $K = \left[G^{-\alpha} - G^{-1-\alpha}\right] M^{\alpha}$. Equation (7) determines the level of profits for any given wage subject to the fact that the firm is choosing the employment (and the price) that maximises the profits.

Summing up, we can say that the pricing rule (5c) and the labour demand (6) fully describe the behaviour of firm i, while equation (7) determines the profits (and the utility) for any possible level of W that is bargained.

2.2 Union Behaviour

The aim of the union is to obtain a wage and an employment that maximise his utility function. Such a function can assume several forms depending on which are the goals that the union pursues (for an excellent discussion of the possible forms of the union utility function, see Oswald (1985)). Here we choose the following form:

$$U = L_i^e\left(\frac{W}{P^e} - \frac{R}{P^e}\right) \tag{8}$$

where R is the outside option which is fixed in nominal term. We have opted for this form because, while being simple, it captures the interests of union to guarantee the highest consumption to the most of workers[7].

The utility of union is given by the product between the employment and the surplus of real wage over outside option. As in the case of firms, some forms of expectations enter the utility but once again this does not imply that U is an utility under uncertainty. Note that both aggregate price and employment depends on the nominal wages, the former through the pricing rules of

[6]This time we use the fact that, undere rational expectations, $\partial Y_i^e/\partial L_i^e = \alpha L^{\alpha-1}$.

[7]A similar alternative would have been $U = \left[L_i^e\right]^{\gamma}\left(\frac{W}{P^e} - A\right)$ so that γ is a measure on how much the union values employment relatively to real wages. It is possible to show that this alternative does not change much the results, see Corsini (2005).

firm (equation 5c) and the latter through the labour demand (equation (6)). It follows that union utility depends only on nominal wages (and some given parameters) as is easy to see if we insert (5c) and (6) in equation (8):

$$U(W) = M^{-\alpha} (GW)^{-1-\alpha} (W - R) \tag{9}$$

Equation (9) is the union indirect utility function: it tells us the utility of the union for any level of nominal wages that is bargained and it show that, in the end, the union utility depends only on the nominal wage and on other exogenous parameters.

2.3 Bargaining Outcome

The bargaining outcome is represented by the solution of the Nash Maximandum (3). If we specify the utility functions according to equation (7) and (9) the problem becomes

$$\begin{cases} W^B = \arg\max_W \left[L_i \left(\frac{W}{P^e} - \frac{R}{P^e}\right)\right]^\beta \left[Y_i^e \frac{P_i}{P^e} - wL_i\right] \\ s.v \\ L_i = \arg\max_{L_i} \pi^e \end{cases} \tag{10}$$

We can take into account the constraint using the indirect functions of union utility and of profits so that the problem becomes

$$W^B = \arg\max_W \left[MG^{-1}W^{-1}\left(\frac{W-R}{[GW]^\alpha M^{1-\alpha}}\right)\right]^\beta \left[KW^{-\alpha}\right]^{1-\beta} \tag{10a}$$

where G and K do not depend on W. From the maximization we obtain

$$W^B = \left(1 + \frac{\beta}{\alpha}\right) R \tag{11}$$

where W^B is the *bargained* nominal wage.

The equation above determines the bargaining outcomes: it represent the exact amount on which the parts agree. Following this agreement firms will choose the employment and the price that maximise their profits, determining indirectly also the real wage.

We can obtain the employment inserting the bargained wage (11) into the labour demand (6):

$$L_i = \left[G\left(1 + \frac{\beta}{\alpha}\right)\right]^{-1} \frac{M}{R} \tag{12}$$

As for the price level, it is obtained combining the price rule (5c) with (11) and applying the equilibrium condition $P = P_i$:

$$P = \left[G\left(1 + \frac{\beta}{\alpha}\right)\right]^{\alpha} R^\alpha M^{1-\alpha} \tag{13}$$

The real wages are given dividing the bargained nominal wage (11) for the price level (13)

$$\frac{W^B}{P} = G^{-\alpha}\left(1+\frac{\beta}{\alpha}\right)^{1-\alpha}\left(\frac{R}{M}\right)^{1-\alpha} \tag{14}$$

Equations (12) and (14) describe the outcome of the bargaining in terms of employment and real wages and they allow us to examine which elements influence those variables.

