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## Labour Market Institutions and Employment Thresholds. An International Comparison

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Ifo Working Paper No. 15

August 2005

An electronic version of the paper may be downloaded from the Ifo website: [www.ifo.de](http://www.ifo.de)

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### Abstract

This paper deals with the effects to labour market institutions on labour market performance. We analyse the employment threshold (the minimum growth rate necessary to keep employment constant) which is an indicator for the labour intensity of production. We show for 17 OECD countries for the period 1971 to 2002 that the strictness of employment protection, the extent of wage bargaining co-ordination and the tax wedge reduce the labour intensity of production and raise the employment threshold.

JEL Code: J23, E24, J50.

Keywords: Employment protection, labour market institutions, labour demand, international comparison.

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## 1 Introduction

Labour market institutions play a key role in explaining international differences in labour market performance. The most important labour market institutions considered in previous research are the unemployment benefit system, the system of wage determination (wage bargaining co-ordination, union density, collective bargaining coverage), labour taxes and employment protection.

There are a great number of studies which explore the implications of institutions for the unemployment rate (see Nickell 1997, Blanchard/Wolfers 2000, Nickell/Layard 1999, Berthold/Fehn 2002, Nickell/Nunziata/Ochel 2005). Although the results are still somewhat mixed (OECD 2004), there seems to emerge a consensus that labour market institutions are an important determinant of unemployment. For instance, Nickell/Nunziata/Ochel (2005) report that shifts in labour market institutions explain a great part of movements in unemployment across OECD countries. Employment protection, labour taxes and the unemployment benefit system increases unemployment and especially unemployment persistence.

The unemployment rate is only one among a greater list of indicators of labour market performance. In a study for 60 countries, Caballero et al. (2004) find that job security regulation reduces the speed of adjustment of employment to shocks and the growth rate of total factor productivity. The results in Gomez-Salvador, Messina and Vallanti (2004) show that the strictness of employment protection, the extent of wage bargaining co-ordination and the generosity of unemployment benefits have a negative effect on job creation and the pace of job reallocation. Messina (2004) finds that more unionized and coordinated wage-setting structures as well as employment protection imply a lower employment share in the service industry.

In the following we analyse the effects of labour market institutions on the labour intensity of production. To be concrete, we use the concept of the employment threshold as the variable to be explained. The employment threshold represents the growth rate of production which is necessary for keeping employment constant. We show how this concept is related to the elasticities of labour demand and to the development of input prices and how various labour market institutions may affect it. If a specific regulation increases the employment threshold, a country needs a higher growth rate in order to keep employment constant. This increases the likelihood of a weak employment performance and of a higher unemployment rate.

The paper is organised as follows. In section 2 we discuss the theoretical foundations of the concept of the employment threshold. In section 3 we present the empirical model for the estimation of the employment thresholds and the empirical analysis of the effects of different labour market institutions. Section 4 summarises and draws some conclusions

## 2 Theoretical foundations

### 2.1 Labour demand and the employment threshold

In the following we assume that output  $y$  is produced by employing the input factors labour  $L$  and capital  $K$ . If firms minimize their production costs at given input prices and for a given level of output, there exists under weak assumptions with regard to production technology a dual cost function (see e.g. McFadden, 1976, or Chambers, 1988):

$$(1) \quad C = C(l, q, y, T),$$

where  $C$  indicates the minimum costs of producing output  $y$  at the wage rate  $l$  and the user cost of capital  $q$ . The variable  $T$  represents the state of technology. In order to be able to represent all economically relevant information of the underlying technology, the cost function must meet certain regularity conditions:  $C$  must be increasing in  $l, q$  and  $y$  and has to be concave and linearly homogenous in  $l$  and  $q$ .

The demand for labour is derived via Shephard's Lemma:

$$(2) \quad L(l, q, y, T) = \frac{\partial C}{\partial l}.$$

After totally differentiating equation (2) with respect to time and some manipulations we get the growth rate of labour input:

$$(3) \quad w_L = \varepsilon_{L,l} w_{l/q} + \varepsilon_{L,y} w_y + \varepsilon_{L,T} w_T,$$

where  $w_x$  denotes the growth rate of variable  $x$  and  $\varepsilon_{L,l}$ ,  $\varepsilon_{L,y}$  and  $\varepsilon_{L,T}$  are the elasticities of labour demand with respect to the wage rate, output and the state of technology, respectively.

