LABOUR MARKET INSTITUTIONS AND THE EMPLOYMENT INTENSITY OF OUTPUT GROWTH. AN INTERNATIONAL COMPARISON

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Abstract

This paper deals with the effects of labour market institutions on labour market performance. We analyse as an indicator for the labour intensity of output growth the employment threshold (the minimum growth rate of output necessary to keep employment constant). We show for a sample of 17 OECD countries for the period 1971 to 2002 that the strictness of employment protection raises the employment threshold in all econometric specifications. A higher wage bargaining coordination and a higher tax wedge reduce also the labour intensity of production, although the effects are not significant in all econometric specifications.

JEL Code: J23, E24, J50.

Keywords: employment protection, labour market institutions, labour demand, international comparison, employment threshold.

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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 and active labour market policy, the system of wage determination (wage bargaining co-ordination, union density, collective bargaining coverage), labour taxes including contributions to the social security system and employment protection (see Nickell/Nunziata/Ochel 2005).

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, Bertola/Blau/Kahn 2001, Berthold/Fehn 2002, Nickell 2003, Belot/van Ours 2004, Griffith/Harrison/Macartney 2007). 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 (2003) reports 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 lowers 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 that is the most expanding sector in modern economies.

In the following, we analyse the effects of labour market institutions on the labour intensity of output growth. 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) $C = C(l,\ q,\ y,\ T)$,

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

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

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

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. It should be stressed that all elasticities are typically not constant and depend on output, factor prices and technology (for a more intensive discussion of these topics see Flaig/Rottmann, 2001). Thus, they are varying over time and across countries.

The employment threshold is defined as the growth rate of output which is necessary to keep employment constant (Flaig/Rottmann, 2001). By setting w_L in equation (3) equal to zero and solving for w_y , we get the employment threshold w_y^{ET} :

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

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 of input prices, 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. However, 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, the magnitude and even the sign of the effect of a more stringent employment protection on the employment threshold is theoretically unclear. In the end, this is an empirical question.

Similar reasoning applies for other labour market institutions. Institutions may affect factor prices, elasticities of labour demand, adjustment costs and the growth rate and the bias of technical change and thereby labour demand and employment (for a discussion of this topic see Nickell/Layard, 1999). Due to the complex nature of these effects, in the following we do not estimate a structural model but try to investigate the relationships between institutions and labour demand in a reduced form framework which is explained in the next section.

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 (for simplicity of notation we omit the country index). Under this assumption we get the following estimation equation:

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

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 β_1 and β_2 we choose alternatively two different statistical models: A first order random walk process (RW1) and a second order random walk process (RW2):

(6a) $(1-L)\,\beta_{i,t} = \nu_{i,t}$

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

with L as the lag operator. The model (equations (5) and (6)) is set in a state-space-form and is estimated for each country individually by maximum likelihood using the Kalman filter (for details on the Kalman filter see Harvey 1989). According to different test statistics (Akaike information criterion, Ljung-Box statistic for testing the white noise properties of the recursive residuals, Jarque-Bera statistic for testing the normal distribution of recursive residuals) the first order random walk model outperforms for most countries slightly the second order specification. The disadvantage is that in some cases the first order random walk model produces some erratic movements of the employment threshold. We check the robustness of our results by modelling the time varying parameters alternatively as a second order random walk. Second order random walks can accommodate complex time series properties of variables but produce a "smooth" development. Preliminary tests in both specifications showed that β_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, for each country β_2 is therefore modelled as a constant parameter. In contrast, β_1 varies both between countries and over time.

We estimate the model for each of 17 OECD countries individually (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 for both specifications in the private sector in the 17 countries for different sample periods. Independently of the random walk specification, the employment threshold declined during the sample period in most countries. The unweighted mean of the employment thresholds was 3.8 % (3.9 %) during the seventies, 2.4 % (2.4 %) during the eighties and 1.4 % (1.5 %) in the years after 1990 for the RW1 (RW2) specification of the employment threshold, respectively. 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 A1 in the Appendix contains the minima, maxima, means and the standard deviations of RW1 and RW2. Additionally to the overall standard deviations (OV) the table shows the standard deviations within countries (WI) and between countries (BE). The overall standard deviation for the RW2 is slightly smaller than that of the RW1, where the between standard deviations are the same for both specifications. The RW1 varies more about time as the higher within standard deviation reveals.