3 The effects of market imperfections

Now that we have derived the bargaining outcomes in terms of the real wages and the consequential level of employment, we can discuss how the market imperfections influence those variables. In particular, if we measure the degree of market imperfections in terms of the bargaining power of the union (β) and of the elasticity of product demand (ε), we can can find out the effects of market imperfections deriving the variables of interests for these two parameters.

If we derive the real wages (as given in (16)) and employment with respect to the bargaining power we obtain:

$$\frac{\partial\left(\frac{W^B}{P}\right)}{\partial\beta} = \frac{(1-\alpha)}{\alpha}G^{-\alpha}\left(1+\frac{\beta}{\alpha}\right)^{-\alpha}\left(\frac{R}{M}\right)^{1-\alpha} > 0 \tag{15}$$

$$\frac{\partial L_i}{\partial\beta} = -\frac{1}{\alpha G}\frac{M}{R}\left(1+\frac{\beta}{\alpha}\right)^{-2} < 0 \tag{16}$$

The results show that a stronger bargaining power leads to higher real wages and lower employment. This is quite straightforward and it tells us that a stronger union uses his higher power to increase the wages at the expense of employment. The cost in terms of employment comes from the reaction of the firms which, when facing an increase in wages, rise their prices and therefore cause a reduction of product demand and of their need for the labour input.

If we examine the role of elasticity of demand (which is inversely related to the market power of firms) we notice that

$$\frac{\partial\left(\frac{W^B}{P}\right)}{\partial\varepsilon} = \frac{1}{\varepsilon^2}\alpha\left[\left(\frac{\varepsilon}{\varepsilon-1}\right)\left(1+\frac{\beta}{\alpha}\right)\frac{R}{M}\right]^{1-\alpha} > 0 \tag{17}$$

$$\frac{\partial L_i}{\partial\varepsilon} = \frac{1}{\varepsilon^2}\left(1+\frac{\beta}{\alpha}\right)^{-1}\frac{M}{R} > 0 \tag{18}$$

so that a more competitive markets yields higher wages and higher employment. The first results is not connected with rent-sharing mechanism but it pass through the outside wages: in fact more competitive markets generate lower price, increasing the real outside wage and allowing union to obtain an higher real wage.

The second results is not surprising: when a product market becomes more competitive firms charge a lower price so that demand (and employment) rises.

3.1 The effects on profits

To obtain the effects on profits we first insert the bargained wages (11) in the indirect function of profits (7)

$$\pi_i = \left(\left(\tfrac{\varepsilon-1}{\varepsilon}\right)^{-\alpha} - \left(\tfrac{\varepsilon-1}{\varepsilon}\right)^{-1-\alpha}\right) M^{\alpha} \left(\left(1+\frac{\beta}{\alpha}\right) R\right)^{-\alpha} \tag{19}$$

Then we derive π_i for the parameters β and ε:

$$\frac{\partial \pi_i}{\partial \beta} = -\left(\left(\tfrac{\varepsilon-1}{\varepsilon}\right)^{-\alpha} - \left(\tfrac{\varepsilon-1}{\varepsilon}\right)^{-1-\alpha}\right) M^{\alpha} R^{-\alpha} \left(1+\frac{\beta}{\alpha}\right)^{-\alpha-1} < 0 \tag{20}$$

$$\frac{\partial \pi_i}{\partial \varepsilon} = \left[\left(\tfrac{\varepsilon-1}{\varepsilon}\right)^{\alpha-1} - (1+\alpha)\left(\tfrac{\varepsilon-1}{\varepsilon}\right)^{\alpha}\right]\left(\tfrac{1}{\varepsilon^2}\right) M^{\alpha} R^{-\alpha} \left(1+\tfrac{\beta}{\alpha}\right)^{-\alpha} > 0 \tag{21}$$

for $\varepsilon < 1 + \dfrac{1}{\alpha}$

The above equations tell us that higher bargaining power of the union reduces real profits while higher market power of the firms (a lower value of ε) not necessarily increases them. We will furhter discuss this result below, when we examine the (de)regulation policy.