The employment threshold is defined as the growth rate of output which is necessary to keep employment constant. By setting  $w_L$  in equation (3) equal to zero and solving for  $w_y$ , we get the employment threshold  $w_y^{ET}$ :

$$(4) \quad w_y^{ET} = -(\varepsilon_{L,l} w_{l/q} + \varepsilon_{L,T} w_T) / \varepsilon_{L,y}.$$

Since  $\varepsilon_{L,l}$  is negative, a higher growth rate of the relative wage ( $l/q$ ) leads to an increase of the employment threshold. A higher pace of technical progress increases the employment threshold since  $\varepsilon_{L,T}$  is typically negative in a cost minimising approach.

## 2.2 Effects of labour market institutions on the employment threshold

As can be seen from equation (4), the effects of labour market institutions on labour demand and the employment threshold can work via different channels. The first channel concerns the effects on growth rates, the second channel on the elasticities. For example, tighter employment protection may deteriorate the flexibility of an economy and may thus lower the growth rate of total factor productivity (Caballero et al. 2004). This would decrease the employment threshold by reducing  $w_T$ . But it should be kept in mind that  $\varepsilon_{L,T} w_T$  not only captures total factor productivity growth but also the effect of biased technical change. A higher wage rate induced by a higher employment protection of insiders may lead to a technology-driven reduction in labour demand (increasing the absolute value of  $\varepsilon_{L,T}$ ) which increases the employment threshold. In addition, a tighter employment protection reduces probably the elasticity of labour demand with respect to output and therefore increases the employment threshold. For all these reasons we expect that a more stringent employment protection increases the employment threshold. Similar reasoning applies for other labour market institutions.

## 3 Empirical results

### 3.1 The employment threshold across countries and over time

Since we do not have international comparable data for the user costs of capital, we do not estimate the structural labour demand equation (3), but a reduced form where we treat the sum of  $\varepsilon_{L,l} w_{l/q}$  and  $\varepsilon_{L,T} w_T$  as an unobserved variable. Under this assumption we get the following estimation equation:

$$(5) \quad w_{L,t} = \beta_{1,t} + \beta_{2,t} w_{y,t} + u_t .$$

The possibly time-varying parameters  $\beta_{1,t}$  and  $\beta_{2,t}$  are defined as  $\beta_{1,t} = \varepsilon_{L,l} w_{l/q} + \varepsilon_{L,T} w_T$  and  $\beta_{2,t} = \varepsilon_{L,y}$ . The variable  $u_t$  is a white noise error term. The employment threshold defined in equation (4) is now given by the expression  $-\beta_{1,t}/\beta_{2,t}$ .

For the specification of  $\beta_1$  and  $\beta_2$  we choose a second order random walk:

$$(6) \quad (1-L)^2 \beta_{i,t} = v_{i,t}$$

with  $L$  as the lag operator. Second order random walks can accommodate complex time series properties of variables but nevertheless produce “smooth” curves. Preliminary tests showed that  $\beta_2$  varies between countries but is constant or almost constant over time within a country. In our

final model for which we present the results below,  $\beta_2$  is therefore modelled as a constant parameter.

The model (equations (5) and (6)) is set in a state-space-form and is estimated by maximum likelihood using the Kalman filter (for details on the Kalman filter see Harvey 1989).

We estimate the model for 17 OECD countries (see table 1), using yearly data from 1971 to 2002. The dependent variable is the growth rate of labour input in the private sector. Labour input is measured as total hours worked. The explanatory variable is the growth rate of real value added in the private sector (Source for both variables: OECD, Economic Outlook). Production and employment in the public sector are not included. The data for Germany refer to West Germany until 1990 and to unified Germany from 1991 onwards. In order to eliminate the “outlier” in the growth rates for 1991, we include a dummy variable, which takes the value one in 1991 and zero in all other years.

