Interactions between Product and Labour Market Reforms.*

Jo Seldeslachts†

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Abstract

Labour market reforms face very often opposition from the employed workers, because it normally reduces their wages. Also product market regulations are regularly biased towards too much benefitting the firms. As a result there remain many frictions in both the labour and product markets that hinder an optimal functioning of the economy. These issues have recently received a lot of attention in the economics literature and scholars have been looking for politically viable reforms in both markets. However, despite its potential importance, there has been done virtually no research on the *interaction* between reforms in product and labour markets. We find that when combining reforms, the opposition for reforms decreases considerably. This is because there exist complementarities and the gains in total welfare can be more evenly distributed over the interest groups. Moreover, the interaction of reforms offers a way out for the so-called 'sclerosis' effect.

Keywords: Private Interests, Regulation, Product Market Competition, Unemployment, Political Support for Reforms, Interactions between Markets.

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†Dept. Economia i d'Història Econòmica, Universitat Autònoma de Barcelona, 08193 Bellaterra (Barcelona), Spain. Tel: +34-935811811. Fax: +34-935812012. E-mail: jseldes@idea.uab.es

1 Introduction

Product and labour market frictions are often blamed for the relatively poor European performance of the last 30 years, especially with respect to unemployment. Remove (many of) these frictions, the argument goes, and both employment and output will increase.[1]

But why is it then that there remain so many frictions in both the labour and product markets? Boeri et al. (2000) and Nicoletti et al. (2000) develop a set of indicators of frictions in product and labour markets and find that in Europe regulations are still high as compared to other OECD countries (for more details, see Table 1 in Section 2). Reforms are largely marginal, especially in the labour markets. Product market reforms are more widespread, but slow-moving and several sectors are still virtually served by (sometimes state owned) monopolies (see e.g. Bergman et al., 1998).

One possible explanation comes from a political point of view. Removing frictions is fundamentally reducing and redistributing rents. Thus, even if a reform eventually proves beneficial, it is likely to come with strong redistribution effects and hence strong opposition from the loosing side. The political aspects of reforms in labour and product markets have received considerable attention in the economics literature. The main reason for frictions in labour markets, says Saint-Paul (2000), is that many reforms have proved difficult because they face fierce opposition by the employed workers when wages decrease. It is found that these frictions explain indeed a large part of unemployment (see e.g. Blanchard & Wolfers, 2000). A combination of different labour market reforms to stimulate employment has the most chances to get approval, but even then it is often not granted that employed workers agree to reforms (Coe & Snower 1996).

The same mechanism is at work in the product markets as was first shown by Stigler (1971). Firms are enjoying more rents than socially optimal. This is because also regulation in the product markets is essentially a redistributive process among interest groups who want to gain specific benefits by the means of governmental intervention (Persson and Tabellini, 2000). Influencing the political process is costly and only the firms, who have a large benefit in doing this and are best organised in the product market, will effectively do this (see e.g. Becker, 1983, Noll, 1989, and Winston, 1993). Therefore, reforms prove more difficult to implement when firms do not agree as Li et al. (2001) and Kroszner & Strahan (1999) show.[2]

Of course, the labour and product markets are not functioning independently. Since labour demand originates from firm behaviour in the product market, some authors have recently suggested that product markets reforms may be helpful in reducing unemployment (Amable & Gatti, 2001a, Blanchard, 2000, Burda, 2000, and Gersbach, 2000).

[1] This is the theme of a number of studies by the OECD (e.g. The OECD Observer, December 1997-January 1998).

[2] Also, firms enjoy informational advantages which makes that industrial policy is difficult to be socially optimal. Regulation is therefore normally a trade-off between efficiency distortions and informational rents enjoyed by these firms (Laffont & Tirole, 1991, and Laffont, 1996).

However, there has been done virtually no research on the *interaction* between reforms. How are reforms in the labour and product markets likely to interact? It is often stated that reforms should be comprehensive and wide-ranging to be successful. A recent OECD Study (1999a) says that it is important to take simultaneously and co-ordinated actions in all areas, because of synergies between different reforms, and the possibility increases that reforms are fairer against all groups. Nicoletti et al. (2000) find that where product markets are adverse to competition, labour markets tend as well to have tight legislations protecting the employed pool.[3] However, despite its potential importance, the theoretical argument has remained surprisingly loose.[4] The reasons *why* comprehensive reforms work better and seem to create synergies are not understood.

In this paper we try to answer the question from a political economy point of view. That is, we want to identify the winners and losers from reforms in product and labour markets and analyse the conditions under which there will be sufficient support for having them. To our knowledge, this is a first attempt to model from a micro-economic point of view the interaction of reforms in the labour and product markets that takes explicitly into account the interests of *both* workers and firms, and where firms compete in an oligopolistic product market.[5] Our setup is the closest to Saint-Paul (1998) who assesses the support of employed workers for active labour market policies, but not taking into account firms and product markets. Amable & Gatti (2001b) and Blanchard & Giavazzi (2000) study the interaction of regulations in both product and labour markets, but look only at effects in labour markets and do not consider what is happening in product markets and approval of firms.

Our conclusions are encouraging. The main finding is that when the losses and gains of welfare enhancing reforms can be evenly distributed over employed workers and firms, they have considerably more chance to get approval. This is because reforms in the labour and product markets are complementary, and therefore the loosing side of one reform will be the winning side of the other reform. This means that higher employment and more product market competition can be more easily accomplished. Moreover, this paper offers a possible way out of the so called 'sclerosis' effect. When frictions in markets are high, interest groups enjoy higher rents and oppose more reforms and thus the markets that need most a reform, are most stuck in a sclerosis. But combining reforms offers a solution. The high frictions in the one market make it *easier* to reform the other market and therefore the sclerosis in the one market can cancel out the sclerosis in the other market. This implies also that it is better to reform in both

[3]Their paper is based on a new OECD index of product market regulation which proves to be strongly correlated to different measures of labour market regulation (a statistical correlation of 0.73 significant at the 1% level).

[4]The only paper we found that looks explicitely at both reforms in product and labour markets is Amable & Gatti (2001b). They find that more product market competition should be accompanied by an increase in job security in order to increase employment.

[5]Duso & Röller (2001) investigate wether political considerations are important in the arena of industrial organisation and claim that it may be necessary to integrate politics and industrial organization. Nickell (1999), Padilla et al. (1996) and Weiss (1998) show that modelling imperfect competition is essential when looking at product and labour market interactions.

markets at the same pace and can be therefore an explanation for the observations of Boeri et al. (2000) that when product markets are less regulated, labour markets tend to have less tight legislations.

In the next section, we illustrate in a table that the rigidities are still strong in Europe and explain in more detail how we model rigidities and reforms in the product and labour markets. In the third section, we characterise the equilibrium in the labour market in function of the labour and product market regulations. The model is built on two basic assumptions: competition á la Cournot in the product market and a labour supply derived from an efficiency wage model based on Shapiro & Stiglitz (1984). In the fourth section, we search for politically viable reforms to increase welfare. The last section concludes.

2 Rigidities and Reforms in Labour and Product Markets

Before explaining how we model rigidities and reforms, we show in a table taken from two OECD studies that rigidities in Europe are in general higher than in other OECD countries. Also, it can be noticed that when the rigidity in the one market is high, it is also high in the other market.

INSERT TABLE 1 HERE

We model labour market rigidities as the degree of employment protection. Employment protection legislation is complex; it associates to each cause of firing a set of constraints imposed on the employer. These constraints include severance payments, administrative supervision, obligation to provide the displaced workers with job counseling, etc. Despite the common view of the negative effect of employment protection rules on employment, specially among policy makers and employers, there are very different views among economists depending on the model used. However, most of the existing work on firing costs focuses on labour demand models and the only type of dismissals considered are redundancies (see e.g. Bentolila & Bertola,1990, and Garibaldi,1998). These models, as Galdón-Sánchez & Güell (2002) point out, are very useful in understanding the effects of firing costs on the dynamic functioning of the labour market, but the effects on aggregate employment are ambiguous and are studied in a partial equilibrium context. The implicit assumption of all these models is that wages are exogenous and do not change in the presence of firing costs. Most recent empirical studies do find a negative relationship between employment protection and equilibrium employment. In a survey on the economics of employment protection, Addison & Teixeira (2001) find that, with the major exception of an OECD study (1999b), and to a lesser extend a study by Nickell & Layard (1999), all other recent empirical studies point to a reduction in equilibrium employment (or an increase in structural unemployment) in more generous employment protection regimes, despite differences in the employment protection measure, time period, econometric specification, and underlying model (see e.g. Heckman & Pages, 2000, and Nicoletta & Scarpetta, 2001).