3.2 The effects on union utility

In a similar way, we can obtain the union utility combining the bargained wages (11) with the indirect utility function (9)

$$U = M^{-\alpha} G^{-1-\alpha} \alpha^{\alpha} \beta (\alpha+\beta)^{-1-\alpha} R^{-\alpha} \tag{22}$$

The effects of changes in the parameters are

$$\frac{\partial U}{\partial \beta} = M^{-\alpha} G^{-1-\alpha} \alpha^{1+\alpha} R^{-\alpha} (1+\beta)(\alpha+\beta)^{-\alpha-2} > 0 \tag{23}$$

$$\frac{\partial U}{\partial \varepsilon} = (1+\alpha)\, \alpha^{1+2\alpha} M^{-\alpha} R^{-\alpha} \beta (\alpha+\beta)^{-1-\alpha} \left(\frac{\varepsilon-1}{\varepsilon^3}\right)^{\alpha} > 0 \tag{24}$$

so that more bargaining power of union and less firms market power increase union utility.

4 Optimal regulation policy

We now examine the effects of (de)regulation policies on the utility of parts and search for a policy that improves the utility of both the firms and the union. In other words, we are looking for a policy that is Pareto improving. We call such a policy optimal because it increases the utility of the parts. This does not mean that it is optimal in absolute terms, it is in fact possible that a policy we call optimal does not meet some other objective of a policy maker (efficiency or employment, for example). In addition, we are particularly interested in the complementarity of policies, that is, we want to examine whether in order to obtain a Pareto improvement we need policies that affect both markets at the same time. Finally, we want to stress the fact that optimal policies improve the welfare of both parts so a policy maker should find no opposition in implementing them.

In this work we refer to a (de)regulation as a policy able to change the degree of imperfections, so that it modifies the value of the elasticity of demand ε and of the union bargaining power β. Increasing ε or lowering β is considered a deregulation policy, the contrary is considered a regulation policy.

As we have seen before, high regulation in the labour market is good for unions and bad for firms, while high regulation in product market is usually good for firms but bad for unions. The only exception to this is when the elasticity of demand is extremely low (see equation (21)): in such a case a rise of elasticity is good for both parts so that any policy that deregulate the product market is Pareto improving. We will start discussing this simpler case.

4.1 Highly monopolistic product market

For $\varepsilon < \frac{1}{\alpha} + 1$ a deregulation policy in the product market alone increases the utility of both parts. This is quite obvious for the union utility but less intuitive for profits. However we have to consider that the rise of the elasticity induces two effects on profits: a positive one, due to the rise of aggregate demand and a negative one, due to the reduction of the gain per unit produced. When a market is highly monopolistic the first effect prevails so that in the end deregulating such a market increases the profits of each firm. On the other side, union utility increases for the rise of employment and wages.

In this circumstances a deregulation policy of product market is always advisable and fruitful: all the parts gain from it, inducing a clear Pareto improvement. Moreover, there is no complementarity here between the (de)regulation of labour and product markets: implementing the policy only on the latter is enough to have an improvement.

The situation we are depicting is however limited to markets where firms have a very high market power. Just to make some numerical examples, consider that for $\alpha = 0.5$ this policy would be advisable when the mark-up is at least 50% and for $\alpha = 0.8$ the mark-up should be at least 80%.

4.2 Other markets

Let us now consider the case when $\varepsilon > \frac{1}{\alpha} + 1$. In effect this case is the most likely, not only for the fact that for most values of he parameter the condition holds, but also for the fact that, as we have seen in the previous paragraph, when it is not met, the advisable policy should be to reduce market power so that at some point the condition is necessarily met.