In table 1, we present the average values of the estimated employment thresholds in the private sector in the 17 countries for different time periods. In most countries, the employment threshold declined during the sample period. The (unweighted) mean of the employment thresholds was 3.9 % during the seventies, 2.4 % during the eighties and 1.5 % in the years after 1990. In Germany, Japan and the USA the employment thresholds increased by about 1 percentage point from the eighties to the nineties. It should be noted that, compared with the first two countries, the employment threshold is still relatively low in the USA. It is remarkable that especially in the continental European countries the employment threshold is relatively high, compared with Australia, Canada, Sweden, the UK and the United States. A very special case is New Zealand: The employment threshold is in many years negative. During the nineties the labour volume would have increased even in a recession.

**Table 1: Employment thresholds in OECD countries**

Country	Period			1971-2002
	1971-1980	1981-1990	1991-2002	
Aus	0.014	0.012	0.011	0.012
Bel	0.060	0.039	0.015	0.036
Can	0.017	0.010	0.013	0.013
Dnk	0.046	0.025	0.023	0.030
Fin	0.042	0.038	0.033	0.037
Fra	0.047	0.035	0.022	0.034
Ger	0.054	0.016	0.024	0.031
Ire	0.065	0.039	0.010	0.036
Ita	0.066	0.022	0.013	0.033
Jpn	0.040	0.021	0.033	0.032
Nld	0.042	0.030	0.016	0.028
Nzl	-0.014	0.016	-0.040	-0.014
Nor	0.061	0.027	0.028	0.038
Esp	0.047	0.030	0.012	0.028
Swe	0.034	0.021	0.020	0.024
UK	0.034	0.023	0.016	0.024
Usa	0.014	0.005	0.015	0.011
Total	0.039	0.024	0.015	0.026

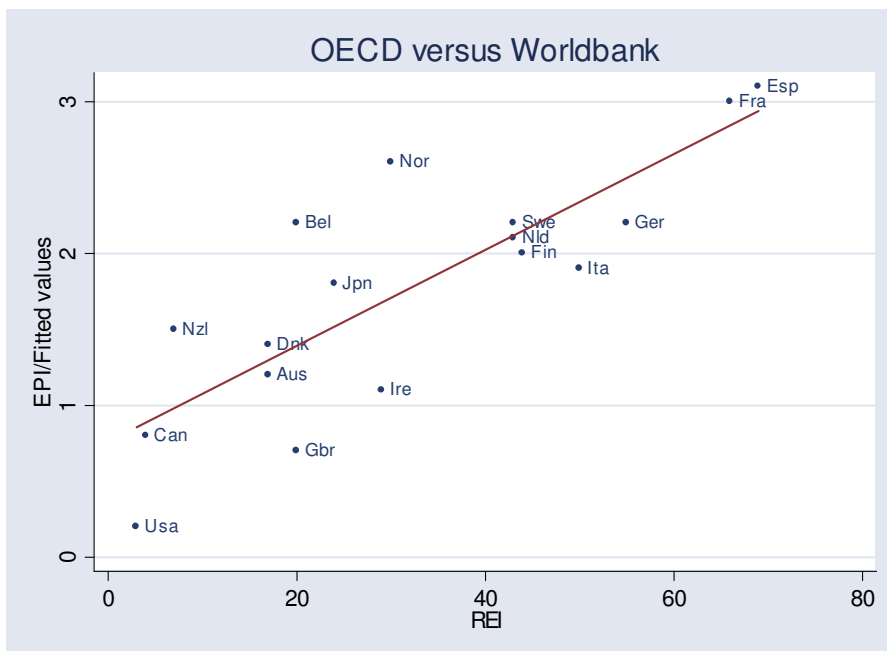
### 3.2 The effects of labour market institutions on the employment threshold

In this study we concentrate our interest on the effects of employment protection, labour taxes (measured by the tax wedge), union density and the degree of co-ordination in wage negotiations on the employment threshold.