In order to capture this effect and to endogenise wages, we use the insider-outsider theory, put forward by Lindbeck & Snower (1988) and more recently used by Saint-Paul (1998) and Güell (2000). The idea is that firing costs are a source of market power for the incumbent workers (the insiders) vis-à-vis the unemployed (the outsiders). Insiders use their market power to exercise upward pressure on wages and create thereby unemployment. According to this view, the higher the firing costs, the higher the power of the employed workers and thus the higher the wage and equilibrium unemployment (Diaz-Vázquez & Snower, 2002).[6]

We think of product market regulation as a measure of the intensity of direct competition between firms present in the market. In other words, frictions in the product market increase the market power of the operating firms.[7] We take this measure because in the context of European integration. A decrease in regulation may reflect the elimination of tariff barriers, or standardisation measures making it easier to sell domestic products in other European countries. European economies are fairly similar and the main effects of integration run through product market integration which strengthens direct competition and changes the boundaries for which the good can be traded. Thus, if trade barriers are lowered, there will be greater product market integration and therefore more direct competition between firms. It is important to understand the effects of more integration on European labour markets. While much of the academic debate has focused on the standard arguments for gains of more free trade, less effort has been devoted to analyse the effects on unemployment (Andersen et al., 2000). There is also a recent and growing literature dealing with the effects of international integration in imperfect competitive markets (see Slaughter & Swagel, 1997, for an overview). But these models are either partial or are cast in a setting where there can be no unemployment, assuming a competitive fringe absorbing all "excess" labour. Moreover, these papers show how more integration directly influences the labour market, but do not look at how this has an effect on *reforms* in the labour markets. Finally, it is normally not taken into account that firms can influence these reforms, while lobbying of firms matters.[8] In a study by Irwin & Kroszner (1999) it is indeed found that firms have a large influence on product market deregulation in the US. We believe it is important to analyse whether and through which routes product market integration can induce reforms in labour markets, in a more general framework where both markets work imperfectly. And, to our knowledge not yet investigated, in this setup we can also study how labour market changes

[6]The main idea we want to capture is that there exist frictions in the labour market, increasing the rents for the employed workers at the expense of employment and total welfare. Apart from emploment protection, frictions can also be modeled for example as excessive union power or too high unemployment benefits.

[7]Blanchard & Giavazzi (2000) use the same measure of regulation, but they model product market competition as monopolistic competition, whereas we model competition à la Cournot, leading to interaction between firms and market power in the long run. We also looked at a regulation measure that determines the cost of entry for new firms. Although lowering the cost of entry affects in a different way the equilibrium employment and production, our calculations showed that both reforms have qualitatively the same impact in our model.

[8]Grossman & Helpman (2001) state that 'One cannot help but wonder why observed trade policies are so different from the prescription of the normative literature. Of course that literature assumes only the existence of a "benevolent dictator" - a species that is all to rare in the real world of policy making.'

can ease product market reforms. There have been reforms in product markets but according to the existing empirical evidence, regulatory policy seems to have a great degree of inertia (Faure-Grimaud & Martimort, 2000) and a large scope for further reforms still exists (Gonec et al., 2000).

Reforms are approved when both the firms and employed workers agree, i.e. when they do not loose from a reform. It is clear that organised interests are more likely to agree with reforms when they perceive greater gains from making the system more effective. We suppose that both groups have veto power, that is, each group can independently block a reform. Probably this is not completely true in reality. Reforms are a result of a decision process -or voting procedure- where both groups have the power to influence decisions. However, in assuming veto power for both groups, we establish a lower bound for the approval of reforms. Thus, when finding approval in our model, we can be sure that these reforms will also be agreed upon when applying a more elaborated voting procedure.

We are looking at reforms that remove rigidities earlier imposed on an economy by its government and this in order to increase employment, competition and general welfare. However, we need to point out that this is of course not the whole picture. First, it has already been shown in the labour market context (Bentolila & Bertola, 1990) that while changes can be welfare increasing in a first-best world, this is not necessarily the case in a second-best case. Also, we are only looking at economic measures, but as Winston (1993) says, 'economics is not everything', social policy has equal importance. More research of the effects of deregulation on for example effort of workers, quality, safety, etc. is equally important.

3 Equilibrium in the product and labour market

We develop a labour supply, dependent on the degree of employment protection, based on the efficiency wage model from Shapiro & Stiglitz (1984). The labour demand comes from firms that are competing in the product market á la Cournot. The equilibrium in the product and labour markets depends both on the degree of competition in the product market and the level of employment protection in the labour market.

The labour supply is a modified version of the shirking model of Shapiro & Stiglitz (1984). As such it is actually a wage setting curve and not a labour supply, but we will both use as synonyms throughout the paper. A worker's effort is not perfectly observable and there is a detection technology that catches shirking workers with some probability q (where $q < 1$). Each firm finds it optimal to fire shirkers, since the only other punishment, a wage reduction, would simply induce the disciplined worker to shirk again. Since q is associated with the monitoring technology, it can safely be assumed that firms do not want to fire people if they are not shirking. This is because other (exogenous) reasons of loosing a job are accounted by a variable b in the model. Hence, in Shapiro & Stiglitz (1984) each firm fires the worker with probability 1 when a worker is detected shirking. Our departure from the Shapiro & Stiglitz model

is including employment protection legislation. Firing and job destruction in our model are no longer instantaneous, but can be costly and lengthy. The simplest and most widely used form of employment protection legislation is a fixed firing cost to be incurred by the firm when firing takes place (see e.g. Bentolila & Bertola, 1990). But the multiple dimensions of employment protection are difficult to model in such a simple way. In most European countries, before firing can take place a discussion with a union representative is often necessary and, in extreme cases, a full agreement with government officials must be reached. From the firm's point of view, the existence of complicated procedures introduce uncertainty over the actual costs of firing and over the actual timing. For example, the existence of a 'just clause' rule in most European legislation allows the worker to appeal against dismissal and can result in reinstatement of the dismissed worker (Galdón-Sanchez & Güell, 2002). The traditional indicators fail to capture this uncertainty. As Garibaldi (1998), we focus on a different form of job security provisions and consider a model where firing requires an exogenous firing permission. More formally, we introduce a stochastic parameter s that reflects the legal framework in the labour market. The higher s, the more flexible is the labour market. The probability of getting fired when caught shirking becomes now $sq \in [0,1]$. In the next subsection we develop this labour supply.

On the demand side of the labour market, firms decide how much labour they want as a function of the wage they have to pay. In the literature on labour market reforms the demand side of the labour market is assumed to be the marginal product of labour, which must be equal to the wage in equilibrium, $w = p\frac{\partial F(l)}{\partial l}$, where p is the given price of the output in the product market, l is the total number of labour used and $F(l)$ is the total production of the firms present in the labour market. We model a product market where firms compete à la Cournot and where the degree of direct competition varies, depending on the product market regulation. This allows us to analyse how product market reforms have an impact on the labour market and what how labour and product market reforms interact. Moreover, firms are making positive profits which makes them active players in the political process.

3.1 Labour Supply

There exists a number of identical workers n and each worker is at any point of time either employed or unemployed. A worker is assumed to be risk neutral and his instantaneous utility function is separable in wage and effort: $U(y, Ef) = y - Ef$, where y is the payment a worker gets at each instant and Ef his effort. We suppose that an unemployed individual receives no unemployment benefit $y = 0$ and does not supply any effort ($Ef = 0$), which means that his instantaneous utility is $U_u(y, Ef) = 0$. An employed worker receives a wage $y = w$ and decides to shirk ($Ef = 0$) or to provide some fixed positive level of effort $Ef = e > 0$. A shirker has an instantaneous utility $U_e^s(y, Ef) = w$ and a non-shirker has a utility $U_e^{ns}(y, Ef) = w - e$. The only choice an employed worker makes is the selection of effort. If the worker supplies effort for his job, only exogenous factors can cause a separation. This exogenous separation rate is due to relocation, recession, etc. and is a probability per unit of time $b \in [0,1]$. If an employed worker

shirks, there is again the possibility b that he will loose his job, but there has to be added a probability $sq \in [0,1]$ per unit of time that he will be fired when discovered shirking, where q is the probability being caught and s the probability being fired when caught shirking. For $s = 1$, this gives us the original condition of Shapiro & Stiglitz (1984).

The worker selects an effort level to maximise his discounted utility stream. This involves a comparison of the (expected) utility from shirking with the (expected) utility from not shirking, to which we now turn. We define E^s as the expected lifetime utility of an employed worker who shirks, E^{ns} the expected lifetime utility of an employed nonshirker and U as expected lifetime utility of an unemployed individual. The asset value equation for a nonshirker is given by

$$rE^{ns} = w - e + b(U - E^{ns}), \tag{1}$$

while for a shirker, it is

$$rE^{s} = w + (b + sq)(U - E^{s}). \tag{2}$$

Each of these two equations is of the form "interest rate r times asset value equals flow benefits".[9] The difference between the two valuations is that a non-shirker has a lower instantaneous utility $(w - e)$, because he supplies effort, but a shirker has a higher probability to loose his job $(b + sq)$. Hence, the risk of getting unemployed is proportional to the probability of getting caught q and to the flexibility of the labour market s. If the labour market is more regulated, the lower will be s, and the less the cost of shirking.

The no-shirking condition is $E^{ns} \geq E^{s}$. The employer will pay the minimum allowable wage in order to meet the no-shirking condition, which means that in equilibrium $E^s = E^{ns} = E$. Substracting the asset value of the shirker (2) from the asset value of the non-shirker (1), and using that in equilibrium they will be the same yields:

$$E = U + \frac{e}{sq}. \tag{3}$$

Using the relation between the value of the unemployed and employed workers (3), we find the asset value for an unemployed person:

$$\begin{aligned} U &= a(E - U) \\ &= a\frac{e}{sq}, \end{aligned} \tag{4}$$

where a is the endogenous probability of obtaining a job per unit of time.

Because in equilibrium the no-shirking condition will hold with equality and using the relation between the values for the employed workers and unemployed workers (3), we can rewrite the no-shirking wage w^{ns} as

$$w^{ns} = e + (r + b + a)\frac{e}{sq}. \tag{5}$$

[9] We only consider the steady state and do not take into account differences of E and U over time.

The rate a itself can be related to more fundamental parameters of the model. The flow into the unemployment pool is bl, where l is aggregate employment and b the exogenous separation rate. The flow out of the unemployment pool is $a(n-l)$, where n is the total workforce. In the steady state, these must be equal , so $bl = a(n-l)$, or

$$a = \frac{bl}{n-l}. \tag{6}$$

Therefore the no-shirking condition (5) can be written as

$$\begin{aligned} w^{ns} &= e + (r + \frac{bn}{n-l})\frac{e}{sq} \\ &= rU + e + \frac{e}{sq}(r+b) \end{aligned} \tag{7}$$

If the firm pays this wage, workers will not shirk. In this wage equation, we can distinguish between the reservation wage $rU + e$ and the rent linked to the incentive problem $\frac{e}{sq}(r+b)$. It is easy to see that the higher the flexibility of the labour market s, the lower the efficiency wage. Hence, rents arise because of microeconomic frictions and are magnified by legal restrictions in the labour market. We have thus an effect of legal restrictions on the power of employed workers (higher wage) and on the flows in and out of employment. Because of a higher wage, the employment l decreases and therefore also the inflow into jobs, a.

Equation (7) is the curve for *one* firm. If we suppose that there are N identical firms present in the labour market, and that the total labour force consists of Nn workers (we replicate the labour market N times), we can write the wage setting curve as

$$w^{ns} = e + (r + \frac{bNn}{Nn - \sum^N l_i})\frac{e}{sq}, \tag{8}$$

where l_i is the number of workers employed by firm i and $\sum^N l_i$ is the total number of employed workers in the labour market.

3.2 Labour Demand

On the demand side of the labour market, firms decide how much labour they want as a function of the wage they have to pay. When paying this wage, firms take into account effort decisions of the workers but take the endogenous rate of finding a job, a, as given. In other words, a firm can influence effort decisions of workers by paying a high enough wage, but is small relative to the size of the labour market and takes job flows as given.

In labour economics on the micro-level, the demand side of the labour market is normally determined by the marginal product of labour which must be equal to the wage in equilibrium, $w = p\frac{\partial F(l)}{\partial l}$,where p is the given price of the output in the product market, l is the number of labour used and $F(l)$ is the total production of the firms present in the labour market. We assume that firms have market power in the product market and take production decisions in interaction with their competitors, and consequently $\frac{\partial p}{\partial f(l)} \neq 0$.

The firm's short-run production is $f_i(l_i) = l_i^\alpha$, with $0 < \alpha \leq 1$ and we are implicitly assuming that the firm's other production factors (capital or skilled labour) are fixed and at full capacity. Total production in the product market is separable in individual productions, $F(l) = \sum f_i(l_i) = \sum l_i^\alpha$.

In order to allow for a change in direct competition through changes in regulation and at the same time having firms that react strategically and enjoy rents in the long run, we cannot use a model of monopolistic competition. Instead, we model the product market as a replica economy where firms compete à la Cournot (see Vives, 2000, for a similar idea, but in a different set-up). From the previous section, we know that there are N firms present in labour and product markets. If markets are "zero-integrated", a firm faces no direct competition and can act as a monopoly, deciding on production independently of competitors. If total demand in the product market is equal to d, each firm i faces then an inverse demand $p = d - l_i^\alpha$. If however, each firm faces direct competition from exactly one other firm (firms are competing in a Cournot duopoly), they have to take into account this other firm when deciding on optimal production. Thus production decisions of firm i, $l_i^\alpha = d - p$ and production decisions of its direct competitor j, $l_j^\alpha = d - p$ are now taken interdependently. The price p is jointly determined by the productions of firms i and j, $l_i^\alpha + l_j^\alpha = 2(d - p)$ and therefore $p = d - \frac{l^\alpha + k^\alpha}{2}$. Generalising this reasoning for all degrees of competition, we can write the inverse demand as

$$p = d - \frac{\sum^m l_i^\alpha}{m},$$

where $m \in [1, \infty[$ indicates the degree of product market integration and therefore also of the degree of direct competition each firm faces in the product market. The competition firms face lies between the extreme $m = 1$, where a firms can behave as a monopoly in the product market (there is no integration) and the other extreme $m \to \infty$, where firms have no market power and face perfect competition (maximum possible integration).

The profit of each firm is then

$$\pi_i = (d - \frac{\sum^m l_i^\alpha}{m}) l_i^\alpha - w_i l_i,$$

where w_i is the wage firm i pays. Each firm maximises its profit w.r.t. production, paying a high enough wage to induce workers to put in effort:

$$\begin{aligned} &\max_{l_i} \ \pi_i \\ &s.t. \quad w_i \geq w^{ns}. \end{aligned}$$

Solving this problem gives us the labour demand and optimal wage of the firm,

$$w_i = (d - \frac{l_i^\alpha + \sum^m l_i^\alpha}{m}) \alpha l_i^{\alpha - 1} \text{ and } w_i = w^{ns}. \tag{9}$$

In order to sum up the demand for all N firms present in the labour markets, one needs a labour demand separable in l_i. Limiting ourselves to the case where $\alpha = 1$,[10] we can write the total labour demand as

$$w = (d - \frac{(m+1)\sum^N l_i}{mN}), \tag{10}$$

where $w = w^{ns}$ is the identical wage firms pay in the labour market.

3.3 Equilibrium in the markets

We are now able to characterise the equilibrium in the labour and product markets and analyse how it depends on the degree of competition in the product markets and on the level of employment protection in the labour markets. Since the labour demand is derived from profit maximisation in the product market, the equilibrium in the labour market determines at the same time the optimal production in the product market.

LEMMA 1 ***(i)*** *When N identical firms are present in the markets and the total supply of workers is Nn, the equilibrium in the markets is unique and independent of N.*

(ii) *Equilibrium employment increases when direct competition in the product market is fiercer, $\frac{\partial l^*}{\partial m} \geq 0$, but the marginal effect decreases, $\frac{\partial^2 l^*}{\partial m^2} \leq 0$. Equilibrium wage increases when competition in the product market is fiercer, $\frac{\partial w^*}{\partial m} \geq 0$, but the marginal effect decreases, $\frac{\partial^2 w^*}{\partial m^2} \leq 0$.*

(iii) *Equilibrium employment increases when the labour market is more flexible, $\frac{\partial l^*}{\partial s} \geq 0$, but the marginal effect decreases, $\frac{\partial^2 l^*}{\partial s^2} \leq 0$. Equilibrium wage decreases when the labour market is more flexible, $\frac{\partial w^*}{\partial s} \leq 0$, but the marginal effect decreases, $\frac{\partial^2 w^*}{\partial s^2} \geq 0$.*

(iv) *The higher the direct competition in the product market, the lower the equilibrium price, $\frac{\partial p^*}{\partial m} \leq 0$. The more flexible the labour market, the lower the equilibrium price, $\frac{\partial p^*}{\partial s} \leq 0$.*

Proof. (i) Since firms demanding labour pay optimally the no-shirking wage (see wage equations (9)), we can equate the wage setting curve (8) and total labour demand (10) to find the equilibrium:

$$(d - \frac{(m+1)\sum^N l_i}{mN}) = e + (r + \frac{bNn}{Nn - \sum^N l_i})\frac{e}{sq}.$$

Assuming that all firms are identical, $l_i = l$, the equilibrium can be rewritten as

$$(d - \frac{(m+1)Nl}{mN}) = e + (r + \frac{bNn}{Nn - Nl})\frac{e}{sq},$$

[10] While $\alpha = 1$ means constant returns to scale, it needs to be pointed out that when the price in the product market is not exogenous, we still have a downward sloping labour demand, $\frac{\partial w}{\partial l} < 0$. For a given price in the product market, this assumption would lead to a horizontal labour demand, $\frac{\partial w}{\partial l} = 0$, which means that constant returns to scale cannot be assumed in these models. Since we add a product market where price depends negatively on production, this assumption has no qualitative consequences.

and N cancels out. Let $G \equiv (d - (e + (r+b)\frac{e}{sq})$ and $B \equiv \frac{be}{sq}$ and the equilibrium is

$$G - \frac{Bn}{n-l} - \frac{(m+1)}{m}l = 0. \tag{11}$$

This equation can be rearranged as $(G - \frac{(m+1)}{m}l)(n-l) = Bn$. Solving for equilibrium employment l^*, the equation gives us two possible candidate solutions. But one solution is larger than n, which is impossible since this would result in a total employment Nl larger than Nn, the total labour supply.

For part (ii), (iii) and (iv): see Appendix. ■

Parts (i) of Lemma 1 shows that the equilibrium is unique and is independent of the number of firms N. Since we use replica economies, no matter how many firms present, it is as each firm faces an individual labour supply with n workers. This does *not* imply that there is immobility of workers across firms or sectors. The total labour force of workers Nn is free to move and supply labour to any firm. But since firms and workers are symmetric, in equilibrium each firm will hire the same number of workers and the equilibrium wage will be the same. This allows us as well to let $N \to \infty$, which justifies our assumption that firms take the aggregate job acquisition rate a as given.

When the direct competition in the product market increases through more integration, the demand for labour becomes more elastic. For a given labour supply, the equilibrium wage and employment will therefore increase. This is indeed the to be expected effect. While at the individual firm level, a decrease in market power for firms can lead to a decrease in wages, this does not carry over to economy-wide changes (Nickell, 1999). While market power raises wages relative to the outside option, a universal rise in market power (fall in labour demand elasticity) also reduces labour demand by reducing the marginal revenue at any given output. This leads to a new equilibrium with lower employment, lower wages and higher firm profit. Thus, while a fall in market power at the individual firm level can lower welfare of the employed workers in the firm, an overall fall is positive for them.

The slope of the labour demand is $-(\frac{m+1}{m})$. For a large m, this coefficient will not change much when competition direct increases, and thus the marginal effect of more integration on equilibrium wage and employment decreases.[11]

When the labour market is made more flexible, the more elastic is the labour supply. For a given labour demand, the equilibrium employment increases and wages decrease. Again, the marginal effect of a higher flexibility s decreases and thus effects on equilibrium wages and employment are lower.

The price depends on the direct competition firms face and the equilibrium price is $p^* = d - \frac{\sum^m l^*}{m} = d - l^*$ since all firms are symmetric. This equilibrium price p^* decreases when the product markets are more integrated and when the labour market is more flexible, as shown in part (iv). Remark that $\frac{\partial p^*}{\partial l^*}$ is not the slope of the inverse demand, but how the *equilibrium* price changes when the equilibrium

[11] If we change competition structure, the employment changes as well. More competition means higher equilibrium employment. But this would mean that we have different bases of comparison. So to allow us to use the same base of comparison, we need to impose that the initial equilibrium employment is the same for different degrees of competition (Saint-Paul, 1998). This means that the correct notation would be $\frac{\partial^2 l^*}{\partial m^2}\Big|_{l^*=\bar{l}^*}$, but we leave out the subscript $l^* = \bar{l}^*$.

production changes. The slope of the demand is $\frac{\partial p}{\partial l} = -\frac{1}{m}$. When the conditions in the labour market change, all firms will react in the same way: $\frac{\partial l_i^*}{\partial m} = \frac{\partial l_j^*}{\partial m}$ for all firms i, j because firms are symmetric. The change of the equilibrium price is then $\frac{\partial p^*}{\partial l^*} = \sum^m \frac{\partial p}{\partial l^*} = \sum^m -\frac{1}{m} = -1$.

In the case where firms compete in perfect competition in the product market, the firm is both a price taker in the product market and a wage taker in the labour market, leading to no power in both markets.

COROLLARY 1 *When firms face perfect competition in the product market, $m \to \infty$, and firms are wage takers in the labour market, the wage in the labour market is the same as the price in the product market: $w^* \to p^*$.*

Thus, if firms face perfect competition, both in the product market and in the labour market, they cannot make any profits, $\pi = 0$. The average revenue, which is the price of the product, equals the average cost, which is the wage of the employed workers. Consequently, all the gains from production will go to the employed workers.

4 Government policies and their support

We look at reforms in labour and products markets that increase employment and production. First we develop welfare measures for the interest groups and total welfare and show that higher employment and a higher production always increase total welfare. Unemployment is costly for society in terms of unemployment benefits, forgoing of taxes, waste of talents and production factors etc. and is a serious problem in Europe. An inefficient level of production means that firms have too much market power and again production factors, labour in our model, are not sufficiently used.[12]

We first assess the probability of approval for labour market reforms, dependent on the degree of competition in the product market. A labour market reform in our model is defined as changing the flexibility in the labour market through changes in the employment protection legislation, this in order to increase employment and general welfare. Likewise, dependent on the level of labour market flexibility, we determine how firms agree with product market reforms. Product market reforms are changes in product market regulation that increase direct competition through more product market integration, this in order to raise production and general welfare. This gives us a first insight how the one market has an impact on reforms in the other market.

However, as can be seen from the current intents to change the competition and labour laws in Europe, reforms in one market are difficult to accomplish (Boeri et al., 2000). Competition reforms face opposition by firms and labour market reforms by employed workers. But both reforms also create

[12] One should ideally also include capital and make a distinction between skilled and unskilled labour, since reforms will have a different impact on the utilisation of these factors, but this is beyond the scope of this paper.

positive externalities. Changing the competition and trade laws can create a higher demand for labour and hence higher wages, which benefits the employed workers. Reforms in the labour market create more labour supply and thus possibly lower wages and lower costs for the firms. Therefore, a combined reform that takes place in both labour and product markets makes use from these positive externalities and may open the way for approval from both interest groups separately. We analyse under which conditions governments can both increase employment and competition and receive approval from firms and employed workers.

We only analyse cross-steady states. By cross-steady state is meant the comparison of different steady states without taking into account the dynamics between two different steady states. It is the case where no adjustment costs prevent employment l from jumping by a discrete amount directly to the new steady at the time the exogenous parameters change. Saint-Paul (1998) finds that transitional dynamics only account for a small fraction of the variation of welfare, suggesting that the cross steady state comparison is a good approximation.

4.1 Welfare measures

We develop measures for welfare of firms, employed workers and total welfare.[13]

4.1.1 Employed

From equation (3), we know that the expected discount value of income for unemployed workers is

$$rE = rU + \frac{re}{sq} = (r + a)\frac{e}{sq}. \tag{12}$$

In comparison with unemployed workers, employed workers enjoy a rent because of the asymmetric information. This means that an increase in labour market flexibility s will hurt them more which can lead to opposition for more labour market flexibility. Whether they approve a labour market reform depends on how this policy affects a. A product market reform increases the probability of obtaining a job per unit of time, a, and always increases the welfare of the employed.

4.1.2 Firms

The welfare per unit of time for firms is $\pi = (p - w)l$.[14] Using the results from Lemma 1, in equilibrium the profit can be written as

$$\pi = \frac{l^{*2}}{m}. \tag{13}$$

[13]Unemployed workers always approve a policy that is designed to decrease unemployment and that is approved by the employed workers.

[14]It may seem strange that for the firms the interest rate does not play a role. However, if we write the flow equation for firms in discrete time, we have $\pi = (p - w)x - \frac{b}{1+r}\pi x + \frac{a}{1+r}\pi(n - x)$ and since $a = \frac{bx}{n-x}$, we see immediately that the profit per unit of time is $\pi = (p - w)x$. The same reasoning holds for continous time.

Firms favour a labour market reform that increases the labour market flexibility s, since this increases equilibrium production l^*. More product market integration on the other hand increases the degree of competition in the product market m and is always opposed by the firms as will be shown below.

4.1.3 Total Welfare

It is important to know if an equilibrium allocation is Pareto efficient or not. A social planner maximises aggregate welfare per unit of time in equilibrium is

$$\begin{aligned} W &= N(\pi + rEl^* + rU(n - l^*)) \\ &= N((p^* - w^*)l^* + (a^* + r)\frac{e}{sq}l^* + a^*\frac{e}{sq}(n - l^*)). \end{aligned}$$

where $N\pi$ is the profit of the firms, $NrEl^*$ the welfare of employed workers, $NrU(n - l^*)$ the welfare of unemployed workers. This equation can be rewritten as

$$W = Nl^*(p^* - e). \tag{14}$$

In steady state, the inflows and outflows are such that maximising aggregate welfare across agents is equivalent to maximising the expected utility of a representative individual that gets all resources in the economy. That is, the total welfare is total output multiplied by the social profit of production $(p^* - e)$ (see Güell, 2000). If the output price were constant, the social planner would always be concerned about more employment. Since in this model the output price is not taken as given, we need to check whether this still holds. When taking derivatives w.r.t. equilibrium employment, $\frac{\partial W}{\partial l^*} = N((p^* - e) + l^*(\frac{\partial p^*}{\partial l^*}))$. From Lemma 1, we know that $p^* = d - l^*$, so $\frac{\partial W}{\partial l^*} = N((d - 2l^* - e)$. If the competition structure is such that $m = 1$, the equilibrium wage will be $w^* = d - 2l^*$, and $\frac{\partial W}{\partial l^*} = w^* - e$. Since $w^* > e$,

$$\frac{\partial W}{\partial l^*} > 0.$$

If $m > 1$, the wage will be higher than $d - 2l^*$, so the inequality holds for all degrees of competition. Hence, even for non-constant product market prices, welfare is increased when employment or production increase.

We need to point out that we left out consumers for expositional ease. However, it is more logical that at least part of what an economy produces is consumed in the same economy. Including consumers in the welfare function leads us to

$$W' = N(\pi + rEl^* + rU(n - l^*) + \alpha(\int_0^{l^*} p(l)dl - p^*l^*),$$

where $\alpha \in [0, 1]$ is the share of the production that is consumed in the economy. For example, W' is the welfare of Europe and $(1 - \alpha)$ is the share of production which is exported outside Europe. As is shown in the Appendix, $\frac{\partial W'}{\partial l^*} > 0$, and therefore the results do not change when leaving out the consumer part.

4.2 Labour market reforms, given a competition structure in the product market

When controlling for employment, we look at how the initial labour market flexibility and how the competition structure in the product market influences the support of the employed workers for a more flexible labour market. The employed workers will not oppose an increase in labour flexibility when $\frac{\partial(rE)}{\partial s} \geq 0$.

LEMMA 2 ***(i)*** *The lower the initial labour market flexibility, the lower the probability that* $\frac{\partial(rE)}{\partial s} \geq 0$.

(ii) *The more competition in the product market, the higher the probability that* $\frac{\partial(rE)}{\partial s} \geq 0$.

(iii) *The lower the initial labour market flexibility, the higher the influence of the product market on labour market reforms:* $\frac{\partial^3(rE)}{\partial s \partial m \partial s} \leq 0$

Proof. See Appendix. ■

The higher the initial labour market flexibility, the higher the probability that workers will agree with an even more flexible labour market. On the contrary, when initial labour flexibility is low, the rent of the employed workers is high and any change in the labour market will hurt them more. Thus, the greater the initial rent (the less flexible the labour market), the more likely that changing employment protection legislation will be opposed by the employed workers. This is the so-called ' European Sclerosis' effect. The less flexible the labour markets, the more difficult it is to get approval for reforms (Saint-Paul, 2000).

A higher degree of competition in the product market leads to a more elastic labour demand. Therefore, an increase in labour market flexibility has a higher positive effect on employment and thus on a, the probability of obtaining a job per unit of time. In other words, an increase in s makes the labour supply more elastic, and decreases the equilibrium wage. However, if the labour demand is more elastic, the equilibrium wage decreases less and employed workers will oppose less an increase in labour market flexibility s. This result is similar to what Saint-Paul (1998) finds. He states that an 'adverse policy selection' is more likely when the elasticity of labour demand is low. Thus, the more inelastic the labour demand, the more employed will favour a less flexible labour market. Our conclusion is the same, but in our model the elasticity of demand is determined by the degree of regulation in the product market and is not taken as given.

In point (iii) of Lemma 2, we find that the influence of the product market of labour market reforms is higher when the labour market is less flexible. In other words, the less flexible the labour market, the more the conditions of the product market influence the labour market reforms. However, even when there is a high degree of product market integration, it is still not granted that employed workers will agree upon a labour market reform.

4.3 Product market reforms, given the degree of employment protection in the product market

When controlling for production, we look at how the support of the firms for more competition is analysed in function of the initial product market competition and in function of the flexibility of the labour markets. The firms will not oppose an increase in product market competition when $\frac{\partial(\pi)}{\partial m} \geq 0$.

LEMMA 3 ***(i)*** *For every initial product market competition m, the firms always oppose an increase in product market competition:* $\frac{\partial(\pi)}{\partial m} \leq 0$.

(ii) *A lower initial product market competition m makes this opposition even stronger:* $\frac{\partial^2(\pi)}{\partial m^2} \geq 0$ *for* $m \geq m'$, *where* $m' \in [1, 1+\sqrt{2}]$ *and for* $s \to 0$, $m' \to 1$.

(iii) *The more flexible the labour market, the less firms oppose an increase in product market competition:* $\frac{\partial^2(\pi)}{\partial m \partial s} \geq 0$.

(iv) *The lower the initial product market competition, the higher the influence of the labour market on product market reforms:* $\frac{\partial^3(\pi)}{\partial m \partial s \partial m} \leq 0$.

Proof. See Appendix. ■

Firms *always* block a product market reform, since it reduces their market power and hence their profits. When initial market competition is low, a firm's market power is high, rents for firms are high as well and firms have more to loose from a product market reform. This is the product market side of the 'sclerosis' effect as found for example in Duso (2002) and Kroszner & Strahan (1999): the less competition between the firms, the more difficult to reform the product market.[15]

A more flexible labour market has a more elastic labour supply. When the labour supply is more elastic, an increase in product market competition increases equilibrium production more because the wages increase less. Since a higher increase in production benefits the welfare of firms, the possibility for approval from firms of a product market reform increases when having a more flexible labour market.

The influence of the labour market on the product market reforms is higher when there is less competition in the product market. Hence, the less competition in the product market, the more the conditions of the labour market influence the product market reforms.

[15] In the extreme case where equilibrium wages do not change for changes in labour demand (i.e. when the labour supply is horizontal), the maximum loss of a product market reform is not encountered for the smallest m ($m = 1$), but for $m \in [1, 1+\sqrt{2}]$. However, one can prove that if the wages change, the maximum loss occurs for $m = 1$ and we do not discuss this case any further.

4.4 Product and labour market reforms combined

Since even in optimal conditions labour market reforms or product market reforms might be opposed by employed workers and firms respectively, especially when initial m and s are low, it is worth looking at the interaction of both reforms, since in this case the positive effects that each reform creates on the other market might lead to approval for reforms from both interest groups.

PROPOSITION 1 ***(i)*** *(a) By combining labour and product market reforms, the possibilities to find support from employed workers is easier than when only a labour market reform is used:* $\frac{\partial(rE)}{\partial s} + \frac{\partial(rE)}{\partial m} \geq \frac{\partial(rE)}{\partial s}$, *since* $\frac{\partial(rE)}{\partial m} \geq 0$.

(b) A combination of a low initial labour market flexibility and high initial product market competition lowers the chance of support from employed workers for combined reforms.

(ii) *(a) Support from firms for combined reforms is easier than for only product market reforms:* $\frac{\partial(\pi)}{\partial m} + \frac{\partial(\pi)}{\partial s} \geq \frac{\partial(\pi)}{\partial m}$, *since* $\frac{\partial(\pi)}{\partial s} \geq 0$.

(b) A combination of a low initial product market competition and high initial labour market flexibility lowers the chance for support from firms for combined reforms.

(iii) *When there exists a positive correlation between the labour market flexibility and product market competition, the likelihood to find overall support for a combined reform is highest.*

Proof. See Appendix. ■

Employed workers will more likely favour a combined reform than only a labour market reform. A product market reform is always favored by the employed workers because this increases their wages and thus the sum of the two reforms has more change to get approval. Only when they are negatively affected by a labour market reform, which is when the initial flexibility of the labour market is low (the sclerosis effect), and when the competition in the product market is initially intense, it is possible that a combined reform might not find approval. In this case, a product market reform does not bring much change in wages and cannot compensate the employed workers for the negative impact of the labour market reform.

Firms will more agree upon a combined reform than only a product market reform. A labour market will always be favored by the firms since this decreases the labour costs and thus the sum of the two reforms has more chance to get approval. But when the initial market power is high, inducing more competition hurts the firms more, and when the labour market is already flexible, the possibility that firms will oppose a combined is highest. In this case, a labour market reform does not bring much change in labour costs and cannot compensate the firms for the negative impact of the product market reform.

The use of a combination of both welfare enhancing reforms opens the possibility to distribute the losses and gains for the employed workers and firms. This is because both reforms are complements: each reform creates positive and negative externalities, but for different interest groups. Only when initially the labour market is very flexible and initial direct competition very low, firms will not agree. Also, when initial direct competition between firms is high and labour market flexibility low, employed workers cannot be compensated enough and will block reforms.[16] Thus the higher the negative correlation between the frictions in the markets, the higher the possibility that one of the two interest groups will block a combined reform. Therefore, the higher the negative correlation, the less chance for total approval. On the other hand, if frictions in both markets are positively correlated, the reforms keep each other nicely in balance for each interest group because of the equal positive and negative externalities of both reforms. Therefore, if there exists a positive correlation, the possibility that both interest groups will approve a combined reform is highest.

This result has in our view a very important implication. When markets suffer from sclerosis, i.e. frictions are very high, it has been traditionally found in the literature that reforms will be hardest to be approved. But our analysis suggests that this is not necessarily the case when reforms are combined. If there exist sclerosis in both markets, it is *not* impossible to get approval from reforms. The high frictions in the one market make it *easier* to reform the other market and therefore the sclerosis in the one market can cancel out the sclerosis in the other market. The results also indicate that in order to implement reforms, one should combine both reforms at the same pace and gives a plausible explanation for the high positive correlation between product and labour market frictions (Boeri, 2000).

In our model we did not take into account that workers can also be consumers, which is outside the scope of our model. In other words, we did not take into account the fact that the product market price has at least some influence on the welfare of the workers. We give here briefly the reasoning of what would happen when including the product market price in the welfare of the workers.

An exogenous increase in the product market competition m leads to a decrease in the equilibrium product market price p^* as is shown in Lemma 1. This means that welfare of workers goes up more in this case than we found in our model. Of course, the higher purchasing power is then translated in a higher product demand, which has again implications for p^*, l^* and w^*, but these are endogenous changes and cannot superate the first effect that is induced by an exogenous increase in m.

[16] We are currently working at an extension of this paper that includes long term unemployed workers, since evidence suggests that most of the European unemployment is long-term. Moreover, the share of long term unemployed seems to increase more than unemployment. Modelling these two characteristics, first results show us that in this case there has to be made a distinction between low and high unemployment. When unemployment is high, reforms in the product market have a much bigger impact on employment and welfare than labour market reforms, indicating that interactions between markets are even stronger than is found in this paper. The reason is that because of the gradually more long term unemployed, who have less influence on wages, the labour supply is very elastic when there is high unemployment. So, a product market reform will not push up wages much and leads to large changes in employment. For low unemplyment, product market reforms have less impact on employment than found in this paper.

An exogenous increase in the labour market flexibility s leads to a decrease in the equilibrium product market price p^* as is shown in Lemma 1. Thus, the welfare of the workers goes down less than found in our model. Again, this has its consequences on the product demand and p^*, l^* and w^*, but these endogenous movements are smaller than the effect that is induced by an exogenous increase in s.

Taking into account that workers can also be consumers in the product markets should lead therefore lead to less resistance by workers for a labour market reform and even more approval for a combined reform than found in our model, but the qualitative results found in this paper should still hold in a more general equilibrium context.

5 Conclusion

Welfare increasing reforms in the product and labour market are difficult to implement. In both markets there exist well-organised interest groups that have the power to block any change. In the labour markets, employed workers enjoy higher rents because of frictions and will likely oppose a reform that tries to remove some of these rigidities to increase employment. In the product markets, firms enjoy higher rents when competition is low and will try to steer the political decision process towards a status quo. Thus, also product markets reforms that introduce more competition will have a high probability to be opposed by firms. Indeed, in Europe regulations are still high and reforms are largely marginal, especially in the labour markets. The product market reforms are more widespread, but still slow-moving and several sectors are still virtually served by monopolies, e.g. in the European power markets.

These issues have received a lot of attention in the economics literature. However, there has been done almost no research on the interaction between reforms in the labour and product markets. In this paper, we analyse interactions between both types of reform. We find that there exist important complementarities between reforms in the product and labour markets: each reform creates positive and negative effects, but for different interest groups. The positive externalities that one reform creates on an interest group can then be used to offset the negative externalities of the other reform. In this way, approval from both firms and employed workers is always easier to accomplish than when trying to reform only one market. This result offers a possible explanation for the observation that when product markets are more open to competition, labour markets tend as well to have less tight legislations protecting the employed pool. Moreover, this paper offers a possible way out of the so called 'sclerosis' effect. When frictions in markets are high, interest groups enjoy higher rents and oppose more reforms which means that markets that need most reforms, are most stuck in a sclerosis. But combining reforms offers a solution. The high frictions in the one market make it *easier* to reform the other market and therefore the sclerosis in the one market can cancel out the sclerosis in the other market.

Further progress requires extending the model of this paper. We have not explicitly modelled the political process through which the private interests are materialised in particular policy descriptions.

Essentially the supply side of regulation is taken as exogenous, while the regulators are also agents that create, shape and monitor the regulatory process. The model does not include capital as a factor of production and does not distinguish between long and short term unemployment. Moreover, we used particular ways of modelling reforms that we thought as relevant for Europe. In the product market, we modelled reforms as a higher product market integration that leads to more direct competition. The next reform that we need to look at is lowering entry barriers and allowing new firms to enter the market. Labour market reforms are focused on making the laws for laying off a worker more flexible, but other research in labour economics found that results can be different for other types of reforms. Also, workers are not consuming in the same economy, so our model is not one of complete general equilibrium.

However, we believe that the basic result is important and will hold for other assumptions. There exist interactions between product an labour markets that can make it easier to get approval for welfare increasing reforms.

6 Appendix

Proof of Lemma 1

(ii) The derivative of implicit function (11) w.r.t. the parameter of direct competition m is $\frac{\partial l^*}{\partial m} = \frac{\frac{l^*}{m^2}}{\frac{m+1}{m}+\frac{Bn}{(n-l^*)^2}} \geq 0$, since total labour supply is higher than equilibrium labour demand, $Nn > Nl^*$. In order to have the same base for comparison, we have to assume the same equilibrium employment l^* for different degrees of competition as Saint-Paul (1998) showed. We do this for all the comparative statics in this paper. The second derivative is thus $\left.\frac{\partial^2 l^*}{\partial m^2}\right|_{l^*=\bar{l}^*} = \frac{-\frac{l^*}{m^3}(\frac{1}{2m}+1+\frac{Bn}{(n-l^*)^2})}{(\frac{m+1}{m}+\frac{Bn}{(n-l^*)^2})^2} \leq 0$.

The equilibrium found in part (i) of Lemma 1 can also be rewritten as a system of two equations:

$$\begin{cases} w^* - d + \frac{m+1}{m} l^* = 0 \\ w^* - e - \frac{re}{sq} - \frac{Bn}{n-l^*} = 0. \end{cases}$$

This system allows us to take derivatives of the wage w^* with respect to the degree of competition m and given the found signs for $\frac{\partial l^*}{\partial m}$ and $\frac{\partial^2 l^*}{\partial m^2}$, we find $\frac{\partial w^*}{\partial m} = \frac{\frac{Bn}{(n-l^*)^2}\frac{l^*}{m^2}}{\frac{m+1}{m}+\frac{Bn}{(n-l^*)^2}} = \frac{Bn}{(n-l^*)^2}\frac{\partial l^*}{\partial m} \geq 0$ and $\left.\frac{\partial^2 w^*}{\partial m^2}\right|_{l^*=\bar{l}^*} = \frac{Bn}{(n-l^*)^2}\frac{\partial^2 l^*}{\partial m^2} \leq 0$.

(iii) Using equation (11), the derivative of equilibrium employment l^* w.r.t. s, $\frac{\partial l^*}{\partial s} = \frac{(r+\frac{bn}{(n-l^*)})\frac{e}{qs^2}}{\frac{m+1}{m}+\frac{Bn}{(n-l^*)^2}} \geq 0$, since $Nn > Nl^*$ and $\left.\frac{\partial^2 l^*}{\partial s^2}\right|_{l^*=\bar{l}^*} = \frac{-(r+\frac{bn}{(n-l^*)^2})(\frac{e}{qs^3})}{(\frac{m+1}{m}+\frac{Bn}{(n-l^*)^2})^2} \leq 0$. In the same way as we found $\frac{\partial w^*}{\partial m}$, we find that $\frac{\partial w^*}{\partial s} = -\frac{(\frac{m+1}{m})(r+\frac{bn}{(n-l^*)})\frac{e}{qs^2}}{\frac{m+1}{m}+\frac{Bn}{(n-l^*)^2}} = -\frac{m+1}{m}\frac{\partial l^*}{\partial s} \leq 0$ and $\left.\frac{\partial^2 w^*}{\partial s^2}\right|_{l^*=\bar{l}^*} = -\frac{m+1}{m}\frac{\partial^2 l^*}{\partial s^2} \geq 0$.

(iv) The inverse demand in the product markets is $p = d - \frac{\sum^m l_i}{m}$. Since firms are symmetric, in equilibrium $p^* = d - \frac{\sum^m l_i^*}{m} = d - \frac{\sum^m l^*}{m} = d - \frac{ml^*}{m} = d - l^*$. Therefore, $\frac{\partial p^*}{\partial m} = \frac{\partial p^*}{\partial l^*}\frac{\partial l^*}{\partial m} = -\frac{\partial l^*}{\partial m} \leq 0$ and $\frac{\partial p^*}{\partial s} = \frac{\partial p^*}{\partial l^*}\frac{\partial l^*}{\partial s} = -\frac{\partial l^*}{\partial s} \leq 0$. **QED**.

Proof of $\frac{\partial W'}{\partial l^*} > 0$

The derivative of welfare with consumers W' w.r.t. equilibrium employment $l^* = \bar{l}^*$ is $\frac{\partial W'}{\partial l^*} = \frac{\partial W}{\partial l^*} + \frac{\partial[\alpha(\int_0^{l^*} p(l)dl - p^*l^*)]}{\partial l^*}$, where W is the welfare without consumers. It is already proven in the text that $\frac{\partial W}{\partial l^*} > 0$, and we prove here that the second part of the derivative is also positive. We know that $p(l) = d - \frac{\sum^m l}{m}$, so $\int_0^{l^*} p(l)dl = dl^* - \frac{(m-1)l^{*2}}{m} - \frac{l^{*2}}{2m}$ and $\frac{\partial(\int_0^{l^*} p(l)dl)}{\partial l^*} = d - 2l^* + \frac{l^*}{m}$. On the other hand, $p^*l^* = (d - l^*)l^*$ and $\frac{\partial(p^*l^*)}{\partial l^*} = d - 2l^*$. Therefore $\frac{\partial(\int_0^{l^*} p(l)dl)}{\partial l^*} \geq \frac{\partial(p^*l^*)}{\partial l^*}$ and thus $\frac{\partial[\alpha(\int_0^{l^*} p(l)dl - p^*l^*)]}{\partial l^*} \geq 0$. **QED.**

Proof of Lemma 2

(**i**) The welfare per unit of time for employed workers in equilibrium is $rE = (r + a^*)\frac{e}{sq}$ and thus $\frac{\partial(rE)}{\partial s} = \frac{e}{sq}(\frac{\partial a^*}{\partial l^*}\frac{\partial l^*}{\partial s} - (r + a^*)\frac{1}{s})$. Then $\frac{\partial(rE)}{\partial s} \geq 0$ when $s\frac{\partial a^*}{\partial l^*}\frac{\partial l^*}{\partial s} \geq (r + a^*)$. This expression can be rewritten as $\frac{\partial a^*}{\partial l^*}\frac{\frac{e}{q}(r+b+a)}{\frac{m+1}{m}+\frac{ben}{s(n-l^*)^2}} \geq (r + a^*)$. For a given equilibrium employment level $l^* = \bar{l}^*$, the higher s, the higher the left hand side of the inequality while the right hand side does not change for changes in s. Thus, the higher s, the higher the probability that $\frac{\partial(rE)}{\partial s} \geq 0$.

(ii) Using the results of Lemma 1, we find $\frac{\partial^2 l^*}{\partial s \partial m}\Big|_{l^*=\bar{l}^*} = \frac{\frac{1}{m^2}(r+\frac{bn}{(n-l^*)})(\frac{e}{qs^2})}{(\frac{m+1}{m}+\frac{Bn}{(n-l^*)^2})^2} \geq 0$ and therefore $\frac{\partial^2 (rE)^*}{\partial s \partial m}\Big|_{l^*=\bar{l}^*} \geq 0$, because $\frac{\partial a^*}{\partial l^*} = \frac{bn}{(n-l^*)^2} \geq 0$. Hence the probability that $\frac{\partial (rE)}{\partial s} \geq 0$ increases for m larger.

(iii) Given the equilibrium employment $l^* = \bar{l}^*$, the influence of the product market on a labour market reform is $\frac{\partial^3 (rE)^*}{\partial s \partial m \partial s}\Big|_{l^*=\bar{l}^*} = \frac{e}{sq}\frac{\partial a^*}{\partial l^*}\frac{\partial^3 l^*}{\partial s \partial m \partial s} \leq 0$, since $\frac{\partial^3 l^*}{\partial s \partial m \partial s}\Big|_{l^*=\bar{l}^*} \leq 0$ (this follows easily from the derivation of $\frac{\partial^2 l^*}{\partial s \partial m}\Big|_{l^*=\bar{l}^*}$ in part (ii) of Lemma 2). Thus, the lower s, the higher the influence of m on $\frac{\partial (rE)^*}{\partial s}$. **QED.**

Proof of Lemma 3

(i) The welfare per unit of time for firms in equilibrium is $\pi = \frac{l^{*2}}{m}$ (equation (13)). Thus, $\frac{\partial(\pi)}{\partial m} = 2l^*\frac{\partial l^*}{\partial m}\frac{1}{m} - \frac{l^{*2}}{m^2}$ and $\frac{\partial(\pi)}{\partial m} \geq 0$ when $\frac{2l^*}{m}(\frac{\partial l^*}{\partial m} - \frac{l^*}{m^2}) \geq 0$. From Lemma 1, we know that $\frac{\partial l^*}{\partial m} = \frac{\frac{l^*}{m^2}}{\frac{m+1}{m}+\frac{Bn}{(n-l^*)^2}}$, so $\frac{\partial l^*}{\partial m} \leq \frac{l^*}{m^2}$ and $\frac{\partial(\pi)}{\partial m} \leq 0$ for every m.

(ii) The minimum of $\frac{\partial(\pi)}{\partial m}$ is reached for $m = m'$where $m' = \frac{(1+\sqrt{2})}{(1+\frac{Bn}{(n-l)^2})}$. Hence, $\frac{\partial(\pi)}{\partial m}$ does not behave monotonously. But $m' \in [1, 1+\sqrt{2}]$ and for $s \to 0$, $m' \to 1$. Since $m \in [1, \infty[$ and $s \in [0,1]$, the theoretical probability that $m < m'$ is very small. For $m \geq m'$, $\frac{\partial^2(\pi)}{\partial m^2}\Big|_{l^*=\bar{l}^*} \geq 0$ and thus for $m \geq m'$, a higher m lowers the opposition of the firms for a product market reform.

(iii) Using the results from Lemma 1, we find $\frac{\partial^2 l^*}{\partial m \partial s} = \frac{(\frac{bn}{(n-l^*)})\frac{e}{qs^2}\frac{l^*}{m^2}}{(\frac{m+1}{m}+\frac{Bn}{(n-l^*)^2})^2} \geq 0$ and therefore $\frac{\partial^2(\pi)}{\partial s \partial m}\Big|_{l^*=\bar{l}^*} \geq 0$.

(iv) Given the equilibrium employment $l^* = \bar{l}^*$, the influence of the labour market on a product market reform is $\frac{\partial^2(\pi)}{\partial s \partial m}\Big|_{l^*=\bar{l}^*} = \frac{2l^*}{m}\frac{\partial^2 l^*}{\partial m \partial s}$. From part (iii) of Lemma 3 we can derive that $\frac{\partial^3(\pi)^*}{\partial m \partial s \partial s}\Big|_{l^*=\bar{l}^*} = \frac{e}{sq}\frac{\partial a^*}{\partial l^*}\frac{\partial^3 l^*}{\partial s \partial m \partial s} \leq 0$, since $\frac{\partial^3 l^*}{\partial s \partial m \partial s} \leq 0$. Thus, the lower s, the higher the influence of m on $\frac{\partial(\pi)}{\partial s}$. **QED.**

Proof of Proposition 1

(i) (a) The change in welfare per unit of time for employed workers w.r.t. m is $\frac{\partial(rE)}{\partial m} = \frac{e}{sq}\frac{\partial a^*}{\partial l^*}\frac{\partial l^*}{\partial m} \geq 0$ because $\frac{\partial l^*}{\partial m} \geq 0$ (Lemma 1) and $\frac{\partial a^*}{\partial l^*} \geq 0$ (Lemma 2). Here out logically follows $\frac{\partial(rE)}{\partial s} + \frac{\partial(rE)}{\partial m} \geq \frac{\partial(rE)}{\partial s}$.

(i) (b) We need to check the effects of a low s and high m on both $\frac{\partial(rE)}{\partial s}$ and $\frac{\partial(rE)}{\partial m}$. From point (i) of Lemma 2, we know that $\frac{\partial(rE)}{\partial s}$ has a lower probability to be positive for a lower s. Also, we know from point (ii) of Lemma 1 that $\frac{\partial^2 l^*}{\partial m^2}\Big|_{l^*=\bar{l}^*} \leq 0$ and therefore $\frac{\partial^2 (rE)^*}{\partial m^2}\Big|_{l^*=\bar{l}^*} = \frac{e}{sq}\frac{\partial a^*}{\partial l^*}\frac{\partial^2 l^*}{\partial m^2} \leq 0$. Hence the direct effects of a low s and high m are clearly negative. We now check the cross effects. The derivative $\frac{\partial(rE)}{\partial m}$ also diminishes for a lower s as we can see from point (i) (a) when substituting $\frac{\partial l^*}{\partial m}$. But we know from point (ii) of Lemma 2 that the higher m, the higher the probability that $\frac{\partial(rE)}{\partial s}$ will be positive. However, the ratio $\frac{\frac{\partial^2 (rE)^*}{\partial m^2}\Big|_{l^*=\bar{l}^*}}{\frac{\partial^2 (rE)^*}{\partial s \partial m}\Big|_{l^*=\bar{l}^*}} = \frac{\frac{l}{m}(\frac{1}{m}-2(r+\frac{Bn}{(n-l)^2}))}{\frac{e}{s^2 q}(r+b+a)}$ and $\lim_{m\to\infty}(\frac{\frac{\partial^2 (rE)^*}{\partial m^2}\Big|_{l^*=\bar{l}^*}}{\frac{\partial^2 (rE)^*}{\partial s \partial m}\Big|_{l^*=\bar{l}^*}}) = 0$. This means that $\frac{\partial(rE)}{\partial m}$ goes faster to zero than $\frac{\partial(rE)}{\partial s}$ for m large and thus for a large m the probability of approval of employed workers for a combined policy diminishes.

(ii) (a) The change in welfare per unit of time for firms w.r.t. s is $\frac{\partial(\pi)}{\partial s} = \frac{2l^*}{m}\frac{\partial l^*}{\partial s} \geq 0$ because $\frac{\partial l^*}{\partial s} \geq 0$ (Lemma 1). Here out logically follows $\frac{\partial(\pi)}{\partial s} + \frac{\partial(\pi)}{\partial m} \geq \frac{\partial(\pi)}{\partial m}$.

(ii) (b) We need to check the effects of a high s and low m on both $\frac{\partial(\pi)}{\partial s}$ and $\frac{\partial(\pi)}{\partial m}$. From point (ii) of Lemma 3, we know that $\frac{\partial^2(\pi)}{\partial m^2}\Big|_{l^*=\bar{l}^*} \geq 0$ for $m \geq m'$ where $m' \in [1, 1+\sqrt{2}]$. Thus a low m generates a more negative $\frac{\partial(\pi)}{\partial m}$. Also, we know from point (iii) of Lemma 1 that $\frac{\partial^2 l^*}{\partial s^2}\Big|_{l^*=\bar{l}^*} \leq 0$ and therefore $\frac{\partial^2(\pi)}{\partial s^2}\Big|_{l^*=\bar{l}^*} = \frac{2l^*}{m}\frac{\partial^2 l^*}{\partial s^2} \leq 0$ and a high s generates a low $\frac{\partial(\pi)}{\partial s}$. Hence the direct effects of a high s and low m are clearly negative. We now check the cross effects. The ratio $\frac{\frac{\partial^2(\pi)^*}{\partial s \partial m}\Big|_{l^*=\bar{l}^*}}{\frac{\partial^2(\pi)^*}{\partial m^2}\Big|_{l^*=\bar{l}^*}} = \frac{(r+\frac{bn}{(n-l^*)^2})(\frac{e}{s^2 q})}{-l^{*2}(\frac{1}{2m}+l^*+\frac{Bn}{(n-l^*)^2})}$ and goes down for a lower m. This means that the negative effect of a low m on $\frac{\partial(\pi)}{\partial m}$ dominates the positive effect of a low m on $\frac{\partial(\pi)}{\partial s}$ and thus for a low m the probability of approval of firms for a combined policy diminishes. Also, the ratio $\frac{\frac{\partial^2(\pi)^*}{\partial s^2}\Big|_{l^*=\bar{l}^*}}{\frac{\partial^2(\pi)^*}{\partial s \partial m}\Big|_{l^*=\bar{l}^*}} = \frac{-(r+\frac{bn}{(n-l)^2})\frac{e}{s}}{(r+\frac{bn}{(n-l)^2})\frac{1}{m}}$ goes down for a higher s. This means that $\frac{\partial(\pi)}{\partial s}$ goes faster to zero than $\frac{\partial(\pi)}{\partial m}$ for a bigger s and thus for a larger s the probability of approval of firms for a combined policy diminishes.

(iii) This part follows from part (i) and (ii): If either s is small and m large, or m is small and s large (meaning the two parameters are negatively correlated), one of the two interest groups will block reforms. Therefore, the lower the negative correlation, or the higher the positive correlation, the higher the chance that both interest groups will agree upon a combined reform. But we can also prove this directly and give here a sketch of the proof.

If a reform is to be approved by both groups, their welfare change has to be at least zero. Suppose that a reform in the labour markets is implemented (at equilibrium employment l_1^*) and then a reform in the product markets (at equilibrium employment l_2^*). Reversing the order in which the reforms are implemented would lead us to the same reasoning and is omitted. It must be that

$$\begin{cases} \frac{\partial(rE)}{\partial s}\Big|_{l_1^*} + \frac{\partial(rE)}{\partial m}\Big|_{l_2^*} \geq 0 \\ \frac{\partial(\pi)}{\partial s}\Big|_{l_1^*} + \frac{\partial(\pi)}{\partial m}\Big|_{l_2^*} \geq 0. \end{cases}$$

Using the results of Lemma 3 and 4, this system can be rewritten and leads us to conditions

$$\begin{cases} \frac{\partial l_2^*}{\partial m} \geq \frac{\frac{\partial l_1^*}{\partial s}(\frac{1}{s}(r+a_1^*)-\frac{\partial a_1^*}{\partial l_1^*})}{\frac{\partial a_2^*}{\partial l_2^*}} \\ \frac{\partial l_1^*}{\partial s} \geq \frac{m_1}{2l_1^*}((\frac{l_2^*}{m_1})^2 - 2\frac{l_1^*}{m1}\frac{\partial l_2^*}{\partial m}) \end{cases} \equiv \begin{cases} LH_E \geq RH_E \\ LH_F \geq RH_F, \end{cases}$$

where LH and RH mean left hand side and right hand side of the conditions and the subscripts E and F are for employed workers and firms respectively. The higher the left hand side of each condition, the easier approval for a reform, the higher the right hand side of a condition, the more difficult a reform. This notation is used to ease the exposition of the proof. We also leave out the subscripts 1 and 2 to simplify notation. The proof is explained in two steps. In the first step, we look at what happens with the conditions when m and s change. In the second step, we look when the conditions are possibly satisfied for combinations of s and m.

(i) Changes in s and m

(a) The influence of m:

The higher m, the lower $\frac{\partial l^*}{\partial m}$ ($\frac{\partial^2 l^*}{\partial m^2}\Big|_{l^*=\bar{l}^*} \leq 0$ as shown in point (ii) of Lemma 1) and the lower the influence of s on $\frac{\partial l^*}{\partial m}$ ($\frac{\partial^3 l^*}{\partial m \partial s \partial m}\Big|_{l^*=\bar{l}^*} \leq 0$ from point (iv) of Lemma 3). Thus $\frac{\partial^2 (LH_E)}{\partial m^2}\Big|_{l^*=\bar{l}^*} \leq 0$ and $\frac{\partial^3 (LH_E)}{\partial m \partial s \partial m}\Big|_{l^*=\bar{l}^*} \leq 0$.

The right hand side of the condition for the firms RH_F goes also down for a higher m ($\frac{\partial^2 (RH_F)}{\partial m^2}\Big|_{l^*=\bar{l}^*} \leq 0$ for $m \geq m'$ where $m' \in [1, 1+\sqrt{2}]$) and the influence of s on RH_F reduces for a higher m ($\frac{\partial^3 (RH_F)}{\partial m \partial s \partial m}\Big|_{l^*=\bar{l}^*} \leq 0$).

(b) The influence of s:

The higher s, the lower $\frac{\partial l^*}{\partial s}$ ($\frac{\partial^2 l^*}{\partial s^2}\Big|_{l^*=\bar{l}^*} \leq 0$ as shown in point (iii) of Lemma 1) and the lower the influence of m on $\frac{\partial l^*}{\partial s}$, $\frac{\partial^3 l^*}{\partial s \partial m \partial s}\Big|_{l^*=\bar{l}^*} \leq 0$ (this follows from Lemma 2). Thus $\frac{\partial^2 (LH_F)}{\partial s^2}\Big|_{l^*=\bar{l}^*} \leq 0$ and $\frac{\partial^3 (LH_F)}{\partial s \partial m \partial s}\Big|_{l^*=\bar{l}^*} \leq 0$.

For the right hand side of the condition for the employed workers RH_E, we assume that $\frac{1}{s}(r + a_1^*) \geq \frac{\partial a_1^*}{\partial l_1^*}$, which is the worst possible case. The contrary would lead us to a negative RH_E and approval is always reached. The right hand side of the condition for the employed workers RH_E goes down for a higher s ($\frac{\partial^2 (RH_E)}{\partial s^2}\Big|_{l^*=\bar{l}^*} \leq 0$) and the influence of m on (RH_E) reduces for a higher s ($\frac{\partial^3 (RH_F)}{\partial s \partial m \partial s}\Big|_{l^*=\bar{l}^*} \leq 0$).

(ii) Combinations of s and m

(a) Approval of employed workers:

The lower m, the higher LH_E. Also, the lower m, the more a low s decreases LH_E (see point (i)(a)). The lower s, the higher RH_E. Also, the lower s, the more a lower m decreases RH_E (see point (i)(b)). Thus when both parameters are low, both the LH_E (because of a low m) and RH_E (because of a low s) are high, but not at their maximum (LH_E is not at its maximum because of a low s and RH_E is not at its maximum because of a low m). When both m and s gradually increase, LH_E decreases because of a higher m, but this decrease is tempered because of a higher s. The same happens with the RH_E. When both m and s gradually increase, RH_E decreases because of a higher s, but this decrease is tempered because of a higher m. Thus when m and s move in the same direction, LH_E and RH_E also move in the same direction. This means that when there is a high positive correlation between the two parameters, the posibility for approval from employed workers always exists. The condition for the employed workers is most easily satisfied for a low m and high s. On the other hand, it is least easily satisfied for a low s and high m.

(b) Approval of firms:

The lower s, the higher LH_F. Also, the lower s, the more a low m decreases LH_F (see point (i)(b)). The lower m, the higher RH_F. Also, the lower m, the more a lower s decreases RH_F (see point (i)(a)). Thus when both parameters are low, both the LH_F (because of a low s) and RH_F (because of a low m) are high, but not at their maximum (LH_F is not at its maximum because of a low m and RH_F is not at its maximum because of a low s). When both s and m gradually increase, LH_F decreases because of a higher s, but this decrease is tempered because of a higher m. The same happens with the RH_F. When both s and m gradually increase, RH_F decreases because of a higher m, but this decrease is tempered because of a higher s. Thus when m and s move in the same direction, LH_F and RH_F also move in the same direction. This means that when there is a high positive correlation between the two parameters, the posibility for approval from firms always exists. The condition for the firms is most easily satisfied for a low s and high m. On the other hand, it is least easily satisfied for a low m and high s.

(c) Approval of both employed workers and firms:

From (ii)(a) we know that the condition for the employed workers is most easily satisfied for a low m and high s. But it is least easily satisfied for the firms. On the other hand, when m high and s low, the condition for the employed workers is least easily satisfied and for the firms most easily satisfied. Thus when there exists a negative correlation between the two parameters, one interest group benefits most, but the other least and the probabilty for a joint approval is the lowest for a combined policy. However, as explained in (ii)(a) and (ii)(b), when there exist a positive correlation between both parameters, the possibility for approval from both interest groups always exists and the probability of approval from both groups is highest. Thus, when there exisst a positive correlation between m and s, the possibility of approval for combined reforms is highest. **QED**.

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Table 1: Indicators of Product Market regulation and Employment Protection Legislation,1998 (Min is 0, Max is 6).

	product market regulation	employment protection legislation
United States	1.0	0.2
United Kingdom	0.6	0.5
Canada	1.6	0.6
New Zealand	1.5	1.0
Ireland	1.5	1.0
Australia	2.0	1.1
Belgium	2.6	2.1
Finland	2.5	2.1
Sweden	1.8	2.4
Netherlands	1.8	2.4
Austria	2.1	2.4
Japan	1.5	2.6
Germany	2.0	2.8
France	2.5	3.1
Italy	2.6	3.3
Spain	2.1	3.2
Portugal	2.5	3.7
Greece	3.1	3.5

Source: Boeri et al. (2000) and Nicoletti et al. (2001).