This said, we can state that both bargaining power β and elasticity of demand ε have a positive effect on the utility of union and a negative on the profits of firms: it is then possible that varying both the parameters (through a (de)regulation policy) we obtain a Pareto improvement. Note that the Pareto improvement policy necessarily happens through a rise of one of the parameter and a reduction of the other, but a priori, it is not possible to tell which direction of the change is necessary. In other words, while it is possible to induce a Pareto improvement we have to risr ε and reduce β (a deregulation policy), it is also possible we have instead to implement the contrary (a regulation policy) to obtain the improvement.

To make things simpler we make a change in variables, setting $\mu = \frac{\varepsilon}{\varepsilon-1}$. This change allows us a more homogeneous treatment of the subject: μ is directly related to the mark-up so that a high value of μ shows high market power while a low value shows low market power.

The variable μ and ε are inversely correlated (with $\partial\mu/\partial\varepsilon < 0$): when ε go to 1 (the minimum value for the elasticity of demand) μ go to infinity; when ε goes to infinite μ becomes 1. Note that the condition $\varepsilon > \frac{1}{\alpha}+1$ implies $\mu < 1+\alpha$ so that we are now considering this latter case only. It is easy to show

$$\frac{\partial \pi_i}{\partial \mu} = \left((1+\alpha)\,\mu^{-2-\alpha} - \mu^{-\alpha-1}\right)\alpha^{1+\alpha} M^{\alpha} \left(\left(1+\frac{\beta}{\alpha}\right) R\right)^{-\alpha} > 0 \qquad (25)$$

for $\mu < 1 + \alpha$

and

$$\frac{\partial U}{\partial \mu} = -\,(1+\alpha)\,\mu^{-2-\alpha}\,(MR)^{-\alpha}\,\alpha^{\alpha}\beta\left(\frac{\alpha}{(\alpha+\beta)}\right)^{1+\alpha} < 0 \qquad (26)$$

so that we can be certain that, in the case we are studiying, a rise in market power induces a rise in the profits. Now that we redifined this variable we can directly assess the problem of regulation policies, searching for a policy that rises both U and π_i. We start with a graphical analysis and then we better formalise the problem.

4.3 A Graphical Analysis

We draw in figure 1 the isoprofits curves π_j (lower curves correspond to higher profits) and the indifference curves U_j (higher curves correspond to higher utility). The curves represent the geometrical locus of the couples (μ, β) that guarantee, respectively, the same level of profits and of utility. It is easy to see that the only couples that form a pareto optimum are the ones that lay where the isoprofits and the indifference curves are tangent. In the figure we have drawn the isoprofits curve upward sloping and concave and the indefference curves are upward sloping and convex: these are indeed the correct shapes of the curves as we demonstrate in appendix A.

Consider for example point A, in it both profits and union utility are lower than in C: therefore a policy that rises μ and β (a regulation policy) would be Pareto improving. On the other side, point B has lower utility and profits than C so that lowering μ and β (a deregulation policy) would increase the utility of both parts.

The set of points where the curves are tangent represent the optimal (in the paretian sense) combination of μ and β so that it can be considered a sort of optimal regulation curve (ORC in figure 1). When we are above that curve we should deregulate the markets, when below we should regulate them.

4.4 Formal Analysis

From an analytical point of view, the Pareto optimality is met when the slopes of the isoprofits (the marginal substitution rate of profits) and the slopes of the indifference curves of union (the marginal substitution rate of union utility) are equal. The Pareto optimality condition is then given by

$$-\frac{\partial U}{\partial \mu} / \frac{\partial U}{\partial \beta} = -\frac{\partial \pi}{\partial \mu} / \frac{\partial \pi}{\partial \beta} \tag{27}$$

where $-\frac{\partial U}{\partial \mu} / \frac{\partial U}{\partial \beta}$ is the marginal rate of substitution of union utility and $-\frac{\partial \pi}{\partial \mu} / \frac{\partial \pi}{\partial \beta}$ is the marginal rate of substitution of profits. Note that equation (27) is an optimum only if isoprofits and indifference curves are upward sloping and concave and convex respectively. This is indeed our case, as we demostrate in appendix A.

