Employment Outcomes and the Interaction Between Product and Labor Market Deregulation: Are They Substitutes or Complements?[*]

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Abstract

This paper investigates the effect of product market liberalization on employment and considers possible interactions between policies and institutions in product and labor markets. Using panel data for OECD countries over the period 1980-2002, we present evidence that product market deregulation is more effective at the margin when labor market regulation is high. The data also suggest that product market deregulation promotes labor market deregulation. These results are consistent with the basic predictions of a standard bargaining model, such as Blanchard and Giavazzi (2003), extended to allow for a richer specification of the fall back position of the union.

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1   Introduction

Over the past two decades, many OECD countries have sought to promote productivity and long term growth by improving the efficiency of goods and services markets through liberalization and privatization. There is a growing body of evidence suggesting that these processes have indeed boosted productivity performances in the sectors concerned, but less is known about their consequences on employment.[1]   A few recent theoretical and empirical studies suggest that product market deregulation may also stimulate aggregate employment, yet robust conclusions are still lacking.[2] In assessing the effect of regulatory reform of product markets it is crucial to take into account that this policy has been implemented in countries with very different labor market settings. This raises two related questions. First, do the employment gains from product market deregulation depend upon the underlying labor market policies and institutions that shape the bargaining power of workers and, if so, how? Second, do reforms that promote stronger product market competition lead to changes in labor market policies and institutions?

While the effects on employment outcomes of labor market policies, and the interactions between various measures, have been explored extensively, less work has been done on the employment effects of interactions between product and labor market policies.[3] Moreover, the predictions about these interactions often are not based on fully specified theoretical models and the empirical results, obtained mostly from estimating static equations, have differed widely across studies. While, for instance, Nicoletti and Scarpetta (2005), Griffith et al. (2007), and Amable et al (2007) find that product market deregulation is more effective at the margin in highly-regulated labour markets, Berger and Danninger (2006) and Bassanini and Duval (2006) find the opposite: product market deregulation is more effective when labor market policies are less restrictive. Robust evidence is still lacking, especially in the context of dynamic econometric models that control for the many observed and unobserved factors that determine employment. Moreover, none of these empirical analyses accounts for the fact that policies in labour and product markets are not exogenous to

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[1]See Schiantarelli (2005), Nicoletti and Scarpetta (2006) and Crafts (2006) for a review of the cross country evidence.

[2]Theoretical models include Blanchard and Giavazzi (2003), Spector (2002), Amable and Gatti (2001), Ebell and Haefke (2003) and Koeniger and Prat (2006).

[3]Interactions between labor market policies have been explored, for instance, by Saint-Paul (2000) and Belot and van Ours (2004). See Nickell, Nunziata and Oechl (2005) and Blanchard (2006) for an overview of the effects of labor market policies, shocks and institutions on unemployment. For micro evidence on the employment effects of entry regulation see also Bertrand and Kramarz (2002). For additional macro evidence see Boeri et al. (2000).

macroeconomic shocks and may interact with each other, for instance because the power of unions to lobby for restrictive labor market policies may change as competitive pressures in product markets increase due to deregulation.

In this paper we address several of the limitations of previous empirical research in this area and we provide a systematic empirical investigation of the effect of product market liberalization on employment when there are interactions and political economy linkages between policies and institutions in product and labour markets. The empirical analysis is grounded in an extended version of Blanchard and Giavazzi '(2003) model of bargaining in a monopolistic competitive economy, in which we allow a fuller specification of the fall-back position of the union, taxation and endogenous determination of bargaining power. In our econometric work we use a dynamic specification of the employment rate equation that includes both country specific constants and trends, and we explicitly account for the potential endogeneity of labour and product market policies and for the possible interactions in their determination. We show that this helps understanding some of the conflicting results of the previous literature on policy interactions, while providing a more detailed picture of the channels through which they affect employment.

We first extend the model of bargaining and monopolistic competition developed by Blanchard and Giavazzi (2003), by including a fuller specification of the fallback position of the union as well as taxation in the model.[4] Treating initially product market regulation and labor market regulation as set exogenously and independently from one another, the model suggests that employment gains from product market deregulation are the largest in situations where labor market settings provide strong bargaining power to workers. The basic intuition behind this result is that, with low unions' bargaining power, real wages will be close to the level that clears the labor market and employment close to its full employment level. In this case, liberalization measures that lead to a decrease in the markup have the potential to generate only small changes in employment By contrast, if the unions' bargaining power is high and the economy is far away from full employment, a decline in the markup can lead to large employment responses. We show that this result holds both in the short-run and in the long run, and both in efficient bargaining and right-to-manage frameworks. Moreover, we build on and expand the version of the Blanchard-Giavazzi model that allows unions to lobby for

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[4]Some authors have contended that a high tax wedge on labour use is an important factor behind the difference in the level of unemployment in Europe vis a vis the US in the nineties. On these general issues see Daveri and Tabellini (2000) and Prescott (2004).

labor market regulations that increase their bargaining power. The idea is that, by increasing competition and downward pressures on market rents, product market deregulation also reduces incentives for unions to seek increases in their bargaining power through stricter labour market settings. This is consistent with a burgeoning political economy literature that links competition to weakening bargaining power of workers.[5]

We then test the model's predictions on harmonized panel data for OECD countries over the period 1980-2002. We approximate product market reforms with a new set of indicators that include both changes in domestic regulation and in border barriers to investment, while labour market settings are described by standard indicators of policies and institutions. We also explore the determinants of product and labor market policies and institutions and we control for their endogeneity in the employment rate equation. The results confirm that market-friendly product market reforms over the past two decades have produced substantial employment gains in the OECD countries. There is also evidence that employment gains have been larger when workers' bargaining power was initially high as a result of stringent labor market regulations. In this sense, product and labor market deregulation can be classified as "economic substitutes". However, we also find evidence that product market deregulation has led, over time, to a decline in workers' bargaining power, through its effect on union density and coverage, and/or through an easing of labour market policies, summarized by a combination of employment protection and unemployment benefit regimes. In this sense, product market and labor market deregulation can be considered as "political economy complements" as reforms of the former induce reforms of the latter. Thus, in assessing the long-run employment effects of product market deregulation one needs to consider both its direct effect and the indirect effect stemming from the induced changes in labor market policies and institutions. The overall results are consistent with the predictions of our model.

The structure of the paper is as follows. In Section 2 we present the extended version of the Blanchard and Giavazzi (2003) model and discuss its main predictions. In section 3 we discuss the data. In section 4, we outline our empirical strategy, while Sections 5 presents our empirical results of the employment rate equation based on specifications that policies are exogenously and

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[5]The idea that competition can weaken workers' bargaining power has been explored in several other recent theoretical studies. Ebell and Heafke (2006) develop a model in which greater product market competition induces a shift from collective to individual bargaining. In Boulhol (2006) trade and investment liberalization generates pressures on social partners to lift labour market regulations that enhance workers ' bargaining power (such as, restrictive employment protection legislation). Rodrik (1997) was among the first to suggest the idea that import competition can weaken workers' bargaining power.

independently set. In Section 6 we discuss the determination of product and labor market regulation and address the issue of its potential endogeneity in the employment equation. Section 7 concludes the paper.

2 A simple bargaining model with interactions between product and labour markets

In this section we present a simple bargaining model that provides a framework for assessing the effects of product market liberalization on employment, while also considering possible interactions between product and labour market regulation. The first question the model addresses is whether, for independently- and exogenously-set policies, a deregulation of the product market has more beneficial employment effects when the labor market is heavily or lightly regulated. The second question is whether product market deregulation may actually lead to labor market deregulation. We discuss these issues in the context of the bargaining model proposed by Blanchard and Giavazzi (2003, BG thereafter), extended to allow for a richer specification of the fall back position of the union and taxation. This yields interesting predictions about the interaction between product and labor market policies both in the short and long run. We first summarize the basic set up and predictions in the context of an efficiency bargaining model (details are confined to Appendix A). In the following section we then discuss the results in the case of a right-to-manage model. Finally, we present a version of the model where workers' bargaining power is endogenous and depends on the mark-ups.

2.1 Efficient bargaining model

Employment and the wage are determined by solving a cooperative Nash Bargain between unions and imperfectly competitive firms. Denoting by V_i the union's utility function and by Π_i the firm's profits, the efficient bargain solution is obtained maximizing with respect to both the wage and employment the generalized Nash maximand , $\beta \ln(V_i - \overline{V_i}) + (1 - \beta) \ln \Pi_i$, where β captures the union bargaining power. We will assume that β is affected by labor market policies, such as employment protection legislation and the generosity of income support systems for the unemployed

that reduce the pressure of outsiders on incumbent workers. It can also be affected by institutional characteristics of the labor market such as union density (the proportion of workers who are union members) and coverage rate (the share of workers covered by bargaining agreements). V_i is equal to the sum of the income of employed workers, L_i, who earn a wage equal to $\frac{W_i}{P}$ and the income of union members not employed by the firm, whose expected income is $\frac{W_i^A}{P}$. $\overline{V_i}$ represents total income expected by the union if a bargaining agreement is not struck with the firm and equals $\frac{W_i^A}{P}$ times union membership, N. In defining $\frac{W_i^A}{P}$ we will assume that the alternatives to employment with the present firm are either unemployment benefits, public employment, or a job with another firm. Unemployment benefits are not taxed and public employment is assumed to be fixed exogenously. For simplicity we assume that the private and public wage are identical. Firm i uses one unit of labor, L_i, to produce one unit of output, Y_i. Each firm faces a downward sloping demand function with elasticity $\sigma = \overline{\sigma} g(m)$, with $g' > 0$. σ captures the elasticity of substitution among goods, $\overline{\sigma}$ is a constant, and m denotes the number of firms. The markup over marginal costs, μ, equals $\frac{1}{1+\sigma}$. We will assume that the markup is affected by product market policies, such as legal constraints to entry or to rivalry among firms. Labor income is subject to an income tax rate of τ^L, while employers are subject to a payroll tax of τ^p. Finally, to close the model, we will assume that the government budget is kept in balance (and there is no public spending on goods).

In the efficient bargain, at an optimum, relative output prices, $\frac{P_i}{P}$, and the real wage, $\frac{W_i}{P}$, are proportional to the alternative wage, with constants of proportionality equal to $(1 + \mu)(1 + \tau^p)$ and $(1 + \mu\beta)$ respectively. In the symmetric short run equilibrium ($\frac{P_i}{P} = 1$, $\frac{W_i}{P} = \frac{W^o}{P} = \frac{W}{P}$, fixed number of firms), the alternative wage and the real wage are:

$$\frac{W^A}{P} = \frac{1}{(1 + \mu)(1 + \tau^p)} \tag{1}$$

$$\frac{W}{P} = \frac{(1 + \mu\beta)}{(1 + \mu)(1 + \tau^p)} \tag{2}$$

Using the definition of the alternative wage, the assumption that private and government wages are equal, and the balanced budget condition, we can obtain an upward sloping relationship between

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the alternative wage and the employment rate:

$$\frac{W^A}{P} = \frac{(1 + \mu\beta)}{(1 + \mu)(1 - \tau^l)}l \tag{3}$$

where $l = \frac{L}{N}$ is the employment rate. Its short run equilibrium value is obtained by solving (1) and (3):

$$l = \frac{1}{(1 + \mu\beta)\frac{(1+\tau^p)}{(1-\tau^L)}} \tag{4}$$

Note that, given public employment and the equilibrium values of private employment and of the wage, the balanced budget condition determines unemployment benefits. Moreover, using the balanced budget condition one can eliminate public employment and unemployment benefits from the solution.

Contrary to BG, employment depends on β also in the short run equilibrium due to the fuller specification of the fallback position of the union. This result holds even if we do not make use of the balanced budget condition. As a result, a decrease in the union bargaining power leads to an increase in employment. As in BG, a decrease in the markup, due, for instance, to an increase of substitutability between products, captured by an increase in $\overline{\sigma}$, or to an exogenous increase in the number of firms also leads to an increase in employment. The increased substitutability could be for instance the result of measures that decrease border barriers, thereby facilitating the entry of foreign products into the domestic market. An increase in the number of firms, may be due to a policy-induced decrease in entry barriers, which will be analyzed more fully below. Finally, employment will be adversely affected by payroll or income taxes.