Table 1: Employment thresholds (RW1, RW2) in OECD countries

	Mean of RW1			
Country	**1980**	**1990**	**2002**	**1971-2002**
Aus	0.013	0.013	0.013	0.013
Bel	0.063	0.032	0.020	0.037
Can	0.012	0.012	0.012	0.012
Dnk	0.042	0.026	0.025	0.030
Fin	0.038	0.037	0.037	0.037
Fra	0.046	0.038	0.021	0.034
Ger	0.053	0.017	0.024	0.031
Ire	0.059	0.041	0.016	0.037
Ita	0.072	0.014	0.019	0.034
Jpn	0.039	0.022	0.033	0.032
Nld	0.037	0.036	0.014	0.028
Nzl	-0.013	0.015	-0.037	-0.013
Nor	0.061	0.027	0.028	0.038
Esp	0.050	0.032	0.008	0.029
Swe	0.031	0.021	0.022	0.024
Gbr	0.032	0.022	0.019	0.024
USA	0.012	0.007	0.014	0.011
Total	0.038	0.024	0.017	0.026

	Mean of RW2			
Country	**1980**	**1990**	**2002**	**1971-2002**
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
Gbr	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

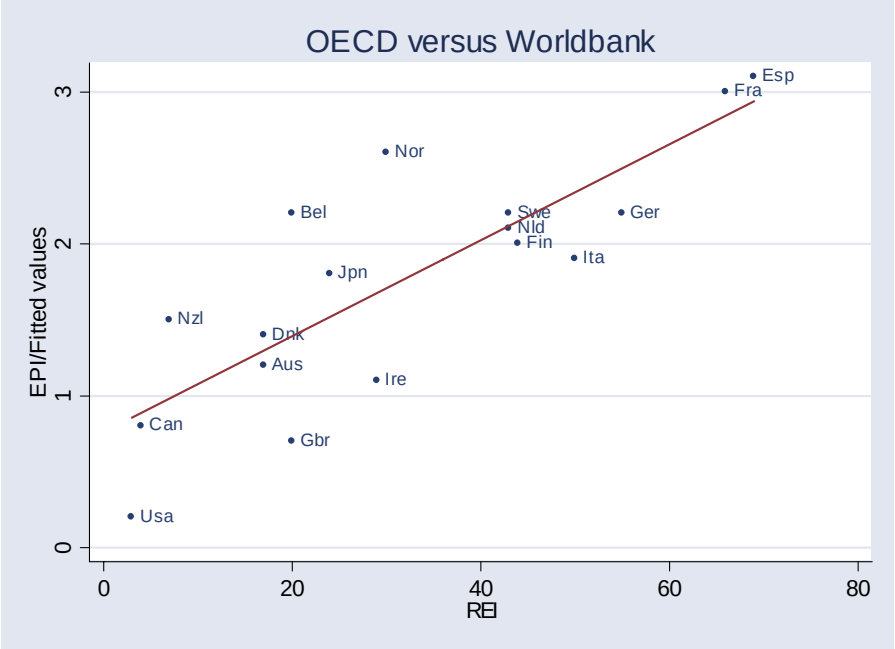
3.2 The effects of labour market institutions on the employment threshold

In the second step of our study we use the estimated employment thresholds for each year in the sample period 1971 to 2002 for each of the 17 OECD countries as an indicator for the labour intensity of production and study its relationship to labour market institutions. 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.

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) as a measure of the strictness of this system. 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.

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. The EP covers a set of different types of labour market institutions and obviously, the aggregate level can hide some internal movements which neutralise each other. Therefore, 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). 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 co-ordinated. COW is an index with range {0, 2} 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 A2 in the Appendix contains the minima, maxima, means and the standard deviations of these variables. Additionally to the overall standard deviations (OV) the table incorporates the standard deviations within countries (WI) and between countries (BE). In contrast to the estimated employment thresholds the within standard deviations for the variables of the labour market institutions are much smaller than the overall standard deviations, because the most part of variation in the labour market institutions is between countries.

Table 2 presents the OLS results for the estimation period 1971 to 2000 and the dependent variable RW1.[1] Explanatory variables are the employment protection index (EP), union density (UDNET), the tax wedge (TW) and the wage bargaining co-ordination index COW. The two models differ with respect to the modelling of time effects. Model 1 contains a linear time trend, model 2 includes in addition a squared time trend. In order to compare the fit of the models we report the values of the Adjusted R^2. Because the left hand side variable is a generated variable, we show additionally to

1 We must restrict our estimation period, because we can observe some of the explanatory variables only until 2000.

the normal also the robust standard errors, but this makes no difference. Simple tests prefer clearly the model 2 against model 1, but the results are very similar.[2]

Table 2: OLS Regression for RW1

	model 1			**model 2**		
	parameter	standard errror	standard error robust	Parameter	standard error	standard error robust
EP	.0085	.0023***	.0024***	.0099	.0023***	.0024***
UDNET	-.0045	.0051	.0046	-.0024	.0051	.0045
TW	.0183	.0094*	.0105*	.0170	.0092*	.0104
COW	.0048	.0019**	.0018**	.0039	.0019**	.0019**
Trend	-.0010	.0001***	.0001***	-.0026	.0004***	.0005***
Trend^2	----------	----------	----------	.0001	.0000***	.0000***
constant	.0218	.0040***	.0043***	.0296	.0044***	.0051***
Adj. R^2	0.26			0.29		

Significance levels: * 10%; ** 5%; *** 1%

In both 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 1 percentage point (Model 2). 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 1.4 %. The tax wedge TW increases the employment threshold, but the effect is only weakly significant. The degree of co-ordination COW has a positive 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 0.4 percentage points.[3] 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

2 In order to check the stability of the results, we have also included dummies for each year. This has no effects on the interpretation of the results in all estimations. Detailed results are not shown, but are available from the authors upon request.