If we solve equation (27) we can derive the following optimality condition

$$\beta = \left(\frac{\mu}{\alpha \left(1 + \alpha - \mu\right)} - 2 \right)^{-1} \tag{28}$$

the above equation identifies the pareto optimal degree of regulation.

Moreover, when the equality does not hold, a (de)regulation policy is always able to increase the utility of both parts: if the marginal rate of substitution of union utility is higher than the marginal rate of substitution of profits, then a deregulation policy is Pareto improving. When the contrary is true, it is a regulation policy that is Pareto improving[8]. In practice, when

$$\beta > \left(\tfrac{\mu}{\alpha(1+\alpha-\mu)} - 2 \right)^{-1} \tag{29}$$

the optimal policy would be to deregulate the markets. It is possible that $\left(\frac{\mu}{\alpha(1+\alpha-\mu)} - 2 \right)^{-1} < 0$ so that condition (29) is met for any value of β: this happens when $\mu < \dfrac{2\alpha\left(1+\alpha\right)}{\left(1+2\alpha\right)}$. This a particular situation and it cannot happens when α less than $\sqrt{0.5}$ (roughly 0.71) but it may arise when α is above that level.

We will treat that situation later but for now we consider only the case when $\alpha < \sqrt{0.5}$. Under this condition we can be certain that when $\beta > \left(\frac{\mu}{\alpha(1+\alpha-\mu)} - 2 \right)^{-1}$ the optimal policy would be to deregulate the markets while it would be optimal to regulate them when β is below that value. Graphically this is shown in figure 2: equation (27) identifies the ORC, in any point below it, a regulation policy is advisable, in any point above, a deregulation is Pareto improving. In practice the ORC curve is the threshold between regulation and deregulation policy.

When we say that it is optimal to deregulate (or regulate) we do not imply that any policy that decreases μ and β is optimal; rather, we mean that through an adequate mix of deregulation in the labour and product market it is possible to obtain an improvement of the utility of both the parts. In this is crucial that the (de)regulation must affect both markets, only exploiting the complementaries of them we can obtain a Pareto improvement.

Finally, it is important to stress that, contrary to widespread beliefs, there exists a space where to deregulate is not optimal in Pareto sense. Whether this is not optimal is a broader sense depends on which are the aims of the policy maker.

We turn now to the case when $\alpha > \sqrt{0.5}$. If we examine the optimal regulation curve in this case we observe thatit now lay partially in the positive region and partially in the negative region. This is shown in figure 3, where the

[8]Once again, this is true when the isoprofits cruves are concave and the union indifference curves are convex.

positive part is called ORC1 and the negative is called ORC2. The asymptote that divides the two curves is given exactly by $\mu = \frac{2\alpha(1+\alpha)}{(1+2\alpha)}$.

The region below the orizontal axis does not have any economical meaning as the bargaining power cannot reach negative values. Moreover, the curve ORC2 is not neceserally an optimum: in fact we are not able to say anything on the shapes of the isoprofits and indifference curves when β is less than zero. This does not create any problem to our analysis: given the concavity of the isoprofits curves and the convexity of the indifference curves we are still certain that even when $\mu < \frac{2\alpha(1+\alpha)}{(1+2\alpha)}$ a movement toward the positive part of the optimal regulation curve brings a Pareto improvement, so that regulation constitutes certainly an optimal policy.

5 Conclusions

The aim of this work was to explore the effect of regulation and deregulation of labour and product market. In particular we were searching for the existence of a policy that could be Pareto improving. In order to do that we built a model with firms operating in a context of monopolistic competition and with wage bargained according to a Right to manage rule. We used such a model to derive the firms profits and union utility and we explored the effect of (de)regulation on them. The idea was to look for a (de)regulation policy that could make both parts better off. Our results show that such a policy exists and its prescriptions may differ depending on how distant the markets are from being perfectly competitive. In details, we found that the optimal policy is to regulate both markets when they are close to be competitive and to deregulate them in the other cases. Moreover, we found that when firms detain very high market power, the deregulation of the product market is optimal even if made alone. While in the second case the deregulation is necessary in one market only, in the first one the policies must be brought forth on both markets at the same time: in this case an improvement is possible only if we operate on both markets.