Every country in the world has established a complex system of laws and institutions (so-called “case law” and collective agreements) intended to protect the interests of workers. We use the Employment Protection Index (EP) from the Labour Market Institutions Database of Nickell and Nunziata (2001). This series was built chaining OECD data (Employment Protection Legislation Index Version I) with data from Lazear (1990). For the recent years we use the information of Nickell (2003) and the OECD (2004) by linearly interpolating the missing years and connecting with the series of the just mentioned database. The variable in the range  $\{0, 2\}$  is increasing with the strictness of employment protection. Table A1 in the Appendix shows the means of EP for different periods in the sample countries.

The OECD indicator takes into account regulations concerning individual dismissals, collective dismissals and the temporary employment forms such as fixed-term employment and the supply of labour by temporary work agencies. Although the OECD has elaborated, with the country ranking, the most highly differentiated evaluation scheme made so far, there are still some restrictions with regard to the reliability of the indicators. For example, one difficult problem is the weighting of the evaluated aspects of regulation. Therefore, we compare EP with another index of employment regulation, recently introduced by the World Bank (2005). The Rigidity of Employment Index (REI) of the World Bank for the year 2004 is based on a detailed study of employment laws and regulations, as well as relevant constitutional provisions. This index takes into consideration information about hiring and firing of workers and the rigidity of working hours. In figure 1 we compare the World Bank index for the year 2004 with the OECD index (EPI) for the year 2003. Both institutions assess the regulations of the employment protection very similar in the different countries. The rank correlation coefficient between the two variables is 0.79 and is highly significant .

**Figure 1: The World Bank and the OECD indices of Employment Protection**



We take the tax wedge (TW), union density (UDNET) and the co-ordination index (COW) from Nickell (2001, 2003). Table A2 in the Appendix contains the minima, maxima and the means of these variables. TW (in decimal notations) measures the total tax rate on labour and contains payroll taxes, income taxes and consumption taxes. UDNET is calculated as the percentage of employees who are union members. Another aspect of wage bargaining is the extent to which bargaining is coordinated. COW is an index with range  $\{-1,1\}$  constructed as an interpolation of OECD data by



Nickell. It is increasing in the degree of co-ordination in the bargaining process on the employers' as well as on the unions' side.

Table 2 presents the results for the estimation period 1971 to 2000. The dependent variable is the estimated employment threshold. Explanatory variables are the employment protection index (EP), union density (UDNET), the tax wedge (TW), the wage bargaining co-ordination index COW and COW squared (COW2). The reason for including COW2 is that labour market performance may not be a monotonic but a U-shaped or hump-shaped function of the co-ordination index. (see, e.g., Calmfors/Driffill 1988).

Model 1 and model 2 are estimated by OLS. The two models differ with respect to the modelling of time effects. Model 1 includes a linear time trend, model 2 includes time dummies for each year. Models 3 and 4 allow for country-specific variances of the error term and are estimated by GLS.

**Table 2: Basic model. 1971-2000**

Variable	Model 1	Model 2	Model 3	Model 4
EP	0.0074 (3.4)	0.0094 (4.5)	0.0064 (5.2)	0.0094 (6.4)
UDNET	-0.0051 (1.2)	-0.0007 (0.2)	-0.0012 (0.6)	0.0026 (1.1)
TW	0.0198 (2.6)	0.0146 (2.0)	0.0221 (6.0)	0.0117 (2.5)
COW	0.0050 (3.1)	0.0036 (2.3)	0.0030 (3.3)	0.0022 (2.1)
COW 2	0.0005 (0.3)	0.0001 (0.1)	-0.0012 (1.1)	-0.0018 (1.5)
Trend	-0.0011 (12.7)	time dummies	-0.0012 (26.6)	time dummies

Note: Absolute t-values in parentheses

In all specifications, the employment protection index exerts a highly significant positive effect on the employment threshold. An increase in the EP index by one point increases the employment threshold by 0.94 percentage points (Models 2 und 4 with time dummies). During the period 1992 to 2002 Germany had on average an employment threshold of 2.4 %, whereas the actual output growth rate in the business sector during this period was only 1.7 %. If there were a regime with an employment protection comparable to the UK, the employment threshold would be only 1.5 %. The tax wedge TW and the degree of co-ordination COW increase the employment threshold. COW squared is insignificant. This implies that co-ordination has a monotonically increasing effect on the threshold. If in Germany there were a regime with a degree of co-ordination comparable to the UK, the employment threshold would be lower by half a percentage point. The effect of union density UDNET is always insignificant.