3 We have also included COW squared in our estimations, but COW squared was always insignificant.. 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).

administrative governance of collective contracts may be more important for the coverage rates than union membership (OECD, 2004). As an indicator of collective bargaining coverage we could use the Collective Bargaining Coverage Index (CBC), which stems from the OECD (2004). We show no results with this index, because there are information on CBC only for the years 1980, 1990 and 2000. Therefore, we would have to neglect many observations of our data and crudely interpolate CBC for the remaining years in order to estimate the effect of CBC.[4]

There is some concern that the results are influenced by the method estimating the employment thresholds. Table 3 shows the OLS results with RW2 as the dependent variable. It makes no difference with respect to the interpretation of the results, whether we calculate normal or robust standard errors and whether we us a linear time trend, a squared time trend or time dummies. Comparing the estimates with that of table 2 we find on average very similar parameter estimates with a little bit smaller standard errors. In addition, the adjusted R^2 in table 3 are higher than in table 2. In our perspective these results are not surprising. The random walk of second order generates a smoother development of the employment thresholds than the random walk of first order. Therefore the standard deviation within countries is smaller for RW2 than for RW1, but the standard deviation between the countries doesn't chance.[5] Giving more weight to the between variation it is not surprising that the labour market institutions can better explain the RW2, because the variations of the labour market institutions within countries are also small (see table A2).

Table 3: OLS Regression for RW2

	model 1			**model 2**		
	parameter	standard error	standard error robust	parameter	standard error	standard error robust
EP	.0071	.0019***	.0019***	.0088	.0018***	.0018***
UDNET	-.0054	.0041	.0041	-.0027	.0040	.0040
TW	.0201	.0076***	.0091**	.0185	.0073**	.0089**
COW	.0051	.0015***	.0016***	.0040	.0015***	.0015***
Trend	-.0011	.0001***	.0001***	-.0031	.0003***	.0004***
Trend^2	----------	----------	----------	.0001	.0000***	.0000***
constant	.0237	.0032***	.0038***	.0337	.0034***	.0043***
Adj. R^2	0.37			0.42		

Significance levels: * 10%; ** 5%; *** 1%

4 If we neglect the seventies and linearly interpolate CBC for the remaining years, the indicator for collective bargaining coverage has no effect on the employment threshold in all specifications.

5 As the means of RW1 and RW2 are very similar, there is no problem comparing the standard deviations of the variables.

There are some reasons why our explaining variables may be endogenous. Labour market institutions can be thought of as instruments that correct for market failures, which make up for the absence of a complete set of contingent markets for risk sharing (Agell 2002, Greg/Manning 1997, Saint-Paul 1996)). This suggests that many of the labour market rigidities originally emerged as a defensive reaction to the threat of unemployment. This poses the following question: Are the labour market institutions also endogenous in respect to the employment thresholds? This seems to be less likely, because the employment thresholds are not directly observable and can be estimated only with a time lag. However, the endogeneity of the labour market institution cannot be excluded by theoretical arguments. In order to control the robustness of our results, we execute instrumental variable estimations. To avoid a possible estimation bias due to correlations of the labour market institutions with the contemporary error terms, we instrument all labour market institutions by their lagged and second lagged observations. Table 4 presents the results for RW1 and RW2 each with a quadratic trend and robust standard errors.

Table 4: IV-Estimation for RW1 and RW2

	RW1		**RW2**	
	parameter	standard error robust	parameter	standard error robust
EP	.0092	.0023***	.0086	.0017***
UDNET	.0002	.0042	-.0001	.0036
TW	.0106	.0099	.0125	.0081
COW	.0040	.0018**	.0038	.0015**
Trend	-.0025	.0005***	-.0031	.0004***
Trend^2	.0000	.0000***	.0001	.0000***
constant	.0318	.0050***	.0358	.0042***

Significance levels: * 10%; ** 5%; *** 1%

Comparing the results with their respective OLS estimates we find only minor differences. The coefficients of TW are now a little bit smaller and get insignificant. In both specifications test statistics support the validity of our estimations. The Hansen J statistics of overidentifying restrictions take the values 3.39 (RW2) and 5.80 (RW1) each with four degrees of freedom and so do not reject the validity of the instruments used. The C test[6], (Eichenbaum/Hansen/Singleton 1988) shows that

[6] The test is computed as the difference between two J statistics where the first is computed from the efficient estimation method using the full set of overidentifying restrictions (including the regressors as instruments) and the second is calculated from the inefficient but consistent regression using a smaller set of identifying restrictions (without the regressors as instruments). In our case OLS is the efficient model under the H_0 that the institutions are exogenous regressors and the IV estimation is the consistent but inefficient estimation method under H_0. The degrees of freedom for the J-tests are respectively eight and four.

the labour market institutions can be treated as exogenous.[7] Therefore, we prefer the OLS-estimates in tables 2 and 3 to the IV estimates in table 4.

Our IV estimations and the tests are only valid if there are no unobserved country effects which are correlated with the labour market institutions. To get a grip on this problem we can in principle estimate a fixed effects model. But as we have already seen, the labour market institutions vary not very much within countries. Together with potential measurement errors this could lead to more biased estimates for the fixed effects estimator than the simple OLS estimator (Hsiao 2003, Ch 10). Table 5 shows the results of the fixed effects estimations (with the within transformation.) The only labour market institution with a significant influence is now EP. To treat the measurement problem we can estimate a fixed effects model with instrumental variables. In our case it is not possible to estimate the fixed effects model with the within transformation, because there are no strictly exogenous instruments available. Assuming no autocorrelation in the measurement errors and using the first difference transformation we estimate the models with the second and third lag of al labour market institutions variables as instruments (Wooldridge 2002, Ch. 11). As with the comparison between OLS and IV estimations the fixed effects estimations and the unobserved component model with IV estimation differ only slightly.

Table 5: Fixed-effects Regression for RW1 and RW2

	RW1		**RW2**	
	parameter	Robust standard error	parameter	Robust standard error t
EP	.0203	.0056***	.0145	.0041***
UDNET	.0199	.0167	.0089	.0109
TW	.0138	.0282	.0198	.0151
COW	.0024	.0027	.0012	.0018
Trend	-.0028	.0005***	-.0032	.0003***
Trend^2	.0001	.0000***	.0001	.0000***
constant	.0131	.0121	.0264	.0082***

Significance levels: * 10%; ** 5%; *** 1%

In the fixed effects model, the only significant institutional factor for explaining the development of the employment threshold in the different countries over time is employment protection. However, as already mentioned, although using a fixed effects specification may solve the problem of a correlation between unobserved country individual effects and explaining variables, it may aggravate the problem of measurement errors (also by IV estimation if the measurement errors are autocorrelated) and ignores totally the information between countries.

[7] The C tests do not reject the null of the exogeneity of the labour market institutions with the p-values of 93% (RW2) and 97% (RW1).

Taking all estimation results together, the very robust result is that a more stringent employment protection reduces the labour intensity of production and may contribute to a higher unemployment rate. Although not in every specification significant, a higher tax wedge and a higher wage bargaining co-ordination are also factors that reduce labour demand and therefore increase the employment threshold.

4 Summary and Conclusions

Labour market institutions affect labour demand via many channels. They may have an effect on the level and the growth rate of real wages, they influence the pace and the bias of technical progress and they are a major determinant of the flexibility of firms in adapting to various shocks. Due to the very complex nature of the interrelationships among all these factors we don't estimate a structural model but – in analogy to the common practice in the literature – a reduced form with a special index of labour intensity of output growth as the dependent variable and various measures of labour market institutions as the explaining variables. The index for labour intensity used in this paper is the so-called employment threshold. The employment threshold is the growth rate of production that is necessary to keep employment constant. Theoretically, the employment threshold depends on various elasticities of the labour demand function and the growth rates of real factor prices and technical progress. A higher employment threshold reduces the probability that employment is increasing and thus raises the likelihood of a higher unemployment rate.

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 effect of employment protection is highly significant in all econometric specifications; the effects of a higher tax wedge and a higher extent of wage bargaining co-ordination are always positive, but in some specifications not significant. The likely 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: Descriptive statistics

	mean	min	max	std. dev. (OV)	std. dev. (BE)	std. dev. (WI)
RW1	.0258	-.0921	.1525	.0237	.0134	.0198
RW2	.0256	-.0923	.1167	.0217	.0134	.0174

Table A2: Descriptive statistics

	mean	min	max	std. dev. (OV)	std. dev. (BE)	std. dev. (WI)
EP	1.0568	.1	2	.5145	.5037	.1598
UDNET	.4314	.09	.9112	.2025	.1985	.0644
TW	.4999	.2431	.8314	.1248	.1233	.0467
COW	1.1011	0	2	.6234	.5287	.3536

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