To conclude we want to stress the fact that our results depend on how we formulate our model. While we believe that our hypothesis are reasonable, it would be useful to derive optimal policies under different set pf hypothesis. In particular it should be interesting to explore what happens when the rational expectation hypothesis is removed.

A APPENDIX

In this appendix we want to derive analitically tha slopes of the isoprofits curves and of the indifference curves of union. We will derive them in the space (μ, β) but, for what we discussed above, we are only interested in the cases when $1 < \mu < 1 + \alpha$ and $0 < \beta < 1$.

We start from the isoprofits curves and we will then examine the union indiffernce curves

A.1 Isoprofits Curves

We want to demonstrate that in the space (μ, β) the isoprofits curves have a positive slope $\frac{\partial \beta}{\partial \mu} > 0$ and are concave $\frac{\partial^2 \beta}{\partial \mu \partial \mu} < 0$.

The start from the equation for profits which are given by

$$\pi_i = \left[\left(\frac{\mu}{\alpha} \right)^{-\alpha} - \left(\frac{\mu}{\alpha} \right)^{-1-\alpha} \right] M^{\alpha} \left[\left(1 + \frac{\beta}{\alpha} \right) R \right]^{-\alpha} \tag{a}$$

so that for any value of the profits π_j the relative isoprofit curve j in the space (μ, β) is given by

$$\beta = \alpha \pi_j^{-\frac{1}{\alpha}} \alpha^{\alpha} \mu^{-1} \left[\mu^{-\alpha} - \alpha \mu^{-1} \right]^{\frac{1}{\alpha}} M R^{-1} - \alpha \tag{b}$$

To save on notation we set $T_j = \alpha \pi_j^{-\frac{1}{\alpha}} \alpha^{\alpha} M R^{-1}$. Note that T_j do not depend nor on μ nor on β. We have

$$\beta = T_j \mu^{-1} \left(1 - \alpha \mu^{-1}\right)^{\frac{1}{\alpha}} - \alpha \tag{c}$$

The slope of the isoprofit curve j is

$$\frac{\partial \beta}{\partial \mu} = T_j \left(1 + \alpha - \mu\right) \left(1 - \alpha \mu^{-1}\right)^{\frac{1-\alpha}{\alpha}} \frac{1}{\mu^3} \tag{d}$$

Since $1 + \alpha - \mu < 0$, $\alpha < \mu$ and $\mu > 0$ the sign of the first derivative is positive.

$$\frac{\partial \beta}{\partial \mu} > 0 \quad \blacksquare \tag{e}$$

We want also to demonstrate that $\frac{\partial \beta}{\partial \mu \partial \mu} < 0$.

To do that we start showing that $\frac{\log \frac{\partial \beta}{\partial \mu}}{\partial \mu} < 0$. Consider that

$$\log \frac{\partial \beta}{\partial \mu} = \log T_j + \log \left(1 + \alpha - \mu\right) + \frac{1 - \alpha}{\alpha} \log \left(1 - \alpha \mu^{-1}\right) - 3 \log \mu \tag{f}$$

and then

$$\frac{\partial \log \frac{\partial \beta}{\partial \mu}}{\partial \mu} = - \frac{(\mu - 1) + 2 (\mu - \alpha)}{(\mu - \alpha) \mu} - \frac{1}{1 + \alpha - \mu} \tag{g}$$

since $\mu > 1$, $\mu > \alpha$ and $1 + \alpha > \mu$ we can be certain that

$$\frac{\log \frac{\partial \beta}{\partial \mu}}{\partial \mu} < 0 \tag{h}$$

and obviously

$$\frac{\log \frac{\partial \beta}{\partial \mu}}{\partial \mu} < 0 \Longrightarrow \frac{\partial^2 \beta}{\partial \mu \partial \mu} < 0 \quad \blacksquare \tag{i}$$

A.2 Union Indifference Curves

We want to demostrate that in the space (μ, β) the union indifference curves have a positive slope $\frac{\partial \beta}{\partial \mu} > 0$ and are convex $\frac{\partial^2 \beta}{\partial \mu \partial \mu} > 0$. Dealing with these curves is a bit more troublesome than with isoprofits curves. To makes thing simpler we start studying the slope of the curves in the space (β, μ) and then discuss how the results we obtained can be traslated in the space (μ, β).