What is of particular interest for us here is the interaction between product and labor market regulation, captured by μ and β, respectively, assuming for the time being that they are set independently from one another. It is easy to see that the cross derivative of employment with respect to μ and β is negative in our model. This implies that, at the margin, a reduction in the markup has greater positive effects on employment when the labor market is more regulated and unions have greater bargaining power. Some authors define product and labor market deregulation as substitutes in this case. When the cross derivative is positive and it pays more in terms of employment to reduce the markup when the union bargaining power is low, then product and labor market

deregulation are classified as complements.[6]

Figure 1

Employment effects of a decrease in μ for different β

We can give a graphical presentation of this general equilibrium result by plotting equation (1) and (3) in a graph with the employment rate on the horizontal axis and the alternative wage on the vertical axis. In Figure 1 (1) is denoted by PS and (3) by WS^{β^H} when drawn for a high value of β and by WS^{β^L} for a low value of β.[7] The relationship between the alternative wage and employment is steeper when β is high. A decrease in μ, due, for instance, to product market deregulation that

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[6]In Blanchard and Giavazzi (2003) the effect of product market deregulation is independent of labor market regulation in the short run, since employment in the efficient bargain does not depend upon the bargaining power parameter, β. This is mostly a consequence of the assumption that the fall back position of the union only depends upon the unemployment rate and is independent of the wage, in equilibrium.

[7]Note that PS and WS are general equilibrium loci. For instance PS identifies the level of the alternative wage compatible with $\frac{P_i}{P} = 1$ in the symmetric equilibrium. One could also draw in the graph the marginal revenue product schedule for an individual firm, which would shift with changes in μ, buth this would clutter the figure.

increases the substitutability among goods (reflected in an increase in $\overline{\sigma}$), shifts PS upward by the same amount, whatever the value of β. Moreover it makes the relationship between the alternative wage and employment, WS, steeper. The first effect dominates, generating always an increase in employment. However, following the decrease in μ , the increase in the slope of WS^{β^H} is smaller than the one for WS^{β^L}. As a result, there is a larger positive employment response when unions' bargaining power is high: employment increases from l^H to $l^{H'}$ when β is high, and from l^L to $l^{L'}$ when β is low. [8]

The basic intuition behind this result is that low unions' bargaining power will be associated with low real wages and employment close to the full employment level. In this case product market deregulation measures that lead to a decrease in the markup have the potential to generate only small changes in employment. If the unions' bargaining power is high and the economy is far away from full employment, a reduction in the markup can lead, instead, to large employment responses. This intuition holds, not only when the economy literally hits the full employment constraint, but also when it is below full employment. To see this, consider that when β is close to one, workers are already extracting most of the rents and it is not possible for decreases in μ to be associated with further wage increases (when $\beta = 1$ the wage will be actually independent of μ). This explains why the upward rotation of the WS locus is smaller when β is high and why, as a result, the decrease in the markup generates a greater increase in employment.

Note, instead, that in this model the cross derivatives between μ and taxes, or between β and taxes, are positive. This means that the positive employment effects of deregulating the product or labor market are greater when taxes are low.

The qualitative results concerning the effect of product and labor market deregulation and their interaction also hold in the long run. In long run steady state equilibrium the number of firms in the markets and hence the markup will be determined by the condition that profits, (A1), must be equal to (annualized) entry costs, c, assumed to be a fraction of output. Using this condition together with the equations defining the optimal value of employment and the real wage, (2)and

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[8]For given l the increase in $\frac{W^A}{P}$ following an infinitesimal decrease in μ equals $\frac{1-\beta}{(1+\mu)^2(1+\tau^L)}l$.

Note that both the numerator of the fraction and l are smaller when β is higher. The relative size of the rotation for different values of β is crucial in generating the result that product and labor market deregulation are "substitutes". This is what matters, not the fact that (3) is flatter for low levels of β. This may give the mistaken impression that a decrease in μ generates a greater employment response when β is low. This would be true if only PS shifted upward. However, the decrease in μ also makes WS steeper, and by less when β is greater.

(4), the long-run equilibrium levels of employment and wages are:[9]

$$l = \frac{(1 - \beta - c)\left(1 - \tau^L\right)}{(1 - \beta - c + c\beta)\left(1 + \tau^p\right)} \tag{5}$$

$$\frac{W}{P} = \frac{(1 - c)}{(1 + \tau^p)} \tag{6}$$

A decrease of entry costs, c, union power, β,or taxes will all have a positive employment effect. The cross derivative with respect to β and c is negative, provided $\beta < \frac{1}{\mu}$ which is the case for any realistic value of μ. This implies that a reduction in entry barriers is more effective in highly regulated labor markets where union power is high. As in the short run, the interaction between taxes and c or β is positive.

2.2 Right to Manage model

The results we have obtained so far concerning first and cross derivatives are fundamentally robust to assuming that firms and unions bargain only about the wage and firms are allowed to hire along their labor demand function (the Right to Manage model). In this case, profit maximization implies that prices will be set by the firm as a markup above the real wage, adjusted for payroll taxes so that $\frac{P_i}{P} = (1 + \mu)(1 + \tau^p)\frac{W_i}{P}$. In the symmetric short run equilibrium, the wage will be:

$$\frac{W}{P} = \frac{1}{(1 + \mu)(1 + \tau^p)} \tag{7}$$

This equation can be thought of as the aggregate price setting equation. Using the first order condition for the wage, together with the definition of the alternative wage and the balanced budget condition, one can obtain the following relationship between the real wage and the employment rate:

$$\frac{W}{P} = \frac{(1 + \mu\beta)}{(1 + \mu)(1 - \tau^l)}l \tag{8}$$

This equation can be interpreted as the aggregate wage setting locus. Note that the aggregate price setting and wage setting equations, (7) and (8), in the Right to Manage model are identical

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[9]The equation defining the markup is $\mu = \frac{c}{1 - \beta - c}$, so that μ is increasing in c and β.

to the corresponding equations in the Efficient Bargain model, (1) and (3), the only difference being that the actual wage has now replaced the alternative wage in the expressions. As a result the short run solution for employment in the Right to Manage model is identical to the one in the Efficient Bargain model (see (4)) and all the conclusions reached before about first and cross derivatives still hold. In particular the effect of a decrease in the markup is greater when unions have greater bargaining power.[10] Note also that the graphical presentation of the model in Figure 1 and 2 remains valid by simply relabelling the vertical axis to represent the real wage and not the alternative wage. In this case the horizontal line, PS, is the aggregate price setting locus, while the upward sloping one is the aggregate wage setting locus, WS. When the markup decreases, PS shifts upward by the same amount, while WS becomes steeper, but by a lesser degree when β is high. In other terms, the wage becomes less sensitive to changes in employment along the aggregate wage setting function, but to a lesser degree when unions are more powerful. Again, the intuition is that there is little room to extract higher wages, following a decrease in μ, when the unions are already appropriating most of the rents. This is reflected in a smaller increase in the slope of the wage setting locus and, therefore, the decrease in the markup will result in a larger increase in employment.

In the long run, however, the employment solution for the Efficient Bargain and for the Right to Manage model differ from one another. More precisely, when the number of firms is endogenized by equating monopoly profits to entry costs, long run employment and wages are[11] :

$$l = \frac{(1+\tau^p)}{(1-\tau^L)}\frac{1-c}{1-c+c\beta} \tag{9}$$

$$\frac{W}{P} = \frac{1-c}{1+\tau^p} \tag{10}$$

The first derivatives of employment with respect to β and c and taxes are negative as before, and so is the cross derivative between β and c. Therefore, also for the Right to Manage model the effect of reducing entry barriers on employment is greater when labor market policies or institutions lead to a high bargaining power for the unions.

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[10]In a related paper, Griffith et al. (2007) show that a decrease in the markup will increase employment more in a model with a monopoly union, compared with a model with a competitive labor market. On a related topic, see Kugler and Pica (2004) for a matching model with entry and dismissal costs (tested on micro data) that implies that stricter entry regulation reduces the effectiveness of labor market reforms in generating new jobs.

[11]The expression for the markup is now $\mu = \frac{c}{1-c}$.

2.3 Endogenizing union's bargaining power

We now ask the question whether product market deregulation may lead to labor market deregulation. Blanchard and Giavazzi (2003) endogenize β by assuming that it is the solution to the *union's* problem of maximizing the labor income share (equal to the wage in the model), net of lobbying costs, that are assumed to be quadratic in β. They show that product market deregulation that results in a lower mark-up will lead to a decrease in union' bargaining power in the short run. We modify their set up by assuming that the objective function of the lobby (union confederation, political party) representing the unions in the first stage of the game is the union utility in excess of the fall back position, minus quadratic lobbying costs. This is more consistent with the union utility function used in the Nash bargaining stage of the game. Moreover, we analyze the effect of product market regulation on workers' bargaining power both in the short run and in the long run. We assume that the lobby knows that employment and wages are determined by the efficient solution to such Nash bargain (or to the Right to Manage model), and their resulting equilibrium values.[12] The optimal value of β is a solution to:

$$\underset{\beta}{Max} \left[\left(1 - \tau^L\right) \left(\frac{W_i}{P} - \frac{W_i^A}{P}\right) L_i - \frac{a}{2}\beta^2 \right] \tag{11}$$

Using the short run equilibrium wages and employment for the efficient bargain, equations (2) and (4) in (11), one can show that $V_i - \overline{V_i}$ is increasing in both β and μ.[13] Most importantly for us, a decrease in μ will generate a decrease in β. The sign of the effect depends upon the cross derivative of $V_i - \overline{V_i}$ with respect to μ and β. This cross derivative is positive in our model and this implies that the losses from a decrease in β are smaller when markups, and hence the monopoly profits to be shared between firms and workers, are low. This reduces the incentive to lobby or fight for a high β and explains why lower product market regulation (and the associated lower μ) leads to lower labor market regulation. These results carry through to the long run , in the sense

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[12]One can think that a portion of lobbying costs are split equally among the various unions, but they will not affect the solutions derived so far for wages and employment as they disappear from the Nash maximand, since they are subtracted from both the union utility and from its disagreement level (both assumed to be linear in income). A fraction of lobbying cost falls directly on the lobbying organization itself (that we do not model fully). See Rama and Tabellini (1998) for a fuller analysis of lobbying for trade protection and labor market policies.

[13]The fact that union utility above the fall back position decreases when the markup decreases may explain by itself why unions may not be supportive in practice of product market reform, independently of possible effects of μ on β.

that lower entry costs lead to lower bargaining power for the unions, but only if the union is not too powerful to start with. More precisely, β is decreasing in c if $\beta < \frac{1-2c+c^2}{1+2c-c^2}$. They also tend to extend to the Right to Manage model in the short run for realistic values of μ (or c) and β.[14] Ultimately, whether product market deregulation induces or not labour market deregulation is an empirical issue.

3 Data

The empirical analysis is based on harmonized annual data for a sample of 20 OECD countries over the period 1980-2002.[15] We relate the employment rate (the share of the working age population in employment) to labour and product market regulations and policies that are likely to affect firms' market power (the markup in our model) and workers' bargaining power. In addition, we control for the business cycle and other unobservable time invariant country specific effects, as well as for country specific trends and common year effects. The description of the key variables is provided below. Further details on data sources and definitions are provided in Appendix B.

Employment Rates. The dependent variable in our equations is the non-agricultural employment rate, ERB, the component of employment most directly influenced by labour and product market policies and institutions. [16]

Product market regulation. We use time-series data on product market policies that restrict com-

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[14]More precisely, the condition for β to be increasing in μ in the short run is:

$$1 + \beta^2 \mu^2 (1 + 2\mu) > 4\beta\mu(1 + \mu)$$

In the long run β is increasing in c if:

$$1 + 4\beta c^2 > 4c^2 + 2\beta c + c$$

Remember that c is expressed as a share of output. If, in the first stage the union lobby maximizes the wage per worker (equal to the labor share of income) as in Blanchard and Giavazzi (2003), there is a positive association between μ (c) and β only for the efficient bargain in the short run. In all other cases there is no effect of product market deregulation on unions' bargaining power.

[15]The countries are Australia, Austria, Belgium, Denmark, Germany, Greece, Finland, France, Italy, Japan, Ireland, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom and the United States.

[16]We separately control for the share of public employees in the working-age population (the public employment rate – ERG) to test for the hypothesis that the latter may crowd out business sector employment opportunities. In preliminary analysis, we experimented with both total non-agricultural and business non-agricultural employment rates. Here we focus on the unrestricted version of the model in which the effect of public employment is estimated. A significantly negative coefficient on the public employment variable would support the crowding out hypothesis.

petition to measure market liberalization in the OECD countries covered by the analysis. The data cover both domestic regulations and border barriers. For domestic regulations we draw on Conway and Nicoletti (2006) who provide indicators over the 1975-2003 period for the following non-manufacturing industries: gas, electricity, post, telecommunications, air transport, rail transport and road freight. [17] Their indicators cover three main areas: public ownership of business sector firms, legal barriers restricting access to markets and other barriers to entry related to market or industry structure (e.g. market dominance and vertical integration in network industries). [18] Indicators for each of these areas are based on detailed information on laws, rules and market and industry settings. In each period and each area, country-industry observations are scored along a cardinal scale from least to most restrictive. Area-wide indicators (e.g. for public ownership or legal barriers) are subsequently obtained by averaging these scores across industries and an overall indicator of regulation in energy, transport and communication is obtained by averaging across both areas and industries. To account for the effects on employment of different areas of regulation, in our regressions we experiment with three area-wide indicators: one excluding public ownership, REG, a second one focusing more narrowly on barriers to entry and vertical integration, $REGbevi$, and finally one covering only public ownership, $REGpo$. All indicators suggest substantial cross country differences in the average level of regulation and a trend towards deregulation in the later years that differs in timing and intensity across countries. In figure B1 we report, as an example, the cross country and time series variation for REG. We supplement this information on domestic regulations with the indicator of FDI restrictions provided by Golub (2003) and Golub and Koyama (2006). This indicator covers limitations on foreign ownership, restrictive screening and notification procedures and operational restrictions for foreign affiliates in the manufacturing sector and eight non-manufacturing industries over the 1980-2006 period. The construction of this indicator follows the same steps as for the indicator of domestic regulation: the basic information is scored from least to most restrictive in each period and area-wide indicators are derived for each industry and across industries; finally an aggregate indicator for the whole economy is obtained by averaging. [19] To account for both domestic and border barriers to competition, in the empirical analysis we also use a summary indicator, $REGfdi$, obtained as the first principal component of REG and of the

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[17] Nicoletti and Scarpetta (2003) and Alesina et al. (2005) used an earlier version of these indicators to estimate the effects of anticompetitive regulation on productivity and investment, respectively.

[18] The coverage of these three areas varies across industries. Legal barriers are reported in all industries; public ownership is covered in all industries except road freight; vertical integration is documented for gas, electricity and railways; market structure is reported for gas, telecoms and railways.

[19] The aggregate indicator of FDI is an average of the indicators for the various industries weighted by a combination of industry shares in trade and FDI flows (see Golub (2003)).

aggregate indicator of FDI restrictions (both standardized). The resulting indicator is reported in Figure B2. Note that the first principal component of two standardized variables gives equal weight to each one of them and, hence, is proportional to their arithmetic average. It should be noted that, even though barriers to foreign investment in the manufacturing sector are covered, our measures of restrictive product market policies focus mostly on the non-manufacturing industries, where restrictions are covered in more detail. Unfortunately, little time-series information is currently available on restrictions affecting the manufacturing industries.[20] This may not necessarily be a serious empirical problem, however. In the OECD countries covered by our regressions, the non-manufacturing industries account for a large and increasing share of aggregate employment. Moreover, anti-competitive regulations are usually concentrated in these sectors. Finally, deregulation in these sectors can have important consequences for the structure of costs in manufacturing, given the input-output linkages.

Employment protection legislation and unemployment benefits. To gauge the effects of labour market policy and institutional settings on workers' bargaining power we focus on employment protection and the generosity of the unemployment benefit system. These policies can increase the power of "insiders". In particular, EPL tends to raise labour adjustment costs, thereby making it harder for employers to adapt the workforce to the evolution of demand. The unemployment benefit replacement rate affects the cost of being unemployed and, therefore, the workers' fallback position. In particular, while, on the one hand, income support for the unemployed can facilitate job search and improve job matching, on the on the other hand, it raises the reservation wage and it is likely to increase the bargaining power of incumbent workers. As argued below, these policies have often been seen as substitutes, with stronger employment protection partially compensating for weak income support for job-seekers, and vice versa. Hence, one way to capture labour market overall protection/stringency is to consider the particular combination of the two policies adopted by each country, summarizing them into a single indicator. This is the choice we adopt in our basic specification.

The indicator of EPL covers restrictions concerning workers on both permanent and temporary

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[20]Detailed information on economy-wide regulations is provided by Conway et al. (2006) only for the 1998 and 2003 periods. Some authors (e.g. Griffith et al.(2006)) have used information on economy-wide domestic and border regulations provided by Gwartney and Lawson (2006) for the 1975-2003 period. However, their data are based on less detailed and more heterogeneous information than that provided in our sources and are only complete (on a quinquennial basis) from the beginning of the 1990s.

contracts. This information was collected and coded for the late 1980s, the late 1990s and 2003 by OECD (2004), which also provides details on sources and methodologies. Individual dismissal protections for workers with permanent contracts include: procedural inconveniences that employers face when trying to dismiss a worker; notice and severance payments at different job tenures; and prevailing standards of and penalties for "unfair" dismissals. The indicator for temporary contracts covers, for both fixed-term contracts and contracts through temporary work agencies: the "objective" reasons under which they could be offered; the maximum number of successive renewals; and the maximum cumulated duration of the contract. The EPL indicator used in the econometric analysis below is time varying, with the shifts in regime from the late 1980s to the early 2000s being defined on the basis of information about the timing of major EPL reforms (concerning both temporary and regular workers) in OECD countries. Unemployment benefit replacement rates. To capture the effect of unemployment benefits on employment, we use gross replacement rates, BEN, which are a summary measure of the fraction of income replaced by unemployment benefits over a five years period for three family types and two earnings levels. [21] We combine EPL and BEN into a single measure of labour market regulation, $LMRP$, by taking their first principal component (see Figure B3). Again recall that the first principal component is proportional to the simple average of the two variables. The comparison between the time-series profiles of $LMRP$ and REG (or $REGfdi$) highlights that, over the sample period, product market liberalization has been more extensive and generalized than liberalization in labour markets.

Taxes on labour use. We use two measures of the tax wedge that is expressed as the ratio of total taxes and social security contributions to total labour costs (wage plus employers' social security contributions). The first measure, $WEDGE1$, is based on revenue data from National Accounts and includes, in addition to income taxes and employer's and employee's social security contributions also indirect taxes. The second indicator, $WEDGE2$, is calculated using a tax model and considers the social security contributions and taxes and benefits of an average worker with two different family situations (single and married with a dependent spouse and two children).

Unions' power and bargaining regimes. There are different indicators available to capture unions' power in the bargaining process. First, union density, the proportion of workers who are members of the unions. This variable provides a *prima facie* indication of the strength of unions. However, in

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[21] The net replacement rate would be a preferable indicator, but unfortunately it is currently available only for a few years. For a discussion of the different definitions of replacement rates, see Martin (1996).

countries where there is administrative extension of collective agreements (e.g. many Continental EU countries) it is a poor proxy for bargaining power insofar as even unions with low membership can exert a strong influence on wage settings. The second indicator is the share of workers covered by these agreements. Available data on coverage are too limited to be used as a separate variable in the empirical analysis (OECD (2004)). However, we tried to account for both these dimensions of union power by constructing a variable that combines union density and coverage, $UDCO$, by means of principal components analysis (see Figure B4).We think this is a better choice than union density alone, which may be a partial proxy for the bargaining power of the unions. For example union density in France is 11%, the same as in the United States, but coverage is much higher in France (around 80%).

Consistent with an extensive literature (e.g. Bruno and Sachs (1985); Calmfors and Driffil (1988); Elmeskov et al.(1998); Nickell and Layard (1998)), we also consider the wage bargaining regime. Indeed, it has been argued that both decentralized and centralized systems are preferable to intermediate ones based on bargaining at the industry level (OECD (1997); Flanagan (1998)). To account for these features, we consider both the level of bargaining, which can be centralized, intermediate (at the industry or regional level), or decentralized (at the firm level) and the degree of coordination among, on the one hand, employers' associations and, on the other hand, trade unions. Combining these two features into a low-corporatism, $LLCORP$, intermediate corporatism, $MDCORP$, and high corporatism, $HGCORP$, variable makes it possible to consider cases where cooperation between employers and unions in an industry-level bargaining system (e.g., Germany and Austria and, more recently, Italy, Ireland and the Netherlands) may be a functionally-equivalent alternative to centralized systems. This is because strong coordination allows industry unions to internalize the aggregate effects of their wage decisions into the negotiation process, *de facto* mimicking the outcomes of a highly centralized bargaining regime.

4   Econometric Strategy

The model described in the previous section has three main predictions. First, product and labour market regulation, by curbing competition among firms and strengthening workers' bargaining power have a negative effect on equilibrium employment. Second, reforms in these markets are

economic substitutes, in the sense that product market deregulation has a larger effect on employment when the labor market is highly regulated. However, if product market competition is allowed to influence workers' bargaining power (through its effects on labor market policies or institutions), regulations in the two markets can be seen as political-economy complements as product market deregulation can lead to labor market deregulation. In this section we discuss whether the econometric evidence supports these main predictions of the model.

To better relate our results to previous literature in this area, we proceed in steps. First, we estimate the employment effects of product and labour market interactions under the usual assumption that product and labor market policies are exogenously and independently set. We then explore the determinants of product and labor market regulations and tackle head on the potentially important issue of their endogeneity in the employment equation, using a control function approach. While important for ensuring the validity of the empirical results, endogeneity issues are generally not dealt with in the empirical literature on the impact of product an labor market deregulation – and their interactions – on employment, although the endogeneity of unionization in unemployment equations has been addressed in Checchi and Nunziata (2006).

Throughout, our estimates are based on a dynamic model for the business (non agricultural) employment rate for a panel of OECD countries over the period 1980-2002. The model is estimated by feasible GLS, allowing for the variance to differ across countries and for an AR(1) structure in the error term with country-specific autocorrelation coefficients, ρ_i.[22] Test results reject at the 1% level the equality of variance across countries and the absence of serial correlation in all specifications. We use a specification that includes lagged employment, since it is likely that the short run and long run effects of regulation differ.

Most of the previous empirical work on the interaction between product and labor market regulation has typically relied on static model specifications for employment (unemployment).[23] In principle, static regressions may be thought to capture a cointegrating relationship between the employment (unemployment) rate and the explanatory variables. However, this interpretation is questionable in our context. For instance, using the Levin, Lin, and Chu (2002) test for unit roots in panels, we

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[22]The results with a common first order serial correlation coefficients are similar.

[23]Nickell et al. (2005) estimate dynamic unemployment models by feasible GLS, but do not address the issue of the interaction between product and labor market regulation.

can reject the unit root hypothesis for the business employment rate at the 5% level.[24] Moreover, many of the variables representing product and labor market regulation are unlikely to be well described by unit roots. These variables often display regime changes and could be erroneously interpreted as unit root processes.

All regressions include country dummies, DC_i, year dummies, DT_t, and country-specific time trends $Trend_{i,t}$. The country specific trends capture country level low frequency movements in the structure of the labour force, such as changes in participation or demographics. Moreover, they capture, potentially non neutral, technological progress, since the industrial composition varies across countries and the rate of technological progress is likely to be industry specific. As explained below, omission of these country-specific time trends may lead to misleading conclusions concerning sign of the interaction effects. We also consider two additional country dummies for Germany post-reunification (1991-2002) and for Finland after the collapse of the Soviet Union (1991-2002). The main conclusions, however, do not hinge on the inclusion of these dummies. We focus on the employment rate in the non agricultural business sector in country i in year t, $ERB_{i,t}$ as the dependent variable, and estimates variants of the following equation:

$$
\begin{aligned}
ERB_{i,t} &= \alpha ERB_{i,t-1} + \beta PMR_{i,t} + \gamma LMR_{i,t} + \delta PMR_{i,t} LMR_{i,t} + \theta ERB_{i,t-1} LMR_{i,t} \quad (12) \\
&\quad \sum_{k=1}^{K} \phi_k Z_{k,i,t} + DC_i + DT_t + \psi_i Trend_{i,t} + \epsilon_{i,t} \\
\epsilon_{i,t} &= \rho_i \epsilon_{i,t-1} + \xi_{i,t}
\end{aligned}
$$

PMR denotes various measures of product market regulation, LMR various measures of labor market regulation and $Z_{k,i,t}$ a set of control variables. The focus of the paper is in assessing the sign and significance of the coefficient of the interaction between product and labor market regulation, δ. Note that we also allow the degree of persistence to depend upon labor market regulation to capture the idea that more rigidly regulated labor markets may lead to greater persistence in the employment process.

In our basic specification we report results using two measures of product market regulation: one

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[24]This is true in specifications with or without trends, including either two or three lags of ERB.

that measures domestic restrictions to competition, REG, and another that also includes the restrictions on foreign direct investment, $REGfdi$.[25] We always include also a measure of public ownership of business enterprises, $REGpo$, as an additional regressor. As a measure of labour market regulation and policy we use the first principal component of employment protection EPL and unemployment benefits replacement rate, BEN, denoted by $LMRP$. We also report results using EPL and BEN as separate regressors. With a balanced budget, the effect of benefits on the fall back position should be captured by the tax rate. In reality, however, government budgets are often not balanced in all countries and the generosity of the unemployment benefit system also affects the bargaining power of insiders.

To account for labor market institutions, we use the principal component of union density and union bargaining coverage, $UDCO$. In the same vein, we include an indicator of corporatism – discretized in low, medium and high ($LLCORP, MDCORP$ and $HGCORP$)– which has been often used in the literature as a proxy for the degree of bargaining centralization and coordination.

In all regressions we control for business cycle fluctuations captured by the deviation of actual output from potential output, GAP. The set of control variables include taxation on labor income captured by the two different measures of the tax wedge described above, based either on tax revenue data, $WEDGE1$, or on the taxes paid by a representative worker, $WEDGE2$. The first measure better captures the average tax burden on labour use but is likely to be more susceptible to endogeneity problems due, among other things, to the progressivity of the tax system that may induce a spurious positive correlation between shocks to employment and the tax wedge, even controlling for the output gap. To tackle at least partially the endogeneity problem, we use its lagged value in the empirical analysis. The tax wedge drawn from the tax model is less subject to endogeneity problems, but refers to a representative worker and does not consider possible changes in tax enforcement and special treatments. We will address the issue of the potential endogeneity of $WEDGE2$ in section 5. We also include in the regression public employment and control for its likely endogeneity by using a lagged moving average of it at t_{-1} and t_{-2}, $ERGM$. Public employment may crowd out business employment to the extent that it improves the fall back position for the union. A negative effect on private employment may also reflect the fact that public

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[25]The results obtained using $REGbevi$ (that focuses more narrowly on barriers to entry and vertical integration) are very similar to those obtained using REG and are not reported here. See the working paper version of the model for further details.

employment produces services that are close substitute for private activities and, as well, because it has to be financed by taxation. However, public employment may increase the productivity of private employment, with favorable consequences for the latter.

5   Empirical Evidence on Policy Interactions: Exogenous Policies

We focus first on results obtained under the assumption that product and labour market policies are set exogenously (and independently). Estimation results obtained by using Feasible GLS are reported in Table 1. The direct effects of product market regulation, represented by REG or $REGfdi$, and of the summary measure of labor market regulation, $LMRP$, are always negative and significant in most cases at the 1% level (see columns 1 through 4).[26] Thus, high levels of regulation are associated, on average, with lower employment rates. Note that the variables in the interaction term between product and labour market regulation are either mean zero or are defined as deviations from their overall sample mean, so that the coefficient of the main effects capture the marginal effect of a variable evaluated at the sample mean. It is also worth noting at the outset that the lagged employment variable is always highly significant, with a coefficient of around .65, pointing to a strong persistence of employment over time. Moreover, consistent with earlier results (Scarpetta, 1996; Nickell et al. 2005) the persistence significantly increases with the stringency of labor market regulation. Finally, the output gap is a very important explanatory variable in all specifications, pointing to strong cyclical effects as well.

Given the focus of this paper, the main result is that the coefficient of the interaction between our two proxies for product market regulation, REG or $REGfdi$ and labor market regulation, as proxied by the summary index $LMRP$, is negative and significant at the 5% and 1% level, respectively. Hence, consistently with the predictions of our model, deregulating the product market is more effective at the margin when the labour market is highly regulated. In this sense, product and labour market deregulation can be seen as economic substitutes. This is an important result because it suggests that in situations where labor market regulation is stringent and difficult to reform politically, deregulating the product market may be the best way to promote higher employment

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[26] Omitting the interaction terms does not change the sign and significance of these direct effects. For more details see the original IZA or BC working paper version of this paper.

at the margin.[27]

The difference in the estimated effect of product market deregulation in countries where labour market policies are tight or loose is sizeable. Consider, for example, a product market deregulation that, ceteris paribus, moves a country from the third quartile (5.25) of REG to the first quartile (3.08). When labour market regulation is low and equal to the first quartile of $LMRP$ (-.89), the increase in the employment rate is not statistically significant at the 5% level and equals only .18 percentage points on impact and .45 percentage points in the long run (using the results in column 1 of Table 1). When labour market regulation is high and equal to the third quartile of $LMRP$ (.95), the effect of deregulation is larger, quite substantial and significant at the 1% level. It generates an employment gain of .82 percentage points on impact and 2.82 percentage points in the long run. Another way to highlight the different effect of product market deregulation in different labour market settings is to consider that one standard deviation decrease in RNOPO generates a long run gain in the employment rate of 1.20 percentage points in France (a high $LMRP$ country) and of only .23 percentage points in Ireland (a low LMRP country).

The coefficient of our measure of public ownership $REGpo$ is generally positive but its significance varies across specifications. State owned firms may constitute a barrier to entry or a hindrance to competition for other firms (see e.g. Sappington and Sidak, 2003), but at the same time they are likely to be characterized by over-manning. The latter effect seems to be stronger, leading to a positive coefficient that is sometimes significant at conventional levels.[28] When the interaction between $REGpo$ and labor market regulation is included as an additional regressor, its coefficient is never significant. The positive effect of $REGpo$ on employment explains why when we use as a summary measure of regulation the simple average of $REGpo$ and REG,its coefficient remains negative, but is now smaller and less significant (-0.142 with a t of -1.58 for the model of column 1, versus -.228 with a t of 2.68.when REG is used). In any case the coefficient of the interaction term remains negative and significant at the 5% level.[29]

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[27]Note that the result on the sign and significance of the interaction term is robust to using the employment rate for prime age men and women (25-54) as the dependent variable. In this case available data do not allow to distinguish between private and public employment. For instance, in the specification of Column 1 of Table 1, the coefficient of the interaction between REG and $LMRP$ is negative and significant at the 5% level and very similar in size (-.162 versus -.159). The results are also robust to controlling or not for total public employment (the coefficient on the interaction is -.162 without and -.152 with public employment). The detailed results are not reported here for reason of space, but are available from the authors upon request.

[28]See Azmat et al. (2007) for an analysis of the effect of privatization on the labour share in network industries.

[29]Detailed results are not reported here, but are available from the authors.

Let us consider now the role of the additional control variables The evidence in favor of the tax wedge being an important determinant of the employment rate in this specification is mixed: the coefficient of the lagged value of $WEDGE1$ is negative and highly significant, while the coefficient of $WEDGE2$ is always insignificant.[30] The theoretical model discussed earlier in this paper also suggests that there should be interactions between the tax rate and measures of market and bargaining power. However, interactions between the two different measures of the tax wedge and REG (or $REGfdi$) and $LMRP$ were found to be (almost always) individually or jointly insignificant. The only exception is the interaction between $LMRP$ and lagged $WEDGE1$ that is positive and significant at the 5% level.[31] Thus, the model predictions concerning taxation receives no or weak support, at best, in the data.

Focusing on the effect of labor market institutions, the impact of our summary measure of union strength, $UDCO$, on the employment rate is consistently negative and significant across specifications. As for corporatism, Calmfors and Driffil (1988) suggested that it is likely to have a non-linear effect. In our analysis, we find no evidence of significant differences across bargaining systems that differ in the degree of centralization and coordination. Finally, concerning public employment, the results suggest that an increase in EGRM has a negative but *in*significant effect on business employment.

In columns 5 and 6 of Table 1, we also allow BEN and EPL to enter as independent regressors in the model that uses $WEDGE1$ and we include separate interactions between each one of them and both the lagged dependent variable and product market regulation. As expected, higher EPL increases the persistence of the employment rate.[32] EPL also has a negative and significant effect on the employment rate. The coefficient of BEN is not significant. The interaction between

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[30]If we use the contemporaneous value of $WEDGE1$, its coefficient is significant at conventional levels when using $REGfdi$, but not when using REG. When we use the lagged value of $WEDGE2$ its coefficient is always not significant.

Nickell et al. (2005) find evidence of a positive effect of the tax wedge on unemployment in the context of a dynamic model. Their estimates, obtained using a definition of the tax wedge based on tax receipts from national accounts data, exploit a longer time series (1961-1995) that covers wider fluctuations in the taxation of labour. Moreover, Elmeskov et al. (1998) found that the tax wedge (from the tax model) has a positive effect on unemployment in countries with intermediate bargaining regimes, where wage negotiations do not allow higher taxes to be passed through to lower take home wages.

[31]When we interact the tax wedge with the corporatism variable – to account for the possible effects of bargaining systems on the ability of firms to shift labor taxes on to wages – the coefficient of the interaction term is not significant.

[32]We have also interacted the lagged dependent variable with BEN, but the interaction is always insignificant, and therefore it has been set equal to zero.

REG and EPL is not significant while the one with BEN is negative and significant at the 5% level. These results are confirmed when we consider $REGfdi$ as the measure of product market regulation. The results are also robust to using $WEDGE2$ as a measure of the tax wedge. The general message that product and labour market regulations are substitutes, therefore, remains, although it appears that the negative interaction between the various measures of product market regulation and $LMRP$ is mostly driven by the interaction with our measure of the unemployment benefit replacement rate.

As already mentioned, EPL and BEN represent two alternative ways to protect workers against dismissal. For example, Buti et al. (1998) suggest that protecting jobs - through EPL – may act as a substitute for protecting workers after the dismissal by supporting their job search with unemployment insurance benefits. Under this hypothesis, countries might opt for either generous unemployment benefits with lax EPL or the reverse. [33] Indeed, across the OECD area - and in particular within Europe - there is a negative relationship between the stringency of EPL and the generosity of BEN. Empirically, the trade off between these two policies has been recently documented by Neugart (2007).[34] Given this trade off, it is useful to consider them jointly in regression analysis, as we do when we use $LMRP$ as a summary measure of labor market regulation, since it may be difficult to distinguish their separate effects reliably.

We have also explored the sensitivity of our results to the exclusion of the unobserved time effects. In column 7 and 8 of Table 1 we estimate the same specification of columns 1 and 2 without country-specific trends. A number of results change when the country-specific trends are omitted. Notably, the coefficient of the interaction between product and labour market regulation now becomes positive and significant when product market regulation is proxied with $REGfdi$. When using REG, the coefficient of the interaction is also positive, but not significant. Therefore, omission of country-specific trends blurs the substitutability between product market regulation and labour market settings. Omitting these trends, as in some previous studies of policy interactions, leads to serious misspecification insofar as they capture low frequency movements in the structure of the labour force (e.g. changes in participation or demographics) and/or (potentially non neutral) technological progress. Results not reported here also show that omitting trends in a static em-

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[33]Boeri et al., (2003) document and formalize this policy interaction in a political economy context.

[34]The trade off appears to be particularly sharp across OECD countries when accounting for the average number of inactive household members.

ployment model results in a positive, although not significant, coefficient of the interaction term. When they are included in the static model, we obtain a negative and significant coefficient for the interaction term between product and labor market regulation. The inclusion or not of the country specific trends is, therefore, very important in explaining the difference between our results and those in Berger and Danninger (2006) and Bassanini and Duval (2006), who find, using static models, that product market deregulation and labour market deregulation (proxied by EPL) are complements, in a specification without country specific trends.