The reason for the insignificance of UDNET may be that not union density per se but the coverage of workers by collective bargaining provisions is the more important factor. In some countries there are extremely large differences between these two variables. For example, in France the union density was about 10 percent in the last decade, but the coverage by collective bargaining provisions is assessed to be about 90 percent. In sectoral bargaining systems employer behaviour combined with administrative governance of collective contracts may be more important for the coverage rates than union membership (OECD, 2004). In the following we estimate an extended model containing additionally an indicator of collective bargaining coverage. We use the Collective Bargaining Coverage Index (CBC), which stems from the OECD (2004). Unfortunately, we do have information on CBC only for the years 1980, 1990 and 2000. Therefore, we neglect the data for the seventies and interpolate CBC for the remaining years. Consequently, we have only 307 observations instead of 476 in the basic model.

Table 3 presents the results when we add CBC to the explanatory variables.

**Table 3: Extended model (with CBC), 1980-2000**

Variable	Model 1	Model 2	Model 3	Model 4
EP	0.0064 (2.6)	0.0064 (2.5)	0.0065 (3.9)	0.0068 (3.8)
UDNET	-0.0010 (0.3)	-0.0008 (0.2)	-0.0009 (0.4)	-0.0009 (0.3)
TW	0.0164 (2.0)	0.0152 (1.8)	0.0169 (2.6)	0.0173 (2.5)
COW	0.0033 (2.1)	0.0030 (1.9)	0.0023 (2.1)	0.0020 (1.7)
COW 2	0.0012 (0.5)	0.0008 (0.4)	-0.0031 (2.1)	-0.0027 (1.7)
CBC	0.0000 (0.0)	0.0000 (0.1)	-0.0000 (0.7)	-0.0000 (0.9)
Trend	-0.0003 (2.6)	time dummies	-0.0003 (3.8)	time dummies

Note: Absolute t-values in parentheses

It seems that the indicator for collective bargaining coverage has no effect on the employment threshold. The most important institutional factors for explaining the development of the employment threshold in the different countries over time are employment protection, the tax wedge and the wage bargaining co-ordination.

#### 4 Summary and Conclusions

The employment threshold seems to be a useful concept for analysing the effects of factor prices (see Flaig/Rottmann 2001) and labour market institutions on employment. In this paper we have shown that the employment threshold is not only a possibly time-varying parameter but also depends on labour market institutions. A more restrictive employment protection, a higher tax wedge

and a higher extent of wage bargaining co-ordination all lead to a less labour-intensive production and require a higher growth rate of output in order to keep employment constant. The economic reasons for these effects are the induced pressure on wages and higher direct costs of using labour instead of capital and other factors as production inputs.

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## Appendix

**Table A1: Means of EP**

Country	Periods			Total
	1971-80	1981-90	1991-2002	
Aus	0.50	0.50	0.50	0.50
Bel	1.59	1.58	1.18	1.44
Can	0.39	0.39	0.39	0.39
Dnk	1.20	1.18	0.83	1.06
Fin	1.20	1.19	1.04	1.14
Fra	1.13	1.31	1.43	1.30
Ger	1.60	1.63	1.36	1.52
Ire	0.40	0.50	0.53	0.48
Ita	1.72	1.71	1.38	1.60
Jpn	1.17	1.17	1.15	1.16
Nld	1.35	1.34	1.18	1.28
Nzl	0.88	0.88	0.98	0.92
Nor	1.55	1.54	1.35	1.47
Esp	1.99	1.88	1.56	1.80
Swe	1.22	1.76	1.26	1.40
UK	0.38	0.42	0.43	0.41
Usa	0.10	0.10	0.10	0.10
Total	1.08	1.12	0.98	1.06

**Table A2: Descriptive Statistics**

Variable		min	mean	max
EP		0.10	1.06	2.00
Udnet		0.09	0.43	0.91
TW		0.24	0.50	0.83
Cow		-1.00	0.10	1.00
CBC		14.00	65.21	90.00

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