We know that the union utility function is

$$U = M^{-\alpha} \mu^{-1-\alpha} \alpha^{1+2\alpha} \beta \left(\alpha + \beta\right)^{-1-\alpha} R^{-\alpha} \tag{j}$$

and the indifference curve U_j in the space (β, μ) is given by

$$\mu = \frac{\beta^{\frac{1}{1+\alpha}}}{(\alpha + \beta)} U_j^{\frac{1}{1+\alpha}} (MR)^{\frac{-\alpha}{1+\alpha}} \alpha^{\frac{1+2\alpha}{1+\alpha}} \tag{k}$$

to save on notation we set $D_j = U_j^{\frac{1}{1+\alpha}} (MR)^{\frac{-\alpha}{1+\alpha}} \alpha^{\frac{1+2\alpha}{1+\alpha}}$. Note that D_j does not depend on β nor on μ. We can write

$$\mu = D_j \frac{\beta^{\frac{1}{1+\alpha}}}{(\alpha + \beta)} \tag{l}$$

The slope of the indifference curve j is given by

$$\frac{\partial \mu}{\partial \beta} = D_j \left[\frac{\alpha}{1+\alpha} \frac{1-\beta}{(\alpha+\beta)^2} \right] \beta^{\frac{-\alpha}{1+\alpha}} \tag{m}$$

since $0 < \beta < 1$ we can adfirm that

$$\frac{\partial \mu}{\partial \beta} = D_j \frac{\alpha}{1+\alpha} \frac{(1-\beta)\, \beta^{\frac{-\alpha}{1+\alpha}}}{(\alpha+\beta)^2} < 0 \tag{n}$$

If we consider that the terms in the numerator $(1-\beta)$ and $\beta^{\frac{-\alpha}{1+\alpha}}$ are both a decreasing function of β and that the term in the denominator $(\alpha+\beta)^2$ is a positive function of β we can state

$$\frac{\partial^2 \mu}{\partial \beta \partial \beta} < 0 \tag{o}$$

If function (k) is invertible, than $\frac{\partial \mu}{\partial \beta} > 0$ and $\frac{\partial^2 \mu}{\partial \beta \partial \beta} < 0$ imply that $\frac{\partial \beta}{\partial \mu} > 0$ and $\frac{\partial^2 \beta}{\partial \mu \partial \mu} > 0$.

Looking at the function (k) we can say that is invertible if it continuos and monotone in the interval $1 < \mu < 1 + \alpha$ and $0 < \beta < 1$. The continousness is obvious and its being monotone in the interval $0 < \beta < 1$ is directly given by (n).

We can than state that

$$\frac{\partial \beta}{\partial \mu} > 0 \quad \blacksquare \tag{p}$$

and

$$\frac{\partial^2 \beta}{\partial \mu \partial \mu} > 0 \quad \blacksquare \tag{q}$$