In Table 2 we further extend the estimated model by including the interaction between product market regulation and labour market institutions. More specifically, we introduce an additional interaction between REG or $REGfdi$ and the principal component of union density and contract coverage, $UDCO$. We do this because $UDCO$ is also a very reasonable proxy for union bargaining power. Moreover, we also interact $UDCO$ with the degree of corporatism to check whether the negative effects of unions' power on employment depend on the type of bargaining system. Perhaps surprisingly, the findings show that none of these interactions are significant at the 5% level (in only one case the interaction between REG and $UDCO$ is significant and positive at the 10% level, when using $WEDGE2$). Most importantly, the conclusions reached previously concerning the interaction between labour market policies and product market regulation remain unchanged.[35]

5.1 Determinants of product and labour market regulation and endogeneity issues

So far we have assumed that product and labour market policies are exogenous and set independently from one another but, as discussed above, there are good political economy reasons to believe that they can indeed be interrelated. The simple model of Section 2.3, that generalizes the result in Blanchard and Giavazzi (2003), suggests that product market deregulation may lead to labour market deregulation and, as already mentioned, this linkage has been explore in a few other theoretical settings. In this section we explore this issue and the related issue of the potential endogeneity of product and labour market regulation (and of other variables) in the employment

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[35] Griffith et al. (2007) find that, in the context of a static model, a decrease in profitability caused by product market deregulation has a more favorable effect on unemployment when union density or collective bargaining coverage is high.

equation.

5.1.1 Accounting for political economy considerations

What determines the product and labor market settings that prevail in a country at a particular time? In Table 3 we present (extended) Granger causality tests of product and labour market regulation, focusing on our summary measures of labor market policies and of union bargaining power. That is, we investigate whether our measures of product market regulation Granger cause $LMRP$ and $UDCO$ (and vice-versa), after controlling for additional macroeconomic and political economy variables.

More specifically, we regress $LMRP$ on its own two lags and two lags of REG (or $REGfdi$) and we do a parallel exercise for these summary measures of product market regulation. We then add our measure of unions' strength, $UDCO$, to the system. As in Hoj et al. (2006), we control for a number of potential political economy influences on the reform process. Given that reforms are sometimes set in motion by economic crises, we include as controls the first and the second lag of a dummy that takes value 1 if the output gap drops by more than 4% ($BIGCRISIS$). We also take into account other political economy variables: the political orientation of the government (left or right of center), captured by the dummy variable $LEFT$ that equals one if the government is left-of-center; and the length of time the government has been in power, OGOV. All the equations are estimated again by feasible GLS, allowing for a different error variance in each country. We also allow for AR(1) errors with country specific autocorrelation coefficients in all equations, except in the ones for $LMRP$, since testing suggests the presence of residual autocorrelation in all cases, except for $LMRP$.[36] All specifications include country dummies, country-specific trends and year dummies. We test whether the coefficients of the first two lags of the included variables are jointly significant and also if their sum is different from zero.

Political economy variables help explain both product and labour market regulation. Notably, crises have opposite effects on the two markets: labour regulation tends to be tightened while product markets tend to be liberalized after severe downturns. At the same time, mature governments are more likely to implement product market reforms and, not surprisingly, left-of-center governments

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[36]Allowing for AR(1) errors also in the $LMRP$ equation does not alter the results.

are more willing to tighten regulations in both labour and product markets.[37]

More importantly, the results suggest that REG Granger-causes $LMRP$ (the marginal significance level of the test is reported under joint sign. REG in Table 3). The converse is not true. In addition, the sum of the coefficients on the two lags of REG is positive and significant, which means that domestic deregulation of the product market leads to lower regulation in the labour market in the long run (the marginal significance of the test reported as sign. sum REG in Table 3). By contrast we do not find evidence that $REGfdi$ Granger-causes $LMRP$. An implication of this result is that in assessing the effect of product market deregulation one should consider also its indirect effects through subsequent changes in labor market policies. Another implication is that sequencing reforms to deal first with product markets could make it easier to overcome political opposition to labour market deregulation later on. In this sense product and labor market deregulation are political economy complements.[38]

Next, we also include in the regression lags of $UDCO$ (columns 5-10). The findings in columns 1-4 are confirmed: REG Granger causes $LMRP$, but the same is not true for $REGfdi$. However, $REGfdi$ and REG Granger cause $UDCO$ (at the 1% and 10% significance level respectively): product market deregulation, especially when measured by a decrease in $REGfdi$, leads to lower unions' power. There appears to be some evidence, therefore, that deregulating the product market has a positive indirect effect on employment because it induces either lower labour market regulation or weaker unions' power.[39] Interestingly, $UDCO$ Granger causes $REGfdi$ (at the 1% significance level) , but with a negative sign: higher levels of $UDCO$ lead to less stringent product market regulations. This result is puzzling and deserves further investigation.

[37] These results are broadly consistent with the findings of Hoj et al. (2006) and Duval and Elmeskov (2005).

[38] Dang, Galasso, Hoj, and Nicoletti (2006) and Checchi and Nunziata (2006) also find an empirical link between policies (or institutions) in the two markets. There is also empirical evidence that trade liberalization and market-oriented reforms in the product markets have reduced workers' bargaining power. Initial findings by Abowd and Lemieux (1993) for Canada were followed by evidence by Dumont et al. (2006) and Boulhol et al. (2006) for European countries and by Dreher and Gaston (2007) for OECD countries.

[39] In our analysis, we have considered the two components of $LMRP$ – BEN and EPL – as a policy package to provide protection to workers. If we include them separately in our causality tests, we cannot reject absence of Granger causality from REG to EPL. However, there is some evidence that REG leads to lower EPL, based on the test of equality to zero of the sum of the coefficients, in the specification that imposes equal error variance across countries. There is also evidence that REG Granger causes BEN, at the 10% significance level. The sum of the coefficients is positive and significantly different from zero at the 5% level. There is also substantial evidence that BEN and EPL Granger-causes REG. The sum of the coefficients is positive for EPL and negative for BEN. The result for EPL is not does not have a straightforward interpretation. The one for BEN could be taken to suggest that more generous benefits may help product market deregulation by providing a cushion to the greater turbulence in employment. See Alesina et al. (2007). These results are tentative and further investigation is needed. Finally, there is ample evidence that $REGfdi$ Granger causes $UDCO$ (at the 1% significance level).

Allowing for the impact of product market deregulation on labour market policies (or institutions) can increases its employment effect substantially. For instance, consider the long run effect on employment of a product market deregulation that moves a country from the third quartile of REG to the first quartile. For a back of the envelope calculation of the change in the estimated long run effect of REG on $LMRP$, focus on the equation for employment and for labor market regulation together, disregarding the feedback implied by the product market regulation equation Using the results for employment in column 1 of Table 1 and those for $LMRP$ in column 1 of Table 3, the long run increase in the employment rate goes from .45 percentage points (when the effect of product market deregulation on labour market policies is not considered) to 1.95 percentage points (when such interaction is taken into account), under the assumption that labour market regulation is low and equal to the first quartile of $LMRP$. When labour market regulation is high and equal to the third quartile of $LMRP$, the employment gain following product market deregulation increases from 2.82 to 5.74 percentage points in the long run.

5.1.2 Controlling for endogeneity issues in the employment equation

In this section we deal with the possible endogeneity of some of the explanatory variables, in particular of the product and labour market regulation and of the unionization-coverage variable. More specifically, if the error term in the employment equation is uncorrelated with the ones in the equations generating $LMRP$, REG and $UDCO$, then there are no endogeneity problems coming from this source. However, if the correlation is non zero, then the estimates of the employment effects of product and labour market policies and of labour market institutions obtained by GLS are, in principle, inconsistent.

Table 4 presents the endogeneity tests and estimation results that control for the endogeneity of $LMRP$, REG and $UDCO$. In addition, we allow for the endogeneity of the GAP variable[40] At the bottom of the columns we report the endogeneity test for the employment model of columns 1 and 2 of Table 1 (results for other specifications are qualitatively similar). The test is based on the control function approach of Rivers and Vuong (1988) and it is implemented by introducing the estimated errors from the first stage equations for $LMRP$, REG, $UDCO$ and interactions

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[40] The bias due to the endogeneity of GAP is unlikely to be very large since there is little correlation between GAP and REG, $LMRP$ and $UDCO$ (the correlation coefficients are respectively -.10, .03, -.07).

of the errors with other variables (due to the presence of interaction effects) in the employment equation.[41] We also add the residuals of an AR(2) model for the GAP variable. The test of joint significance of the terms containing the errors is a test of endogeneity of $LMRP$, $RNOPO$, $UDCO$ and GAP. Moreover, in the presence of endogeneity, the estimated coefficients on the variables of interest obtained by adding the first stage errors (and the appropriate interaction among them) are consistent, although their standard errors are incorrect due to the generated regressor problem. We report such estimates in columns 1 and 2 with corrected standard errors, using an extension of the formulas in Murphy and Topel (1985). In column 3 and 4 we add $WEDGE2$ to the list of endogenous variables, modelling it as an AR(2) process as well. The tests suggest that we can reject the absence of endogeneity problems at the 5% level, but not at the 1% level (with one exception), suggesting that the GLS estimates in columns (1) and (2) of Table 1 and 2 may be inconsistent.

The instrumental variable estimates presented in Table 6, which correct for these potential biases, suggest nonetheless that the qualitative conclusions we have reached in previous sections concerning the effect of product market deregulation on employment are robust to accounting for endogeneity. More specifically, the coefficient on the main effect of labor market regulation remains negative and significant and of similar value to the ones obtained so far. The main effect of $REGfdi$ remains negative and significant at the 5% level, using the specification with the lagged value of $WEDGE1$, and at the 10% level, using $WEDGE2$, although the absolute value of the coefficient is somewhat smaller Most importantly, the coefficients of the interaction terms remain negative and significant at the 1% level, when using $REGfdi$, and at the 5% level when using REG, and their absolute values are either similar or larger than before. Thus, for instance, the positive effect of deregulation (through REG) on employment is significant at the 5% level from the 60th percentile of $LMRP$ and upwards. Quantitatively, the effect of deregulating the product market is smaller than the one obtained when one does not correct for endogeneity, but it remains always substantial when labor market regulation is high. Consider again a product market deregulation that, ceteris paribus, moves a country with high labor market regulation from the third quartile to the first quartile of REG, keeping labor regulation constant. It generates an employment gain of .60 percentage points on impact and 1.78 percentage points in the long run, using the results in column 1 of Table 4 (the figures were .82 and 2.82, using the results in column 1 of Table 1) Moreover, a

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[41]More specifically, we add to the employment equation the estimated innovation in the $LMRP$, $RNOPO$, and $UDCO$ equations, denoted respectively by u^L, u^P, u^U, as well as $u^L * u^P$, $u^P * LMRP$, $u^L * PMR$, $u^L * ERB(-1) * LMRP$. See also Lewbel (2005) to whom we are indebted for very useful discussions and suggestions on this issue.

one standard deviation decrease in regulation (REG), given $LMRP$, generates a long run gain in the employment rate of .74 percentage points in France (a high $LMRP$ country) versus 1.20 percentage points when one does not correct for endogeneity. In the case of Ireland (a low $LMRP$ country) the effect is miniscule in both cases. Allowing for endogeneity and for the response of labor market regulation to product market regulation, the results in column 1 of Table 3 and 4 imply a long run increase in the employment rate of 1.34 percentage points, under the assumption that labour market regulation is low and equal to the first quartile of $LMRP$, instead of 1.95 with no correction for endogeneity. When labour market regulation is high and equal to the third quartile of $LMRP$, the employment gain following product market deregulation increases is now 4.40, instead of 5.74. In summary, these results support the conclusions reached so far concerning the sign, statistical significance, and economic importance of the interactions between product and labour market regulation., although the size is slightly smaller when potential endogeneity bias is accounted for.

6 Conclusions

In this paper, we have provided a theoretical model and a detailed empirical analysis of the effects of product market deregulation, and its interactions with labour market policy settings, on employment outcomes. Our theoretical model includes a full specification of the fall back position of the unions and allows for union bargaining power to be endogenous and to depend on the market rents that firms enjoy. This provides a suitable framework for assessing the full set of interactions between product and labour market reforms, including those working through political economy linkages that were largely ignored by the previous empirical literature. To test the predictions of our model, we use a dynamic specification of the employment rate equation, which controls for fixed effects and country-specific trends and addresses explicitly both political economy linkages between policies and their endogeneity in the employment equation.

The results confirm that product market liberalization has produced substantial employment gains in OECD countries. Hence, there is evidence that policies aimed at increasing competitive pressures not only favorably affect productivity, but can also boost aggregate employment in reforming countries. A key result of our empirical investigation is that product and labor market deregulation

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can be classified as economic substitutes as regards their effects on employment: gains from reducing barriers to entry in product markets are larger when labor market policies are tight, thereby increasing the bargaining power of workers. This is an important conclusion from a policy perspective since it implies that in situations where labor market regulation is high and introducing more flexibility may prove to be difficult politically, deregulating the product market is an attractive option because it has a more favorable effect on employment at the margin.

Another important result is that employment gains from deregulation are underestimated if the political economy linkages between product and labour market policies are ignored. Results using summary measures of labor market policies that include both employment protection and the generosity of unemployment benefits we find that domestic product market deregulation has generated a decline in the bargaining power of workers, by promoting deregulation in the labor market or an easing of bargaining institutions, as captured by a measure that includes union density and coverage. From a political economy perspective, therefore, there is some evidence that product market deregulation can be considered as complementary to labor market deregulation. An implication of this result is that in assessing the effect of product market deregulation one should consider also its indirect effects through subsequent changes in labor market policies or institutions. In other words, deregulating product markets would imply a "double dividend" in terms of employment gains in the long run. In any case, the feedbacks between labour market policies and institutions and product market regulation deserve further discussion and investigation.

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Appendix A: Derivations

The (net) profit function for the firm, Π_i, is:

$$\Pi_i = \frac{P_i}{P} L_i - \frac{W_i}{P} L_i (1 + \tau^p) \tag{A1}$$

where $\frac{P_i}{P}$ denotes the price of the firm's product relative to the aggregate price level

Union utility in excess of the disagreement point is

$$V_i - \overline{V_i} = \left(1 - \tau^L\right) \left(\frac{W_i}{P} - \frac{W_i^A}{P}\right) L_i \tag{A2}$$

where $\overline{V_i} = \frac{W_i^A}{P} N_i$. The alternative wage is:

$$\frac{W_i^A}{P} = \frac{N - L - L^g}{N} \frac{B}{P\left(1 - \tau^L\right)} + \frac{L^g}{N} \frac{W^g}{P} + \frac{L}{N} \frac{W_i^o}{P} \tag{A3}$$

where L is aggregate employment, N the labor force, assumed equal to total union membership, L^g public employment. $\frac{B}{P}$ are unemployment benefits which are untaxed. $\frac{W^g}{P}$ is the government wage and $\frac{W^o}{P}$ the wage with another private employer. We will assume a balanced budget (and no public spending on goods):

$$\frac{B}{P} \frac{N - L - L^g}{N} + \frac{L^g}{N} \frac{W^g}{P} = \left(\tau^L + \tau^p\right) \frac{L}{N} \frac{W_i}{P} + \tau^L \frac{L^g}{N} \frac{W^g}{P} \tag{A4}$$

The first order conditions yield:

$$\frac{P_i}{P} = (1 + \mu)(1 + \tau^p) \frac{W_i^A}{P} \tag{A5}$$

$$\frac{W_i}{P} = (1 + \mu\beta) \frac{W_i^A}{P} \tag{A6}$$

Using (13) and (13) and $\frac{P_i}{P} = 1$, and $\frac{W_i}{P} = \frac{W^o}{P} = \frac{W}{P}$ we can obtain (2) and (1) in the text. Using (2), the definition of the alternative wage, (A3), the assumption that private and government wages are equal, and the balanced budget condition, (A4), one can obtain an upward sloping relationship between the alternative wage and the employment rate,(3) in the text.

Appendix B: Data sources and definitions

Employment

Non-agricultural business employment rate

Definition: non-agricultural business employment as a share of the working-age population (15-64 group), in %

Source: Business employment and working-age population from OECD Analytical Database; agricultural employment and from OECD Labour Force Statistics.

Data adjustments: the share of agricultural employment in total employment in Labour Force Statistics was used to estimate an agricultural employment series consistent with the businessemployment series drawn from the OECD Analytical Database

Public employment rate

Definition: public employment as a share of the working-age population (15-64 age group), in %.

Source: OECD, Analytical Database;

Data adjustments: missing observations are obtained by linear interpolation when possible.

Product and labour market policies

Domestic Product Market Regulation

Definition: OECD summary indicator of regulatory impediments to product market competition in seven non-manufacturing industries. The data covers regulations and market conditions in seven non-manufacturing industries: gas, electricity, post (basic letter, parcel, express mail), telecommunications (fixed and mobile services), passenger air transport, railways (passenger and freight services) and road freight. Detailed qualitative and quantitative data on several dimensions of ownership, regulation and market or industry structure are coded and aggregated into synthetic indicators that are increasing in the degree of restrictions to private ownership and competition. Dimensions covered are degree of public ownership, legal impediments to competition, degree of vertical integration of natural monopoly and competitive activities in network industries, market share of incumbent or new entrants in network industries, price controls in competitive activities. The data are yearly over the 1975-2003 period and cover 21 OECD countries.

Source: Conway and Nicoletti (2006). The underlying data and the indicators are available online at www.oecd.org/eco/pmr .

Foreign direct investment restrictions

Definition: OECD summary indicator of restrictions to entry and post-entry restrictions to foreign

direct investment in business services (legal, accounting, architecture, engineering), telecommunications (fixed and mobile), construction, retail and wholesale distribution, finance (insurance and banking), hotels & restaurants, transport (air, maritime, road), electricity and manufacturing. Restrictions cover limits on foreign equity ownership, constraints on business operation and obligations to undergo screening procedures. The data are collected every 5 years over the 1980-2005 period and cover 30 OECD countries.

Source: Golub (2003) and Golub and Koyama (2006).

Data adjustments: Intermediate years are interpolated.

Average unemployment benefit replacement rate

Definition: average unemployment benefit replacement rate across two income situations (100% and 67% of APW earnings), three family situations (single, with dependent spouse, with spouse in work) and three different unemployment durations (1st year, 2nd and 3rd years, and 4th and 5th years of unemployment).

Source: OECD, Benefits and Wages Database.

Data adjustments: original data are available only for odd years. Data for even years are obtained by linear interpolation.

Tax wedges on labour use:

WEDGE1:

WEDGE1 is constructed using tax revenue data from National Accounts and includes indirect taxes. The tax wedge is calculated in two different ways depending on whether social security contributions are deductible or not from taxable income [42]:

A: If social security contributions are not not deductible:

$\tau_l = (\tau_H * W + 2100 + 2200 + \alpha * 2400 + 3000)/(\text{WSSS} + 3000)$

where:

$\alpha = W /(\text{OSPUE} + \text{PEI} + W) = $ share of labour income in household income

Tax ratio for total household income:

$\tau_H = 1100/(\text{OSPUE} + \text{PEI} + W)$

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[42] While in most countries households are able to deduct social security contributions from their taxable income, this is not always the case. Among the 20 countries in the sample, Australia, Canada, Portugal, the United Kingdom and the United States have non-deductible social security contributions. In Germany and Ireland deductions are for a flat amount.

B: If social security contributions are deductible:

$\tau_l = (\tau_H$ * (W - 2100 - α* 2400) + 2100 + 2200 + α * 2400 + 3000)/(WSSS + 3000)

$\alpha = $ (W-2100)/(OSPUE + PEI + W-2100-2300)

$\tau_H = $ 1100/(OSPUE + PEI + W - 2100 – 2300 – 2400)

In both cases the tax ratio on consumption, τ_c is expressed as follows:

$\tau_c = $ (5110 + 5121 + 5122 + 5123 + 5126 + 5128 + 5200 – 5212)/(CP + CG – CGW)

Tax ratio on labour income and consumption combined, $\tau_{lc}(WEDGE1)$:

$\tau_{lc} = \tau_l + (1 - \tau_l) * \tau_c$

Notes:

The tax revenue data are from the OECD Revenue Statistics. In particular:

• 1100 Taxes on income, profits and capital gains of individuals or households.

• 2000 Total social security contributions (2100 is paid by employees; 2200 by employers; 2300 by the self-employed and persons outside of the labour force; 2400 is unallocated).

• 3000 Taxes on payroll and workforce.

• 5110 General taxes on goods and services (5111 VAT).

• 5120 Taxes on specific goods and services (5121 excise taxes; 5122 profits of fiscal monopolies; 5123 customs and import duties; 5125 taxes on investment goods; 5126 taxes on specific services; 5128 other taxes).

• 5200 Taxes on use of goods and performances [5212 taxes on motor vehicles paid by others (i.e. other than households)].

The variables from National Accounts are:

• CP Private final consumption expenditure.

• CG Government final consumption expenditure.

• CGW Government final wage consumption expenditure.

• IG Investment by general government.

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• OSPUE Unincorporated business net income (including imputed rentals on owner-occupied housing).

• PEI Interest, dividends and investment receipts.

• W Wages and salaries of dependent employment.

• WSSS Compensation of employees (including private employers' contributions to social security and to pension funds).

• YPEPG Government interest payments.

Source: See Carey D. and J. Rabesona (2002), "Tax Ratios on Labour and Capital Income and on Consumption", OECD Economic Studies No35. Data used in the paper have been updated using the same methodology.

WEDGE2:

Definition: share of personal income tax and all social security contributions (net of social benefits) to total labour cost (wages and employers' social security contributions) and averaged over two family types (single household and a couple with a dependent spouse and two children, both family types earning 100% of an average worker income).

Source: OECD, Taxing Wages.

Employment Protection Legislation (EPL)

Definition: OECD summary indicator of the stringency for Employment Protection Legislation for:

Indefinite contract (regular) workers

Fixed-term contract (temporary) workers

All contracts (measured as a simple average of indefinite and fixed-term contracts).

Information on regular contracts include procedural inconveniences that employers face when trying to dismiss a worker; notice and several payments at different job tenures; and prevailing standards of and penalties for unfair dismissals. Information on fixed-term and temporary work agency contracts include: the objective reasons under which they can be offered; the maximum number of successive renewals; and the maximum cumulated duration of the contract. Detailed data sets were collected for end of 1980s, end of 1990s and 2003 for 30 OECD countries.

Source: OECD (2004).

Data adjustments: Less detailed information on the timing of EPL reforms was used to construct an yearly series over 1985-2003. The 1985 value was extrapolated back to 1980.

Labour market institutions

Degree of corporatism:

Definition: indicator of the degree of centralisation/co-ordination of the wage bargaining processes, which takes values 1 for decentralised and uncoordinated processes, and 2 and 3 for intermediate and high degrees of centralisation/co-ordination, respectively. The "low corporatism" dummy variable frequently used in this paper takes value 1 when bargaining is decentralised and uncoordinated and zero otherwise.

Source: OECD, Employment Outlook 2004.

Data adjustments: original data are five-year averages and classify countries in each period along a 0-5 scale from least to most "corporatist" countries. In the present paper, annual data have been reconstructed based on various sources on the timing of past changes in centralisation and/or co-ordination of wage bargaining. Furthermore, the indicator has been rescaled along a 1-3 scale. In this process, it has been assumed that wage bargaining in France predominantly occurs at the intermediate level, while original data describe it as a mix of firm-level and industry-level bargaining. For other countries, values 1, 2 and 3 correspond to values 1-2, 3 and 4-5 in the original dataset, respectively.

Union density

Definition: trade union density rate, i.e. the share of workers affiliated to a trade union, in %.

Source: OECD, Employment Outlook 2004.

Data adjustments: data for missing years are obtained by linear interpolation. Furthermore, original data are typically available until 2001 for most OECD countries. Extrapolations have therefore been made in order expand data availability up to 2003. These are mainly based on national sources but, in some cases, an assumption of unchanged union densities over the period 2001-2003 had to be made due to lack of data.

Union coverage

Definition: collective bargaining coverage rate, i.e. the share of workers covered by a collective agreement, in %. Data are available for 1980, 1990, 1995 and 2000.

Source: OECD, Employment Outlook 2004. For two countries – Greece and Ireland – data are not available from the OECD source and we have used data from Golden, Miriam; Peter Lange; and Michael Wallerstein. 2006. "Union Centralization among Advanced Industrial Societies: An Empirical Study." Dataset available at http://www.shelley.polisci.ucla.edu/. Version dated June 16, 2006. Data from this latter source are broadly comparable with those of the OECD for the other countries in our sample.

Macro-economic conditions

Output gap

Definition: OECD measure of the gap between actual and potential output as a percentage of potential output.

Source: OECD (2005) Economic Outlook 77.

Big economic crisis

Definition: Dummy variable set to 1 when output gap is larger than -4%.

Source: Dang et al. (2006).

Political institutions

Ideology left-of-centre government

Definition: Dummy variable set to 1 for when the political orientation of the government is left-of-centre. The dummy is based on an ideology variable, which is measured as a simple average of the chief executive's ideology and the average of the two main parties in the coalition (if applicable). Ideological scores were attributed as follow: 2 = right-of-centre, 1 = centre and 0 = left-of-centre. The dummy is set to 1 for when the average value of ideology is lower than 0.8.

Source: Dang et al. (2006) based on World Bank, Database of Political Institutions, 2004

Mature government

Definition: Dummy variable set to 1 for when government has been in office for more than two years.

Source: Dang et al. (2006) based on World Bank, Database of Political Institutions, 2004

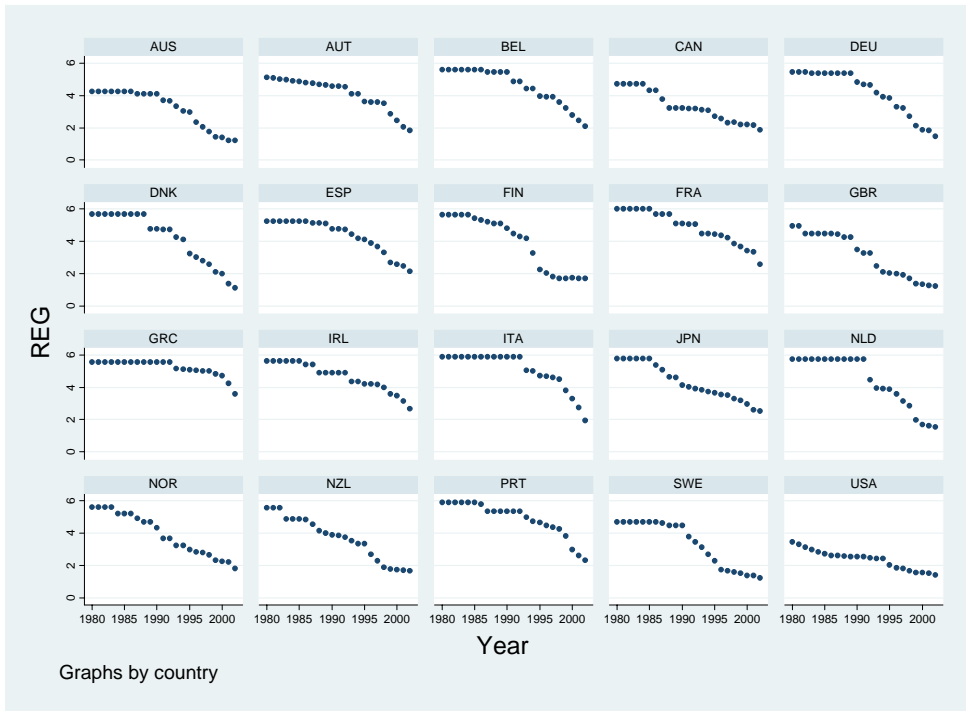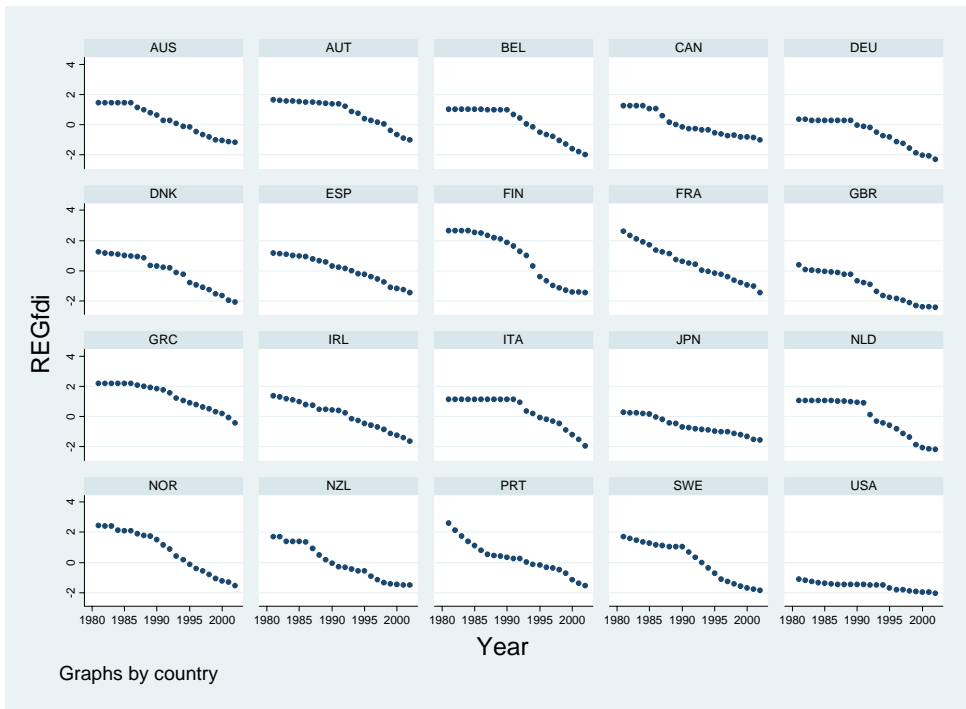Figure B1:REG (product market regulation without public ownership)

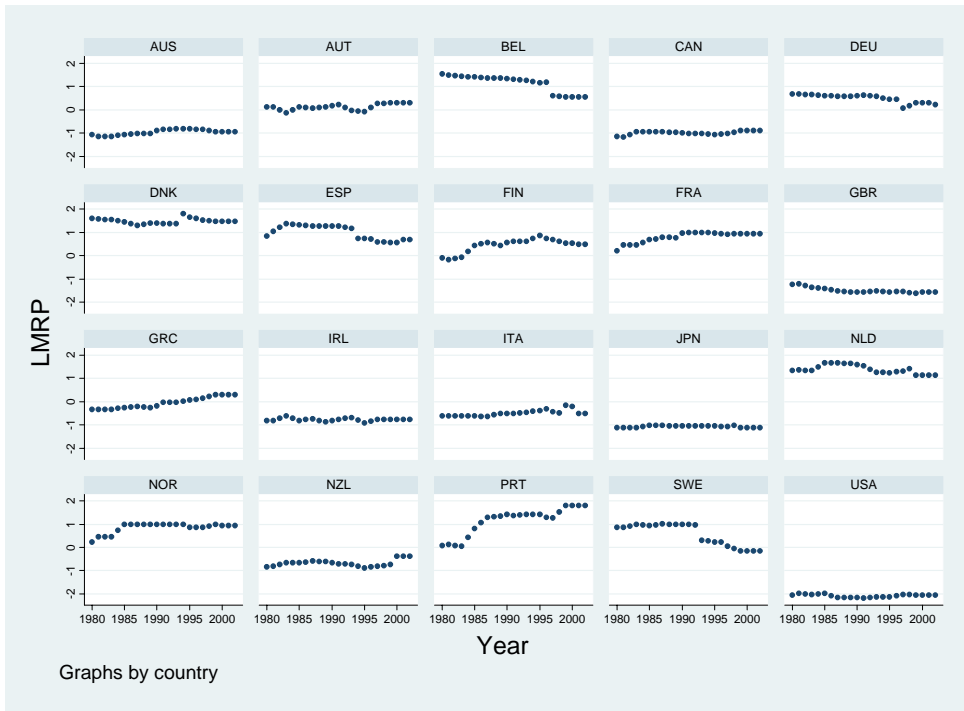Figure B2: $REGfdi$ (First PC of REG and FDI restrictions)

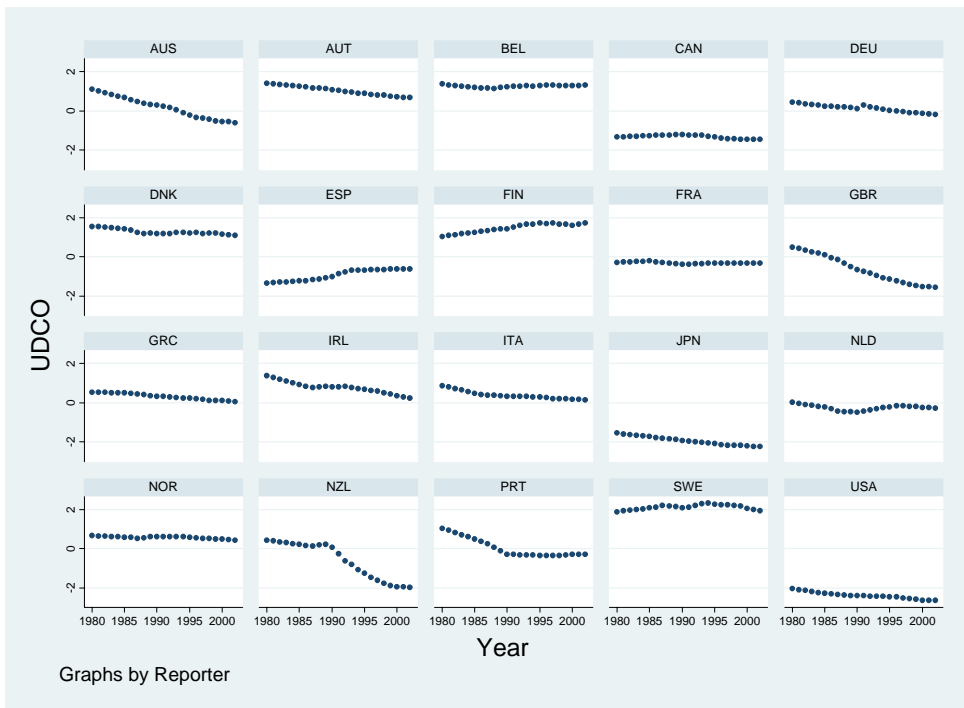Figure B3: $LMRP$ (First PC of EPL and BEN)

Figure B4: $UDCO$ (First PC of union density and coverage)

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Table 1 : Employment rate (ERB) and the interaction between product market and labor market policies

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ERB(-1)	0.648***	0.631***	0.526***	0.520***	0.659***	0.646***	0.736***	0.720***
	(32.79)	(32.82)	(16.05)	(16.01)	(33.01)	(32.80)	(41.21)	(39.89)
*ERB(-1)*LMRP*	0.0631***	0.0725***			0.0534***	0.0619***	0.0294**	0.0420***
	(4.69)	(5.53)			(3.87)	(4.50)	(2.14)	(3.41)
LMRP	-2.687***	-3.054***			-2.290***	-2.626***	-1.456**	-1.978***
	(-4.11)	(-4.83)			(-3.45)	(-4.00)	(-2.24)	(-3.30)
REG	-0.228***		-0.248***		-0.189**		-0.113	
	(-2.68)		(-2.71)		(-2.20)		(-1.34)	
*REG*LMRP*	-0.159**				-0.162**		0.0443	
	(-2.23)				(-2.30)		(1.07)	
REGfdi		-0.442***		-0.401***		-0.331***		-0.167
		(-3.94)		(-3.41)		(-2.93)		(-1.63)
*REGfdi*LMRP*		-0.236***				-0.259***		0.121**
		(-2.75)				(-3.00)		(2.54)
REGpo	0.155*	0.237***	0.128	0.210**	0.134	0.200**	0.152*	0.155*
	(1.78)	(2.62)	(1.48)	(2.35)	(1.57)	(2.25)	(1.86)	(1.79)
UDCO	-1.607***	-1.579***	-1.313***	-1.294***	-1.776***	-1.722***	0.0676	0.165
	(-4.96)	(-5.18)	(-4.02)	(-4.11)	(-5.90)	(-5.84)	(0.33)	(0.83)
WEDGE1(-1)	-0.0525***	-0.0620***	-0.0563***	-0.0647***			-0.00287	-0.0191
	(-2.70)	(-3.16)	(-2.97)	(-3.27)			(-0.18)	(-1.19)
WEDGE2					0.0117	0.00720		
					(0.78)	(0.49)		
GAP	0.306***	0.312***	0.299***	0.304***	0.310***	0.311***	0.271***	0.286***
	(21.64)	(22.63)	(20.98)	(21.77)	(21.89)	(22.21)	(17.85)	(19.06)
EGRM	-0.00925	-0.0533	-0.0895	-0.119	-0.00555	-0.0380	-0.262***	-0.319***
	(-0.11)	(-0.67)	(-1.15)	(-1.53)	(-0.07)	(-0.48)	(-5.70)	(-7.00)
HGCORP	-0.192	-0.140	-0.188	-0.0940	-0.286	-0.276	0.866***	0.898***
	(-0.53)	(-0.49)	(-0.52)	(-0.31)	(-0.82)	(-1.00)	(3.05)	(3.51)
LLCORP	0.431	0.478	0.399	0.431	0.298	0.316	0.881***	0.711***
	(1.16)	(1.64)	(1.00)	(1.30)	(0.84)	(1.15)	(3.08)	(2.68)
*ERB(-1)*EPL*			0.0601***	0.0610***				
			(4.90)	(4.97)				
EPL			-2.454***	-2.466***				
			(-4.18)	(-4.13)				
BEN			-0.00210	0.00685				
			(-0.16)	(0.48)				
*REG*EPL*			0.0346					
			(0.45)					
*REG*BEN*			-0.0113**					
			(-2.40)					
*REGfdi*EPL*				0.0394				
				(0.40)				
*REGfdi*BEN*				-0.0115**				
				(-2.04)				
No. obs.	460	440	460	440	460	440	460	440

t statistics in parentheses. * p<0.10, ** p<0.05 and *** p<0.01 where p is the marginal probability level. Estimation method: feasible GLS. The error follows an AR(1) structure with a country specific rho. All the equations include country-specific constants and trends, year effects , a Finland dummy (1991-2002) and a Germany dummy (1991-2002). Sample period 1980-2002.

Table 2 : Employment rate (ERB) and the interaction between product market policies and labor market policies and institutions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ERB(-1)	0.645***	0.627***	0.655***	0.641***	0.645***	0.629***	0.656***	0.644***
	(32.06)	(31.73)	(32.73)	(32.15)	(31.97)	(31.80)	(32.69)	(32.24)
ERB(-1)*LMRP	0.0640***	0.0753***	0.0533***	0.0647***	0.0636***	0.0711***	0.0513***	0.0605***
	(4.77)	(5.73)	(3.91)	(4.72)	(4.69)	(5.35)	(3.74)	(4.38)
LMRP	-2.771***	-3.186***	-2.347***	-2.778***	-2.759***	-2.979***	-2.258***	-2.555***
	(-4.25)	(-5.00)	(-3.57)	(-4.23)	(-4.19)	(-4.63)	(-3.41)	(-3.86)
REG	-0.226***		-0.200**		-0.235***		-0.202**	
	(-2.66)		(-2.35)		(-2.78)		(-2.40)	
REG*LMRP	-0.172**		-0.179**		-0.155**		-0.160**	
	(-2.41)		(-2.53)		(-2.13)		(-2.21)	
REG*UDCO	0.0693		0.0934*		0.0531		0.0750	
	(1.30)		(1.80)		(0.97)		(1.40)	
REGfdi		-0.466***		-0.374***		-0.488***		-0.400***
		(-4.07)		(-3.19)		(-4.27)		(-3.43)
REGfdi*LMRP		-0.264***		-0.297***		-0.240***		-0.271***
		(-2.97)		(-3.31)		(-2.63)		(-2.97)
REGfdi*UDCO		0.0560		0.0837		0.0231		0.0459
		(0.77)		(1.13)		(0.31)		(0.60)
REGpo	0.139	0.247***	0.116	0.212**	0.178**	0.281***	0.153*	0.247***
	(1.60)	(2.73)	(1.38)	(2.38)	(1.96)	(3.02)	(1.75)	(2.69)
UDCO	-1.550***	-1.608***	-1.685***	-1.745***	-1.419**	-1.178**	-1.339**	-1.141**
	(-4.76)	(-5.31)	(-5.57)	(-5.93)	(-2.39)	(-2.15)	(-2.32)	(-2.11)
WEDGE1(-1)	-0.0496**	-0.0628***			-0.0479**	-0.0587***		
	(-2.54)	(-3.21)			(-2.43)	(-2.99)		
WEDGE2			0.0180	0.0110			0.0199	0.0107
			(1.18)	(0.73)			(1.30)	(0.71)
GAP	0.308***	0.314***	0.313***	0.314***	0.308***	0.312***	0.312***	0.311***
	(21.75)	(22.70)	(22.21)	(22.30)	(21.73)	(22.60)	(22.21)	(22.17)
EGRM	-0.0195	-0.0575	-0.0256	-0.0497	-0.0217	-0.0727	-0.0355	-0.0737
	(-0.24)	(-0.70)	(-0.33)	(-0.61)	(-0.26)	(-0.89)	(-0.45)	(-0.90)
HGCORP	-0.197	-0.155	-0.297	-0.297	-0.349	-0.00923	-0.318	0.00346
	(-0.54)	(-0.54)	(-0.85)	(-1.08)	(-0.68)	(-0.02)	(-0.63)	(0.01)
LLCORP	0.473	0.501*	0.364	0.347	0.535	0.880*	0.577	0.886*
	(1.27)	(1.71)	(1.03)	(1.27)	(0.97)	(1.66)	(1.08)	(1.70)
No. obs.	460	440	460	440	460	440	460	440

t statistics in parentheses. * p<0.10, ** p<0.05 and *** p<0.01 where p is the marginal probability level. Estimation method: feasible GLS. The error follows an AR(1) structure with a country specific rho. All the equations include country-specific constants and trends, year effects , a Finland dummy (1991-2002) and a Germany dummy (1991-2002). Sample period 1980-2002.

Table 3: Determinants of labor and product market policies and institutions

dep. var.	(1) LMRP	(2) REG	(3) LMRP	(4) REGfdi	(5) LMRP	(6) LMRP	(7) REG	(8) REGfdi	(9) UDCO	(10) UDCO
LMRP(-1)	0.910***	-0.0359	0.930***	-0.00545	0.900***	0.917***	-0.0768	-0.0322	0.0102	0.0151
	(19.05)	(-0.41)	(18.98)	(-0.11)	(18.86)	(18.64)	(-0.87)	(-0.64)	(0.84)	(1.13)
LMRP(-2)	-0.208***	0.0436	-0.250***	0.00699	-0.201***	-0.242***	0.0761	0.0287	-0.00980	-0.0180
	(-4.60)	(0.53)	(-5.34)	(0.15)	(-4.46)	(-5.19)	(0.92)	(0.61)	(-0.84)	(-1.40)
REG(-1)	0.00652	0.977***			0.00395		0.961***		0.000372	
	(0.40)	(21.06)			(0.25)		(20.69)		(0.07)	
REG(-2)	0.0270	-0.206***			0.0228		-0.193***		0.00470	
	(1.63)	(-4.27)			(1.40)		(-4.00)		(0.88)	
REGfdi(-1)			-0.00121	1.137***		-0.0138		1.095***		-0.0120
			(-0.04)	(24.79)		(-0.51)		(23.65)		(-1.27)
REGfdi(-2)			0.0194	-0.337***		0.0207		-0.297***		0.0281***
			(0.73)	(-7.61)		(0.79)		(-6.69)		(3.04)
UDCO(-1)					0.0464	0.0545	0.0536	0.0414	1.473***	1.381***
					(0.52)	(0.61)	(0.25)	(0.33)	(38.80)	(33.07)
UDCO(-2)					-0.132	-0.142	-0.235	-0.229*	-0.608***	-0.531***
					(-1.50)	(-1.58)	(-1.07)	(-1.81)	(-16.39)	(-12.91)
BIGCRISIS	0.0173*	-0.000806	0.0173	0.0193	0.0210**	0.0208*	0.00789	0.0245	-0.00266	-0.00184
	(1.68)	(-0.03)	(1.63)	(1.29)	(2.02)	(1.95)	(0.29)	(1.61)	(-0.71)	(-0.48)
BIGCRISIS(-1)	0.00147	-0.0776***	0.00170	-0.0282*	0.00373	0.00409	-0.0774***	-0.0293**	-0.00818**	-0.00973***
	(0.14)	(-3.02)	(0.16)	(-1.96)	(0.36)	(0.39)	(-2.96)	(-2.00)	(-2.23)	(-2.59)
LEFT(-1)	0.0117*	0.0193	0.0119*	0.00137	0.0141**	0.0146**	0.0242	0.00598	0.000373	-0.000168
	(1.71)	(1.13)	(1.68)	(0.14)	(2.07)	(2.10)	(1.36)	(0.58)	(0.18)	(-0.07)
OGOV	0.00539	-0.0358**	0.00719	-0.0167**	0.00497	0.00737	-0.0364**	-0.0169**	-0.000133	-0.0000381
	(0.90)	(-2.35)	(1.18)	(-1.96)	(0.84)	(1.22)	(-2.39)	(-2.02)	(-0.07)	(-0.02)
No. obs.	420	440	400	420	420	400	440	420	420	400
joint sign. REG	0.00811				0.0421				0.221	
sign. sum REG	0.00229				0.0140				0.0869	
joint sign. REGfdi			0.410			0.699				0.0000146
sign.sum REGfdi			0.209			0.640				0.0000466
joint sign. LMRP		0.868		0.990			0.635	0.801	0.675	0.377
sign. sum LMRP		0.895		0.965			0.991	0.916	0.954	0.737
joint sign. UDCO					0.0488	0.0589	0.108	0.00145		
sign. sum UDCO					0.0271	0.0334	0.0424	0.000551		

t statistics in parentheses. * p<0.10, ** p<0.05 and *** p<0.01 where p is the marginal probability level. Estimation method: feasible GLS. The error follows an AR(1) structure with a country specific rho in columns 2,4,7, 8 , 9 and 10. All the equations include country specific constants and trends and year effects. Sample period 1980-2002. p-values are reported for the Granger causality tests (joint sign. *X)* and for the tests of significance of the sum of the coefficients (sign. sum *X*).

Table 4: Testing and correcting for endogeneity in the employment rate equation

	(1)	(2)	(3)	(4)
ERB(-1)	0.608***	0.585***	0.621***	0.594***
	(29.55)	(28.21)	(30.22)	(28.68)
*ERB(-1)*LMRP*	0.0598***	0.0439***	0.0506***	0.0357**
	(3.83)	(2.73)	(3.22)	(2.22)
LMRP	-2.954***	-2.003**	-2.527***	-1.625**
	(-3.94)	(-2.55)	(-3.34)	(-2.08)
REG	-0.118		-0.106	
	(-1.16)		(-1.04)	
*REG*LMRP*	-0.165**		-0.200**	
	(-2.06)		(-2.51)	
REGfdi		-0.312**		-0.248*
		(-2.33)		(-1.88)
*REGfdi*LMRP*		-0.312***		-0.330***
		(-2.88)		(-3.07)
REGpo	0.0976	0.118	0.101	0.120
	(1.27)	(1.54)	(1.33)	(1.56)
UDCO	-1.087***	-1.460***	-1.301***	-1.630***
	(-3.39)	(-4.04)	(-4.19)	(-4.61)
WEDGE1(-1)	-0.0445**	-0.0336		
	(-2.28)	(-1.64)		
WEDGE2			0.00858	0.00649
			(0.51)	(0.38)
GAP	0.363***	0.351***	0.363***	0.350***
	(21.89)	(19.61)	(22.07)	(19.75)
EGRM	-0.0922	-0.0656	-0.0774	-0.0541
	(-1.11)	(-0.76)	(-0.95)	(-0.63)
LLCORP	0.417*	0.481*	0.253	0.379*
	(1.66)	(1.94)	(1.08)	(1.67)
HGCORP	-0.272	-0.189	-0.394*	-0.307
	(-1.12)	(-0.78)	(-1.68)	(-1.35)
No. obs.	400	380	400	380
Endogeneity test	0.000855	0.0269	0.00292	0.0412

t statistics in parentheses. * p<0.10, ** p<0.05 and *** p<0.01 where p is the marginal
probability level. Estimates obtained by Control Function Approach. Standard Errors
have been corrected. Endogeneity test: p-values reported. Variables treated as andogenous:
LMRP, REG, REGfdi, UDCO and *GAP* . In columns (3) and (4) also *WEDGE2* is considered
endogenous.The error follows a country-specific AR(1) structure. All the equations include
country-specific constants and trends, year effects, a Finland dummy (1991-2002) and a
Germany dummy (1991-2002).Sample period 1980-2002