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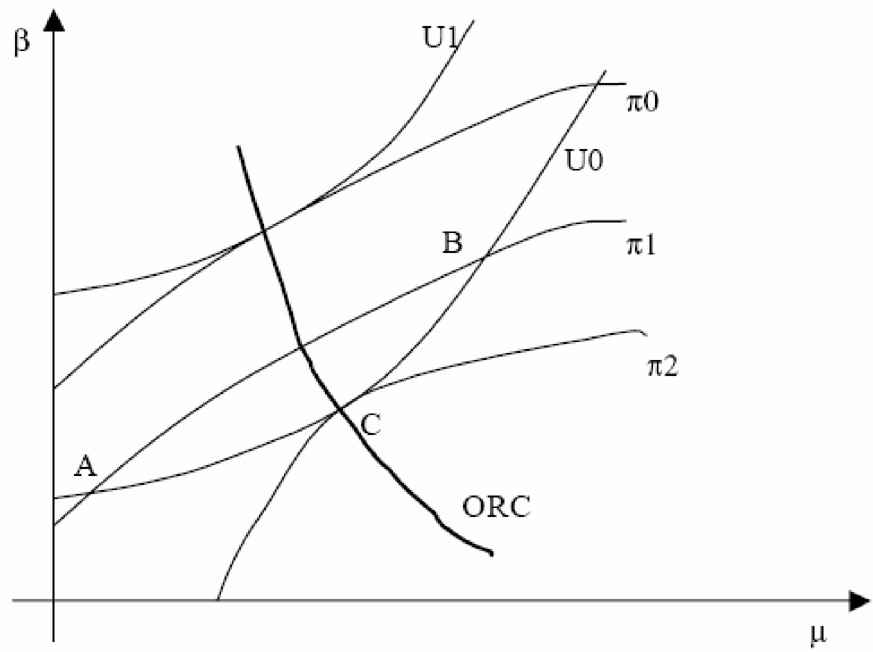

Figure 1:

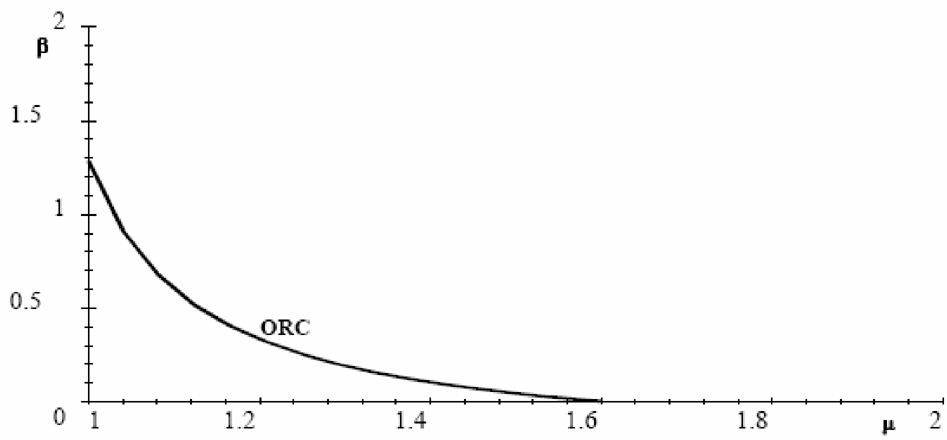

Figure 2:

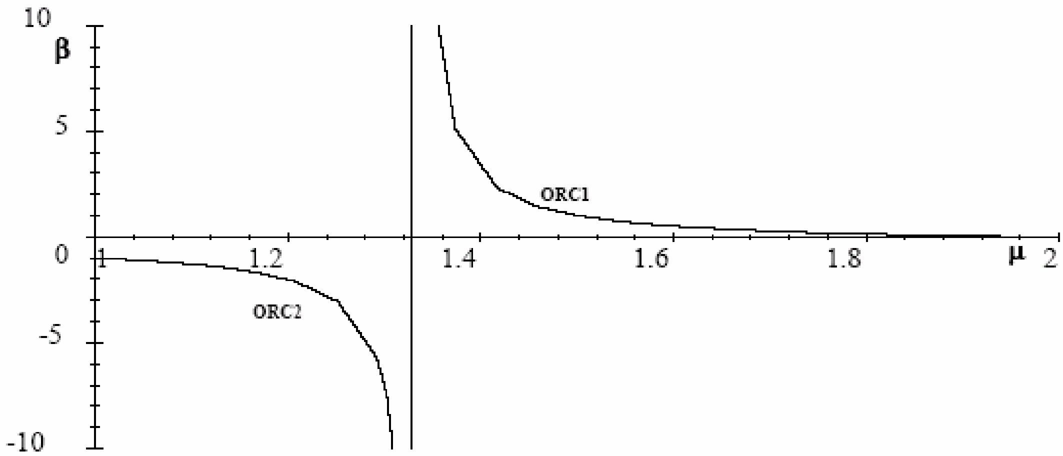

Figure 3: